

**TUNNEY'S PASTURE
HEATING COMPLEX
CONCRETE BUNKER
OIL STORAGE TANK
INVESTIGATION**

8752

JOB NO. 93-9341

AUGUST 1994

PREPARED BY:

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Job: 93-9341

August 15, 1994

Realties Services National
Capital Region
Public Works Canada
Place du Portage, Phase IV
140 Promenade du Portage
Hull, Quebec K1A 0M3

Attention: Mr. Brian Cyr

Re: **Tunney's Pasture Heating Complex
Concrete Bunker Oil Storage Tank Investigation**

Dear Mr. Cyr:

Introduction

Public Works Canada operates the Tunney's Pasture Heating Plant, which supplies heat and cooling to a number of federal government buildings within the Tunney's Pasture complex. The primary fuel source for the complex is natural gas. The supply to the complex is interruptible to allow the utility to meet peak demand periods. Bunker C fuel oil provides the back-up power source during periods of interruption.

The bunker fuel is stored on site in two 40,000 Imperial gallon reinforced concrete storage tanks located beneath the paved area at the northeast corner of the building. On the basis of drawings supplied by Public Works Canada, the estimated age of these tanks is approximately twenty-seven years.

In the spring of 1994, Public Works Canada commissioned Oliver, Mangione, McCalla & Associates Limited to conduct an inspection of the westernmost 40,000 gallon tank, and provide recommendations for its further use and, if necessary, upgrading. The work involved draining and cleaning the tank interior followed by a visual inspection of the tank's surfaces. A report describing this investigation, submitted to Public Works Canada in June 1994, identified shrinkage cracks at a number of locations on the exterior walls of the tank. The observed leakage of fuel along similar cracks in the mutual wall

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of the adjacent 40,000 gallon tank suggested a strong potential for leakage of hydrocarbons to the subsurface environment. The report recommended a subsurface investigation be conducted to determine if contamination existed outside the tank walls.

The following report describes the results of the subsurface investigation, which was conducted in two phases. The first phase consisted of the construction of three boreholes (BH 1, 2 and 3) in the backfill material immediately adjacent to the tank. When contamination was identified in this area, a second phase of investigation was conducted to define the extent of contaminant within the tank nest and extent of migration outward from the area of the tank installation. An additional fourteen boreholes were constructed during the later phase.

Procedure

The investigation procedure involved the construction of fourteen (14) boreholes and two (2) test pits at locations shown on the attached plan, Figure 1.

Nine (9) of these boreholes were drilled in the backfill material surrounding the two concrete tanks. Out of these boreholes BH 1, 2, 3, 4, 6, and 8 were equipped with 50 mm P.V.C. monitoring wells. The remaining five boreholes were constructed outside of the concrete tank area. These include two (2) bedrock monitoring wells constructed during a subsequent geotechnical investigation, north of the asphalt surface (94-2, 94-3).

The test pits were located beside the pipe chase/tank wall at BH4 (monitoring well destroyed) and between BH2 and BH3 towards the existing utilities' trench, northwest of the tanks (see drawing Figure 1).

During the construction of the boreholes, representative samples of soil and rock were collected and retained. The samples were inspected for visual and olfactory evidence of contamination and quantitatively screened for the presence of volatile organic compounds with a photoionization detector using the standard jar headspace technique (Environment Canada). The soil sample with



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the highest total organic vapour measurement was submitted to Parcel Laboratories Limited of Ottawa for analysis. Boreholes constructed outside the area of the tank excavation (BH9, 11, 12, 94-2, 94-3) encountered bedrock at depths of 1 metre or less, i.e., above the general elevation of contamination in the tank pit. Soil samples from these boreholes were not submitted.

Detailed descriptions of borehole lithology, organic vapour measurements, and sample location are included on the attached borehole logs.

Monitoring wells were installed at eight (8) locations. The wells generally consist of 3 metre lengths of 50 mm ID PVC well screen, installed within a clean silica sand gravel pack with an annular bentonite seal to prevent the vertical infiltration of surface water. The wells for the most part are located within the paved area and are equipped with flush-mount well covers. Details of monitoring well construction are provided on the attached borehole logs.

Prior to the collection of water samples, each monitoring well was purged of a minimum three (3) standing well volumes. Samples were collected using standard Oliver, Mangione, McCalla & Associates Limited QA/QC protocol and delivered to Paracel Laboratories within 24 hours of collection. Analysis for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylenes (BTEX) were obtained.

To assess groundwater flow in the immediate vicinity, a topographic survey was completed to tie in all monitoring locations. Measurements of groundwater static elevation were obtained.

The potential for migration of contaminants into adjacent building drainage systems was investigated. Samples from the sumps of the adjacent Heating Plant and Standard Building were collected and submitted for analysis of TPH and BTEX.

Under advisement from Public Works staff, analysis of select soil and groundwater samples for polychlorinated biphenyls (PCB) was undertaken. In addition, a PCB analysis of one oil sample was undertaken.



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Remediation Criteria

The Ministry of Environment and Energy has prepared "Interim Guidelines for the Assessment and Management of Petroleum Contaminated Sites in Ontario" (August 1993). This guideline provide criteria for remediation based on site sensitivity considering such factors as land use, proximity to basements, soil type, groundwater depth, location of wells, etc. These guidelines, however, do not address the remediation criteria for groundwater contamination. As a result, the Alberta Ministry of Environment's M.U.S.T. Guidelines were used to quantify the maximum allowable BTEX and TPH concentrations in groundwater for this site.

A Level I rating is assigned to the most sensitive sites such as those in proximity to residential dwellings with basements and areas where water supply wells can potentially be impacted or in areas where permeable soils and high seasonal water tables. Moderately sensitive sites require remediation to Level II criteria whereas low sensitivity sites (eg. heavy industrial lands) require remediation to Level III.

Using the decision tree provided in the Ministry of Environment and Energy Guideline and considering the presence of basements in adjacent buildings, a groundwater table fluctuating within the zone of contaminant, the presence of sumps in adjacent buildings, and utility service trenches immediately adjacent to the tank area, it is our opinion that the site requires remediation to meet the Level II criteria of the Ontario Guidelines for Soil and to the Level I criteria for Alberta M.U.S.T. Guidelines for Groundwater.

Contaminant Assessment - Soil

Nine of the fourteen boreholes are constructed in the sand backfill immediately adjacent the tank. Boreholes on the north, west, and south sides all showed strong evidence of contamination. During the drilling procedure, small amounts of free product were observed in boreholes 1, 2 and 4. The contamination for the most part was located at depths of 3 to 4 metres, 1 to 1½ metres above bedrock. Borehole 6 and 8 located



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at the south and north corners, respectively, showed no visual or olfactory evidence of contamination.

On the basis of field screening techniques, the sample showing the highest potential for contamination from each borehole was submitted for analysis. The results are summarized in Table 1, attached. In accordance with the field observations, hydrocarbon contamination was encountered at all locations except the north and southeast corners. Contaminant concentrations at all but one of these locations (BH3) was found to exceed the Ministry of Environment and Energy Level II criteria and all but two samples exceeded the most lenient Level III criteria.

On the basis of the above, it is concluded that the backfill material adjacent the concrete tank is contaminated in excess of provincial guidelines and will require remediation.

The tank nest was constructed in a bedrock excavation which appears to have contained the hydrocarbon. Boreholes constructed outside the tank area encountered bedrock at depth of 1 metre or less. In general, there was no evidence of contamination in the overburden at these locations. The test pit constructed between the northwest corner of the tank and the north-south oriented service trench showed no evidence of contamination. Boreholes 94-2 and 94-3 were cored into bedrock to depth of 7.5 metres, respectively, approximately 3 metres below the base of the tank excavation. There is evidence of contamination in these boreholes.

In summary the borehole investigation has determined that the soil contamination is limited to the bedrock excavation in a region of between 0.6 and 1.0 metres from the outside wall of the tanks.

Analysis for PCB contamination of the soil in boreholes 1, 2 and 3 indicate levels below detectable limits.

The contaminated soil coincides with the saturated zone approximately 3.5 metres below the surface depending on seasonal water level changes. The highest levels of contamination are on the west and north side of the tank.



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Contaminant Assessment - Groundwater

Groundwater static elevations are presented in Table 3. Included in this data are records for monitoring wells installed by McRostie, Genest, St-Louis & Associates Limited. In general terms, the local groundwater flow direction is to the north, however, due to the presence of a utility trench near the boreholes continuing water level monitoring will be required.

The results of groundwater analysis were compared with the Ontario Drinking Water Objectives for benzene, ethylbenzene, toluene and xylene (BTEX) and Alberta MUST Level I criteria for TPH. In samples collected within the tank nest area (BH 1, 2 3, 4, 6 and 8) the TPH levels exceed the criteria. Samples from wells along the west wall of the tank also exceeds the criteria for ethylbenzene (BH 1, 2, 3) and benzene (BH 1)

Groundwater contamination appears to be limited to the area of the tank nest. There were no detectable levels of groundwater contamination measured in the samples collected from the sumps in adjacent buildings, similarly there were no contaminants detected in down gradient monitors. A trace level of TPH was detected in monitor 94-2.

Conclusions

A subsurface investigation was conducted in the vicinity of the existing underground reinforced concrete bunker fuel storage tank at Tunney's Pasture Heating Complex. On the basis of conditions encountered, the following conclusions are presented.

1. The existing concrete bunker oil fuel tank is leaking into the backfill and groundwater regime.
2. The measured levels of contamination in the soil backfill material immediately adjacent the tank exceed applicable provincial guidelines and will, therefore, require remediation.
3. The contaminated soil area appears to be confined to the



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vicinity immediately adjacent to the tanks. There was no evidence of soil contamination in boreholes constructed outside the tank nest area.

4. Groundwater contamination in excess of applicable criteria was detected within the nest area and will require remediation.
5. Groundwater contamination appears to be limited to the tank nest. No groundwater contamination was discovered in the adjacent building sumps or in 94-3. A trace level of TPH was measured in the down gradient monitor 94-2.
6. The highest levels of contamination are on the west side and south side of the tank.
7. The approximate groundwater flow direction is to the north.

Recommendations

The results of the above described investigation have confirmed that the two 40,000 Imperial gallon, reinforced concrete bunker fuel storage tank supplying the Tunney's Pasture Heating Complex are leaking. Public Works Canada on consultation with Oliver, Mangione, McCalla & Associates Limited have considered the various options for rehabilitating or replacing the existing storage facility.

It has been decided to proceed with the design and construction of a new storage facility to be located on vacant land to the north. The current time line calls for the construction and commissioning of the new facility by November of 1994. It is proposed that the existing storage facility remain in place and in operation until that time. Public Works Canada advises that there are approximately 20,000 Imperial gallons of oil remaining in the easternmost tank and that this should be sufficient for their needs provided that there are no long-term gas supply interruptions.

In consideration of the above description time table, it is



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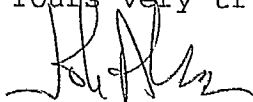
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recommended that the existing tank facility remain in operation until the new facility is commissioned. In our opinion, the two to three month delay should not greatly increase the environmental and economic implications associated with the leaking tank facility. The zone of soil and groundwater contamination appears to be limited to the tank nest, in the area where bedrock has been excavated. Investigations to date have not identified significant contamination outside of this zone.

Following the commissioning of the new tank facility, it is recommended that the existing facility be decommissioned. Residual oil and sludge from the eastern tank should be removed for disposal by a licensed contractor. The reinforced and adjacent contaminated soil should similarly be removed for disposal by a licensed contractor. The excavation should be backfilled and compacted with imported material in anticipation of reinstatement to a paved driveway.

In the interim period prior to final decommissioning, it is recommended that a monitoring program be undertaken to verify previous conclusions regarding the limit of impact. Monitoring wells BH 1, BH 3, BH 8, 94-2, 94-3 and the two building sumps should be sampled on a bi-monthly basis with analysis for TPH completed.

Yours very truly



John A. McKee, M.Sc., P.Eng.
Director of Hydrogeology

OLIVER, MANGIONE, McCALLA & ASSOCIATES LIMITED

C.C. Miss Suzie Lemire, Env. Service Group, Public Works Canada

JHM:st



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PUBLIC WORKS CANADA
TUNNEY'S PASTURE CENTRAL HEATING PLANT
SOIL PETROCHEMICAL ANALYSIS
JUNE 1994

TABLE 1

LOCATION	TOTAL PETROLEUM HYDROCARBON $\mu\text{g/g}$	OIL AND GREASE $\mu\text{g/g}$	PCB mg/kg
BH1 (3.3-4.0 m)	14,000		<1.0
BH2 (3.3-4.0 m)	6,300		<1.0
BH3 (3.3-4.0 m)	640		<0.1
BH4 (3.0-3.6 m)	<20	<500	
BH4 (3.6-4.2 m)	6,100	9,000	
BH5 (3.0-3.6 m)	1,800	1,500	
BH6 (1.2-1.8 m)	<20	<500	
BH7 (3.0-3.6 m)	4,400	2,800	
BH8 (2.4-3.0 m)	<20	<500	

Exceeds Ministry of Environment and Energy Level II
Criteria



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PUBLIC WORKS CANADA
 TUNNEY'S PASTURE CENTRAL HEATING PLANT
 GROUNDWATER PETROCHEMICAL ANALYSIS
 JUNE 1994

TABLE 2

LOCATION	TOTAL PETROLEUM HYDROCARBON mg/L	BENZENE µg/L	ETHYLBENZENE µg/L	TOLUENE	XYLENE	PCB mg/kg
BH1	110	6.2	7.0	2.5		
BH2	630	2.8	4.7	4.2	17.8	
BH3	100	2.0	2.8	1.3	2.0	
BH4	88	<0.5	<0.5	<1.0	<1.5	2.8
BH6	0.2	<0.5	<0.5	<1.0	<1.5	
BH8	1.6	<0.5	<0.5	<1.0	<1.5	
Sump 1 Heat Plant	<0.2	<0.5	<0.5	<1.0	<1.5	
Sump 2 Adjacent Building	<0.2	<0.5	<0.5	<1.0	<1.5	
94-2	0.2	<0.5	<0.5	<1.0	<1.5	
94-2 (retest)	0.2					
94-3	<0.2	<0.5	<0.5	<1.0	<1.5	
94-3 (retest)	<0.2					



Exceeds Ministry of Environment and Energy Ontario Drinking Water Objectives
 Criteria for BTEX

Exceeds Alberta MUST Level I TPH



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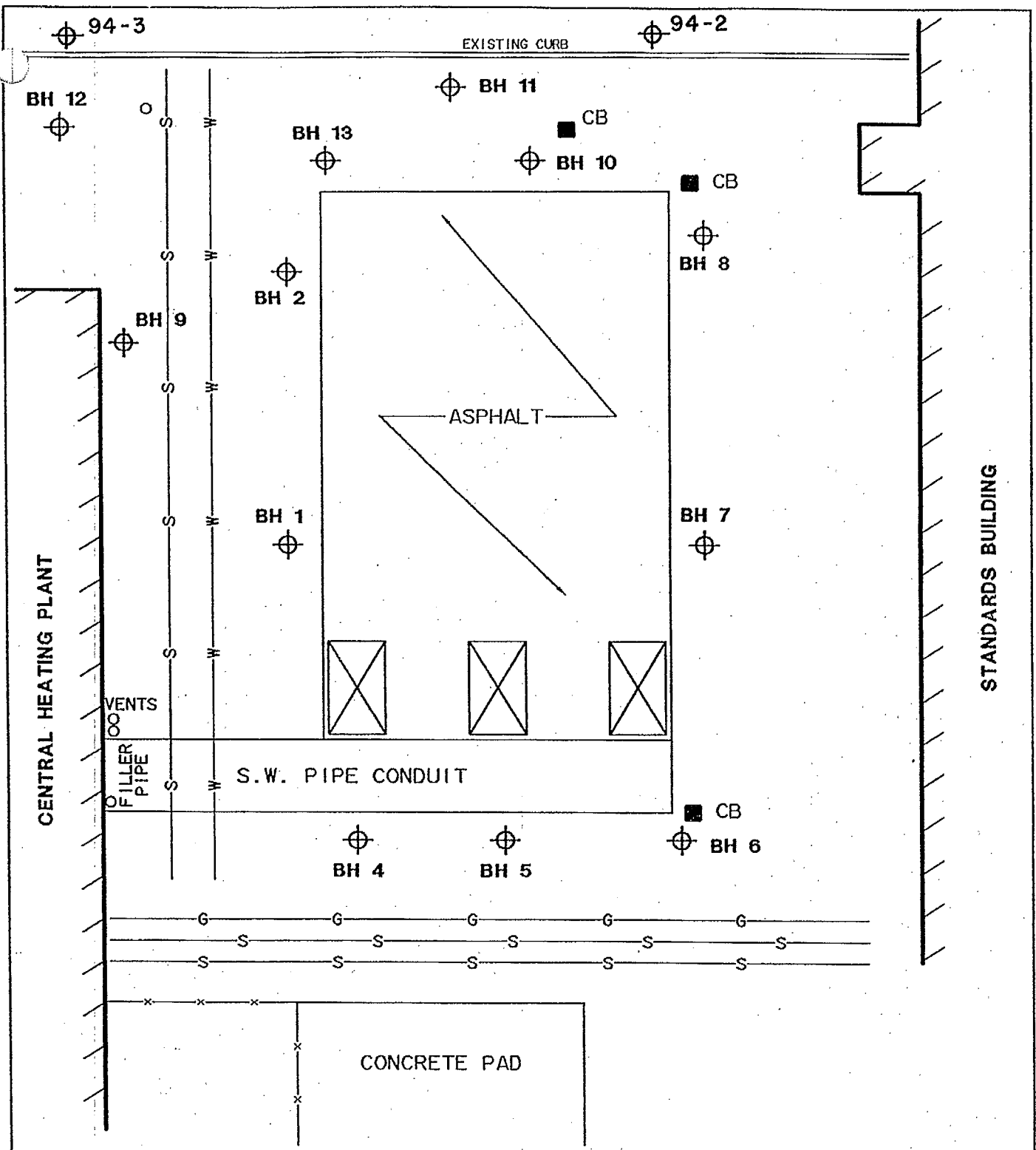
August 15, 1994

PUBLIC WORKS CANADA
TUNNEY'S PASTURE CENTRAL HEATING PLANT
GROUNDWATER MEASUREMENTS
JUNE 1994

TABLE 3

LOCATION	ELEVATION OF MEASUREMENT POINT (m)	WATER LEVEL (m)	WATER LEVEL ELEVATION (m)
BH1	99.39	3.52	95.87
BH2	99.39	3.52	95.87
BH3	99.32	3.45	95.87
BH4	99.58	DESTROY	
BH6	99.21	3.34	95.87
BH8	99.10	3.23	95.87
94-1	99.27	3.08	96.19
94-2	99.36	3.75	95.61
94-3	99.60	3.86	95.74





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Napier, Ontario

- G ——— GAS
- S ——— SEWER
- W ——— WATER
- ⊕ BH 5 — BOREHOLE

SCALE:

JUNE, 1994

CLIENT:

**CENTRAL HEATING PLANT INVESTIGATION
TUNNEYS' PASTURE**

DATE:

N.T.S.

TITLE:

PUBLIC WORKS CANADA

DRAWING NO.

94-9341-1



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PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. BH 1
DATE JUNE 22, 1994

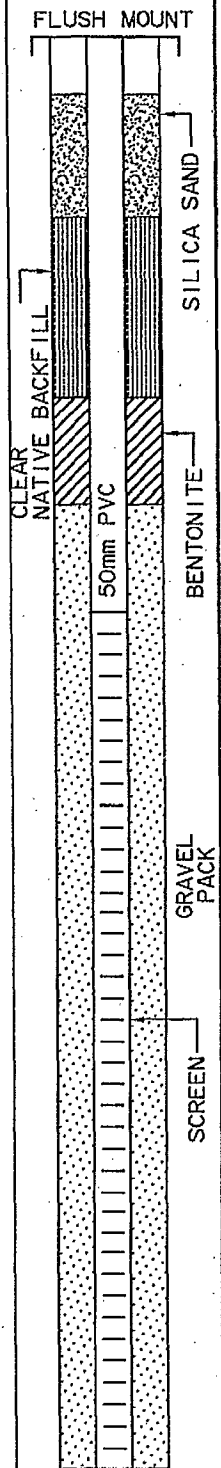
DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE	WATER LEVEL	SOIL DESCRIPTION	LITH- OLOGY	OBSERVATION
0					ASPHALT GRANULAR SUB-BASE		FLUSH MOUNT
20							BENTONITE
1		22			BROWN FINE TO MEDIUM SAND, SOME SILT -NO STAIN, NO ODOUR -DRY		SILICA SAND
2		17.4					BENTONITE
17							50mm PVC
2		17.4					BENTONITE
3		42			BLACK FINE TO MEDIUM SAND WITH SOME SILT -STAINED, STRONG ODOUR -DRY		GRAVEL PACK
4		180	*	▽	BROWN FINE TO MEDIUM SAND WITH SOME SILT-SHELLS OBSERVED - ODOUR -DRY		SCREEN
4					BLACK FINE TO MEDIUM SAND WITH SOME SILT-SHELLS OBSERVED -STAINED, STRONG ODOUR -DRY		
4		75			GREY FINE TO MEDIUM SAND SHEEN ON WATER. -ODOUR -WET		
5					REFUSAL		



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PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. BH 2
DATE JUNE 22, 1994

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE WATER LEVEL	SOIL DESCRIPTION	LITHOLOGY	OBSERVATION
0				ASPHALT GRANULAR SUB-BASE		FLUSH MOUNT
20						
1				BROWN FINE TO MEDIUM SAND, SOME SILT -ODD GRAVEL -NO STAIN, NO ODOUR		SILICA SAND
24						
24						BENTONITE
2						
30						
3						
26						GRAVEL PACK
4		100 38	*	BLACK TO GREY FINE TO MEDIUM SAND SOME SILT, SHELLS, ODOUR MOIST		SCREEN
5				REFUSAL		





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PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. BH 3
DATE JUNE 22, 1994

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE WATER LEVEL	SOIL DESCRIPTION	LITH- OLOGY	OBSERVATION
0				ASPHALT GRANULAR SUB-BASE		FLUSH MOUNT
1		18		BROWN FINE TO MEDIUM SAND, SOME SILT -NO STAINS, NO ODOUR -SOME SHELLS -DRY		SILICA SAND BENTONITE
2		16				CLEAR NATIVE BACKFILL
3		15				50mm PVC
3		3		GRAVEL OR BOULDER		GRAVEL PACK
3		20				SCREEN
4		160	*	BLACK FINE TO MEDIUM SAND WITH -STAINED, ODOUR, DRY BROWN TO GREY FINE TO MEDIUM SAND WITH SOME SILT-ODOUR, DRY		
4		90		BLACK FINE TO MEDIUM SAND WITH SOME SILT -ODOUR -WET		
5				REFUSAL		



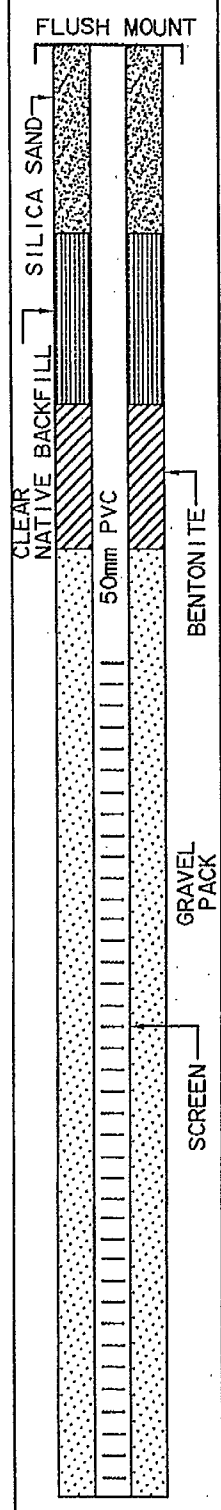
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PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. BH 4
DATE JUNE 23, 1994

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE	WATER LEVEL	SOIL DESCRIPTION	LITH- OLOGY	OBSERVATION
0					ASPHALT		FLUSH MOUNT
					GRANULAR SUB-BASE - 75mm MINUS		
		17					
		15					
		14.2			BROWN FINE TO MEDIUM SAND, SOME SILT SOME STONES AND GRAVEL -SOME SHELLS -NO STAIN OR ODOUR		
		14.2					
		14					
		198					
4			*		BLACK FINE TO MEDIUM SAND WITH SOME SILT -SLIGHT PETROLEUM ODOUR -WET		
5					REFUSAL		





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PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. BH 5
DATE JUNE 23, 1994

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE	WATER LEVEL	SOIL DESCRIPTION	LITH- OLOGY	OBSERVATION
0					ASPHALT		
					GRANULAR SUB-BASE		
1		20					
		18			BROWN FINE TO MEDIUM SAND, SOME SILT -NO STAINS, NO ODOUR -SOME SHELLS -SOME STONES AND GRAVEL		
2		17.7					
		15			GRAVEL HORIZON		
3		50	*				
4		120			BLACK FINE TO MEDIUM SAND WITH SOME SILT -SHELLS -STAINED -SLIGHT PETROLEUM ODOUR		
5							



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PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. BH 6
DATE JUNE 23, 1994

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE	WATER LEVEL	SOIL DESCRIPTION	LITH- OLOGY	OBSERVATION
0					ASPHALT		FLUSH MOUNT
					GRANULAR SUB-BASE		SILICA SAND
20							
1			*				
20							
2					BROWN FINE TO MEDIUM SAND, SOME SILT -ODD GRAVEL -NO STAIN , NO ODOUR -SHELLS -WET AT 4.3m -SEPTIC ODOUR BENEATH WATER -WOOD FOUND ON AUGER HEAD		CLEAR NATIVE BACKFILL
17							50mm PVC
11.8							BENTONITE
3							GRAVEL PACK
12							
4							
5					REFUSAL		SCREEN



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PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. BH 7
DATE JUNE 23, 1994

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE	WATER LEVEL	SOIL DESCRIPTION	LITH- OLOGY	OBSERVATION
0					ASPHALT		
					GRANULAR SUB-BASE		
		20					
1		13			BROWN FINE TO MEDIUM SAND, SOME SILT -NO STAIN , NO ODOUR		
		14					
2		20					
					GRAVEL HORIZON		
		20					
3							
		20	*		GREY FINE TO MEDIUM SAND SOME SILT, SLIGHT ODOUR		
		60			BLACK FINE TO MEDIUM SAND SOME SILT, STRONG ODOUR		
4							
		60			GREY MEDIUM TO COARSE SAND SLIGHT PETROLEUM ODOUR		
5					REFUSAL		



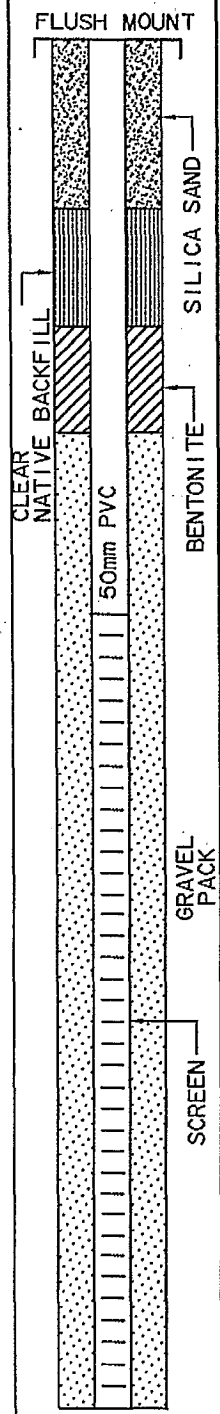
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Nepean, Ontario

PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. BH 8
DATE JUNE 23, 1994

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE WATER LEVEL	SOIL DESCRIPTION	LITH- OLOGY	OBSERVATION
0				ASPHALT		FLUSH MOUNT
				GRANULAR SUB-BASE		
20				GRAVEL HORIZON		SILICA SAND
18				BROWN FINE TO MEDIUM SAND, SOME SILT -ODD GRAVEL, STONES -NO STAIN, NO ODOUR		BENTONITE
16						50mm PVC
20			*			GRAVEL PACK
11						SCREEN
5				REFUSAL		





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Nepean, Ontario

PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. BH 9
DATE JUNE 23, 1994

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE	WATER LEVEL	SOIL DESCRIPTION	LITH- OLOGY	OBSERVATION
0					ASPHALT		
		13			GRAVEL		
1					REFUSAL		
2							
3							
4							
5							



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Nepean, Ontario

PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. BH 10
DATE JUNE 24, 1994

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE	WATER LEVEL	SOIL DESCRIPTION	LITH- OLOGY	OBSERVATION
0					ASPHALT		
					GRANULAR SUB-BASE		
1		200			BROWN FINE TO MEDIUM SAND, SOME SILT -ODD GRAVEL, SHELLS -NO STAIN , NO ODOUR		
		100					
2		100			PRODUCT		
		50					
3							
		100			GREY TO BLACK FINE TO MEDIUM SAND -SOME SILT -MODERATE ODOUR		
4							
					BOTTOM OF BOREHOLE		
5							

OLIVER, MANGIONE, McCALLA & ASSOCIATES LIMITED

CONSULTING ENGINEERS, HYDROGEOLOGISTS & PLANNERS

APPENDIX "A"



Job: 93-9341

June 21, 1994

Realties Services National Capital Region
Public Works Canada
Place Portage Phase IV
140 Promenade du Portage
Hull, Quebec K1A 0M3

Attention: Mr. Brian Cyr

Re: Tunney's Pasture Heating Complex
Concrete Bunker Oil Storage Tank Inspection

Gentlemen:

On June 4, 1994, the writer conducted a visual inspection of the inside surfaces of the reinforced concrete bunker fuel tank at the Central Heating Complex.

The bunker oil storage facility acts as a reserve supply to the Central Heating Complex gas-fired installations. The bunker C reserves are contained in a twin chamber buried concrete tank, which comprises two 40,000 gallon compartments which share a common concrete divider wall. At the time of our inspection, one of the chambers had been completely emptied of its bunker fuel oil and had its inside surfaces cleaned with a diesel fuel application. The other chamber was almost completely full of bunker C fuel oil. We were assisted in the inspections by representatives of Drain-All Limited, who coordinated the clean-up operations.

The purpose of this preliminary report was to assess the structural integrity of visible portions of the tank and to make recommendations concerning the viability of continued use vis-a-vis Code compliance alternatives and overall safety and accessibility. Our observations and comments are as follows.

1. The inside surfaces of the reinforced concrete tank exhibit hairline cracking, which is confined primarily to the two long sides. The hairline cracks are, in general, oriented in a vertical direction and are typical of shrinkage effects in concrete. These cracks would have formed shortly after

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the tank concrete was placed, during the curing and drying period. We have generated sketch plan elevations, which document these various crack locations. These plans are enclosed for your reference. Shrinkage cracking is an inherent feature in unreinforced and reinforced concrete and does not affect the overall structural capacity and integrity of the concrete section.

2. We noted seepage of oil through the hairline cracks in the intermediate dividing wall between the two tanks. Although the flow rate through these cracks is very small, it is conceivable that a similar scenario has been taking place through the hairline cracks in the opposite long wall, and into the granular backfill material exterior to the tank. Based on this observation, our office provided a verbal recommendation that two or three boreholes be sunk outside the tank wall in close proximity to these crack locations to confirm if long-term seepage has been taking place.
3. Because the buried tank installation is on federal lands, the Province of Ontario regulations governing the installation and use of buried tank facilities do not apply. These regulations only accept Underwriters Laboratories of Canada (ULC) approved tanks. The latest provincial regulation lists only double wall steel and fibreglass constructed tanks as ULC approved.

The only available guidelines that fall under the auspice of the federal government are contained in a 1989 publication titled, "Environmental Code of Practice". This publication was issued by the National Task Force on Leaking Storage Tanks, for the Canadian Council of Resource and Environment Ministers. Unfortunately, no reference is made in these guidelines to underground reinforced concrete storage tanks for petroleum products.

4. In spite of the fact that the one tank that we have viewed is in a structurally satisfactory condition, and that there are no federal guidelines pertaining to the use and application of buried reinforced concrete storage tanks for

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petroleum products, we have the following comments concerning the continued use of this facility.

1. At the very least, we recommend that a liner system be installed into the existing tanks. We discussed this issue with Mr. Ron Nobes of Environment Canada, who indicated to us that a liner system had been proposed for the Clark Street buried tank facility. To date, no liner has been installed.
2. A monitoring system must be in place if the tanks are to be kept in use. This monitoring system must be in place in conjunction with the tank liner of Item 1, above. Ideally, the monitoring system would consist of an interstitial monitor between the new tank liner and the concrete inner wall of the original tank installation. The monitor would detect the presence of petroleum products in the interface.
3. The current access requirements should be improved upon if the tank is to be kept in use. As discussed with you previously, part of our scope of services will be to improve upon this existing condition. The existing manhole cover essentially had to be cut away to enable access to the tank. Any proposed access system would require periodic use to prevent deterioration from lack of routine operation.
4. An alternative to Item 1, above, would be the installation of steel tanks within the existing concrete chambers. We will examine the requirements for this this of installation and report to you shortly.

As soon as the results of the borehole investigation are available, we will convey them to you. Should there be no evidence of seepage into the backfill material around the tank installation, we would still insist upon the recommendations 1 to 3, above. In the interim, we will continue our discussions with

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Environment Canada, and our own research, into the suitability of a tank liner for this installation.

Should you have any questions on the contents of this preliminary report, please contact the undersigned.

Yours very truly

Allan D. Murray, P.Eng.
OLIVER, MANGIONE, McCALLA & ASSOCIATES LIMITED

ADM:st

OLIVER, MANGIONE, McCALLA & ASSOCIATES LIMITED

CONSULTING ENGINEERS, HYDROGEOLOGISTS & PLANNERS

APPENDIX "B"



ENVIRONMENTAL ASSESSMENT SCREENING I REPORT FORM

(This form must be accompanied by an Environmental Assessment Registration Form)

PROJECT IDENTIFICATION/TITLE HEATING PLANT TUNNEY'S PASTURE	PROJECT No.	NCC CONTACT & TEL:
SUMMARY OF SCREENING I RESULTS		
1. FEATURES/RESOURCES	Present (yes/no/don't know)	Potential for Adverse Effects (yes, no, don't know) (identify positive and negative effects)
Heritage/historical	NO	
Archaeological	NO	
Rare or unique animal species (incl. insects)	NO	
Rare or unique plants	NO	
Unique or special habitat (nesting/breeding/staging/ feeding area)	NO	
Special use area for fauna	NO	
Marsh/swamp/peat bog	NO	
Water course/water body	NO	
High water table	NO	
Drinking water spring	NO	
Special micro-climatic conditions	NO	
Sensitive/unstable soil conditions	NO	
Unstable slope or >10%	NO	
Unique geological formation	NO	
Rare minerals	NO	
Lookout/scenic view	NO	
Local transportation network	NO	
Local community structure	NO	
Recreational facility/feature	NO	
Utility corridor/facility	NO	
Community/local lifestyle	NO	
Local economic activity	NO	
Agricultural land	NO	
Parkland/greenspace	NO	
Storage of hazardous products	NO	

ENVIRONMENTAL ASSESSMENT SCREENING I. REPORT FORM

(This form must be accompanied by an Environmental Assessment Registration Form)

SUMMARY OF SCREENING I RESULTS (cont'd)	
2. ACTIVITIES/AND OR EFFECTS	yes/no/don't know
Contravention of federal/provincial environmental policy/legislation/guidelines	NO
Contravention of local/regional plans/objectives or bylaws	NO
Change in land resource capabilities	NO
Noise, odour, or dust	DON ' T KNOW
Erosion (especially bank erosion)	NO
Air/water/soil contamination*	NO
Traffic disturbance	YES
Visual obstruction/obstruction of view	NO
Off-road vehicle use (or other transportation e.g. horse)	NO
Increase/decrease in visitor use or traffic	YES
Transportation/use of toxic or hazardous materials	YES
Introduction or elimination of species	NO
Site clearing/clear-cutting	NO
Major landscaping operations (revegetation/berming etc)	NO
Building construction/demolition; digging/filling; drilling/dynamiting	YES
Public concern	NO
Cumulative effects**	NO
Any other adverse effects other than those described above.	NO

* Especially by discharge of hazardous substances, or change in water temperature, turbidity or velocity.

** By the combined effects of this project or by other projects planned as a result of this one.