

**SOIL & GROUNDWATER
QUALITY ASSESSMENT
GARDINER EXPRESSWAY DISMANTLING
TORONTO, ONTARIO**

Prepared For:

URS COLE SHERMAN

Prepared by:

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**Project: SP3201C
August 22, 2001**

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August 22, 2001

URS Cole Sherman
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Attention: Keith Hutchinson, P. Eng.
Project Manager

Dear Mr. Hutchinson:

**SOIL & GROUNDWATER QUALITY ASSESSMENT
GARDINER EXPRESSWAY DISMANTLING
TORONTO, ONTARIO**

Shaheen and Peaker Limited (S&P) was retained by URS Cole Sherman to carry out a Soil & Groundwater Quality Assessment along Lakeshore Boulevard East between Carlaw Avenue and Leslie Street in Toronto, Ontario. The work was requested by the City of Toronto (City) in order to assess the environmental quality of the subsurface soil and groundwater in the vicinity of proposed landscaped areas along the north boulevard of Lakeshore Boulevard East and at the southeast corner of Leslie Street and Lakeshore Boulevard East.

Geo-Canada Limited (a division of S&P) has previously completed two environmental investigations as part of the Gardiner Expressway Dismantling project. These included:

File No G97-0502 - Geotechnical Investigation report, dated November 1997. This report included limited environmental testing of soil to provide preliminary data for disposal of surplus excavated soil.

File No G99-1003 - Geotechnical and Geo-Environmental Investigation report, dated March 2000. This report included environmental testing to provide data for the disposal of surplus excavated soil from the construction of a noise barrier and bicycle path along

the north boulevard of Lakeshore Boulevard East between Carlaw Avenue and Leslie Street.

Both of the previous studies identified the presence of hydrocarbon impacted soil at the test locations.

The Scope of Work for this assessment included: drilling and test pit programs; soil and groundwater sampling; laboratory analysis; and reporting. The results of the soil and groundwater chemical analyses were evaluated using the 'Generic Approach' methodology of the "Guideline for Use at Contaminated Sites in Ontario" (Guideline), published by the Ontario Ministry of the Environment (MOE), February 1997.

Based on the results of this Soil and Groundwater Quality Assessment, S&P concluded the following:

- Visual and olfactory evidence of hydrocarbon and/or PAH impact was detected in the subsurface soil at 10 of the 14 sampling locations;
- The concentrations of metals (beryllium, chromium, copper, lead and zinc), benzene, toluene and xylenes and Total Petroleum Hydrocarbons (gasoline/diesel and heavy oils) exceeded the Table B criteria for industrial/commercial land use at eight of the sampling locations;
- The concentrations of chromium, xylenes and Total Petroleum Hydrocarbons (gasoline/diesel and heavy oils) exceeded the Table D criteria for industrial/commercial land use at four of the sampling locations;
- The results of the assessment indicate that the groundwater at the subject property meets the applicable MOE Guideline for metals; and
- The results of the Regulation 347 leachate extraction (as amended by Reg. 558/00 in effect as April 1, 2001) and analyses indicate that the hydrocarbon impacted fill soil contacted at test pit TP7 (TP7 SA3), located at the southeast corner of Leslie Street and Lakeshore Boulevard East, should be classified as a hazardous waste for transportation and disposal purposes if removed from their current location.

It should be noted that there is no Table D criterion (applies to soil at greater than 1.5 m depth) for lead impacted soil and as such, the Table B criterion (applies to soil at less

than 1.5 m depth) of 1,000 µg/g should be considered as an appropriate remediation criteria unless a Site Specific Risk Assessment is carried out.

Based on the result of the Soil & Groundwater Quality Assessment, consideration should be given to conducting a Site Specific Risk Assessment to develop appropriate remediation criteria and a remedial action plan for the redevelopment of the subject site. Further investigation is warranted to delineate the extent of any soil impairment present at the subject site in order to complete a Site Specific Risk Assessment.

We trust that the foregoing meets your current requirements. Please contact our office if you have any further questions.

Yours very truly,

Shaheen & Peaker Limited

**David J. Baigent, P.Eng.
Senior Project Manager**

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**SOIL & GROUNDWATER QUALITY ASSESSMENT
GARDINER EXPRESSWAY DISMANTLING
TORONTO, ONTARIO**

1. INTRODUCTION

Shaheen and Peaker Limited (S&P) was retained by URS Cole Sherman to carry out a Soil & Groundwater Quality Assessment along Lakeshore Boulevard East between Carlaw Avenue and Leslie Street in Toronto, Ontario. The work was requested by Mr. George Rozanski, P.Eng., Project Manager for the City of Toronto, in order to assess the environmental quality of the subsurface soil and groundwater in the vicinity of proposed landscaped areas along the north boulevard of Lakeshore Boulevard East and at the southeast corner of Leslie Street and Lakeshore Boulevard East.

Authorization to proceed with this work was provided by Mr. Kieth Hutchinson, P.Eng. of URS Cole Sherman.

2. BACKGROUND

2.1 Site Description

The subject site is located in an industrial/commercial area in the city of Toronto and consists of two parcels of land, the north boulevard of Lakeshore Boulevard East between Carlaw Avenue and Leslie Street; and the southeast corner of Lakeshore Boulevard East and Leslie Street. The subject site is currently under construction that includes: grading, installation of stormwater drainage and landscaping. This construction work is being carried out in conjunction with the dismantling of the eastern portion of the Gardiner Expressway (now complete) and the reconstruction and widening of Lakeshore Boulevard East (in progress). A bicycle path currently occupies the subject property. The remaining areas of the subject site are either grass covered or bare ground with the exception of some trees along the north edge of the boulevard along Lakeshore Boulevard East and at the southeast corner of Lakeshore Boulevard East and Leslie Street.

2.2 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

Geo-Canada Limited (a division of S& P) has previously completed two environmental investigations as part of the Gardiner Expressway Dismantling project. These include:

File No G97-0502 - Geotechnical Investigation report, dated November 1997. This report included limited environmental testing of soil to provide preliminary data for disposal of surplus excavated soil from the reconstruction of Lakeshore Boulevard East between the Don Roadway and Leslie Street.

Two of the four soil samples submitted for inorganics and metals analyses during the November 1997 investigation were taken from the granular base layer of Lakeshore Boulevard East, the other two samples were taken from shallow (i.e. less than 1.5 m depth) deposits of sand fill and native sands and silts. The results of the laboratory analyses were evaluated using the 'Generic Approach' methodology of the "Guideline for Use at Contaminated Sites in Ontario" (Guideline), published by the Ontario Ministry of the Environment (MOE), revised February 1997. All four of these soil samples were found to meet the Table D criteria from the Guideline.

Of the five samples submitted for TPH and Leachate analysis, four of the samples were taken from fill deposits at depths greater than 1.5 m. All four of these samples were impacted by hydrocarbons, but only one sample (from a depth of 2.3 to 2.7 m), exceeded the Table D criteria.

The November 1997 report concluded that the hydrocarbon impacted soil encountered did not pose a health risk due to its depth and the presence of asphalt pavement that would act to encapsulate the impacted soil.

File No G99-1003 - Geotechnical and Geo-Environmental Investigation report, dated March 2000. This report included environmental testing to provide data for the disposal of surplus excavated soil from the construction of a noise barrier and bicycle path along the north boulevard of Lakeshore Boulevard East between Carlaw Avenue and Leslie Street.

The one soil sample submitted for inorganics and metals analysis was found to meet the Table D criteria. The four samples submitted for TPH analysis were taken from fill deposits at depths greater than 1.5 m. All four of these samples were impacted by hydrocarbons, but meet the Table D criteria. VOCs and PAHs were detected in the one soil sample analyzed for these parameters, but the sample met the Table D criteria. PCBs were not detected in the sample submitted for analysis.

The March 2000 report concluded that hydrocarbon impacted soil was present on-site, but that the impacted soil was contacted at a depth of more than 1.5 m.

2.3 Scope of Work

To meet the objective of this assessment, a Scope of Work was developed consisting of: drilling and test pit programs; soil and groundwater sampling; laboratory analysis; and reporting as described in the following sections.

The scope of work focussed on the following issues:

- Potential impact from the former Canadian Metal Co. Ltd. plant located immediately north of the subject site;
- Potential impacts from the former A. R. Clarke & Co. Ltd. Tannery located immediately north of the subject site; and
- General fill quality.

The work plan included the following activities:

- Drill six boreholes, four along the north boulevard and one in the centre median of Lakeshore Boulevard East and one at the southeast corner of Leslie Street and Lakeshore Boulevard East;
- Excavate eight test pits, six along the north boulevard of Lakeshore Boulevard East and two at the southeast corner of Leslie Street and Lakeshore Boulevard East;
- Install five groundwater monitoring wells, four along the north boulevard of Lakeshore Boulevard East and one at the southeast corner of Leslie Street and Lakeshore Boulevard East; and
- Laboratory analysis of selected soil and groundwater samples.

3. STUDY METHODS

3.1 Utility Clearances

Prior to initiating the drilling and test pit programs, the locations of the proposed boreholes, test pits and monitoring wells were selected jointly by S&P and the City of Toronto and the drilling locations cleared for public underground utilities.

3.2 Drilling and Test Pits

A drilling program was conducted at the site on July 11 and 12, 2001 and consisted of drilling six boreholes to a maximum depth of 6.6 m. The drilling was carried out by Geo-Environmental Drilling Inc. of Milton, Ontario using a truck mounted CME 75 drilling rig under the direct supervision of experienced S&P field personnel.

A test pit program was conducted at the site on July 11, 2001 and consisted of excavating eight test pits to a maximum depth of 4.0m. The test pits were excavated by A. J. Maddix construction Ltd. Of Toronto, Ontario using a Case 590 rubber tired backhoe under the direct supervision of experienced S&P field personnel.

The locations of the boreholes and test pits are shown on **Drawing 1** and the borehole logs and test pit logs are presented in **Appendix A and B**, respectively.

Soil samples were collected from each borehole using a 50mm outer diameter (OD) split spoon sampler at frequent depth intervals through the fill and native soil. Soil samples were collected using shovels and scoops from each layer of fill and native soil encountered in the test pits. Soil samples recovered from the boreholes and test pits were examined for soil classification and for aesthetic (visual and olfactory) evidence of environmental impact. Soil samples collected in the field were transferred to glass jars and airtight zip lock plastic bags.

The collected soil samples were transported to the S&P's laboratory for further examination. Headspace combustible vapour measurements (excluding methane) were made within the plastic sample bags using a Trace-techtor™ combustible vapour meter calibrated to hexane, with the methane elimination setting enabled. Headspace measurements were made after the samples had been stored indoors for at least two

hours and the samples equilibrated to room temperature. The headspace monitoring was performed on the samples as a preliminary screening for hydrocarbons or volatile organic compounds (VOCs).

The samples selected for laboratory analysis were placed in laboratory supplied jars and kept in refrigerated conditions until submitted to the analytical laboratory. The selection of soil samples for laboratory analysis was based on an evaluation of: headspace readings; presence of organic and foreign matter; and soil staining.

The ground surface elevations at the borehole and monitoring well locations were surveyed by S&P personnel and referenced to the following City of Toronto benchmark:

Benchmark #157 (Rec.#1780) located on the wall of the Brewers Retail Distribution Centre on the west side of Leslie Street just south of Lakeshore Boulevard East (Geodetic elevation 76.986 metres).

3.3 Soil Sampling Procedures and Protocols

The following precautions were taken by S&P while collecting soil samples to prevent cross-contamination and maintain sample integrity:

- A clean split spoon sampler was used by the drilling contractor to drill the boreholes;
- The split spoon soil sampler, shovels and scoops were washed prior to each sampling event with phosphate free detergent in water, rinsed with municipal water and subsequently rinsed with distilled water;
- New disposable vinyl lab gloves were worn when removing the soil cores from the sampler and placing the samples in plastic bags and glass jars for chemical analysis; and
- Samples selected for laboratory analysis were stored under refrigerated conditions in the field and at S&P's laboratory until delivery to the analytical laboratory.

3.4 GROUNDWATER MONITORING

Groundwater monitoring wells were installed in five of the boreholes (BH601, BH602, BH603, BH604 and BH 605) to permit groundwater observations and to obtain groundwater samples for laboratory analysis. The monitoring wells were constructed of 50 mm diameter Schedule 40 Polyvinyl Chloride (PVC) screen with a factory machined slot width of 0.25 mm and completed with a PVC riser pipe. All the pipe sections were wrapped in plastic, which was removed just prior to installation to minimize the potential for contamination. The base of each well was covered with a PVC cap to prevent the influx of sediment. Clean filter sand (silica sand) was placed in the annular space between the well and the well bore to about 0.5-0.6 m above the screen level to obtain relatively sediment free water. A bentonite seal was added to the annular space above the sand pack to an approximate thickness of 0.6 to 0.8 m to prevent infiltration of surface water. Lubricants or glue were not used in the monitoring well construction. The construction of the groundwater monitoring wells is illustrated on the borehole logs presented in **Appendix A**.

A groundwater sample was collected from each monitoring well. The monitoring well was first developed and purged (using a dedicated foot valve installed in the monitoring well) prior to sampling to remove standing water, filter pack water and allow for the influx of fresh formation water into the monitoring well. Three standing well volumes were removed from each well or purged until the well was dry. Groundwater samples were collected in laboratory supplied containers and placed in a chilled cooler for storage and transport to the laboratory for analysis.

3.5 Laboratory Analyses

The laboratory analyses were performed by PSC Analytical Services (PSC) of Mississauga, Ontario. The following is a summary of the laboratory analyses completed:

Soil

- Volatile Organic Compounds (VOCs) – two soil samples
- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) – four soil samples
- Total Petroleum Hydrocarbons from the gasoline, diesel and heavy oil ranges

(TPH) – four soil samples

- Base Neutral Extractables (BNEs) including Polycyclic Aromatic Hydrocarbons (PAHs) – two soil samples
- Polychlorinated Biphenyls (PCBs) – two soil samples
- Metal Scan and pH – twelve soil samples
- Regulation 347 leachate extraction (as amended by Reg. 558/00, in effect as April 1, 2001) and analysis for inorganics and VOCs – two soil samples
- Ignitability – one soil sample

Groundwater

- Metal scan and pH – five groundwater samples

3.6 Criteria for Evaluating Soil and Groundwater Quality

The results of the soil and groundwater chemical analyses were evaluated using the 'Generic Approach' methodology of the "Guideline for Use at Contaminated Sites in Ontario" (Guideline), published by the Ontario Ministry of the Environment (MOE), February 1997. This document presents generic soil and groundwater criteria derived from an effects and background based approach. The applicable generic criteria provided in the Guideline were used to assess whether concentrations of contaminants in soil and groundwater were sufficiently elevated to require restoration (remedial action) using the generic approach. The Guideline provides the following summary of the generic approach to site restoration:

"The generic approach involves use of soil and groundwater quality criteria which have been developed to provide protection against the potential adverse effects to human health, ecological health and the natural environment. The criteria may be applied to agricultural, residential/parkland and industrial/commercial land uses. Criteria are also provided for potable and non-potable groundwater use as well as fine to medium texture and coarse soils.

The potable criteria ensure that groundwater may be used as a source of drinking water. The non-potable criteria offers protection against vapours from groundwater and to aquatic life in receiving surface water."

The generic soil, groundwater and sediment criteria for the different land use categories and groundwater conditions are summarized in Tables A to F of the MOE Guideline document. The selection of a specific set of generic criteria for the subject site was based on the decision process outlined in the MOE guideline document. The decision process is as follows:

- A. Is the site a potentially sensitive site?
- B. What is the intended land use?
- C. Is the soil coarse textured or fine textured?

A. Is the site a potentially sensitive site?

A site must satisfy one of three conditions listed by the MOE to be classified as potentially sensitive. These conditions are listed below and discussed with respect to the subject site:

- (i) Does the site have or potentially have an effect on sensitive sites listed in the MOE Guideline?

The MOE identifies sensitive sites as nature reserves, areas of natural or scientific interest, environmentally sensitive areas, fish habitats, endangered species habitats, wetlands or provincial parks.

The subject site is situated in an industrial/commercial area of the city of Toronto and is presently used as a roadway (Lakeshore Boulevard East). According to topographic map 30M/11 (7th Edition), the ground surface in the vicinity of the subject site slopes gently to the southwest towards the Toronto Harbour and Lake Ontario. The Ship Channel and the Turning Basin that drain into the Toronto Harbour are located approximately 400 m south of the subject site. Groundwater flow is inferred to be in a southerly direction towards the Ship Channel and the Turning Basin.

Based on the distance separating the subject site from the Ship Channel and the Turning Basin and the environmental history of the surrounding area, it is unlikely that the site would be considered a sensitive site.

- (ii) Are there less than two metres of overburden and soil overlying bedrock or in a contaminant plume area downgradient of the site?

The drilling program confirmed that the total depth of overburden fill and native soil was greater than the minimum of 2 metres stated in the MOE Guideline.

- (iii) Is the pH of the soil less than 5 or greater than 9 for surface soil or less than 5 or greater than 11 for subsurface soil.

The pH of the soil samples submitted for analysis were 7.24 to 8.30 and is therefore within the allowable limits for both surface soil (less than 1.5 m depth) and subsurface soil.

Based on these considerations, it is concluded that the subject site is not a potentially sensitive site.

B. What is the intended land use?

The site is currently used as a roadway and the City of Toronto indicated it's intent to continue similar usage of the site. In the opinion of S&P, the land use of the roadway and road allowance in an industrial/commercial area should be considered industrial/commercial land use.

C. Is the soil coarse textured or fine textured?

The generic criteria for coarse textured material were applied to the site. The criteria for coarse textured material are more stringent than those that apply to medium/fine textured material.

In summary, the subject site was identified as non-sensitive and is supplied by municipal water. The texture of surficial soils encountered on site is considered to be coarse textured. Based on these considerations, the MOE Table B criteria for

industrial/commercial land use in a non-potable groundwater condition for coarse textured soils were used to evaluate the environmental quality of the surface soil (less than 1.5 m depth) and groundwater encountered at the site. The MOE Table D criteria for industrial/commercial land use in a non-potable groundwater condition for coarse textured soils were used to evaluate the environmental quality of the subsurface soil (greater than 1.5 m depth).

4. FINDINGS OF THE ASSESSMENT

4.1 General Physical Characteristics of Soil

The soil and groundwater conditions encountered in the boreholes and test pits are provided in the individual borehole logs and test logs in **Appendix A and B**, respectively. The following is a general description of the findings:

The boreholes and test pits encountered an extensive deposit of fill soil across the entire site. The fill deposit generally consists of three fill layers, an upper fill layer of sandy silt to gravely sand fill with organic matter (topsoil), a middle fill layer of sand to gravely sand fill and a lower fill layer of sandy silt to clayey silt fill. Ash, cinders, glass, steel, plastic, paper, reinforced concrete, concrete fragments, brick fragments, railway ties, wood, roots, grass and topsoil pockets were observed in samples of the fill taken from the boreholes and test pits. The thickness of the fill deposit varied from 0.8 m to more than 3.3 m. Hydrocarbon odours and black hydrocarbon staining was detected in samples of the fill from borehole BH605 and test pits TP1, TP2, TP6, TP7 and TP8. An unidentified organic type odour was detected in the fill at test pit TP6. An oily sheen was observed on fill samples from test pit TP2 and TP7. Free phase liquid hydrocarbons (free product) were observed in the fill at test pit TP7.

A stratum of native organic silt and peat was contacted below the fill at all of the borehole and test pit locations except test pits TP1, TP6 and TP8. This stratum consists of grey to dark grey and black sandy to clayey organic silt with interbedded lenses and layers of dark brown fibrous peat. Traces of grass and roots were observed in the organic silt indicating that this stratum was likely a surficial deposit prior to fill placement. The thickness of this stratum varies from 0.6 to 3.0 m. Hydrocarbon odours

and TP7 SA3) exceed the Table B criteria for TPH (gasoline/diesel) and TPH (heavy oil). All three of these samples exceed the Table B and Table D criteria for TPH (heavy oil). Further, that one of these samples (TP7 SA3) also exceeded the Table B criteria for Benzene, Toluene and Xylenes and the Table D criteria for TPH (gasoline/diesel) and Xylenes.

The results of the laboratory analysis of soil samples for BNEs (including PAHs) and PCBs are summarized in **Table 3**. The results of these analyses indicate that both of the soil samples analyzed (TP5 SA3 and TP7 SA3) exceed the Table B criteria for Benzo(a)pyrene. Further, that one of these samples (TP7 SA3) exceeds the Table B criteria for a total of 14 BNE compounds (including Benzo(a)pyrene) and this sample also exceeds the Table D criteria for a total of 12 BNE compounds (including Benzo(a)pyrene). PCBs were not detected in either of the samples submitted for laboratory analysis.

The results of the laboratory analyses of the soil samples for pH and metals are summarized in **Table 4**. The results of these analyses indicate that seven of the twelve soil samples analyzed (BH602 SS2, BH603 SS1, TP3 SA3, TP4 SA2, TP5 SA1, TP6 SA3 and TP7 SA2) exceed the Table B criteria for one or more metals including beryllium, chromium, copper, lead and zinc. Further, that one of these samples (TP3 SA3) also exceeded the Table D criterion for chromium (8,400 µg/g vs. the Table D criterion of 5,000 µg/g). Lead concentrations were found to vary from 97 to 12,200 µg/g vs. the Table B criterion for lead of 1,000 µg/g. It should be noted that there is no Table D criterion for lead.

Table 5 and 6 presents a summary of the results of the Regulation 347 leachate extraction (as amended by Reg. 558/00, in effect as April 1, 2001) and analysis of inorganics and VOCs. The results of these analyses indicate that the leachate from the soil sample from test pit TP7 (TP7 SA3) exceeds the Schedule 4 concentration for Benzene (0.538 mg/L vs. the criteria of 0.5 mg/L). The concentrations of inorganic parameters and other VOCs in the leachate met the Schedule 4 parameters in both of the samples submitted for analysis.

Groundwater

The results of the groundwater analyses for the pH and metals are summarized in **Table 7**. The results indicate that the concentrations of metals in the groundwater samples met the Table B criteria.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this Soil and Groundwater Quality Assessment, S&P concluded the following:

- Visual and olfactory evidence of hydrocarbon and/or PAH impact was detected in the subsurface soil at 10 of the 14 sampling locations;
- The concentrations of metals (beryllium, chromium, copper, lead and zinc), benzene, toluene and xylenes and TPH (gasoline/diesel and heavy oils) exceeded the Table B criteria for industrial/commercial land use at eight of the sampling locations;
- The concentrations of chromium, xylenes and TPH (gasoline/diesel and heavy oils) exceeded the Table D criteria for industrial/commercial land use at four of the sampling locations;
- The results of the assessment indicate that the groundwater at the subject property meets the applicable MOE Guideline for metals; and
- The results of the Regulation 347 leachate extraction (as amended by Reg. 558/00, in effect as April 1, 2001) and analyses indicate that the hydrocarbon impacted fill soil contacted at test pit TP7 (TP7 SA3) should be classified as a hazardous waste for transportation and disposal purposes if removed from their current location.

It should be noted that there is no Table D criterion for lead impacted soil and as such, the Table B criterion of 1,000 µg/g should be considered as an appropriate remediation criteria unless a Site Specific Risk Assessment is carried out.

Based on the result of the Soil & Groundwater Quality Assessment, consideration should be given to conducting a Site Specific Risk Assessment to develop appropriate remediation criteria and a remedial action plan for the redevelopment of the subject site. Further investigation is warranted to delineate the extent of any soil impairment present at the subject site in order to complete a Site Specific Risk Assessment.

6. LIMITATIONS

This assessment was conducted as per the terms of reference described in this report for the account of URS Cole Sherman. The findings of the boreholes and test pits are believed to be representative of the area of investigation and are based on facts and information determined by Shaheen & Peaker Limited during the execution of this project. Soil and groundwater conditions at locations other than the boreholes may vary from conditions encountered at the borehole locations. The findings in this report are limited to the environmental conditions on the site. This report was prepared for the exclusive use of URS Cole Sherman, the City of Toronto and their legal council. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. Shaheen & Peaker Limited accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

SHAHEEN & PEAKER LIMITED

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TABLES

TABLE 1: SUMMARY OF VOCs IN SOIL

Parameter	Table B I/C	Table D I/C	TP2-SA7 (3.2-3.5m)	BH605-SS3 (1.5-2.1m)
Chloromethane	N/V	N/V	<	<
Vinyl Chloride	0.003	0.094	<	<
Bromomethane	0.061	4.5	<	<
Chloroethane	N/V	N/V	<	<
Trichlorofluoromethane	N/V	N/V	<	<
Dichloroethylene, 1,1-	0.0024	0.07	<	<
Acetone	3.8	3.8	<	<
Methylene chloride (Dichloromethane)	140	740	<	<
Dichloroethylene, Trans-1,2-	4.1	4.1	<	<
Methyl Tert Butyl Ether (MTBE)	120	410	<	<
Dichloroethane, 1,1-	22	390	<	<
Dichloroethylene, cis-1,2-	2.3	2.3	<	<
Methyl Ethyl Ketone (MEK)	38	38	<	<
Chloroform	0.79	11	<	<
Trichloroethane, 1,1,1-	26	34	<	<
Carbon Tetrachloride	0.10	3.3	<	<
Benzene	5.3	89	<	0.1
Dichloroethane, 1,2-	0.022	0.16	<	<
Trichloroethylene	1.1	3.9	<	<
Dichloropropane, 1,2-	0.019	0.23	<	<
Bromodichloromethane	25	90	<	<
Dichloropropene, 1,3-	0.0066	0.10	<	<
Methyl Isobutyl Ketone (MIBK)	658	69	<	<
Toluene	34	510	<	0.4
Trichloroethane, 1,1,2-	3.1	12	<	<
Tetrachloroethylene	0.45	0.45	<	<
Dibromochloromethane (Chlorodibromomethane)	18	67	<	<
Ethylene Dibromide (Dibromoethane, 1,2)	0.0056	0.038	<	<
Chlorobenzene	8.0	40	<	0.2
Tetrachloroethane, 1,1,1,2-	0.019	0.46	<	<
Ethylbenzene	290	2500	<	0.2
Xylenes	34	460	0.3	0.6
Stryene	1.2	16	<	<
Bromoform	14	19	<	<
Tetrachloroethane, 1,1,2,2-	0.037	0.22	<	<
Dichlorobenzene, 1,2- (o-DCB)	30	500	<	<
Dichlorobenzene, 1,3- (m-DCB)	30	500	<	<
Dichlorobenzene, 1,4- (p-DCB)	30	230	<	<

NOTES:

Units are in µg/g (ppm)

Table B & D, I/C = Surface and Subsurface Soil Criteria (respectively) for Industrial/Commercial land use for coarse textured soil in a non-potable groundwater condition, from MOE Guideline for Use at Contaminated Sites in Ontario, Revised on February 1997

N/V = No available criteria

< = less than method detection limit

TABLE 2: SUMMARY OF TPH AND BTEX IN SOIL

Parameter	Table B I/C	Table D I/C	BH601 SS5 (3.0-3.6m)	BH602 SS4 (2.25-2.85m)	TP5 SA3 (0.8-1.5m)	TP7 SA3 (1.2-1.9m)
TPH Gasoline Range (C5-C10)	1000	5000	31	<	100	3,200
TPH Diesel Range (C11-C24)			2,000	110	2,800	18,000
TPH Heavy Oil Range (C25-C50)	5000	5000	6,000	800	9,400	9,700
Benzene	5.3	89	0.03	<	<	18.4
Toluene	34	510	0.36	<	0.05	35.6
Ethylbenzene	290	2500	0.33	<	0.54	181
Xylenes	34	460	1.20	<	1.73	700

NOTES:

Units are in µg/g (ppm)

< = less than Method Detection Limit

Table B & D, I/C = Surface and Subsurface Soil Criteria (respectively) for Industrial/Commercial land use for coarse textured soil in a potable groundwater condition from MOE Guideline for Use at Contaminated Sites In Ontario, Revised on February 1997

Bold = Concentration exceeds Table B criteria

700 = Concentration exceeds Table D criteria

TABLE 3: SUMMARY OF BASE NEUTRAL EXTRACTABLES AND PCBs IN SOIL

Parameter	Table B I/C	Table D I/C	TP5 SA3 (0.8-1.5m)	TP7 SA3 (1.2-1.9m)
Total PCBs		N/V	<	<
Acenaphthene	1300	1300	2.9	51.2
Acenaphthylene	840	840	0.9	264
Anthracene	28	28	6.3	281
Benzo(a)anthracene	40	170	6.3	271
Benzo(a)pyrene	1.9	7.2	5.8	267
Benzo(b)fluoranthene	19	72	7.4	343
Benzo(g,h,i)perylene	40	53	1.3	35.3
Benzo(k)fluoranthene	19	37	3.3	150
Biphenyl, 1,1-	4.3	4.3	<	<
Bis (2-Chloroethyl)ether	0.66	0.66	<	<
Bis (2-Chloroisopropyl)ether	0.82	4.7	<	<
Bis (2-Ethylhexyl)phthalate	330	500	<	<
Chloroaniline, p-	1.3	1.3	<	<
Chrysene	19	72	8.4	243
Dibenzo(a,h)anthracene	1.9	7.2	<	12.0
Dichlorobenzene, 1,2-(o-DCB)	30	500	<	<
Dichlorobenzene, 1,3-(m-DCB)	30	500	<	<
Dichlorobenzene, 1,4-(p-DCB)	30	230	<	<
Dichlorobenzidine, 3,3'-	1.3	2.7	<	<
Diethyl Phthalate	0.71	0.71	<	<
Dimethyl Phthalate	0.7	0.7	<	<
Dinitrotoluene, 2,4-	1.8	6.6	<	<
Fluoranthene	40	840	16.3	923
Fluorene	350	350	4.0	379
Hexachlorobutadiene	0.38	4.3	<	<
Hexachloroethane	3.8	42	<	<
Hexachlorobenzene	0.76	2.8	<	<
Indeno(1,2,3-cd)pyrene	19	70	1.7	47.4
Methylnaphthalene, 1-*	280	1600*	4.3	198
Methylnaphthalene, 2-*	280	1600*	3.3	385
Naphthalene	40	1300	4.1	2140
Phenanthrene	40	150	21.8	1310
Pyrene	250	250	17.7	671
Trichlorobenzene, 1,2,4-	30	770	<	<

NOTES:

Units are in µg/g (ppm)

Table B & D, I/C = Surface and Subsurface Soil Criteria (respectively) for Industrial/Commercial land use for coarse textured soil in non-potable groundwater condition, from MOE Guideline for Use at Contaminated Sites in Ontario, Revised on February 1997.

N/V = No available criteria

< = less than method detection limit

*2-methyl naphthalene soil criterion is applicable to 1-methyl naphthalene with the provision that if both are detected in the soil, the sum of the two concentrations cannot exceed the soil criterion.

Bold = Concentration exceeds Table B criteria

671 = Concentration exceeds Table D criteria

Parameters with no Table B & D criteria not shown except PCBs (see Laboratory Certificates of Analysis)

TABLE 4: SUMMARY OF METAL SCAN AND PH IN SOIL (CONTINUED)

Parameter	Table B I/C	Table D I/C	TP2- SA2 (0.35- 0.6m)	TP3- SA3 (0.4- 0.6m)	TP4- SA2 (0.4- 0.8m)	TP5- SA1 (0-0.5m)	TP6- SA3 (0.9- 2.3m)
pH	5.0-9.0	5.0- 11.0	7.41	7.72	8.06	7.50	8.30
Aluminum (Al)	N/V	N/V	3080	5020	2070	4500	11500
Barium (Ba)	1500	4100	99	487	44	122	103
Beryllium (Be)	1.2	3.1	<0.2	0.2	<0.2	0.3	0.6
Cadmium (Cd)	12	41	0.8	8.2	1	6.2	0.6
Calcium (Ca)	N/V	N/V	58000	101000	91200	57500	46000
Chromium (Cr)	750	5000	28	8440	39	41	22
Cobalt (Co)	80	3400	3	3	3	3	7
Copper (Cu)	225	2500	42	201	44	143	269
Iron (Fe)	N/V	N/V	12400	19300	11200	10000	18900
Lead (Pb)	1000	N/V	378	12200	1970	2420	260
Magnesium (Mg)	N/V	N/V	6160	3460	3670	4520	7220
Manganese (Mn)	N/V	N/V	202	283	191	200	414
Molybdenum (Mo)	40	550	<3	4	<3	<3	<3
Nickel (Ni)	150	710	11	20	8	16	20
Phosphorus (P)	N/V	N/V	637	3090	627	971	885
Potassium (K)	N/V	N/V	476	379	551	762	1850
Silver (Ag)	40	240	<1	<1	1	<1	<1
Sodium (Na)	N/V	N/V	125	824	100	306	1370
Strontium (Sr)	N/V	N/V	81.6	279	120	85.6	78
Titanium (Ti)	N/V	N/V	151	116	148	167	287
Vanadium (V)	200	910	14	14	18	17	24
Zinc (Zn)	600	5000	286	1090	96	446	134

NOTES:

Units are in µg/g (ppm)

Table B & D, I/C = Surface and Subsurface Soil Criteria for Industrial/Commercial land use for coarse textured soil in a non-potable groundwater condition, from MOE Guideline for Use at Contaminated Sites in Ontario, Revised February 1997

N/V = No available criteria

Bold = Concentration exceeds Table B criteria

8440 = Concentration exceeds Table D criteria

TABLE 4: SUMMARY OF METAL SCAN AND PH IN SOIL (CONTINUED)

Parameter	Table B I/C	Table D I/C	TP7-SA2 (0.8-1.2m)	TP8-SA2 (0.8-2.0m)
pH	5.0-9.0	5.0-11.0	7.76	7.24
Aluminum (Al)	N/V	N/V	15600	4380
Barium (Ba)	1500	4100	481	217
Beryllium (Be)	1.2	3.1	1.7	0.3
Cadmium (Cd)	12	41	1.6	5.6
Calcium (Ca)	N/V	N/V	38400	33500
Chromium (Cr)	750	5000	23	69
Cobalt (Co)	80	3400	7	4
Copper (Cu)	225	2500	208	167
Iron (Fe)	N/V	N/V	66000	15600
Lead (Pb)	1000	N/V	97	431
Magnesium (Mg)	N/V	N/V	3330	2880
Manganese (Mn)	N/V	N/V	169	140
Molybdenum (Mo)	40	550	4	<3
Nickel (Ni)	150	710	35	22
Phosphorus (P)	N/V	N/V	691	2030
Potassium (K)	N/V	N/V	1490	460
Silver (Ag)	40	240	<1	<1
Sodium (Na)	N/V	N/V	1040	162
Strontium (Sr)	N/V	N/V	354	57
Titanium (Ti)	N/V	N/V	795	172
Vanadium (V)	200	910	42	12
Zinc (Zn)	600	5000	208	513

NOTES:

Units are in µg/g (ppm)

Table B & D, I/C = Surface and Subsurface Soil Criteria for Industrial/Commercial land use for coarse textured soil in a non-potable groundwater condition, from MOE Guideline for Use at Contaminated Sites in Ontario, Revised February 1997

N/V = No available criteria

Bold = Concentration exceeds Table B criteria

**TABLE 5: SUMMARY OF REG. 347 ANALYSIS (INORGANIC)
 AS AMMENDED BY REG. 558/00 IN EFFECT AS OF APRIL 1, 2001**

Parameter	Reg. 347 Schedule 4 Leachate Quality Criteria	TP7-SA3 (1.2-1.9m)	TP5-SA3 (0.7-1.5m)
	Non-Hazardous		
Arsenic	2.5	<0.2	<0.2
Barium	100.0	0.9	0.9
Boron	500.0	<0.1	0.2
Cadmium	0.5	<0.05	<0.05
Chromium	5.0	<0.1	0.1
Cyanide	20.0	0.01	<0.01
Fluoride	150.0	0.2	0.2
Lead	5.0	0.6	<0.1
Mercury	0.1	<0.01	<0.01
Nitrate + Nitrite (as Nitrogen)	1000.0	<0.2	<0.2
Selenium	1.0	<0.1	<0.1
Silver	5.0	<0.01	<0.01

NOTES:

Units are mg/L of Leachate (ppm)

Limits for non-hazardous waste are from Reg 347 (amended in October 2000). Hazardous waste will require registration, non-hazardous waste will not require registration.

Note that this is only a portion of the Schedule 4 list of parameters.

**TABLE 6: SUMMARY OF REG. 347 ANALYSIS (VOLATILE ORGANIC COMPOUNDS)
 AS AMMENDED BY REG. 558/00 IN EFFECT AS OF APRIL 1, 2001**

Parameter	Reg. 347 Schedule 4 Leachate Quality Criteria	TP7-SA3 (1.2-1.9m)	TP5-SA3 (0.7-1.5m)
	Non-Hazardous		
Benzene	0.5	0.538	<
Carbon Tetrachloride	0.5	<	<
Chlorobenzene	8.0	<	<
Chloroform	10.0	<	<
1,2-dichlorobenzene	20.0	<	<
1,4-dichlorobenzene	0.5	<	<
1,2-dichloroethane	0.5	<	<
1,1-dichloroethylene	1.4	<	<
Methyl Ethyl Ketone	200.0	<	<
Methylene Chloride	5.0	<	<
Tetrachloroethylene	3.0	<	<
Trichloroethylene	5.0	<	<
Vinyl Chloride	0.2	<	<

NOTES:

Units are in mg/L of Leachate (ppm)

<= not detected (less than Method Detection Limit)

Limits for non-hazardous waste are from Reg 347 (amended in October 2000). Hazardous waste will require registration, non-hazardous waste will not require registration.

Note that this is only a portion of the Schedule 4 list of parameters.

Bold = Exceeds Schedule 4 criteria

TABLE 7: SUMMARY OF METAL SCAN AND PH IN GROUNDWATER

Parameter	Table B Criteria	BH601	BH602	BH603	BH604	BH605
pH	N/V	6.86	7.09	6.91	6.84	6.61
Aluminum (Al)	N/V	23	<50	10	14	<5
Antimony (Sb)	16,000	<0.5	<0.5	1	<0.5	<0.5
Arsenic (As)	480	3	<20	3	6	<2
Barium (Ba)	23000	255	637	299	65	760
Beryllium (Be)	53	<1	<10	<1	<1	<1
Bismuth (Bi)	N/V	<1	<10	<1	<1	<1
Boron (B)	50,000	237	116	598	1550	233
Cadmium (Cd)	11	<0.1	<0.1	<0.1	0.1	<0.1
Calcium (Ca)	N/V	324000	381000	241000	106000	419000
Chromium (Cr)	2000	<5	<50	<5	<5	<5
Cobalt (Co)	100	15.5	13.3	7.8	8.8	11.5
Copper (Cu)	23	4.3	<5.0	0.9	2.2	<0.5
Iron (Fe)	N/V	200	900	70	370	37800
Lead (Pb)	32	0.7	<5.0	<0.5	<0.5	<0.5
Magnesium (Mg)	N/V	49600	166000	106000	28900	76100
Manganese (Mn)	N/V	1580	2050	1420	1310	2290
Mercury (Hg)	0.12	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum (Mo)	7300	10	<10	15	16	7
Nickel (Ni)	1600	24	<10	10	12	5
Phosphorus (P)	N/V	<50	<500	<50	<50	<50
Potassium (K)	N/V	12.50	72.00	20.60	31.30	17.30
Selenium (Se)	50	<2	<20	<2	<2	<2
Silicon (Si)	N/V	11800	13700	7010	11100	18400
Silver (Ag)	1.2	<0.1	<1.0	<0.1	<0.1	<0.1
Sodium (Na)	N/V	80400	1510000	591000	127000	484000
Strontium (Sr)	N/V	1020	969	669	356	1340
Tin (Sn)	N/V	6	<10	2	<1	<1
Titanium (Ti)	NV	<5	<50	<5	<5	<5
Thallium (Tl)	NV	0.022	<0.5	<0.05	<0.05	<0.05
Uranium (U)	NV	15.4	4.9	11.4	3.4	4.0
Vanadium (V)	200	2.1	<5.0	<5.0	0.6	<5.0
Zinc (Zn)	1100	23	<50	10	14	15

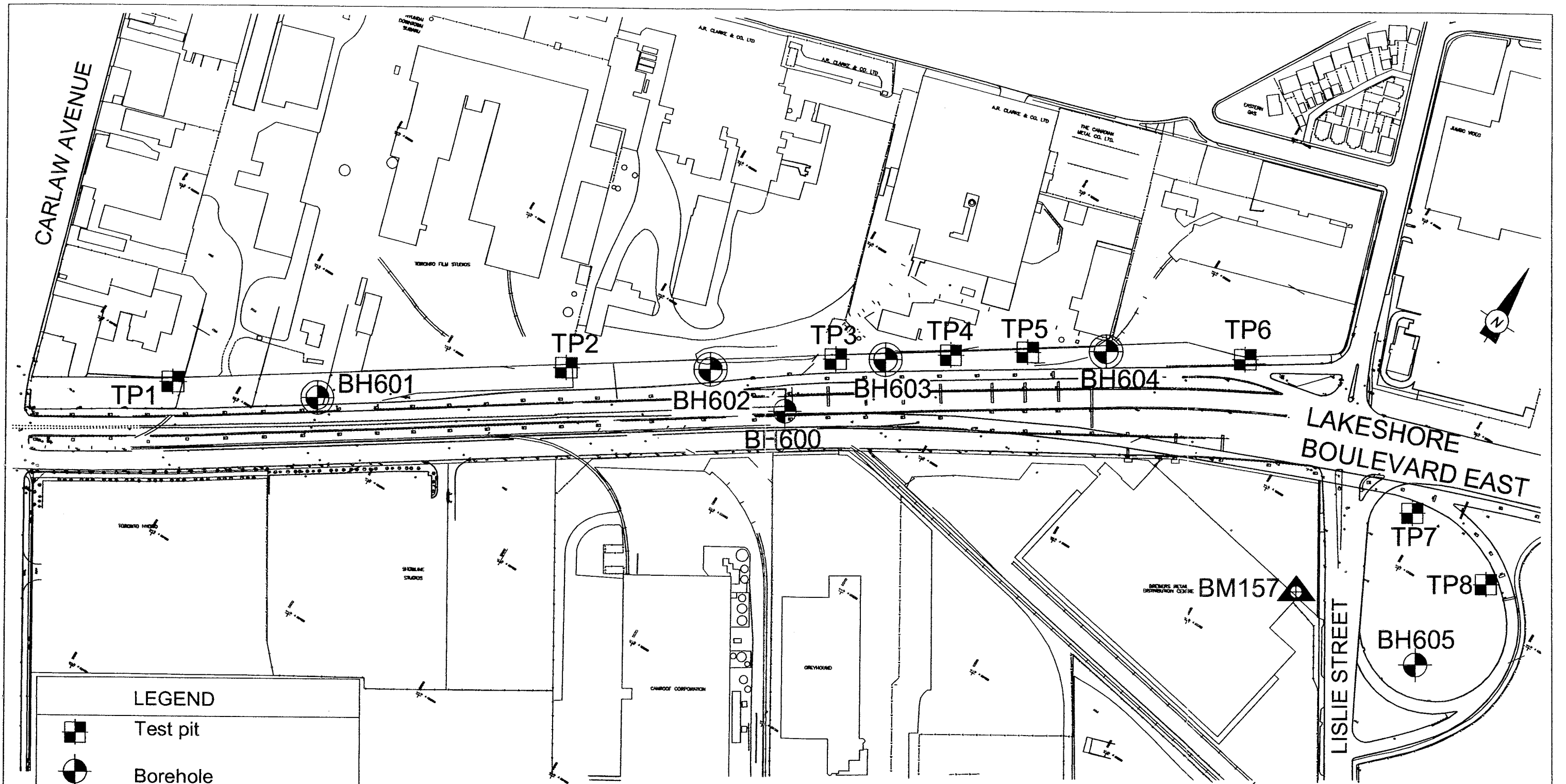
NOTES:

Units are in µg/L (ppb)





Table B criteria are nonpotable groundwater criteria contained in Table B of the "Guideline For Use At Contaminated Sites In Ontario", MOE, revised 1997.

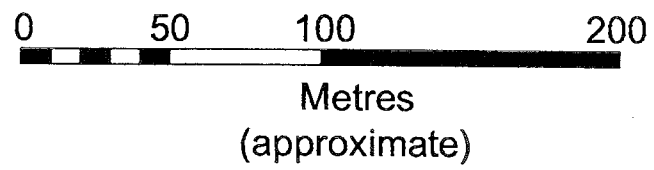
N/V = no available criteria

DRAWINGS



LEGEND

-  Test pit
-  Borehole
-  Monitoring well
-  BENCHMARK



BOREHOLE AND TEST PIT LOCATION PLAN		
Scale: AS SHOWN	Soil & Groundwater Quality Assessment Gardiner Expressway Dismantling	Drawn By: RBW
Date: AUG, 2001		Approved By: DJB
TORONTO, ONTARIO		
Project No.: SP 3201C	SHAHEEN AND PEAKER LIMITED	Drawing No.: 1

APPENDIX A

BOREHOLE LOGS

Project No. SP3201C

Log of Borehole BH600 **REVISED**

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

Drill Type: Solid Stem Auger

SPT (N) Value

Natural Moisture

Datum: Geodetic

Dynamic Cone Test

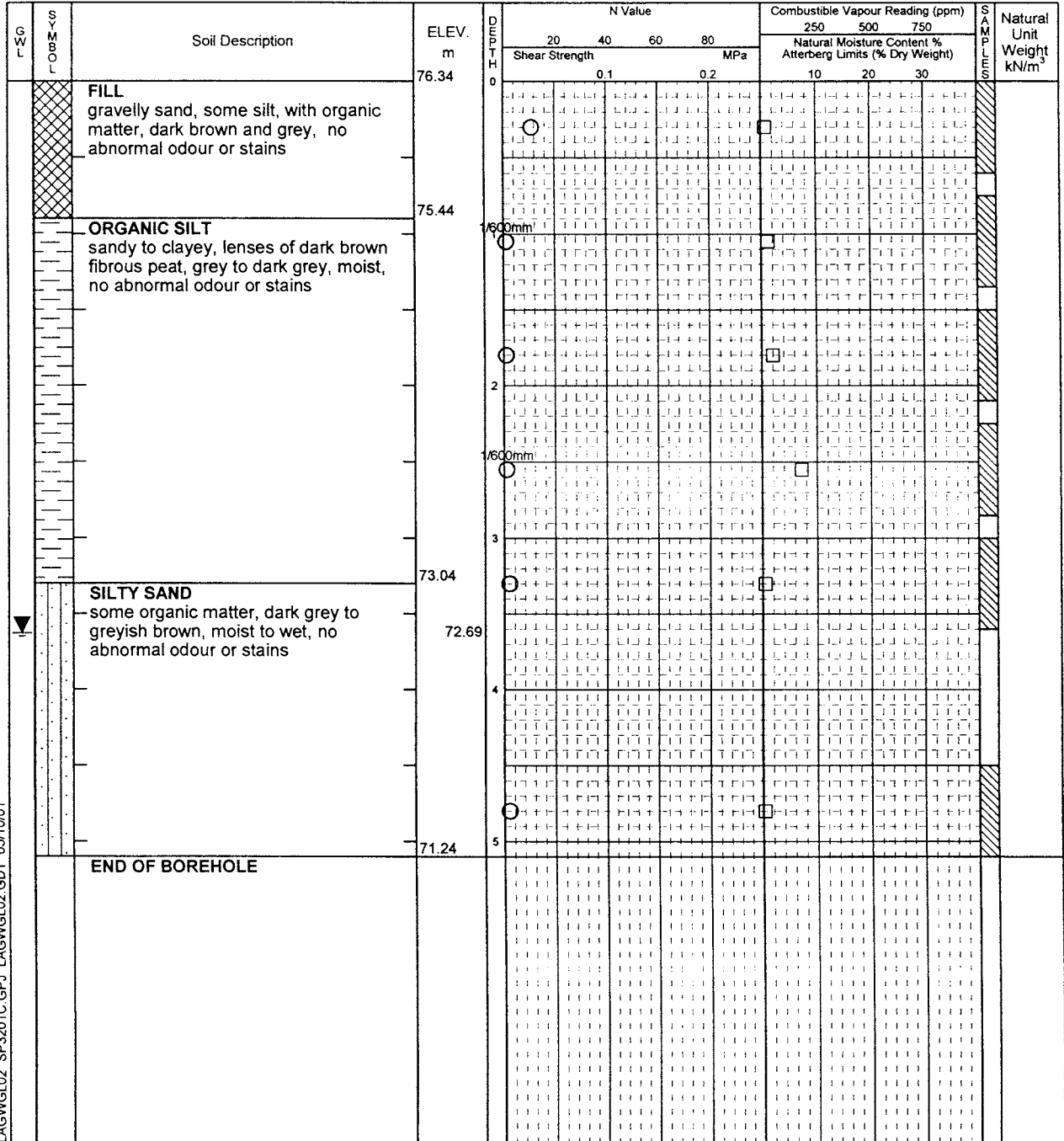
Plastic and Liquid Limit

Shelby Tube

Undrained Triaxial at % Strain at Failure

Field Vane Test

Penetrometer



LAGWGL02 SP3201C.GPJ LAGWGL02.GDT 05/10/01



Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	3.65	

Project No. SP3201C

Log of Borehole BH601

REVISED

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 12, 2001

Auger Sample

Combustible Vapour Reading

SPT (N) Value

Natural Moisture

Dynamic Cone Test

Plastic and Liquid Limit

Shelby Tube

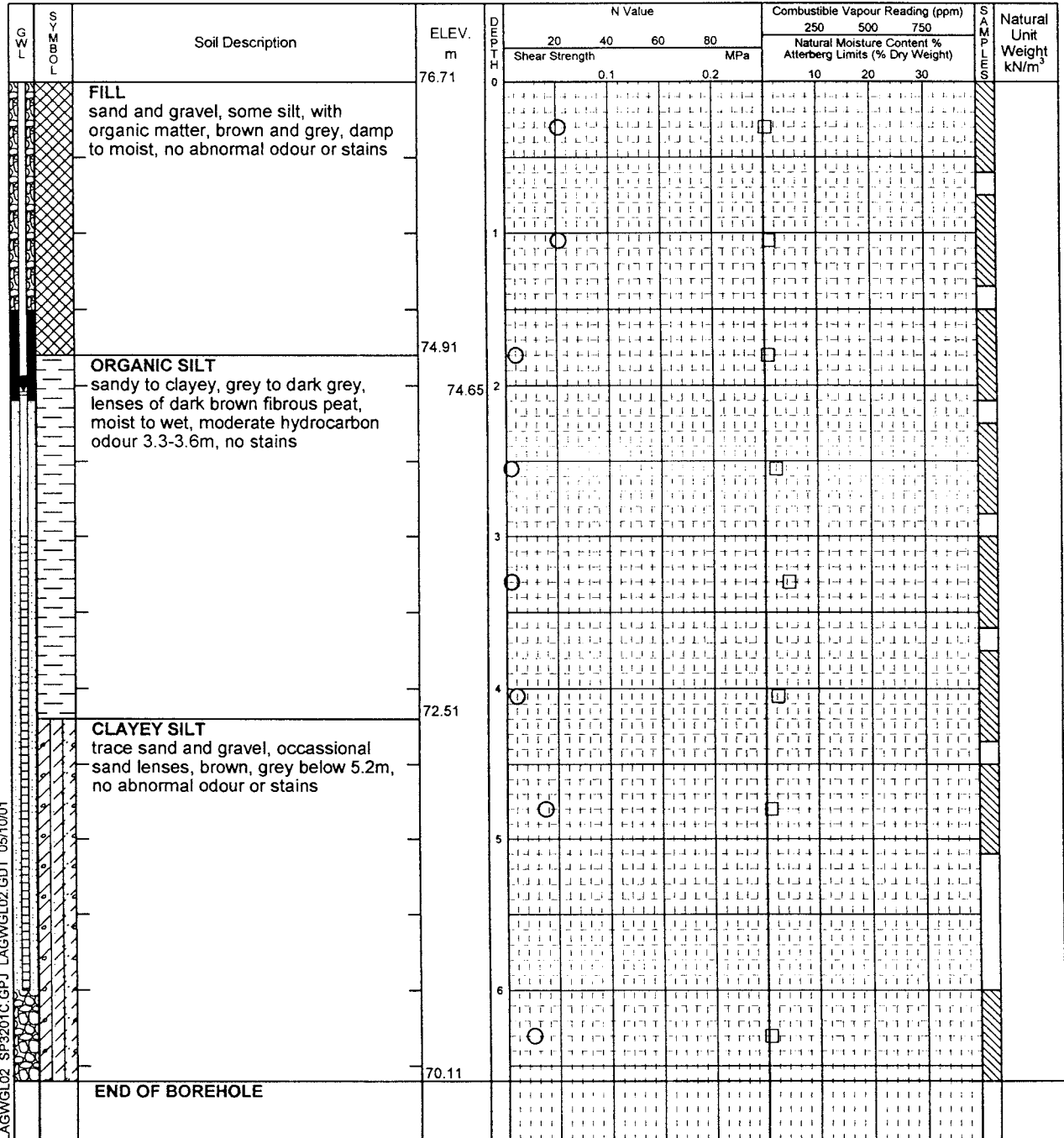
Undrained Triaxial at

Drill Type: Hollow Stem Auger

Field Vane Test

% Strain at Failure

Datum: Geodetic



**Shaheen & Peaker
Consulting Engineers**

Time	Water Level (m)	Depth to Cave (m)
At completion July 16, 2001	Dry 2.06	

Project No. SP3201C

Log of Borehole BH602

REVISED

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 12, 2001

Auger Sample

Combustible Vapour Reading

Drill Type: Hollow Stem Auger

SPT (N) Value

Natural Moisture

Datum: Geodetic

Dynamic Cone Test

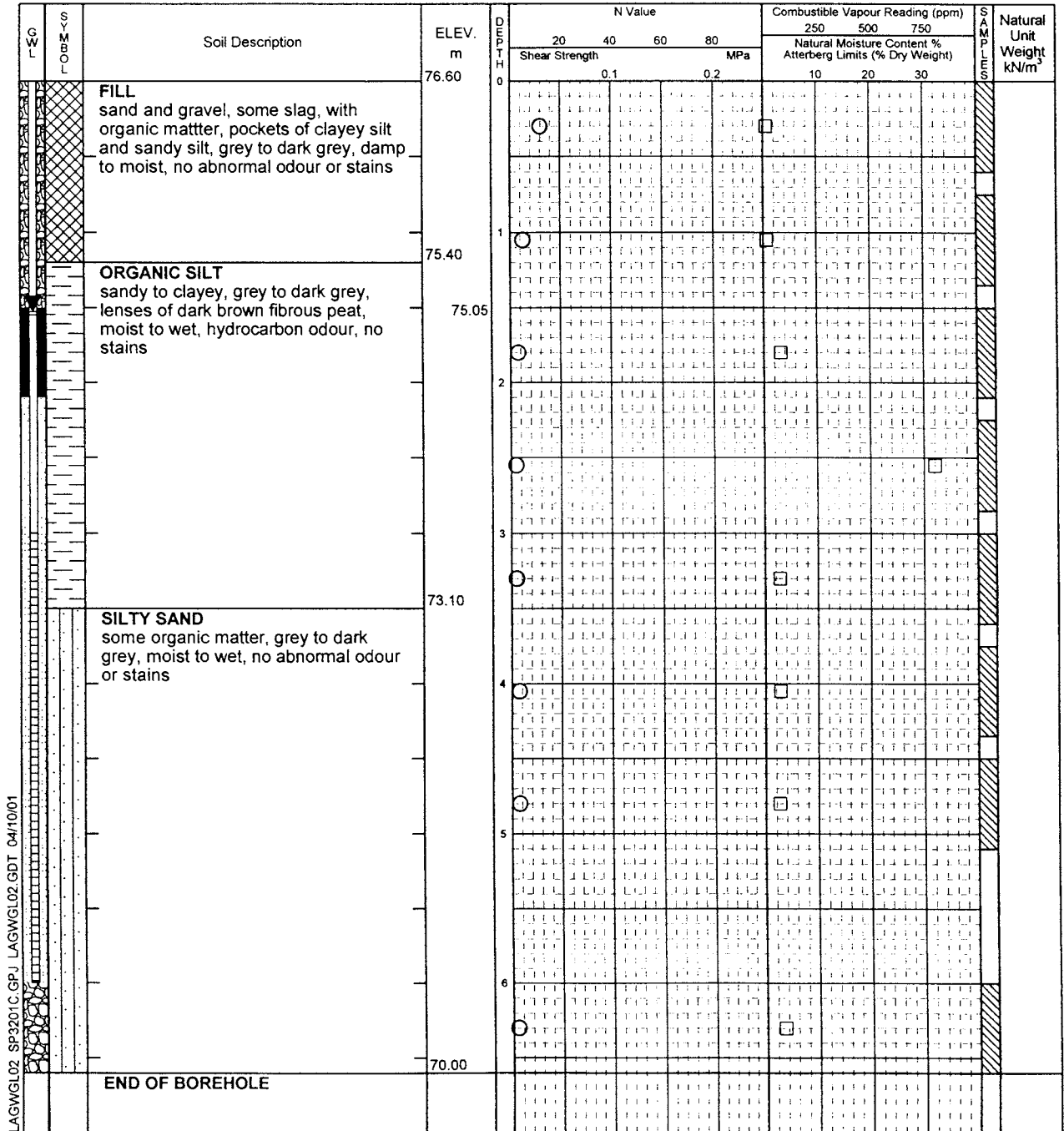
Plastic and Liquid Limit

Shelby Tube

Undrained Triaxial at % Strain at Failure

Field Vane Test

Penetrometer



Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	4.40	
July 16, 2001	1.46	
September 7, 2001	1.61	
September 26, 2001	1.59	
October 2, 2001	1.55	

Project No. SP3201C

Log of Borehole BH603

REVISED

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 12, 2001

Auger Sample

Combustible Vapour Reading

Drill Type: Hollow Stem Auger

SPT (N) Value

Natural Moisture

Datum: Geodetic

Dynamic Cone Test

Plastic and Liquid Limit

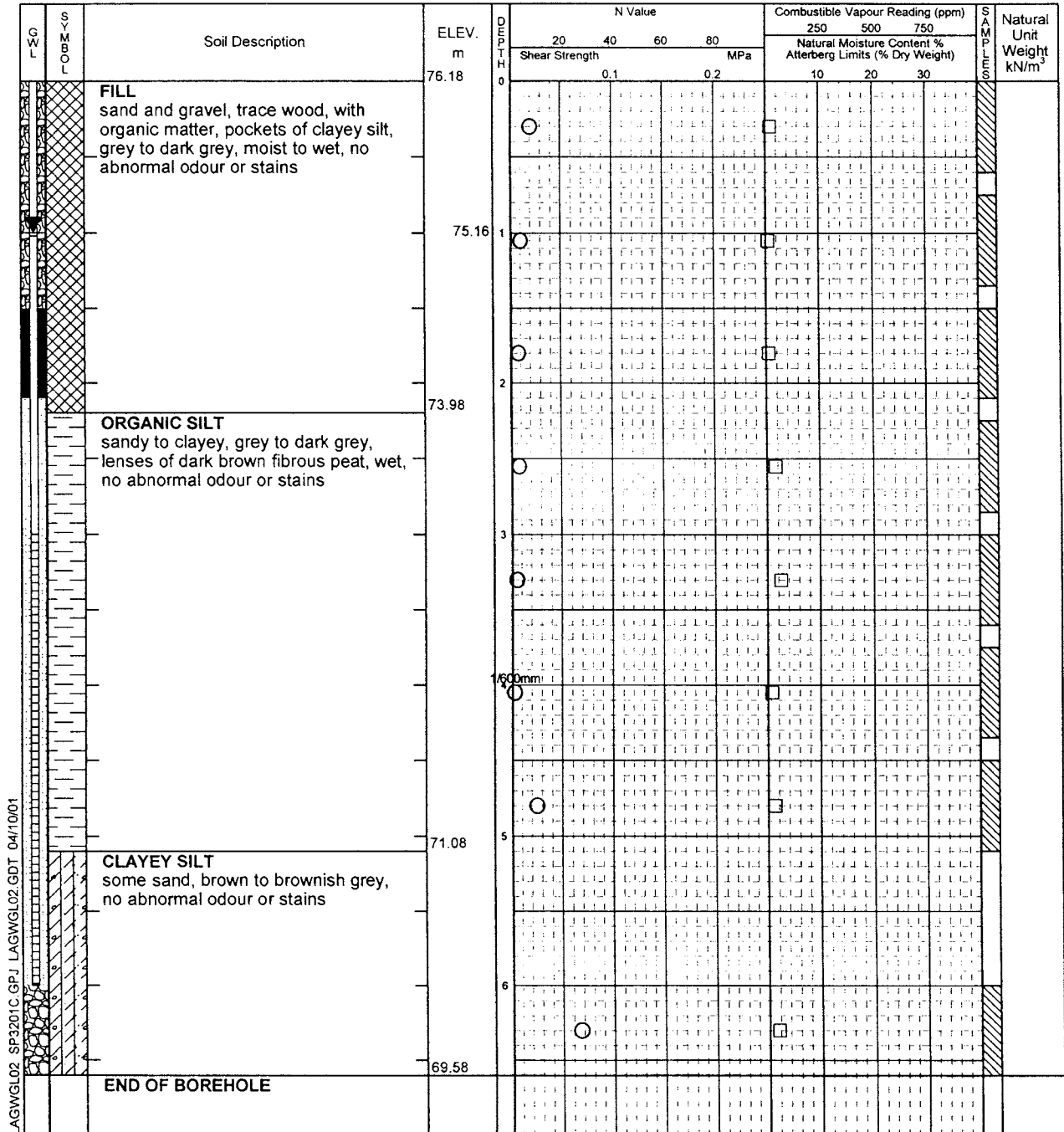
Shelby Tube

Undrained Triaxial at \oplus

Field Vane Test

% Strain at Failure \oplus

Penetrometer \blacktriangle



**Shaheen & Peaker
Consulting Engineers**

Time	Water Level (m)	Depth to Cave (m)
At completion	3.15	
July 16, 2001	0.95	
September 7, 2001	1.16	
September 26, 2001	1.04	
October 2, 2001	1.02	

Project No. SP3201C

Log of Borehole BH604

REVISED

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

SPT (N) Value

Natural Moisture

Dynamic Cone Test

Plastic and Liquid Limit

Drill Type: Hollow Stem Auger

Shelby Tube

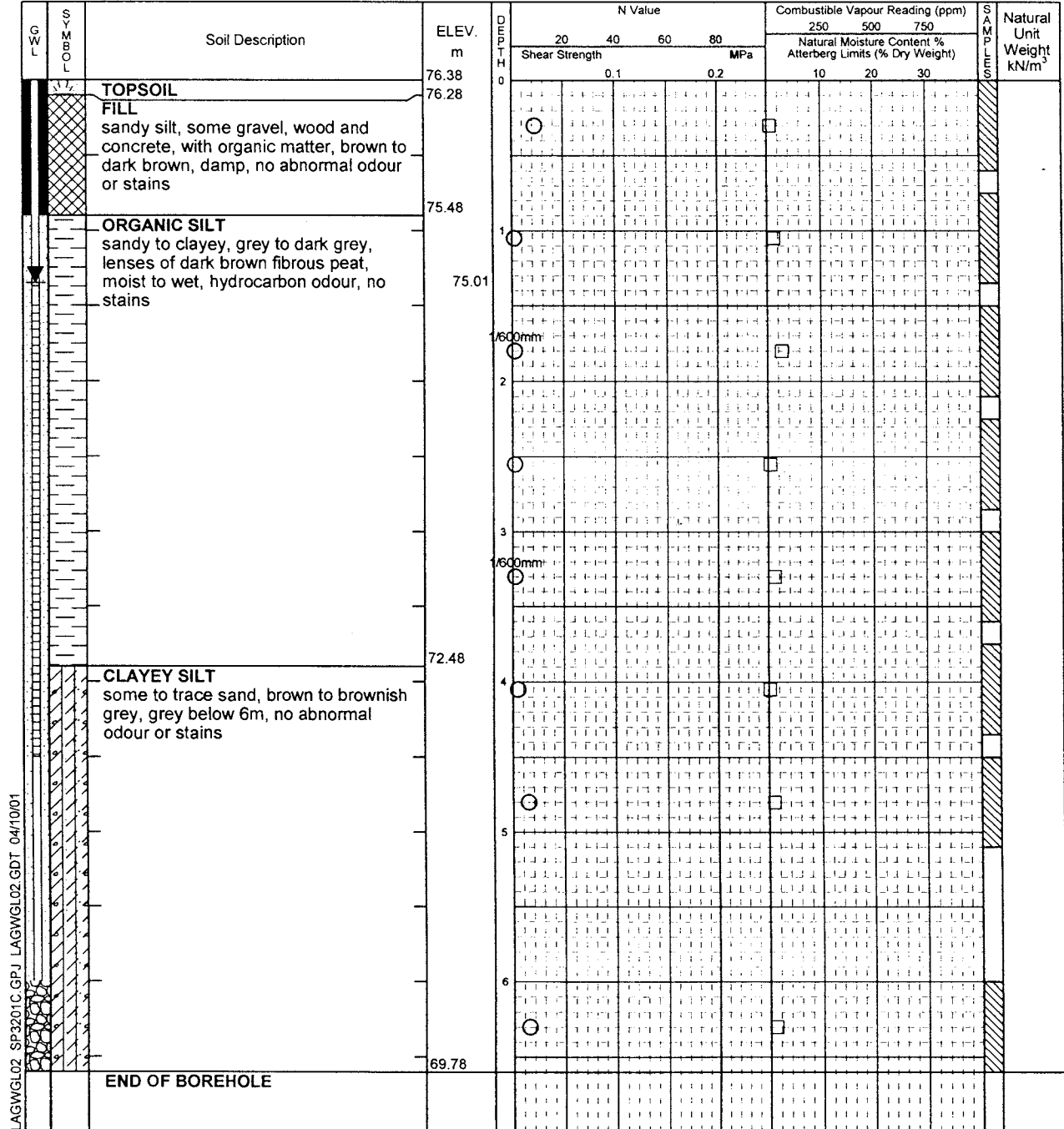
Undrained Triaxial at

Datum: Geodetic

Field Vane Test

% Strain at Failure

Penetrometer



**Shaheen & Peaker
Consulting Engineers**

Time	Water Level (m)	Depth to Cave (m)
At completion	3.05	
July 16, 2001	1.28	
September 7, 2001	1.52	
September 26, 2001	1.38	
October 2, 2001	1.37	

Project No. SP3201C

Log of Borehole **BH605**

REVISED

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismantling, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

Drill Type: Hollow Stem Auger

SPT (N) Value

Natural Moisture

Datum: Geodetic

Dynamic Cone Test

Plastic and Liquid Limit

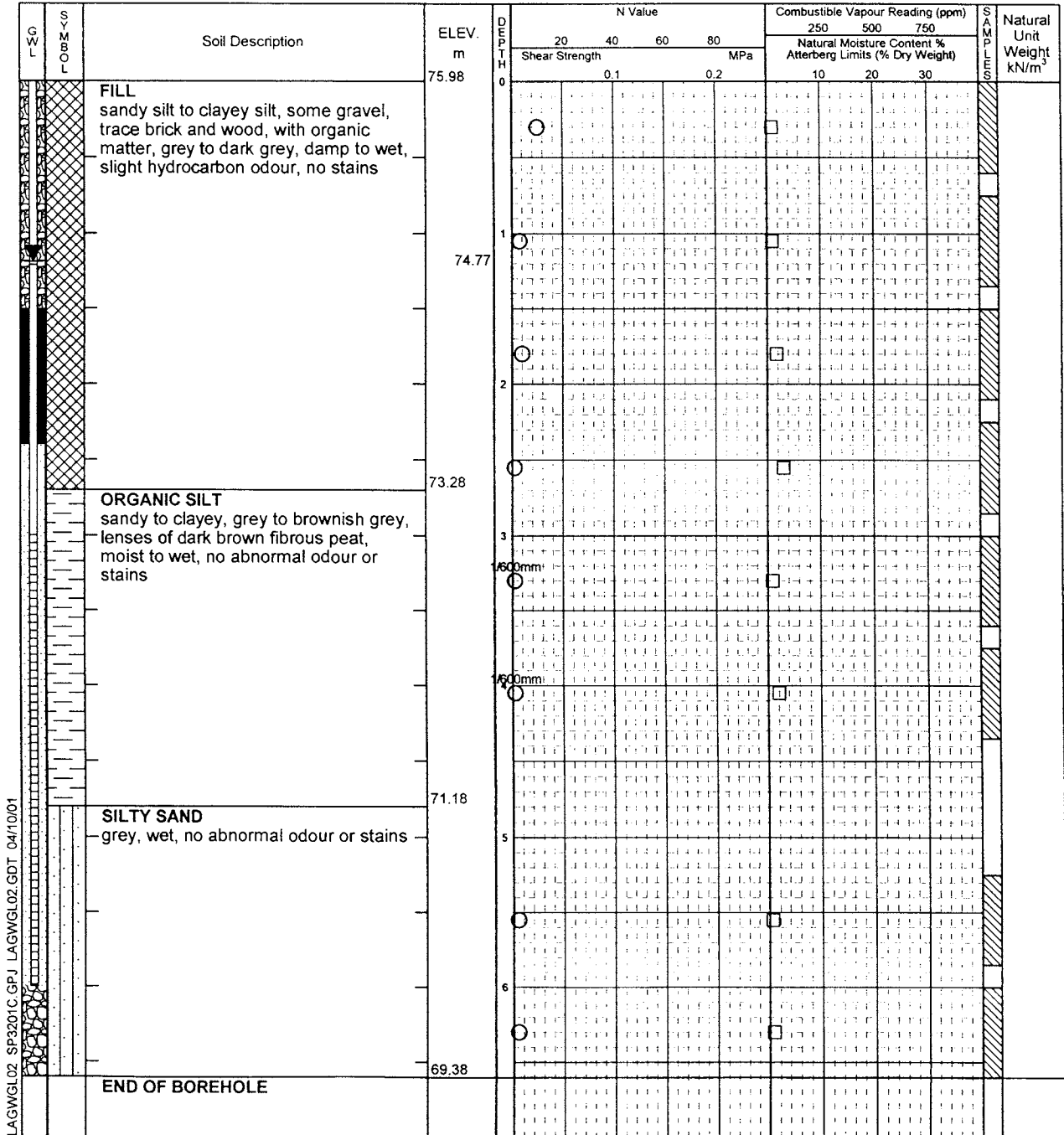
Shelby Tube

Undrained Triaxial at

Field Vane Test

% Strain at Failure

Penetrometer



**Shaheen & Peaker
Consulting Engineers**

Time	Water Level (m)	Depth to Cave (m)
At completion	1.70	
July 16, 2001	1.06	
September 7, 2001	1.15	
September 26, 2001	1.22	
October 2, 2001	1.21	

APPENDIX B

TEST PIT LOGS

Project No. SP3201C

Log of Test Pit TP1

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismantling, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

SPT (N) Value

Natural Moisture

Excavated By: Rubber Tire Backhoe

Dynamic Cone Test

Plastic and Liquid Limit

Datum: Geodetic

Shelby Tube

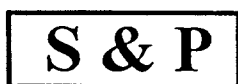
Undrained Triaxial at % Strain at Failure

Field Vane Test

Penetrometer

LWG	SYMBOL	Soil Description	ELEV. m	DEPTH m	N Value				Combustible Vapour Reading (ppm)			SAMPLES	Natural Unit Weight kN/m ³
					20	40	60	80	250	500	750		
					Shear Strength MPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)				
		FILL sandy silt, trace gravel, cinders, glass, brick and concrete fragments, brown, moist, no abnormal odour or stains, gravel, some sand and silt, grey, moist, no abnormal odour or stains, railway ties at 0.5m depth	76.39	0									
		sand, some silt, trace gravel and brick fragments, brown and dark brown, moist, no abnormal odour or stains, concrete pad at 2.7m depth at west edge of test pit, railway ties at 2.3m depth at east edge of test pit	76.09										
			75.59	1									
				2									
			73.89										
		▼ silty sand, some concrete, trace gravel, ash, cinders, glass and brick fragments, dark grey, black stains, hydrocarbon odour	73.69										
		SAND some silt, brown, wet, no abnormal odour or stains	73.49	3									
		END OF TEST PIT	73.19										
		TEST PIT WAS BACKFILLED UPON COMPLETION											

TESTPIT SP3201C.GPJ LAGWGL02.GDT 25/07/01



Shaheen & Peaker Limited
Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	2.70	

Project No. SP3201C

Log of Test Pit TP2

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismantling, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

SPT (N) Value

Natural Moisture

Excavated By: Rubber Tire Backhoe

Dynamic Cone Test

Plastic and Liquid Limit

Datum: Geodetic

Shelby Tube

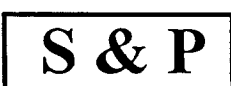
Undrained Triaxial at % Strain at Failure

Field Vane Test

Penetrometer

GWL	SYMBOLOGY	Soil Description	ELEV. m	DEPTH m	N Value				Combustible Vapour Reading (ppm)			Natural Unit Weight kN/m ³	
					Shear Strength MPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)				
					20	40	60	80	250	500	750		
		FILL sand, some silt, brown, moist, no abnormal odour or stains	76.47	0									
		silty sand, trace wood, steel, glass, ash, cinders, plastic and brick fragments, dark grey, moist, black stains, faint unidentified odour	76.12										
		sand, some silt, greenish grey, moist, no abnormal odour or stains	75.87										
		silty sand, trace wood, steel, glass, ash, cinders, gravel and brick fragments, black, wet, hydrocarbon odour	74.97										
		organic silt, trace roots and grass, grey, wet, no abnormal odour or stains	74.47	2									
		silty sand, trace gravel, steel, wood and brick fragments, black, wet, oily sheen and strong hydrocarbon odour	73.87										
			73.67										
		PEAT fibrous, dark brown, moist, no abnormal odour or stains	73.27	3									
		END OF TEST PIT	72.97										
		TEST PIT WAS BACKFILLED UPON COMPLETION											

TESTPIT SP3201C.GPJ LAGWGL02.GDT 25/07/01



Shaheen & Peaker Limited
Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	2.80	

Project No. SP3201C

Log of Test Pit TP3

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

SPT (N) Value

Natural Moisture

Excavated By: Rubber Tire Backhoe

Dynamic Cone Test

Plastic and Liquid Limit

Datum: Geodetic

Shelby Tube

Undrained Triaxial at

Field Vane Test

% Strain at Failure

Penetrometer

SYMBOL	Soil Description	ELEV. m	DEPTH (m)	N Value				Combustible Vapour Reading (ppm)			SAMPLES	Natural Unit Weight kN/m ³
				Shear Strength MPa				250	500	750		
				0.1	0.2	10	20	30				
	TOPSOIL	76.21	0									
	FILL	76.06										
	silty sand, brown, moist, no abnormal odour or stains	75.81										
	wood fibre, some sand and silt, dark orangeish brown	75.61										
	sand, trace silt, brown	75.41										
	ORGANIC SILT		1									
	trace roots, lenses of dark brown fibrous peat, moist to wet, no abnormal odour or stains											
			2									
			3									
	END OF TEST PIT	72.91										
	TEST PIT WAS BACKFILLED UPON COMPLETION											

TESTPIT SP3201C.GPJ LAGWGL02.GDT 25/07/01



Shaheen & Peaker Limited
Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	Dry	

Project No. SP3201C

Log of Test Pit TP4

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

SPT (N) Value

Natural Moisture

Excavated By: Rubber Tire Backhoe

Dynamic Cone Test

Plastic and Liquid Limit

Datum: Geodetic

Shelby Tube

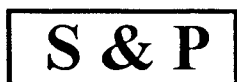
Undrained Triaxial at % Strain at Failure

Field Vane Test

Penetrometer

SYMBOL	Soil Description	ELEV. m	DEPTH	N Value				Combustible Vapour Reading (ppm)			SAMPLES	Natural Unit Weight kN/m ³
				Shear Strength MPa				250	500	750		
				20	40	60	80	Natural Moisture Content % Atterberg Limits (% Dry Weight)				
	FILL silty sand, some topsoil with roots and grass, brown, damp, no abnormal odour or stains	76.22	0									
	sand, some silt, brown, moist	75.82										
	silty sand, trace steel, glass, ash and cinders, orangeish brown	75.42	1									
	ORGANIC SILT some clay, trace of grass and roots, lenses of peat, dark grey, wet, no abnormal odour or stains	74.72	2									
	SILTY SAND trace of organic matter, grey, wet, no abnormal odour or stains	74.12										
		73.52										
	END OF TEST PIT	73.22	3									
	TEST PIT WAS BACKFILLED UPON COMPLETION											

TESTPIT_SP3201C.GPJ_LAGWGL02.GDT_25/07/01



Shaheen & Peaker Limited
Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	2.70	

Project No. SP3201C

Log of Test Pit TP5

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

Excavated By: Rubber Tire Backhoe

SPT (N) Value

Natural Moisture

Datum: Geodetic

Dynamic Cone Test

Plastic and Liquid Limit

Shelby Tube

Undrained Triaxial at % Strain at Failure

Field Vane Test

Penetrometer

SYMBOL	Soil Description	ELEV. m	DEPTH m	N Value				Combustible Vapour Reading (ppm)			SAMPLES	Natural Unit Weight kN/m ³
				Shear Strength MPa				Natural Moisture Content %				
				20	40	60	80	250	500	750		
[Cross-hatched symbol]	FILL silty sand, trace gravel, topsoil pockets, brown, damp, no abnormal odour or stains sand, trace silt	76.36	0									
		75.86										
[Horizontal line symbol]	ORGANIC SILT trace of sand and silt, trace of wood and grass, black, wet, slight hydrocarbon odour	75.56	1									
		73.96	2									
[Vertical line symbol]	SILTY SAND sandy silt to silty sand, some clay, grey, moist to wet, no abnormal odour or stains	73.36										
	END OF TEST PIT TEST PIT WAS BACKFILLED UPON COMPLETION											

TESTPIT_SP3201C.GPJ_LAGWGL02.GDT_25/07/01



Shaheen & Peaker Limited
Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	Dry	

Project No. SP3201C

Log of Test Pit TP6

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

Excavated By: Rubber Tire Backhoe

SPT (N) Value

Natural Moisture

Datum: Geodetic

Dynamic Cone Test

Plastic and Liquid Limit

Shelby Tube

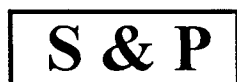
Undrained Triaxial at % Strain at Failure

Field Vane Test

Penetrometer

SOIL SAMPLES	Soil Description	ELEV. m	DEPTH 0	N Value				Combustible Vapour Reading (ppm)			SAMPLING	Natural Unit Weight kN/m ³
				20	40	60	80	250	500	750		
				Shear Strength MPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)				
	FILL gravel and sand, some silt, brown, damp, no abnormal odour or stains	76.81	0									
	sand, trace silt	76.31										
	clayey silt, some sand, trace gravel, wood, ash, cinders, glass, bricks, concrete and reinforced concrete, brown, moderate unidentified odour, no stains	75.91	1									
	dark grey, wet, hydrocarbon odour and pockets of black staining	74.51	2									
	END OF TEST PIT	73.71	3									
	TEST PIT WAS BACKFILLED UPON COMPLETION	73.51										

TESTPIT_SP3201C.GPJ_LAGWGL02.GDT_22/08/01



Shaheen & Peaker Limited
Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	3.10	

Project No. SP3201C

Log of Test Pit TP7

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

Excavated By: Rubber Tire Backhoe

SPT (N) Value

Natural Moisture

Datum: Geodetic

Dynamic Cone Test

Plastic and Liquid Limit

Shelby Tube

Undrained Triaxial at % Strain at Failure

Field Vane Test

Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value				Combustible Vapour Reading (ppm)			SAMPLE	Natural Unit Weight kN/m ³	
					20	40	60	80	250	500	750			
					Shear Strength MPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)					
		FILL silty sand, trace gravel, wood, paper, cinders, concrete, brown, moist, no abnormal odour or stains	76.42	0	0.1	0.2								
		black, strong hydrocarbon and unidentified odours	75.62	1										
		clayey silt, trace gravel, wood, steel, glass, black, wet, oily sheen, liquid phase hydrocarbons (free product), strong hydrocarbon odour	75.22	1										
		silty sand, black, oily sheen, strong hydrocarbon odour	74.52	2										
		ORGANIC SILT lenses of fibrous peat, black, wet, strong hydrocarbon odour	73.72	3										
		SILTY SAND some silt, dark grey, wet, hydrocarbon odour	72.82											
		END OF TEST PIT TEST PIT WAS BACKFILLED UPON COMPLETION	72.42											

TESTPIT SP3201C.GPJ LAGWGL02.GDT 22/08/01



Shaheen & Peaker Limited
Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	3.6	

Project No. SP3201C

Log of Test Pit TP8

Drawing No. _____

Project: Soil and Groundwater Quality Assessment

Sheet No. 1 of 1

Location: Gardiner Expressway Dismanting, Toronto, Ontario

Date Drilled: July 11, 2001

Auger Sample

Combustible Vapour Reading

SPT (N) Value

Natural Moisture

Excavated By: Rubber Tire Backhoe

Dynamic Cone Test

Plastic and Liquid Limit

Datum: Geodetic

Shelby Tube

Undrained Triaxial at % Strain at Failure

Field Vane Test

Penetrometer

G W L	S Y M B O L	Soil Description	ELEV. m	D E P T H m	N Value				Combustible Vapour Reading (ppm)			S A M P L E S	Natural Unit Weight kN/m ³
					Shear Strength				Natural Moisture Content %				
					MPa				Atterberg Limits (% Dry Weight)				
		FILL silty sand, trace gravel, topsoil, steel, plastic, reinforced concrete and brick fragments, brown, moist, no abnormal odour or stains	77.32	0	0.1	0.2							
		trace ash, cinders, glass and wood, black, strong unidentified odour	76.52	1									
		black, wet, oily sheen, strong hydrocarbon odour	75.32	2									
		silty sand, brown, no abnormal odour or stains	74.52	3									
		END OF TEST PIT	74.02										
		TEST PIT WAS BACKFILLED UPON COMPLETION											

TESTPIT SP3201C.GPJ LAGWGL02.GDT 25/07/01



Shaheen & Peaker Limited
Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	2.2	

APPENDIX C

LABORATORY CERTIFICATES OF ANALYSES



Client: Geo-Canada
Project Reference: SP3201C
Work Order: 2156586
Matrix: Soil

VOLATILE ORGANIC COMPOUNDS

Date: 18-Jul-01

Units: micrograms/gram (ug/g) dry weight

Compound	EQL ug/g	TP2-SA7	TP2-SA7 Dup.	BH605-SS3
Chloromethane	1.0	nd	nd	nd
Vinyl Chloride	0.5	nd	nd	nd
Bromomethane	1.0	nd	nd	nd
Chloroethane	0.5	nd	nd	nd
Trichlorofluoromethane	0.2	nd	nd	nd
Acetone	10.0	nd	nd	nd
1,1-Dichloroethene	0.1	nd	nd	nd
Dichloromethane (Methylene Chloride)	0.5	nd	nd	nd
trans-1,2-Dichloroethene	0.1	nd	nd	nd
Methyl-t-Butyl Ether	0.1	nd	nd	nd
1,1-Dichloroethane	0.1	nd	nd	nd
Methyl Ethyl Ketone (MEK)	5.0	nd	nd	nd
cis-1,2-Dichloroethene	0.1	nd	nd	nd
Chloroform	0.1	nd	nd	nd
1,2-Dichloroethane	0.1	nd	nd	nd
1,1,1-Trichloroethane	0.1	nd	nd	nd
Carbon Tetrachloride	0.1	nd	nd	nd
Benzene	0.05	nd	nd	0.1
1,2-Dichloropropane	0.1	nd	nd	nd
Trichloroethene (Trichloroethylene)	0.1	nd	nd	nd
1,1-Dibromodichloromethane	0.1	nd	nd	nd
cis-1,3-Dichloropropene	0.1	nd	nd	nd
Methyl Isobutyl Ketone (MIBK)	5.0	nd	nd	nd
trans-1,3-Dichloropropene	0.1	nd	nd	nd
1,1,2-Trichloroethane	0.1	nd	nd	nd
Toluene	0.1	nd	nd	0.4
2-Hexanone	5.0	nd	nd	nd
1,1-Dibromochloromethane	0.1	nd	nd	nd
1,2-Dibromoethane (Ethylene dibromide)	0.1	nd	nd	nd
Tetrachloroethene (Perchloroethylene)	0.1	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.1	nd	nd	nd
Chlorobenzene	0.1	nd	nd	0.2
Methylbenzene	0.1	nd	nd	0.2
o-Xylene & p-Xylene	0.1	0.3	0.6	0.5
Bromoform	0.1	nd	nd	nd
Styrene	0.1	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.1	nd	nd	nd
m-Xylene	0.1	nd	nd	0.1
1,3-Dichlorobenzene	0.1	nd	nd	nd
1,4-Dichlorobenzene	0.1	nd	nd	nd
1,2-Dichlorobenzene	0.1	nd	nd	nd
Surrogate Standard Recoveries	(Control Limits)			
1,1-Dibromofluoromethane (70-130%)		88%	88%	91%
1,2-Dibromoethane-d8 (70-130%)		98%	92%	96%
4-Bromofluorobenzene (70-130%)		121%	117%	121%





Client: Geo-Canada
 Project Reference: SP3201C
 Work Order: 2156586
 Matrix: Soil

VOLATILE ORGANIC COMPOUNDS

Date: 18-Jul-01

Units: micrograms/gram (ug/g) dry weight

Compound	EQL ug/g	Method Blank			Spiked Method Blank			
		Result	Upper Limit	Accept	% Recovery	Lower Limit	Upper Limit	Accept
Bromomethane	1.0	nd	1.0	yes	103	60	140	yes
Vinyl Chloride	0.5	nd	0.5	yes	107	60	140	yes
Bromomethane	1.0	nd	1.0	yes	98	60	140	yes
Bromoethane	0.5	nd	0.5	yes	127	60	140	yes
Trichlorofluoromethane	0.2	nd	0.2	yes	91	60	140	yes
Acetone	10.0	nd	10.0	yes	66	60	140	yes
1,1-Dichloroethene	0.1	nd	0.1	yes	91	70	130	yes
Dichloromethane (Methylene Chloride)	0.5	nd	0.5	yes	80	70	130	yes
trans-1,2-Dichloroethene	0.1	nd	0.1	yes	92	70	130	yes
Methyl-t-Butyl Ether	0.1	nd	0.1	yes	87	70	130	yes
1,1-Dichloroethane	0.1	nd	0.1	yes	92	70	130	yes
Methyl Ethyl Ketone (MEK)	5.0	nd	5.0	yes	71	60	140	yes
cis-1,2-Dichloroethene	0.1	nd	0.1	yes	92	70	130	yes
Chloroform	0.1	nd	0.1	yes	92	70	130	yes
1,2-Dichloroethane	0.1	nd	0.1	yes	94	70	130	yes
1,1,1-Trichloroethane	0.1	nd	0.1	yes	91	70	130	yes
Carbon Tetrachloride	0.1	nd	0.1	yes	96	70	130	yes
Benzene	0.05	nd	0.05	yes	95	70	130	yes
1,2-Dichloropropane	0.1	nd	0.1	yes	94	70	130	yes
Trichloroethene (Trichloroethylene)	0.1	nd	0.1	yes	97	70	130	yes
1,1-Dibromochloromethane	0.1	nd	0.1	yes	92	70	130	yes
cis-1,3-Dichloropropene	0.1	nd	0.1	yes	92	70	130	yes
Methyl Isobutyl Ketone (MIBK)	5.0	nd	5.0	yes	96	60	140	yes
trans-1,3-Dichloropropene	0.1	nd	0.1	yes	96	70	130	yes
1,1,2-Trichloroethane	0.1	nd	0.1	yes	99	70	130	yes
Toluene	0.1	nd	0.1	yes	99	70	130	yes
2-Hexanone	5.0	nd	5.0	yes	93	60	140	yes
Dibromochloromethane	0.1	nd	0.1	yes	97	70	130	yes
1,2-Dibromoethane (Ethylene dibromide)	0.1	nd	0.1	yes	102	70	130	yes
Perchloroethene (Perchloroethylene)	0.1	nd	0.1	yes	97	70	130	yes
1,1,1,2-Tetrachloroethane	0.1	nd	0.1	yes	94	70	130	yes
Chlorobenzene	0.1	nd	0.1	yes	98	70	130	yes
Ethylbenzene	0.1	nd	0.1	yes	95	70	130	yes
m-Xylene & p-Xylene	0.1	nd	0.1	yes	94	70	130	yes
Bromoform	0.1	nd	0.1	yes	102	70	130	yes
Styrene	0.1	nd	0.1	yes	97	70	130	yes
1,1,2,2-Tetrachloroethane	0.1	nd	0.1	yes	111	70	130	yes
o-Xylene	0.1	nd	0.1	yes	92	70	130	yes
1,3-Dichlorobenzene	0.1	nd	0.1	yes	98	70	130	yes
1,4-Dichlorobenzene	0.1	nd	0.1	yes	103	70	130	yes
1,2-Dichlorobenzene	0.1	nd	0.1	yes	103	70	130	yes
Surrogate Standard Recoveries	(Control Limits)							
1-Bromofluoromethane		99%	70-130%	yes	97	70	130	yes
Toluene-d8		99%	70-130%	yes	98	70	130	yes
4-Bromofluorobenzene		99%	70-130%	yes	102	70	130	yes





Client: Geo-Canada
Project Reference: SP3201C
Work Order: 2156586
Matrix: Soil

VOLATILE ORGANIC COMPOUNDS

Date: 18-Jul-01

Legend: EQL = Estimated Quantitation Limit for undiluted samples
nd = Not Detected Above EQL
Dup. = Duplicate
* = Detected below EQL but passed compound identification criteria

Date of sample receipt: July 13, 2001
Date of sample analysis: July 17 & 18, 2001

Analytical Method:

Due to a level of petroleum hydrocarbon compounds beyond the appropriate range, the samples could not be analysed by the low level direct purge method. The samples were preextracted in methanol and the extracts analysed by high level purge & trap (US EPA Method 5035) gas chromatography/mass spectrometry using US EPA Method 8260B (modified).

Note: Estimated quantitation limit is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

NOTE: All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analysis done. Your samples will be retained by PAS for a period of 30 days following reporting or as per specific contractual arrangement.

Job Approved By:


.....
for Dinesh Rangarajan M.Sc.
Chemist





ANALYTICAL SERVICES

GEO-CANADA

250 Galaxy Blvd.
Etobicoke, ON
M9W 5R8

RECEIVED JUL 8 1 2001

20-Jul-2001

Page: 1
Copy: 1 of 2

Attn: David Baigent
Project: SP3201C

Received: 13-Jul-2001 12:05
PO #: SP3201C

Job: 2156586

Status: Final

Soil Samples

Sample Id	TPH-Heavy Oils		TPH-Gas+Diesel		TPH-Gas		TPH-Diesel		Benzene		Toluene	
	SM 5520F	ug/g	Calc.	ug/g	HS-GC/FID	ug/g	GC/FID	ug/g	HS-GC/PID	ug/g	HS-GC/PID	ug/g
BH602-SS4		800		110		<10		110		<0.02		<0.02
BH601-SS5		6000		2000		31		2000		0.03		0.36
Blank		<100		<10		<10		<10		<0.02		<0.02
QC Standard (found)		96%		---		100%		113%		108. %		96.0%
QC Standard (expected)		100%		---		100%		100%		100. %		100. %

Ethylbenzene m-&p-Xylenes o-Xylene

Sample Id	HS-GC/PID		HS-GC/PID		HS-GC/PID	
	ug/g	%	ug/g	%	ug/g	%
BH602-SS4	<0.02		<0.04		<0.02	
BH601-SS5	0.33		0.59		0.61	
Blank	<0.02		<0.04		<0.02	
QC Standard (found)	98.0%		97.0%		94.0%	
QC Standard (expected)	100. %		100. %		100. %	





ANALYTICAL SERVICES

GEO-CANADA
250 Galaxy Blvd.
Etobicoke, ON
M9W 5R8

20-Jul-2001

Page: 2
Copy: 1 of 2

Attn: David Baigent
Project: SP3201C
PO #: SP3201C
Received: 13-Jul-2001 12:05

Status: Final

Job: 2156586

Soil Samples

Sample Id	TPH-Heavy Oils		TPH-Gas+Diesel		TPH-Gas		TPH-Diesel		Benzene		Toluene	
	SM 5520F	ug/g	Calc.	ug/g	HS-GC/FID	GC/FID	GC/FID	HS-GC/PID	HS-GC/PID	HS-GC/PID	HS-GC/PID	ug/g
TP7-SA3	9700			21000	3200	18000	18000	18.4	35.6			
TP5-SA3	9400			2900	100	2800	2800	<0.02	0.05			
Blank	<100			<10	<10	<10	<10	<0.02	<0.02			
QC Standard (found)	96%			---	100%	113%	113%	108. %	96.0%			
QC Standard (expected)	100%			---	100%	100%	100%	100. %	100. %			

Ethylbenzene m-&p-Xylenes o-Xylene

Sample Id	HS-GC/PID		HS-GC/PID		HS-GC/PID	
	ug/g	%	ug/g	%	ug/g	%
TP7-SA3	181.		536.		164.	
TP5-SA3	0.54		0.84		0.89	
Blank	<0.02		<0.04		<0.02	
QC Standard (found)	98.0%		97.0%		94.0%	
QC Standard (expected)	100. %		100. %		100. %	



ANALYTICAL SERVICES

Client: Geo-Canada
 Project Reference: SP3201C
 Work Order Number: 2156586B
 Matrix: Soil

BASE-NEUTRAL EXTRACTABLES

Date: 20-Jul-01

Compound	EQL µg/g	Method Blank			Spiked Method Blank			
		Result	Upper Limit	Accept	% Recovery	Lower Limit	Upper Limit	Accept
bis(2-Chloroethyl)ether	0.1	nd	0.1	yes	68	31	110	yes
1,3-Dichlorobenzene	0.1	nd	0.1	yes	61	30	108	yes
1,4-Dichlorobenzene	0.1	nd	0.1	yes	63	31	108	yes
1,2-Dichlorobenzene	0.1	nd	0.1	yes	64	32	111	yes
bis(2-Chloroisopropyl)ether	0.1	nd	0.1	yes	79	36	126	yes
Hexachloroethane	0.1	nd	0.1	yes	75	28	106	yes
N-Nitrosodi-n-Propylamine	0.1	nd	0.1	yes	78	38	118	yes
Nitrobenzene	0.1	nd	0.1	yes	65	35	112	yes
Isophorone	0.1	nd	0.1	yes	72	44	114	yes
bis(2-Chloroethoxy)methane	0.1	nd	0.1	yes	70	41	116	yes
1,2,4-Trichlorobenzene	0.1	nd	0.1	yes	64	31	113	yes
Naphthalene	0.1	nd	0.1	yes	67	36	110	yes
o-Chloroaniline	0.2	nd	0.2	yes	64	38	142	yes
Hexachlorobutadiene	0.1	nd	0.1	yes	61	32	112	yes
1-Methylnaphthalene	0.1	nd	0.1	yes	62	42	107	yes
1-Methylnaphthalene	0.1	nd	0.1	yes	64	44	110	yes
Hexachlorocyclopentadiene	0.5	nd	0.5	yes	49	27	117	yes
1-Chloronaphthalene	0.1	nd	0.1	yes	59	41	111	yes
Biphenyl	0.1	nd	0.1	yes	70	45	99	yes
Acenaphthylene	0.1	nd	0.1	yes	72	50	113	yes
Dimethyl Phthalate	0.2	nd	0.2	yes	69	55	112	yes
1,6-Dinitrotoluene	0.1	nd	0.1	yes	77	56	114	yes
Acenaphthene	0.1	nd	0.1	yes	64	49	105	yes
2,4-Dinitrotoluene	0.1	nd	0.1	yes	75	59	118	yes
Fluorene	0.1	nd	0.1	yes	68	54	108	yes
1-Chlorophenyl Phenyl Ether	0.1	nd	0.1	yes	66	56	109	yes
Diethyl Phthalate	0.2	nd	0.2	yes	69	56	111	yes
N-Nitrosodiphenylamine	0.1	nd	0.1	yes	70	60	119	yes
1-Bromophenyl Phenyl Ether	0.1	nd	0.1	yes	68	53	120	yes
Hexachlorobenzene	0.1	nd	0.1	yes	69	49	124	yes
Phenanthrene	0.1	nd	0.1	yes	69	55	112	yes
Anthracene	0.1	nd	0.1	yes	72	56	114	yes
Di-n-Butyl Phthalate	0.2	nd	0.2	yes	71	52	123	yes
Fluoranthene	0.1	nd	0.1	yes	71	60	119	yes
Pyrene	0.1	nd	0.1	yes	74	54	122	yes
Benzyl Butyl Phthalate	0.2	nd	0.2	yes	78	49	128	yes
Benzo(a)anthracene	0.1	nd	0.1	yes	74	57	121	yes
Chrysene	0.1	nd	0.1	yes	72	57	120	yes
3,3'-Dichlorobenzidine	0.5	nd	0.5	yes	74	43	189	yes
bis(2-Ethylhexyl)phthalate	0.5	nd	0.5	yes	78	53	134	yes
Di-n-octyl Phthalate	0.5	nd	0.5	yes	85	53	134	yes
Benzo(b)fluoranthene	0.1	nd	0.1	yes	79	56	124	yes
Benzo(k)fluoranthene	0.1	nd	0.1	yes	80	56	113	yes
Benzo(a)pyrene	0.1	nd	0.1	yes	80	59	124	yes
Indeno(1,2,3-cd)pyrene	0.1	nd	0.1	yes	60	53	137	yes
Dibenzo(a,h)anthracene	0.1	nd	0.1	yes	63	55	135	yes
Benzo(ghi)perylene	0.1	nd	0.1	yes	58	58	129	yes

Surrogate Standard Recoveries:

Nitrobenzene-d5	59%	20-111%	yes	66	20	111	yes
2-Fluorobiphenyl	66%	20-113%	yes	68	20	113	yes
Terphenyl-d14	67%	53-117%	yes	78	53	117	yes





Client: Geo-Canada
Project Reference: SP3201C
Work Order Number: 2156586B
Matrix: Soil

BASE-NEUTRAL EXTRACTABLES

Date: 20-Jul-01

Legend: EQL = Estimated Quantitation Limit
Units = Micrograms per gram ($\mu\text{g/g}$) dry weight
nd = Not detected above EQL
DF = Dilution Factor

Date received: July 13, 2001
Date extracted: July 18, 2001
Date analysed: July 18 - 20, 2001

Analytical Method:

The soil samples (10 grams wet weight) were mixed with sodium sulfate and extracted with a 1:1 mixture of acetone:dichloromethane. Analysis was performed by gas chromatography/mass spectrometry using US EPA Method 8270C (modified).

Report Discussion:

Since some target compounds present were at a level above the calibration range of the instrument, the samples were run at a dilution factor to avoid exceeding the calibration range and to reduce the contamination to the equipment. The quantitation limits for these samples are higher than the EQL's for undiluted samples as indicated above. The amounts reported have been corrected for the dilution factors that were used.

(1) Recoveries for the flagged surrogates in the sample TPS5-sa3 were lower than typical. This is likely due to interferences during quantitation caused by elevated sample background.

Note: Estimated quantitation limit is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

NOTE: All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analysis done. Your samples will be retained by PAS for a period of 30 days following reporting or as per specific contractual arrangement.

Job Approved By:


Tasha Sutherland
Chemist





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Attn: David Baigent
Project: SP3201C
PO #: SP3201C
Received: 13-Jul-2001 12:05

Job: 2156586
Status: Final

Soil Samples

Sample Id	pH	SM 4500B pH Units	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm	Ca ICAP ppm	Cd ICAP ppm	Co ICAP ppm
BH601-SS1	7.81		<1	5420	124	0.3	88800	<0.5	5
BH602-SS2	7.89		<1	3450	237	0.9	26200	0.7	4
BH603-SS1	7.67		<1	6060	293	0.3	73400	10.3	4
BH604-SS2	7.51		<1	11000	237	0.6	44300	0.8	7
BH605-SS1	7.51		<1	6650	176	0.4	53200	6.6	5
TP2-SA2	7.41		<1	3080	99	<0.2	58000	0.8	3
TP3-SA3	7.72		<1	5020	487	0.2	101000	8.2	3
TP4-SA2	8.06		1	2070	44	<0.2	91200	1.0	3
TP5-SA1	7.50		<1	4500	122	0.3	57500	6.2	3
TP6-SA3	8.30		<1	11500	103	0.6	46000	0.6	7
TP7-SA2	7.76		<1	15600	481	1.7	38400	1.6	7
TP8-SA2	7.24		<1	4380	217	0.3	33500	5.6	4
Blank	---		<1	<20	<5	<0.2	<50	<0.5	<2
QC Standard (found)	9.16		<1	17400	153	0.6	6660	0.6	28
QC Standard (expected)	9.38		2	16300	157	0.6	6210	<0.5	25
Repeat BH601-SS1	7.83		<1	5610	129	0.3	91800	0.5	5



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Job: 2156586 Status: Final

Soil Samples

Sample Id	Cr		Cu		Fe		K		Mg		Mn		Mo		Na	
	ICAP	ppm	ICAP	ppm	ICAP	ppm	ICAP	ppm	ICAP	ppm	ICAP	ppm	ICAP	ppm	ICAP	ppm
BH601-SS1	30		83		21800		873		14800		456		<3		322	
BH602-SS2	1620		285		9360		483		1420		101		<3		506	
BH603-SS1	128		376		28600		987		35200		448		<3		559	
BH604-SS2	96		84		21800		2020		6080		251		<3		401	
BH605-SS1	129		143		19700		995		5270		346		<3		411	
TP2-SA2	28		42		12400		476		6160		202		<3		125	
TP3-SA3	8440		201		19300		379		3460		283		4		824	
TP4-SA2	39		44		11200		551		3670		191		<3		100	
TP5-SA1	41		143		10000		762		4520		200		<3		306	
TP6-SA3	22		269		18900		1850		7220		414		<3		1370	
TP7-SA2	23		208		66000		1490		3330		169		4		1040	
TP8-SA2	69		167		15600		460		2880		140		<3		162	
Blank	<1		<1		<50		105		<20		<1		<3		<50	
QC Standard (found)	48		35		31400		2640		8790		1230		<3		305	
QC Standard (expected)	45		32		31100		2630		8060		1140		<3		337	
Repeat BH601-SS1	28		80		22300		974		15700		452		<3		334	





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Soil Samples

Sample Id	Ni		P		Pb		Sr		Ti		V		Zn	
	ICAP	ppm	ICAP	ppm	ICAP	ppm	ICAP	ppm	ICAP	ppm	ICAP	ppm	ICAP	ppm
BH601-SS1	28	648	461	111.	249	24	312							
BH602-SS2	16	445	1300	114.	268	16	320							
BH603-SS1	36	1210	5440	65.7	189	18	876							
BH604-SS2	21	935	264	99.7	472	31	496							
BH605-SS1	27	1640	504	88.3	204	21	587							
TP2-SA2	11	637	378	81.6	151	14	286							
TP3-SA3	20	3090	12200	279.	116	14	1090							
TP4-SA2	8	627	1970	120.	148	18	96							
TP5-SA1	16	971	2420	85.6	167	17	446							
TP6-SA3	20	885	260	78.0	278	24	134							
TP7-SA2	35	691	97	354.	795	42	208							
TP8-SA2	22	2030	431	57.0	172	12	513							
Blank	<2	<20	<5	<0.3	<5	<1	<5							
QC Standard (found)	46	922	24	25.8	861	45	134							
QC Standard (expected)	43	810	21	26.0	882	48	126							
Repeat BH601-SS1	27	673	452	112.	249	23	330							





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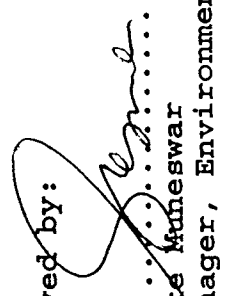
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Note: Sample TP7 SA3 was re-leached and re-analysed for Pb and Ba. Values obtained were 0.2 and 0.6 mg/L for Pb and 0.8 and 1.1 mg/L for Ba.

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Job approved by:
Signed: 
.....
Mike Muneswar
Manager, Environmental Inorganic Services





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 PO #: SP3201C
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Job: 2156586
 Status: Final

TCLP Leach

Sample Id	F- SM 4500F mg/L	NO2+NO3-N COBAS mg/L	Free CN- SM 4500I mg/L	Hg ICP/MS mg/L	As ICP/MS mg/L	Se ICP/MS mg/L	B ICP/MS mg/L	Ba ICP/MS mg/L
TP7-SA3	0.2	<0.2	0.01	<0.01	<0.2	<0.1	<0.1	0.9
TP5-SA3	0.2	<0.2	<0.01	<0.01	<0.2	<0.1	0.2	0.9
Blank	<0.1	<0.2	<0.01	<0.01	<0.2	<0.1	<0.1	<0.2
QC Standard (found)	0.2	1.1	0.06	0.18	1.0	1.0	0.5	1.0
QC Standard (expected)	0.2	1.4	0.06	0.20	1.0	1.0	0.5	1.0
Repeat TP7-SA3	0.2	<0.2	0.01	<0.01	<0.2	<0.1	<0.1	1.9

Sample Id	Cd ICP/MS mg/L	Cr ICP/MS mg/L	Pb ICP/MS mg/L	Ag ICP/MS mg/L	U ICP/MS mg/L
TP7-SA3	<0.05	<0.1	0.6	<0.01	<0.01
TP5-SA3	<0.05	0.1	<0.1	<0.01	<0.01
Blank	<0.05	<0.1	<0.1	<0.01	<0.01
QC Standard (found)	0.50	0.5	0.5	0.03	0.04
QC Standard (expected)	0.50	0.5	0.5	0.03	0.04
Repeat TP7-SA3	<0.05	<0.1	0.3	<0.01	<0.01





REGULATION 558 TCLP VOLATILE ORGANIC COMPOUNDS

Client: Geo-Canada
Project Reference: SP3201C
Work Order: 2156586
Matrix: TCLP Leachate

Date: 19-Jul-01

Legend: EQL = Estimated Quantitation Limit
nd = Not Detected Above EQL

Date of sample receipt: July 13, 2001
Date of TCLP Leach: July 17, 2001
Date of sample analysis: July 18, 2001

Analytical Method:

The samples were extracted using a Zero Headspace Extraction device as described in US EPA Method 1311 - Toxicity Characteristic Leaching Procedure (TCLP). The TCLP leachates were analysed by purge & trap gas chromatography/mass spectrometry according to US EPA Method 8260B.

Note: Estimated quantitation limit is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

NOTE: All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analysis done. Your samples will be retained by PAS for a period of 30 days following reporting or as per specific contractual arrangement.

Job Approved By:


.....
Dinesh Rangarajan M.Sc.
Chemist





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Ignitability:


Burning Rate Test

Tested sample was formed into a strip 250 mm long by 20 mm wide and 10 mm high. The flame was applied to one end of the strip and the timing was started. The flame was held there for 2 minutes.

Sample	Ignition Time (sec.)	Burning Rate (mm/min.)
TP7-SA3	No Ignition	0

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Job approved by:

Signed: 
.....
Ralph Siebert, B.Sc.
Project Manager





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Attn: David Baigent
Project: SP3201C

Received: 16-Jul-2001 16:39

PO #:

Job: 2156676

Status: Final

Revised Final Report

Water Samples

Sample Id	SM	pH Units	pH 4500B	Hg SW 7470	Ag ICP/MS	Al ICP/MS	As ICP/MS	B ICP/MS	Ba ICP/MS	Be ICP/MS
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BH601		6.86	<0.00005	<0.0001	0.022	0.003	0.237	0.255	<0.001	
BH602		7.09	<0.00005	<0.0010	<0.050	<0.020	0.116	0.637	<0.010	
BH603		6.91	<0.00005	<0.0001	0.010	0.003	0.598	0.299	<0.001	
BH604		6.84	<0.00005	<0.0001	0.014	0.006	1.55	0.065	<0.001	
BH605		6.61	<0.00005	<0.0001	<0.005	<0.002	0.233	0.760	<0.001	
Sample+Spike (found)		---	<0.00005	---	0.485	0.512	---	0.725	0.502	
Sample+Spike (expected)		---	<0.00005	---	0.522	0.503	---	0.755	0.500	
Blank		---	<0.00005	<0.0001	<0.005	<0.002	<0.005	<0.005	<0.001	
QC Standard (found)		7.03	0.00108	0.0042	0.884	0.048	0.049	0.052	0.049	
QC Standard (expected)		7.00	0.00100	0.0030	1.00	0.050	0.050	0.050	0.050	
Repeat BH601		6.84	<0.00005	<0.0001	0.023	0.003	0.237	0.253	<0.001	



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Water Samples

Sample Id	Bi ICP/MS mg/L	Ca ICP/MS mg/L	Cd ICP/MS mg/L	Co ICP/MS mg/L	Cr ICP/MS mg/L	Cu ICP/MS mg/L	Fe ICP/MS mg/L	K ICP/MS mg/L
BH601	<0.001	324.	<0.0001	0.0155	<0.005	0.0042	0.20	12.5
BH602	<0.010	381.	<0.0010	0.0133	<0.050	<0.0050	0.90	72.0
BH603	<0.001	241.	<0.0001	0.0078	<0.005	0.0009	0.07	20.6
BH604	<0.001	106.	0.0001	0.0088	<0.005	0.0022	0.37	31.3
BH605	<0.001	419.	<0.0001	0.0115	<0.005	<0.0005	37.8	17.3
Sample+Spike (found)	---	---	0.511	0.533	0.502	0.493	0.78	---
Sample+Spike (expected)	---	---	0.500	0.515	0.500	0.504	0.70	---
Blank	<0.001	<0.5	<0.0001	<0.0001	<0.005	<0.0005	<0.03	<0.1
QC Standard (found)	0.051	5.1	0.0479	0.0485	0.048	0.0477	0.06	1.0
QC Standard (expected)	0.050	5.0	0.0500	0.0500	0.050	0.0500	0.05	1.0
Repeat BH601	<0.001	314.	<0.0001	0.0151	<0.005	0.0043	0.20	12.5





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Water Samples

Sample Id	Mg ICP/MS mg/L	Mn ICP/MS mg/L	Mo ICP/MS mg/L	Na ICP/MS mg/L	Ni ICP/MS mg/L	P ICP/MS mg/L	Pb ICP/MS mg/L	Sb ICP/MS mg/L
BH601	49.6	1.57	0.010	79.9	0.024	<0.05	0.0007	<0.0005
BH602	166.	2.05	<0.010	1510.	<0.010	<0.50	<0.0050	<0.0050
BH603	106.	1.42	0.015	591.	0.010	<0.05	<0.0005	0.0010
BH604	28.9	1.31	0.016	127.	0.012	<0.05	<0.0005	<0.0005
BH605	76.1	2.29	0.007	484.	0.005	<0.05	<0.0005	<0.0005
Sample+Spike (found)	48.7	2.04	0.549	---	0.527	---	0.508	0.554
Sample+Spike (expected)	50.4	2.07	0.510	---	0.524	---	0.500	0.500
Blank	<0.05	<0.005	<0.001	<0.1	<0.001	<0.05	<0.0005	<0.0005
QC Standard (found)	1.02	0.049	0.056	4.9	0.048	0.09	0.0485	0.0539
QC Standard (expected)	1.00	0.050	0.050	5.0	0.050	0.10	0.0500	0.0500
Repeat BH601	49.0	1.58	0.010	80.4	0.023	<0.05	0.0007	<0.0005





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Water Samples

Sample Id	Se ICP/MS mg/L	Si ICP/MS mg/L	Sn ICP/MS mg/L	Sr ICP/MS mg/L	Ti ICP/MS mg/L	Tl ICP/MS mg/L	U ICP/MS mg/L	V ICP/MS mg/L
BH601	<0.002	11.8	0.006	1.02	<0.005	0.00021	0.0154	0.0021
BH602	<0.020	13.7	<0.010	0.969	<0.050	<0.00050	0.0049	<0.0050
BH603	<0.002	7.01	0.002	0.669	<0.005	<0.00005	0.0114	<0.0050
BH604	<0.002	11.1	<0.001	0.356	<0.005	<0.00005	0.0034	0.0006
BH605	<0.002	18.4	<0.001	1.34	<0.005	<0.00005	0.0040	<0.0050
Sample+Spike (found)	0.488	---	---	---	0.524	0.531	0.532	0.510
Sample+Spike (expected)	0.500	---	---	---	0.500	0.500	0.515	0.502
Blank	<0.002	<0.05	<0.001	<0.001	<0.005	<0.00005	<0.0001	<0.0005
QC Standard (found)	0.045	0.12	0.053	0.047	0.050	0.0959	0.0498	0.0487
QC Standard (expected)	0.050	0.10	0.050	0.050	0.050	0.100	0.0500	0.0500
Repeat BH601	<0.002	11.7	0.006	0.986	<0.005	0.00022	0.0149	0.0018





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Water Samples

Sample Id	Zn ICP/MS mg/L
BH601	0.023
BH602	<0.050
BH603	0.010
BH604	0.014
BH605	0.015
Sample+Spike (found)	0.511
Sample+Spike (expected)	0.523
Blank	<0.005
QC Standard (found)	0.047
QC Standard (expected)	0.050
Repeat BH601	0.022





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Note: Sample BH602 was run for ICP/MS metals at an extra dilution due to matrix interference. EQLs were adjusted accordingly.

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Job approved by:

Signed: *Ralph Siebert*
Ralph Siebert, B.Sc.
Project Manager

