



**OLIVER, MANGIONE, McCALLA
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HYDROGEOLOGISTS & PLANNERS**

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Job: 93-9341

February 9, 1995

Ms. Suzie Lemyre
Environment Services Group
Public Works Canada
Government Services Canada
Place du Portage, Phase IV
140 Promenade du Portage
Hull, Quebec
K1A 0M3

**Re: Site Remediation Activities
Tunney's Pasture, Central Heating Plant**

Dear Ms. Lemyre:

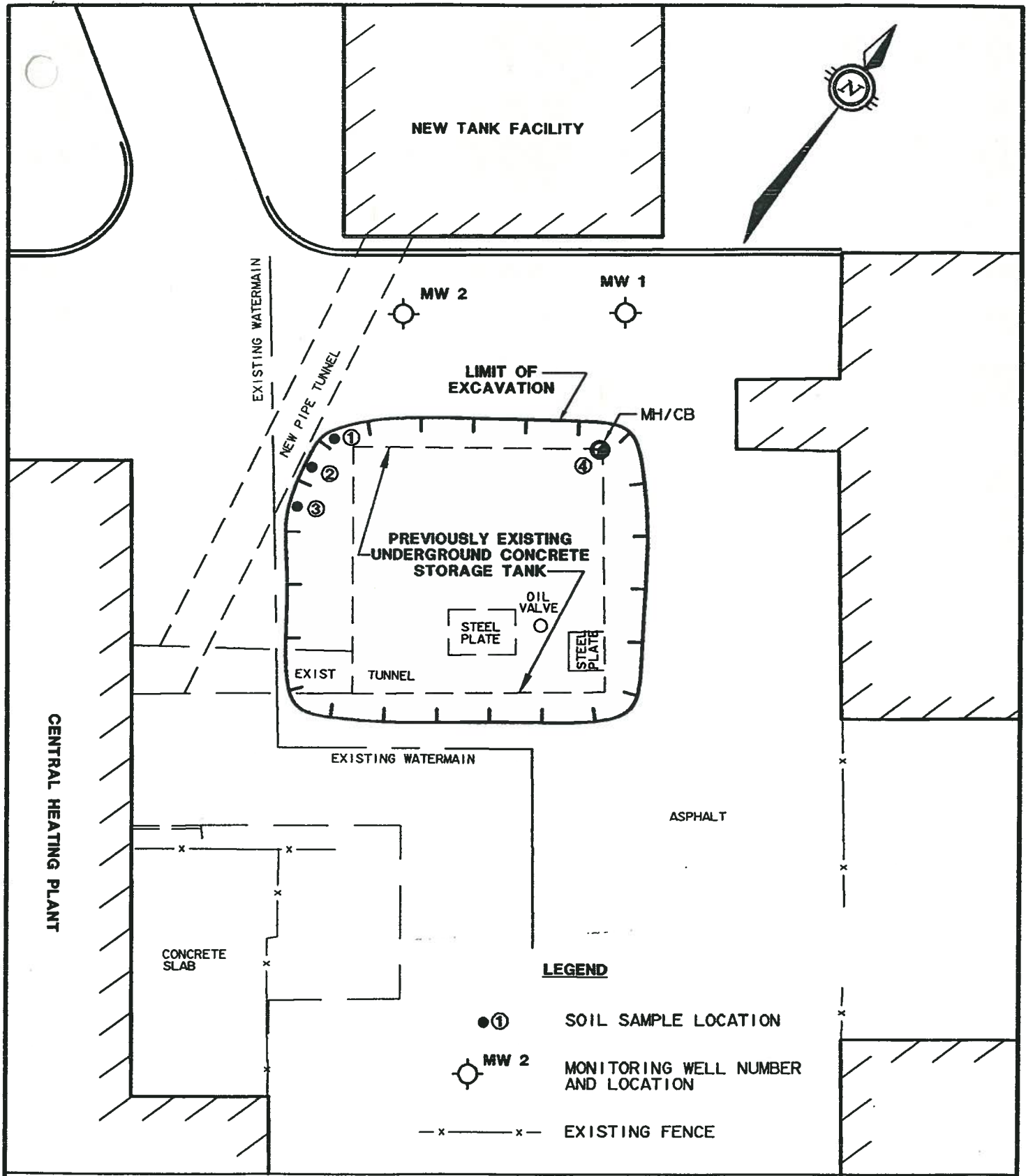
The following letter report will briefly summarize the remediation activities which were conducted at the above mentioned location in the fall of 1994. This letter will also make recommendations regarding future monitoring requirements.

1. BACKGROUND INFORMATION

The Central Heating Plant at Tunney's Pasture is operated by Public Works Canada. This plant provides heating and cooling for a large number of federal buildings throughout the Tunney's Pasture complex. The major source of fuel for the plant is natural gas. In times of peak demand, the flow of gas may be interrupted by Consumers Gas. During times of gas interruption, the plant operates on Bunker C fuel which was formerly stored in two 181,600 litre reinforced concrete, underground storage tanks situated on the east side of the plant (Fig. 1). The tanks were installed within a pit which was excavated into native bedrock.

In the spring of 1994, Public Works Canada authorized Oliver, Mangione, McCalla & Associates Limited (OMM) to conduct an inspection of the most westerly bunker fuel tank. This inspection revealed a number of shrinkage cracks on the outside walls of the tank (see OMM report June, 1994). Subsequently, OMM was authorized to perform a subsurface investigation in the vicinity of the tanks to determine whether the tanks were leaking.

... /2



LEGEND

- ① SOIL SAMPLE LOCATION
- ⊙ MW 2 MONITORING WELL NUMBER AND LOCATION
- x - - x - EXISTING FENCE



OLIVER MANGIONE McCALLA
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Consulting Engineers, Hydrogeologists & Planners

Nepean, Ontario

OMM JOB# 9341SK20

DATE:
DECEMBER, 1994

PUBLIC WORKS CANADA

DWG. NO.

SCALE:
N.T.S.

TANK REMOVAL LOCATION - TUNNEY'S PASTURE

FIG. 1

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The results of the investigation indicated contamination in the backfill material and in the underlying groundwater (see OMM letter report August 1994).

Following this report, Public Works Canada decided to decommission the underground tanks, remediate the contaminated soil and groundwater regime, and build a new above ground Bunker C fuel storage facility.

2. SITE REMEDIAL ACTIVITIES

2.1 Soil Remediation

Throughout the excavation activities, a representative of our firm was on-site to direct the segregation of uncontaminated and contaminated soil. The process of separating the soils was performed by visual and olfactory observations. The contaminated soil was confined to the saturated and capillary fringe zones of the soil horizons. Based on the field observations made during excavation, the extent of soil contamination appeared to be confined to the immediate vicinity of the tanks. These observations were consistent with those made during the subsurface investigation which was summarized in our report of June 1994.

All contaminated soil was removed from the north, east and south sides of the excavation. Some soil which could not be removed was encountered below the manhole/catch basin (MH/CB) at the northeast corner of the excavation (see Figure 1 and Photo 4). A soil sample was collected from this vicinity and submitted to a laboratory for Total Petroleum Hydrocarbon (TPH) analysis (Table 1). TPH was previously determined to be the primary contaminant of concern.

Along the west side of the excavation where the new tunnel was constructed, it was noted that the tunnel was not constructed entirely on bedrock. A structural engineer from our office was consulted and it was decided not to continue excavation towards the tunnel so as not to undermine the footings.

Three composite soil samples were collected from beneath the tunnel footings in order to assess the level of residual contamination. All three samples were collected approximately 1.0 metres below the new weeper tile elevation. Sample locations are shown in Fig. 1. The samples were submitted to a certified environmental laboratory for TPH analysis.



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TABLE 1

Residual Soil Analysis

SAMPLE NO.	SAMPLE LOCATION	TOTAL PETROLEUM HYDROCARBON (ug/g)
1	Below tunnel footings	100
2	Below tunnel footings	3,020
3	Below tunnel footings	<40
4	Below MH/CB	<40
Recommended Limit +		1,000

+ Limit based on the Level II criteria of Ministry of Environment and Energy Guidelines (August 1993)



Exceeds recommended limit.

Based on the analytical results in Table 1, all but one of the samples were found to have TPH concentrations below the previously recommended Level II criteria of the Ontario Ministry of Environment and Energy (MOEE). The one exception was Sample Number 2 which was collected beneath the tunnel footings. As previously indicated, the soil in this location could not be removed without potentially affecting the structural integrity of the tunnel.

The bedrock walls in the excavation in the southwest portion of the excavation show considerable oil staining (see Photo 2). The most severely stained rock which contained some petroleum product was removed by hoe ram. Approximately 3 cubic metres of rock were removed.

In total, approximately 450 tonnes of contaminated reinforced concrete and 710 tonnes of contaminated soil were removed from the site. The contaminated material removed was transported by a licensed carrier to the West Carleton Landfill site in Carp, Ontario. Approximately 610 cubic metres of stockpiled uncontaminated soil was reused on-site as backfill.



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2.2 Groundwater Remediation

Prior to the commencement of the excavation, a groundwater pump and treat system was installed to remove contaminated groundwater from the excavation. The system was installed in the basement of the heating plant and the treated water was discharged to the sanitary sewer. All permits and approvals from the local authorities were obtained prior to system start up.

During the excavation activities, noticeably contaminated groundwater entered the excavation (see Photo 2 and 3) and was collected and treated by the treatment system.

Some free petroleum product was observed in the bedrock fractures. This was especially noticeable in the southwest portion of the excavation (see Photo 2).

No product accumulation occurred in the excavation. The product that did appear, quickly adhered to the imported crushed stone.

In order to facilitate contaminated groundwater containment and remediation, an extraction well was installed in the pit (see Photo 4). This well was connected to the pump and treat system and is currently treating the contaminated groundwater. A sample of the discharge water is being collected every two weeks and submitted for TPH analysis to ensure adequate treatment, as required by the Regional Municipality of Ottawa-Carleton (RMOC). To date, the treatment system has successfully removed all detectable TPH concentrations from the groundwater.

It is anticipated that the treatment system will remain in operation for approximately 1 to 3 years. During this period, samples of the untreated and treated water should be collected monthly. After the first year, it is recommended that the data be reviewed and continuation of the treatment system be reassessed.

During the construction activities, two of the monitoring wells constructed during the initial investigation phase were inadvertently destroyed. As a result, two replacement wells were constructed hydraulically downgradient of the former tank location (to the north) to facilitate monitoring of the groundwater regime (Fig. 1). During the construction of these wells no contaminated soil or rock was encountered. Borehole logs for these wells are attached.



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Groundwater samples were collected from these wells and submitted to for Benzene, Toluene, Ethyl Benzene, Xylene (BTEX) and TPH analysis. Based on the results in Table 2, no detectable TPH and/or BTEX contaminations were measured in either of the submitted groundwater samples.

TABLE 2

Groundwater Analysis

LOCATION	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYL BENZENE (ug/L)	XYLENE (ug/L)	TOTAL PETROLEUM HYDROCARBON (mg/L)
MW1	<0.5	<0.5	<0.5	<0.5	<0.2
MW2	<0.5	<0.5	<0.5	<0.5	<0.2

3. SITE RESTORATION

Upon completion of the tank decommissioning, the excavation was backfilled with imported granular material and compacted 98% Proctor Density as specified in the tender document (Photo 6). Final asphalt restoration will be completed in the spring of 1995.

4. CONCLUSION

Based on the field observations made during the decommissioning of the tanks, a significant portion of the contaminated backfill material surrounding the tanks was successfully removed. One exception was a relatively small zone of soil contamination situated beneath the new tunnel link. Although soil in this vicinity was found to exceed the recommended MOEE Level II criteria, it could not safely be removed without potentially affecting the structural integrity of the tunnel. The potential of this residual zone of soil contamination causing an environmental risk is considered minimal. Furthermore, the weeper tiles around the tunnel foundation will promote aerobic conditions in the vicinity and will enhance the natural biological degradation process of the residual petroleum contamination. As a result, it is anticipated that the remaining soil TPH concentrations will attain acceptable levels with time. The surface of the excavation is to be asphalted further reducing any leaching affects.



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With respect to the groundwater regime, free petroleum product and contaminated groundwater remains within the bedrock fractures in the vicinity of the former tank excavation. The groundwater contamination in this vicinity is presently being contained and treated using a pump and treat system. Treated groundwater is being discharged to the sanitary sewer. The duration of the pump and treat system is anticipated to be at least 12 months. During this time, samples of untreated and treated water should be collected monthly and submitted for TPH analysis. Periodic groundwater elevation measurements should also be collected to ensure that the groundwater contaminant plume is being contained.

The two new monitoring wells installed south of the new tank building show no evidence of contamination in the soil or groundwater at this time.

5. RECOMMENDATIONS

1. Treated groundwater from the groundwater treatment system should be sampled and analyzed monthly for TPH concentrations in order to ensure compliance with the RMOC Discharge Permit. In addition, untreated water from the extraction well should be collected and analyzed for TPH to determine treatment performances.
2. Monitoring Wells MW1 and MW2 should be sampled every 3 months and submitted for TPH and BTEX analyses.
3. Monitoring of the treatment system should continue for a minimum 12 month period. At this time, an evaluation of the system's performance and its continued necessity can be made.

In general, the system should remain in operation until no residual free petroleum product is observed entering the extraction well and/or a minimum of 3 consecutive acceptable untreated groundwater analytical results are obtained.






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If you have any questions regarding the above or would like cost estimates for the monitoring of the groundwater treatment system, please do not hesitate to contact the undersigned or Mr. John McKee, M.Sc., P.Eng.

Yours very truly



Blaine Coons, C.E.T.



John A. McKee, M.Sc., P.Eng.

OLIVER, MANGIONE, McCALLA & ASSOCIATES LIMITED

Attach.

BC:cm





OLIVER, MANGIONE, McCALLA
& ASSOCIATES LIMITED

Consulting Engineers, Hydrogeologists & Planners

PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. MW 1
DATE DECEMBER 19, 1994

OMM JOB# 9341BH2

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE	WATER LEVEL	SOIL DESCRIPTION	LITHOLOGY	OBSERVATION
0	62.15						FLUSH MOUNT
1					GRANULAR BACKFILL		
2							
3					LIMESTONE		
4					- FRACTURED TO APPROXIMATELY 4.0m		
5							
6							
7							
8							
9							
10							



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PROJECT No. 93-9341
PROJECT NAME TUNNEY'S PASTURE
BOREHOLE No. MW 2
DATE DECEMBER 19, 1994

OMM JOB# 9341BH2

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE	WATER LEVEL	SOIL DESCRIPTION	LITH- OLOGY	OBSERVATION
0	62.31						
1					GRANULAR BACKFILL		
2							
3					LIMESTONE		
4					- FRACTURED TO APPROXIMATELY 3.0m		
5							
6							
7							
8							
9							
10							





PHOTO 1 Before excavation.



PHOTO 2 Southwest corner of excavation.

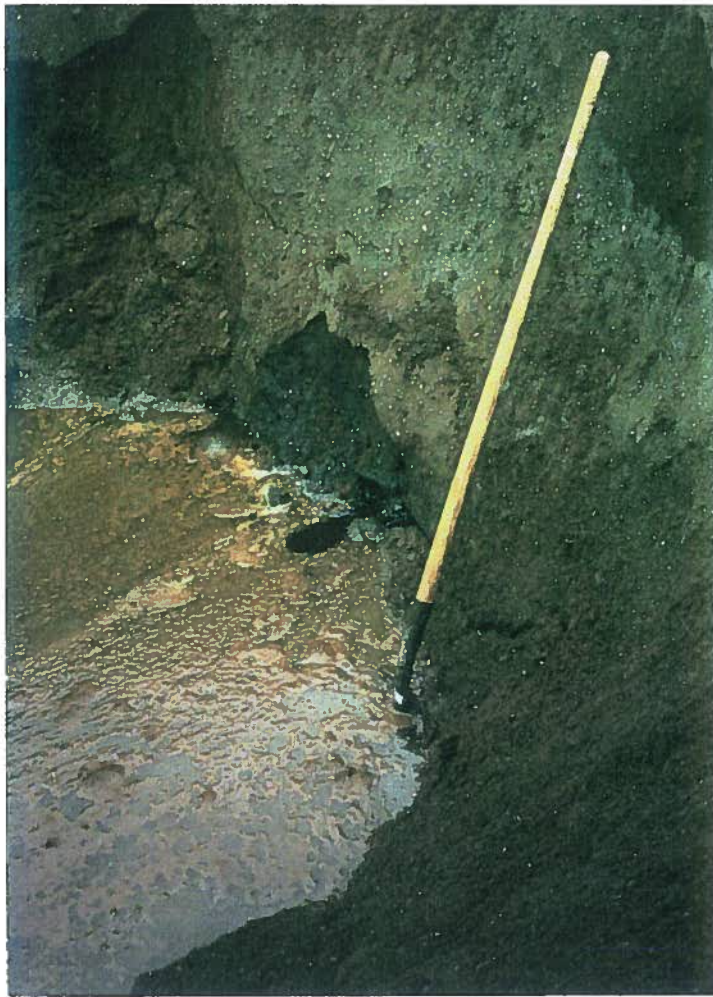


PHOTO 3 West wall near southwest corner.



PHOTO 4 Excavation after tank removal.