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**Environmental Remediation and
Tank Decommissioning Program**

Industrial Property
5545 Albion Road
Ottawa, Ontario

Prepared For

W.O. Stinson & Son Ltd.

Paterson Group Inc.

Consulting Engineers
154 Colonnade Road South
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January 9, 2018

Report: PE4169-1

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File: PE4169-LET.01

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Geotechnical Engineering
Environmental Engineering
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Attention: **Mr. John Armstrong**

Subject: **Environmental Remediation and Tank Decommissioning Program**
5545 Albion Road
Ottawa, Ontario

Dear Sir,

Further to your request and authorization, Paterson Group (Paterson) monitored a site remediation and tank decommissioning program at the aforementioned property. The findings of the program are detailed in this report.

Introduction

The subject site is located on the northeast corner of the intersection of Albion Road and Mitch Owens Road, in Ottawa, Ontario. The subject site is currently occupied by Vanson Construction Ltd. (Vanson). The property is being sold to W.O. Stinson and Son Ltd. (Stinson) with final deed transfer occurring in January 2018. Paterson was retained by Stinson to supervise the removal of the onsite petroleum underground storage tanks (USTs) and associated piping and pump islands, as well as any impacted soil that may have been present.

Background

Vanson has occupied the property since 1972. Vanson had three (3) USTs installed in 1976, containing gasoline and diesel fuel, used to refuel the Vanson fleet of light and heavy-duty equipment. It was reported to Paterson that the original USTs were removed and replaced in 1992, but the original pumps and associated underground piping were left in place and connected to the newly installed USTs.

A Phase I Environmental Site Assessment (ESA) was completed by Pinchin Ltd. (Pinchin) in July 2017 and determined that the site had a private fuel outlet consisting of three (3) USTs. It was also determined that truck servicing and repair work had taken place in one of the site buildings for the past 15 years. Other concerning observations included fuel and oil staining on the concrete floor of the repair shop and the presence of a retail fuel outlet with USTs approximately 25 m to the west of the site. An inquiry to Ontario Spills revealed that a 700 L gasoline spill occurred in March 2007 at the intersection of Albion Road and Mitch Owens Road, immediately adjacent to the southwest corner of the property. It was concluded that a Phase II ESA should be completed on the subject site.

A Phase II ESA was completed by Pinchin in September 2017 and consisted of drilling eight (8) boreholes on the subject site, each of which were completed as groundwater monitoring wells. Soil and groundwater samples were collected and submitted for laboratory analysis of benzene, toluene, ethylbenzene, xylenes (BTEX) and Petroleum Hydrocarbons (PHCs) fractions F1-F4. Analytical laboratory results were compared to the applicable governing criteria, which was selected as the MOECC Ontario Regulation 153/04; Table 2: Full Depth Generic Site Condition Standards for Use in a Potable Ground Water Condition, coarse grained soils and Industrial/Commercial/Community property use.

Comparing the laboratory results to the Table 2 Standards, it was determined that the soil and groundwater samples collected from borehole/monitoring well MW-1 and MW-5 were in exceedance. These MWs were situated immediately east and south west of the pump island. It was recommended that further delineation of the impacted soil and groundwater be completed in conjunction with a Remedial Action Plan.

Paterson were subsequently commissioned to monitor the environmental remediation and tank decommissioning program, the details of which are contained herein.

Remediation Excavation

Paterson monitored the site remediation program from November 22 to 29, 2017, which included the removal of petroleum hydrocarbon impacted soil and groundwater, and the removal of the three (3) onsite USTs and associated pump island and underground piping. The impacted soil was considered solid non-hazardous material. The source of the petroleum release was determined to be the underground piping connecting the USTs to the pump islands.

Vanson Construction Ltd. conducted the excavation work and removed a total of approximately 659 metric tonnes (mt) of contaminated soil from the subject site, under

the observation of Paterson personnel. The contaminated soil was disposed of at Tomlinson Waste Management Inc. in Osgoode, Ontario.

During remediation activities, a significant volume of groundwater entered the excavation due to a high water table in the area. The groundwater was observed to have a PHC sheen. To facilitate excavation activities, a sump was installed (a perforated steel drum surrounded by 50 mm clear stone) and water was pumped from the excavation into a tanker trailer. Over the course of excavation activities, two (2) tanker trailers were filled with groundwater. The contents of the first tanker (18,000 L) were disposed of offsite at Clean Water Works in Ottawa, Ontario. The impacted groundwater in the second tanker (40,000 L) was remediated onsite, by using hydrogen peroxide and aeration. A total of approximately 58,000 L of impacted groundwater was pumped out of the excavation.

During and immediately after the remedial excavation, Paterson carried out a soil sampling program for the base and the sidewalls of the excavation. Thirty-one (31) sidewall samples were collected between 0.8 and 1.5 meters below the surface and twenty-three (23) base samples were acquired. A total of seventeen (17) soil samples were submitted to Paracel Laboratories for BTEX and PHCs analysis. Two (2) samples, G2 and N7, were in excess of the MOECC Table 2 standards. Sample G2 was collected on the first day of the remedial excavation and was submitted to provide guidance on further excavation work. Sample G1 was collected beneath sample G2, and verified that all impacts in that area were removed. Sample N7 was collected from the north sidewall, and Paterson subsequently directed Vanson to remove this impacted area. An additional sample (N16) was collected and laboratory analysis verified that the impacted material in this area had also been removed. Prior to backfilling, two (2) temporary recovery wells (Exc. Well 1 and Exc. Well 2) were installed in the base of the excavation to enable groundwater sampling following the backfilling program. Refer to attached Site Plan and Site Remediation Plan for sample and recovery well locations.

Soil Sampling Program

Subsurface Profile

In general, the soil profile encountered during the excavation consisted of sand and granular fill material over native sand. The groundwater table appeared to be at approximately 1.3 m below grade surface (bgs) and as a result, a significant amount of groundwater was encountered and required management during the excavation work.

Soil Sampling Protocol

Following the removal of contaminated soil by Vanson, a total of fifty-four (54) soil samples were recovered from the excavation in accordance with the MOECC O.Reg.

153/04 - Schedule E: Table 3 for a floor area between 250 and 500 m². Upon recovery, all samples were immediately sealed in appropriate containers to facilitate a preliminary screening procedure.

Soil Sample Headspace Analysis

An RKI Eagle (gastech) calibrated to hexane was used to measure the combustible vapour concentrations in the headspace of all soil samples recovered from the excavation. The technical protocol was obtained from Appendix C of the MOECC document titled "Interim Guidelines for the Remediation of Petroleum Contamination at Operating Retail and Private Fuel Outlets in Ontario", dated March 1992.

Soil samples recovered at the time of sampling were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey. Allowing the samples to stabilize to room temperature ensures consistency of readings between samples.

To measure the soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement. The parts per million (ppm) scale is used to measure concentrations of hydrocarbon vapours that are too low to register on the Lower Explosive Limit (LEL) scale.

The combustible vapour readings were found to range from 0 to 220 ppm in the soil samples obtained. It should be noted that the vapour results can not be used to identify the presence of heavier petroleum hydrocarbons (PHCs) or weathered PHCs. The results of the vapour survey are presented on the Site Remediation Plan.

Analytical Test Results

Soil/Groundwater Standards

The soil/groundwater standards for the subject site were obtained from Table 2 of the document entitled "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*", dated April 15, 2011. The MOECC Standards are based on the following considerations:

- ☐ Coarse grained soil conditions.
- ☐ Potable groundwater condition
- ☐ Industrial/commercial/community property use.

Paracel Laboratories (Paracel) and Eurofins Scientific (Eurofins), both of Ottawa, performed the laboratory analysis of the samples submitted for analytical testing. Paracel and Eurofins are members of the Standards Council of Canada/Canadian Association for Environmental Analytical Laboratories (SCC/CAEAL). Paracel and Eurofins are accredited and certified by SCC/CAEAL for specific tests registered with the association.

Soil

Based on our visual observations, in conjunction with the vapour readings, seventeen (17) soil samples were submitted to Paracel Laboratories for analysis of petroleum hydrocarbons (PHCs Fractions 1 to 4) and BTEX. The results of the analytical testing and the selected soil standards are presented in Tables 1 and 2. A copy of the laboratory certificate of analysis is attached to this report.

Table 1 Analytical Test Results - Soil BTEX and PHCs (Fractions 1 to 4)									
Parameter	MDL (µg/g)	Soil – Base Samples (µg/g)							Table 2 Standards Industrial Land Use (µg/g)
		G1	G2*	B4	B12	B15	B18	B20	
Benzene	0.02	nd	nd	nd	0.06	nd	nd	nd	0.32
Ethylbenzene	0.05	nd	0.68	0.82	0.33	nd	nd	nd	6.4
Toluene	0.05	nd	0.06	nd	nd	nd	nd	nd	1.1
Xylenes (Total)	0.05	nd	3.91	3.68	1.39	0.12	nd	nd	26
F ₁ PHCs (C ₆ -C ₁₀)	7	nd	<u>76</u>	20	nd	nd	nd	nd	55
F ₂ PHCs (C ₁₀ -C ₁₆)	4	nd	nd	20	nd	10	nd	nd	230
F ₃ PHCs (C ₁₆ -C ₃₄)	8	nd	nd	nd	nd	nd	nd	nd	1,700
F ₄ PHCs (C ₃₄ -C ₅₀)	6	nd	nd	nd	nd	nd	nd	nd	3,300
Notes: <input type="checkbox"/> MDL – Method Detection Limit <input type="checkbox"/> Nd – Not Detected (< MDL) <input type="checkbox"/> Bold and underlined results exceed the MOECC Table 2 Industrial/Commercial/Community property use standards <input type="checkbox"/> Asterix indicates soil that was subsequently removed.									

The F1 fraction petroleum parameter in sample G2 marginally exceeded the selected MOECC standard. Sample G1, collected from beneath the G2 sample location, was determined by the laboratory to be compliant with applicable criteria and verified that the

impacted material associated with G2 had been removed. The remaining base soil samples analyzed complied with the selected MOECC standards.

Table 2 Analytical Test Results - Soil BTEX and PHCs (Fractions 1 to 4)												
Parameter	MDL (µg/g)	Soil – Sidewall Samples (µg/g)										Table 2 Standards Industrial Land Use (µg/g)
		N3	N5	N7*	N12	N16	S2	S5	S10	E1	W3	
Benzene	0.02	nd	nd	nd	nd	nd	nd	0.02	nd	nd	nd	0.32
Ethylbenzene	0.05	nd	nd	nd	nd	nd	nd	0.24	0.1	nd	nd	6.4
Toluene	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.1
Xylenes (Total)	0.05	nd	nd	0.2	nd	nd	nd	1.03	0.36	nd	nd	26
F ₁ PHCs (C ₆ -C ₁₀)	7	nd	nd	50	nd	nd	nd	nd	10	nd	nd	55
F ₂ PHCs (C ₁₀ -C ₁₆)	4	166	nd	<u>600</u>	nd	nd	nd	nd	190	nd	30	230
F ₃ PHCs (C ₁₆ -C ₃₄)	8	101	nd	520	nd	nd	nd	nd	170	nd	30	1,700
F ₄ PHCs (C ₃₄ -C ₅₀)	6	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	3,300
Notes:												
<input type="checkbox"/> MDL – Method Detection Limit <input type="checkbox"/> Nd – Not Detected (< MDL) <input type="checkbox"/> Bold and underlined results exceed the MOECC Table 2 Industrial/Commercial/Community property use standards <input type="checkbox"/> Asterisk indicates soil that was subsequently removed.												

The F2 fraction petroleum parameter in sample N7 exceeded the selected MOECC standard. Paterson directed Vanson to remove this area of impacted soil and an additional sample, N16, was collected and submitted for analysis. Sample N16 verifies that the impacted soil in this area was removed. The remaining sidewall soil samples analyzed complied with the selected MOECC standards.

Groundwater

Groundwater displaying a PHC sheen was observed entering the excavation once the excavation extended below the top of the water table, at approximately 1.3 m bgs. Water management was required to continue with excavation work, and a sump was installed next to the eastern sidewall using a perforated drum and 50 mm clear stone. Impacted groundwater was pumped from the sump into tanker trailers. Two (2) tanker trailers were

filled, with the first trailer (18,000 L) brought to Clean Water Works (CWW) for disposal and the second trailer (40,000 L) being treated onsite via aeration and hydrogen peroxide application. Seven (7) groundwater samples were collected and submitted to Paracel Laboratories for analysis of BTEX and PHCs (Fractions 1 to 4). The results of the analytical testing are presented in Table 3. A copy of the laboratory certificate of analysis is attached to this report.

Table 3 Analytical Test Results - Groundwater BTEX and PHCs (Fractions 1 to 4)									
Parameter	MDL (µg/L)	Groundwater (µg/L)							Table 2 Potable Groundwater, coarse (µg/L)
		Tanker-GW1*	Tanker-GW2*	Tanker-GW3	GW2*	Exc. Well 1	Exc. Well 2	MW3-GW1	
Benzene	0.5	<u>96.9</u>	0.7	nd	<u>7.9</u>	nd	nd	nd	5
Ethylbenzene	0.5	<u>756</u>	1.0	nd	<u>43.8</u>	nd	nd	nd	2.4
Toluene	0.5	<u>1130</u>	7.8	nd	<u>36.8</u>	nd	nd	nd	24
Xylenes (Total)	0.5	<u>4410</u>	5.2	nd	228	3.1	nd	nd	300
F ₁ PHCs (C ₆ -C ₁₀)	25	<u>23200</u>	nd	nd	<u>1340</u>	nd	nd	nd	750
F ₂ PHCs (C ₁₀ -C ₁₆)	100	<u>6090</u>	<u>403</u>	nd	<u>760</u>	nd	nd	nd	150
F ₃ PHCs (C ₁₆ -C ₃₄)	100	<u>2700</u>	351	nd	340	nd	nd	nd	500
F ₄ PHCs (C ₃₄ -C ₅₀)	100	nd	nd	nd	nd	nd	nd	nd	500
Notes:									
<input type="checkbox"/> MDL – Method Detection Limit <input type="checkbox"/> Nd – Not Detected (< MDL) <input type="checkbox"/> Bold and underlined results exceed the selected MOECC standards. <input type="checkbox"/> Asterix represents water that was remediated to meet selected standards.									

As mentioned above, the contents of the first tanker trailer (18,000 L) were disposed of at a CWW facility. Sample Tanker-GW1 was collected from the second groundwater filled tanker trailer (40,000 L) and was analysed at Vanson's request, because they felt that the water may meet criteria. The results of the sample proved the tanker water to be impacted with BTEX and PHCs so Vanson decided to treat the water onsite by aeration and hydrogen peroxide application. A follow-up sample (Tanker-GW2) was collected and

submitted for laboratory analysis with subsequent results indicating significantly reduced contaminant concentrations, however, still exceeding standards for one parameter. Vanson conducted further treatment of the tanker water and the final sampling and analysis (Tanker-GW3) determined concentrations to be non-detect for all parameters analysed.

Prior to the filling of the second tanker trailer, a groundwater sample (GW2) was collected from the excavation itself. This sample was collected to provide insight into the contaminant concentrations present. Note that after this sample was collected, an additional (approximately) 40,000 L was pumped from the excavation into the tanker trailer.

Upon the completion of the excavation work, the excavation was backfilled and two (2) recovery/sampling wells were installed so access to groundwater would be available in that area. Excavation Well 1 (Exc. Well 1) was situated adjacent to the eastern side wall of the excavation, Excavation Well 2 (Exc. Well 2) was placed in the centre of the excavation, and MW3 was installed by Pinchin in the September 2017, located immediately west of the former tank nest. Laboratory analysis of samples collected from these three (3) wells determined all parameters to be non-detect, except for a trace concentration of xylene in Exc. Well 1. The groundwater in the area of the excavation was considered to be in compliance with the selected MOECC standards.

Assessment

A site remediation program was carried out at 5545 Albion Road in the City of Ottawa, Ontario. The purpose of the program was to remove three (3) petroleum containing USTs, associated underground piping and pump island, as well as any petroleum hydrocarbon contaminated soil/groundwater that may be present. The selected MOECC standards were from O.Reg. 154/03: Table 2, coarse grained soils in a potable water condition, Industrial/Commercial/Community property use.

In total, 659 metric tonnes of soil were removed from the site by Vanson and disposed of at the Tomlinson Waste Management Inc. A total of 58,000 L of groundwater was removed from the excavation and either disposed of at Clean Water Works or else remediated onsite by Vanson.

Following the removal of impacted soil, fifty-four (54) soil samples were recovered from the walls and floor of the excavation and seventeen (17) were submitted to Paracel/Eurofins Laboratories for BTEX and PHCs analysis. Samples G2 and N7 were in excess of the MOECC Table 2 standards so further excavation work was completed at

these locations, and additional sample analysis confirmed these impacted areas were removed. All final confirmatory soil samples either had non-detectable or trace levels of BTEX and/or PHC concentrations, and were in compliance with the MOECC standards.

Groundwater testing completed following the soil remediation program confirmed that the groundwater in the excavation and immediate area was in compliance with the selected MOECC standards.

Conclusion

Based on the field observations and the analytical test results, it is our opinion that the remedial excavation program was successful in the removal of the petroleum hydrocarbon contaminated soil and groundwater from the former fuel tank and pump island area on the subject site. No further environmental work is recommended at this time.

Statement of Limitations

This report has been prepared in general accordance with the agreed scope-of-work. The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program and may not be representative of conditions elsewhere on the site. Should any conditions be encountered at the subject site and/or historical information that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

This report was prepared for the sole use of W.O. Stinson and Son Ltd. and TD Commercial Banking. Permission from Stinson and Paterson will be required to release this report to any other party.

We trust that this report satisfies your requirements.

Paterson Group Inc.



Greg van Loenen, B.Eng.



Mark S. D'Arcy, P.Eng.

Report Distribution

- ☐ W. O. Stinson and Son Ltd. (2 copies)
- ☐ Paterson Group (1 copy)

Attachments

- ☐ Laboratory Certificates of Analysis
- ☐ Site Plan
- ☐ Site Remediation Plan

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mike Beaudoin

Client PO: 23130
Project: PE4169
Custody: 115519

Report Date: 23-Nov-2017
Order Date: 22-Nov-2017

Order #: 1747330

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1747330-01	G1
1747330-02	G2

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23130

Report Date: 23-Nov-2017

Order Date: 22-Nov-2017

Project Description: PE4169

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	22-Nov-17	23-Nov-17
PHC F1	CWS Tier 1 - P&T GC-FID	22-Nov-17	23-Nov-17
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	23-Nov-17	23-Nov-17
Solids, %	Gravimetric, calculation	23-Nov-17	23-Nov-17

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23130

Report Date: 23-Nov-2017

Order Date: 22-Nov-2017

Project Description: PE4169

Client ID:	G1	G2	-	-
Sample Date:	22-Nov-17	22-Nov-17	-	-
Sample ID:	1747330-01	1747330-02	-	-
MDL/Units	Soil	Soil	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	81.3	80.9	-	-
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Volatiles

Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	0.68	-	-
Toluene	0.05 ug/g dry	<0.05	0.06	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	3.49	-	-
o-Xylene	0.05 ug/g dry	<0.05	0.42	-	-
Xylenes, total	0.05 ug/g dry	<0.05	3.91	-	-
Toluene-d8	Surrogate	114%	108%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	76	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23130

Report Date: 23-Nov-2017

Order Date: 22-Nov-2017

Project Description: PE4169

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	2.62		ug/g		81.9	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23130

Report Date: 23-Nov-2017

Order Date: 22-Nov-2017

Project Description: PE4169

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
Physical Characteristics									
% Solids	66.0	0.1	% by Wt.	64.9			1.7	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	2.81		ug/g dry		83.7	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23130

Report Date: 23-Nov-2017

Order Date: 22-Nov-2017

Project Description: PE4169

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	197	7	ug/g		98.5	80-120			
F2 PHCs (C10-C16)	99	4	ug/g		109	80-120			
F3 PHCs (C16-C34)	197	8	ug/g		106	80-120			
F4 PHCs (C34-C50)	125	6	ug/g		101	80-120			
Volatiles									
Benzene	3.29	0.02	ug/g		82.3	60-130			
Ethylbenzene	4.05	0.05	ug/g		101	60-130			
Toluene	3.84	0.05	ug/g		95.9	60-130			
m,p-Xylenes	8.97	0.05	ug/g		112	60-130			
o-Xylene	4.36	0.05	ug/g		109	60-130			
Surrogate: Toluene-d8	2.47		ug/g		77.3	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23130

Report Date: 23-Nov-2017

Order Date: 22-Nov-2017

Project Description: PE4169

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.



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Parcel ID: 1747330



Chain of Custody
(Lab Use Only)

No 115519

Page 1 of 1

Client Name: <u>Petersen</u>	Project Reference: <u>PE4169</u>	Turnaround Time: <input checked="" type="checkbox"/> Day <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input type="checkbox"/> Regular Date Required: _____
Contact Name: <u>Mike Brandon</u>	Quote #	
Address: <u>154 Colonnade Rd</u>	PO # <u>23130</u>	
Telephone: <u>613-226-7331</u>	Email Address: <u>mbrandon@petersen-lab.com</u>	

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 2 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: _____ ☐ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)						Required Analyses									
Parcel Order Number: <u>1747330</u>						Sample Taken		PHCS F1-F4+BTEN	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	
Sample ID/Location Name						Date	Time								
1	G1	S		2		Nov 22/17		X							
2	O2	S		2		"		X							
3															
4															
5															
6															
7															
8															
9															
10															

Method of Delivery: Parcel

Comments:	Relinquished By (Sign): <u>[Signature]</u>	Received by Driver/Depot: <u>M. Fane</u>	Received at Lab: <u>SUMERSON DUMMIE</u>	Verified By: <u>[Signature]</u>
	Relinquished By (Print):	Date/Time: <u>22/11/17 4:00 PM</u>	Date/Time: <u>Nov 21, 2017 05:00</u>	Date/Time: <u>Nov 21 5:03</u>
	Date/Time:	Temperature: <u>13.2 °C</u>	Temperature: <u>13.2 °C</u>	pH Verified [] By:

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO: 23188
Project: PE4169
Custody: 112438

Report Date: 27-Nov-2017
Order Date: 23-Nov-2017

Order #: 1747445

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1747445-01	E1
1747445-02	N3
1747445-03	N5

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23188

Report Date: 27-Nov-2017

Order Date: 23-Nov-2017

Project Description: PE4169

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	23-Nov-17	24-Nov-17
PHC F1	CWS Tier 1 - P&T GC-FID	23-Nov-17	24-Nov-17
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	23-Nov-17	25-Nov-17
Solids, %	Gravimetric, calculation	24-Nov-17	24-Nov-17

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23188

Report Date: 27-Nov-2017

Order Date: 23-Nov-2017

Project Description: PE4169

Client ID:	E1	N3	N5	-
Sample Date:	22-Nov-17	22-Nov-17	22-Nov-17	-
Sample ID:	1747445-01	1747445-02	1747445-03	-
MDL/Units	Soil	Soil	Soil	-

Physical Characteristics

% Solids	0.1 % by Wt.	80.8	88.9	88.9	-
----------	--------------	------	------	------	---

Volatiles

Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene-d8	Surrogate	109%	105%	106%	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	166	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	101	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23188

Report Date: 27-Nov-2017

Order Date: 23-Nov-2017

Project Description: PE4169

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	8.66		ug/g		108	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23188

Report Date: 27-Nov-2017

Order Date: 23-Nov-2017

Project Description: PE4169

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	18	4	ug/g wet	17			4.8	30	
F3 PHCs (C16-C34)	71	8	ug/g wet	46			42.9	30	
F4 PHCs (C34-C50)	23	6	ug/g wet	13			54.2	30	
Physical Characteristics									
% Solids	84.9	0.1	% by Wt.	89.8			5.6	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	6.27		ug/g dry		110	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23188

Report Date: 27-Nov-2017

Order Date: 23-Nov-2017

Project Description: PE4169

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	183	7	ug/g		91.6	80-120			
F2 PHCs (C10-C16)	105	4	ug/g	17	97.8	60-140			
F3 PHCs (C16-C34)	242	8	ug/g	46	105	60-140			
F4 PHCs (C34-C50)	135	6	ug/g	13	98.2	60-140			
Volatiles									
Benzene	3.44	0.02	ug/g		86.0	60-130			
Ethylbenzene	3.10	0.05	ug/g		77.4	60-130			
Toluene	3.09	0.05	ug/g		77.2	60-130			
m,p-Xylenes	6.48	0.05	ug/g		81.0	60-130			
o-Xylene	3.53	0.05	ug/g		88.3	60-130			
Surrogate: Toluene-d8	7.44		ug/g		93.0	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23188

Report Date: 27-Nov-2017

Order Date: 23-Nov-2017

Project Description: PE4169

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.



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Chain of Custody

(Lab Use Only)

№ 112438

Page 1 of 1

e: paracel@paracellabs.com

Client Name: Paterson Group		Project Reference: PE4169		Turnaround Time: 2 Day												
Contact Name: MARK D'ARCY		Quote #		<input checked="" type="checkbox"/> 1 Day <input type="checkbox"/> 3 Day												
Address: 154 Colonnade Rd. S Ottawa, ON		PO # 23188		<input type="checkbox"/> 2 Day <input checked="" type="checkbox"/> Regular												
Telephone: 613-226-7381		Email Address: mdarcy@patersongroup.ca gvanleren@patersongroup.ca		Date Required:												
Criteria: <input checked="" type="checkbox"/> O. Reg. 153/04 (As Amended) Table 3 <input type="checkbox"/> RSC Filing <input type="checkbox"/> O. Reg. 558/00 <input type="checkbox"/> PWQO <input type="checkbox"/> CCME <input type="checkbox"/> SUB (Storm) <input type="checkbox"/> SUB (Sanitary) Municipality: <input type="checkbox"/> Other:																
Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)				Required Analyses												
Parcel Order Number: 1747445		Sample Taken														
Sample ID/Location Name		Matrix	Air Volume	# of Containers	Date	Time	PHCs F1-F4+BTX	VOCs	PAHs	Metals by ICP	Hg	CvT	B (TW/S)			
1	E1	S		2	Nov 22/17	PM	✓									- 120 mL + 1 vial
2	N3	S		2	↓	↓	✓									↓
3	N5	S		2	↓	↓	✓									↓
4																
5																
6																
7																
8																
9																
10																
Comments: 2-day TAR due to lab capacity SC.				Method of Delivery: Parcel												
Relinquished By (Sign): LZB		Received by Driver/Depot: A. JEWIE		Received at Lab: SUNTECH DOXMAI												
Relinquished By (Print):		Date/Time: 23/11/17 2:50		Date/Time: NOV 23 2017 04:16												
Date/Time:		Temperature: 7.1°C		Temperature: 10.8°C												
				pH Verified [] By: 11/23/17 4:54												

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
Invoice to: Paterson Group
PO#: 23132

Report Number: 1722790
Date Submitted: 2017-11-24
Date Reported: 2017-11-27
Project: PE4169
COC #: 182815
Temperature (C): 16
Custody Seal:

Page 1 of 8

Dear Mark D'Arcy:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Long Qu, Organics Supervisor

Eurofins Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at <http://www.cala.ca/scopes/2602.pdf>.

Eurofins (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests in drinking water.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required.

Environment Testing

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23132
Invoice to: Paterson Group

Report Number: 1722790
Date Submitted: 2017-11-24
Date Reported: 2017-11-27
Project: PE4169
COC #: 182815

O.Reg 153-T2-Res/Park-Med/Fine***Exceedence Summary***

Sample I.D.	Group	Analyte	Result	Units	Criteria
N7	Petroleum Hydrocarbon	Petroleum Hydrocarbons F2	600	ug/g	STD 150

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23132
Invoice to: Paterson Group

Report Number: 1722790
Date Submitted: 2017-11-24
Date Reported: 2017-11-27
Project: PE4169
COC #: 182815

Guideline = O.Reg 153-T2-Res/Park-Med/Fine

VOCs

Lab I.D.
Sample Matrix
Sample Time
Sampling Date
Sample I.D.

1334560 Soil Reg153 2017-11-23 S2	1334561 Soil Reg153 2017-11-23 S5	1334562 Soil Reg153 2017-11-23 N7	1334563 Soil Reg153 2017-11-23 B4	1334564 Soil Reg153 2017-11-23 B12
---	---	---	---	--

Analyte	Batch No	MRL	Units	Guideline					
Benzene	337419	0.02	ug/g	STD 0.17	<0.02	0.02	<0.02	<0.02	0.06
Ethylbenzene	337419	0.05	ug/g	STD 1.6	<0.05	0.24	<0.05	0.82	0.33
Toluene	337419	0.20	ug/g	STD 6	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene Mixture	337420	0.05	ug/g	STD 25	<0.05	1.03	0.20	3.68	1.39
Xylene, m/p-	337419	0.05	ug/g		<0.05	0.91	0.20	3.38	1.39
Xylene, o-	337419	0.05	ug/g		<0.05	0.12	<0.05	0.30	<0.05

Moisture

Lab I.D.
Sample Matrix
Sample Time
Sampling Date
Sample I.D.

1334560 Soil Reg153 2017-11-23 S2	1334561 Soil Reg153 2017-11-23 S5	1334562 Soil Reg153 2017-11-23 N7	1334563 Soil Reg153 2017-11-23 B4	1334564 Soil Reg153 2017-11-23 B12
---	---	---	---	--

Analyte	Batch No	MRL	Units	Guideline					
Moisture-Humidite	337417	0.1	%		17.6	18.3	16.8	21.8	20.3

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23132
Invoice to: Paterson Group

Report Number: 1722790
Date Submitted: 2017-11-24
Date Reported: 2017-11-27
Project: PE4169
COC #: 182815

Guideline = O.Reg 153-T2-Res/Park-Med/Fine

Petroleum Hydrocarbons

Lab I.D.
Sample Matrix
Sample Time
Sampling Date
Sample I.D.

1334560 Soil Reg153 2017-11-23 S2	1334561 Soil Reg153 2017-11-23 S5	1334562 Soil Reg153 2017-11-23 N7	1334563 Soil Reg153 2017-11-23 B4	1334564 Soil Reg153 2017-11-23 B12
---	---	---	---	--

Analyte	Batch No	MRL	Units	Guideline	1334560 Soil Reg153 2017-11-23 S2	1334561 Soil Reg153 2017-11-23 S5	1334562 Soil Reg153 2017-11-23 N7	1334563 Soil Reg153 2017-11-23 B4	1334564 Soil Reg153 2017-11-23 B12
Petroleum Hydrocarbons F1	290004	10	ug/g	STD 65	<10	<10	50	20	<10
Petroleum Hydrocarbons F1	337421	10	ug/g		<10	<10	50	20	<10
Petroleum Hydrocarbons F2	337417	10	ug/g	STD 150	<10	<10	600*	20	<10
Petroleum Hydrocarbons F3	337417	20	ug/g	STD 1300	<20	<20	520	<20	<20
Petroleum Hydrocarbons F4	337417	20	ug/g	STD 5600	<20	<20	<20	<20	<20

PHC Surrogates Rec

Lab I.D.
Sample Matrix
Sample Time
Sampling Date
Sample I.D.

1334560 Soil Reg153 2017-11-23 S2	1334561 Soil Reg153 2017-11-23 S5	1334562 Soil Reg153 2017-11-23 N7	1334563 Soil Reg153 2017-11-23 B4	1334564 Soil Reg153 2017-11-23 B12
---	---	---	---	--

Analyte	Batch No	MRL	Units	Guideline	1334560 Soil Reg153 2017-11-23 S2	1334561 Soil Reg153 2017-11-23 S5	1334562 Soil Reg153 2017-11-23 N7	1334563 Soil Reg153 2017-11-23 B4	1334564 Soil Reg153 2017-11-23 B12
Alpha-androstrane	337417	0	%		86	78	68	68	80

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23132
Invoice to: Paterson Group

Report Number: 1722790
Date Submitted: 2017-11-24
Date Reported: 2017-11-27
Project: PE4169
COC #: 182815

Guideline = O.Reg 153-T2-Res/Park-Med/Fine

VOC Surrogates

Lab I.D.
Sample Matrix
Sample Time
Sampling Date
Sample I.D.

1334560 Soil Reg153 _____ 2017-11-23 S2	1334561 Soil Reg153 _____ 2017-11-23 S5	1334562 Soil Reg153 _____ 2017-11-23 N7	1334563 Soil Reg153 _____ 2017-11-23 B4	1334564 Soil Reg153 _____ 2017-11-23 B12
--	--	--	--	---

Analyte	Batch No	MRL	Units	Guideline
---------	----------	-----	-------	-----------

Toluene-d8	337419	0	%		99	106	111	101	100
------------	--------	---	---	--	----	-----	-----	-----	-----

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23132
Invoice to: Paterson Group

Report Number: 1722790
Date Submitted: 2017-11-24
Date Reported: 2017-11-27
Project: PE4169
COC #: 182815

Quality Assurance Summary

Batch No	Analyte	Blank	QC % Rec	QC Limits	Spike % Rec	Spike Limits	Dup % RPD	Duplicate Limits
290004	Petroleum Hydrocarbons F1	<10 ug/g	90	80-120	105	60-140	0	0-30
337417	Petroleum Hydrocarbons F2	<10 ug/g	120	80-120	81	60-140	0	0-30
337417	Petroleum Hydrocarbons F3	<20 ug/g	120	80-120	81	60-140	0	0-30
337417	Petroleum Hydrocarbons F4	<20 ug/g	120	80-120	81	60-140	0	0-30
337417	Moisture-Humidite		100	80-120			11	
337419	Benzene	<0.02 ug/g	91	60-130	78	50-140	0	0-50
337419	Ethylbenzene	<0.05 ug/g	96	60-130	83	50-140	0	0-50
337419	m/p-xylene	<0.05 ug/g	94	60-130	81	50-140	0	0-50
337419	o-xylene	<0.05 ug/g	95	60-130	85	50-140	0	0-50
337419	Toluene	<0.20 ug/g	93	60-130	80	50-140	0	0-50
337420	Xylene Mixture							
337421	Petroleum Hydrocarbons F1-BTEX							

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23132
Invoice to: Paterson Group

Report Number: 1722790
Date Submitted: 2017-11-24
Date Reported: 2017-11-27
Project: PE4169
COC #: 182815

Test Summary

Batch No	Analyte	Instrument	Preparation Date	Analysis Date	Analyst	Method
290004	Petroleum Hydrocarbons F1	GC/FID	2017-11-27	2017-11-27	TJB	CCME
337417	Petroleum Hydrocarbons F2	GC/FID	2017-11-24	2017-11-27	JLD	CCME
337417	Petroleum Hydrocarbons F3	GC/FID	2017-11-24	2017-11-27	JLD	CCME
337417	Petroleum Hydrocarbons F4	GC/FID	2017-11-24	2017-11-27	JLD	CCME
337417	Moisture-Humidite	Oven	2017-11-24	2017-11-27	JLD	C SM2540B
337419	Benzene	GC/MS	2017-11-27	2017-11-27	TJB	V 8260B
337419	Ethylbenzene	GC/MS	2017-11-27	2017-11-27	TJB	V 8260B
337419	m/p-xylene	GC/MS	2017-11-27	2017-11-27	TJB	V 8260B
337419	o-xylene	GC/MS	2017-11-27	2017-11-27	TJB	V 8260B
337419	Toluene	GC/MS	2017-11-27	2017-11-27	TJB	V 8260B
337420	Xylene Mixture	GC/MS	2017-11-27	2017-11-27	TJB	V 8260B
337421	Petroleum Hydrocarbons F1-BTEX	GC/FID	2017-11-27	2017-11-27	TJB	CCME

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23132
Invoice to: Paterson Group

Report Number: 1722790
Date Submitted: 2017-11-24
Date Reported: 2017-11-27
Project: PE4169
COC #: 182815

Petroleum Hydrocarbons - CCME Checklist

Samples were analysed by Eurofins Ottawa Method AMCCME2, "Petroleum Hydrocarbons in Water and Soil, CCME/TPH", "Petroleum Hydrocarbons in Water and Soil, CCME/TPH". These methods comply with the reference method for the CCME CWS PHC and are validated for use in the laboratory. Eurofins Ottawa is accredited by CALA (ISO 17025) for all CCME F1-F4 fractions as listed in this report. Eurofins Mississauga is accredited by SCC (ISO 17025) for all CCME F1-F4 fractions as listed in this report. Data for QC samples (blank, duplicate, spike) are available on request

Holding/Analysis Times	Yes/No	If NO, then reasons
All fractions analyzed within recommended hold times/analysis times?	Yes	
F1		
nC6 and nC10 response factors within 30% of toluene	Yes	
BTEX was subtracted from F1 fraction	Yes	
If YES, was F1-BTEX (C6-C10) reported	Yes	
F2		
nC10, nC16 and nC34 response factors within 10% of their average (F2-F4)	Yes	
Linearity within 15% (F2-F4)	Yes	
Napthalene was subtracted from F2 fraction		Napthalene (PAH) not requested/analysed
If YES was F2-Napthalene reported		
F3		
PAH (selected compounds) subtracted from F3 fraction		PAH not requested/analysed
If YES was F3-PAH reported		
F4		
C50 response factor within 70% of nC10+nC16+nC34 average	Yes	
Chromatogram descended to baseline by retention time of C50	Yes	
if NO was F4 (C34-C50) gravimetric reported		

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO:
Project: PE4169
Custody: 112439

Report Date: 5-Dec-2017
Order Date: 29-Nov-2017

Order #: 1748317

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1748317-01	N16

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 05-Dec-2017

Order Date: 29-Nov-2017

Project Description: PE4169

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	1-Dec-17	4-Dec-17
PHC F1	CWS Tier 1 - P&T GC-FID	1-Dec-17	4-Dec-17
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	29-Nov-17	1-Dec-17
Solids, %	Gravimetric, calculation	1-Dec-17	4-Dec-17

Certificate of Analysis

Report Date: 05-Dec-2017

Client: Paterson Group Consulting Engineers

Order Date: 29-Nov-2017

Client PO:

Project Description: PE4169

Client ID:	N16	-	-	-
Sample Date:	29-Nov-17	-	-	-
Sample ID:	1748317-01	-	-	-
MDL/Units	Soil	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	91.2	-	-	-
----------	--------------	------	---	---	---

Volatiles

Benzene	0.02 ug/g dry	<0.02	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
Toluene-d8	Surrogate	81.3%	-	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	-	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 05-Dec-2017

Order Date: 29-Nov-2017

Project Description: PE4169

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	7.48		ug/g		93.5	50-140			

Certificate of Analysis

Report Date: 05-Dec-2017

Client: Paterson Group Consulting Engineers

Order Date: 29-Nov-2017

Client PO:

Project Description: PE4169

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	96.4	0.1	% by Wt.	96.9			0.5	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND			0.0	50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	4.15		ug/g dry		95.7	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 05-Dec-2017

Order Date: 29-Nov-2017

Project Description: PE4169

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	197	7	ug/g		98.3	80-120			
F2 PHCs (C10-C16)	122	4	ug/g	ND	105	60-140			
F3 PHCs (C16-C34)	309	8	ug/g	ND	128	60-140			
F4 PHCs (C34-C50)	200	6	ug/g	ND	125	60-140			
Volatiles									
Benzene	3.36	0.02	ug/g		84.0	60-130			
Ethylbenzene	3.40	0.05	ug/g		85.0	60-130			
Toluene	3.10	0.05	ug/g		77.4	60-130			
m,p-Xylenes	7.20	0.05	ug/g		90.0	60-130			
o-Xylene	3.82	0.05	ug/g		95.6	60-130			
Surrogate: Toluene-d8	6.97		ug/g		87.1	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 05-Dec-2017

Order Date: 29-Nov-2017

Project Description: PE4169

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

Paracel ID: 1748317



LABORATORIES LTD.

TF
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RELIABLE.

Lab Office
 0-2319 St. Laurent Blvd.
 Ottawa, Ontario K1G 4J8
 1-800-749-1947
 e: paracel@paracellabs.com

Chain of Custody
(Lab Use Only)

No 112439

Page 1 of 1

Client Name: <u>Paterson Group</u>	Project Reference: <u>PE4169</u>	Turnaround Time: <input type="checkbox"/> 1 Day <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input checked="" type="checkbox"/> Regular Date Required: _____
Contact Name: <u>MARK D'ARCY</u>	Quote # _____	
Address: <u>154 Colonnade Rd. S.</u> <u>Ottawa, ON</u>	PO # _____	
Telephone: <u>613-226-7381</u>	Email Address: <u>mdarcy@patersongroup.ca</u> <u>gvanloenen@patersongroup.ca</u>	

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 2 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: _____ ☐ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number:

1748317

Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)								
				Date	Time															
1 N16	S		2	Nov 29/17	AM	✓														
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Method of Delivery:

Paracel

Comments:

Relinquished By (Sign): <u>[Signature]</u>	Received by Driver/Depot: <u>[Signature]</u>	Received at Lab: <u>SURFPORT</u>	Verified By: <u>Rachel Subject</u>
Relinquished By (Print): <u>Greg L</u>	Date/Time: <u>29/11/17 2:25</u>	Date/Time: <u>Nov 29, 2017 04:06</u>	Date/Time: <u>Nov 29/17</u>
Date/Time: <u>Nov 29, 2017</u>	Temperature: <u>7°C</u>	Temperature: <u>17.2°C</u>	pH Verified <input checked="" type="checkbox"/> By: <u>N/A</u> <u>4:50</u>

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
Invoice to: Paterson Group
PO#: 23192

Report Number: 1722851
Date Submitted: 2017-11-27
Date Reported: 2017-11-28
Project: PE4169
COC #: 193287
Temperature (C): 10
Custody Seal:

Page 1 of 7

Dear Mark D'Arcy:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Sample Comment Summary

Sample ID: 1334681 Tanker-GW1 F2-F4 Surrogate recoveries are not within acceptable limits due to matrix interferences.
--

Report Comments:

Long Qu, Organics Supervisor

Eurofins Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at <http://www.cala.ca/scopes/2602.pdf>.

Eurofins (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests in drinking water.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required.

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23192
Invoice to: Paterson Group

Report Number: 1722851
Date Submitted: 2017-11-27
Date Reported: 2017-11-28
Project: PE4169
COC #: 193287

O.Reg 153-T2-Ind/Com-Coarse

Exceedence Summary

Sample I.D.	Group	Analyte	Result	Units	Criteria
GW2	Misc/Others	Petroleum Hydrocarbons F1	1340	ug/L	STD 55
GW2	Misc/Others	Petroleum Hydrocarbons F2	760	ug/L	STD 230
GW2	VOCs	Benzene	7.9	ug/L	STD 0.32
GW2	VOCs	Ethylbenzene	43.8	ug/L	STD 1.1
GW2	VOCs	Toluene	36.8	ug/L	STD 6.4
GW2	VOCs	Xylene Mixture	228	ug/L	STD 26
Tanker-GW1	Misc/Others	Petroleum Hydrocarbons F1	23200	ug/L	STD 55
Tanker-GW1	Misc/Others	Petroleum Hydrocarbons F2	6090	ug/L	STD 230
Tanker-GW1	Misc/Others	Petroleum Hydrocarbons F3	2700	ug/L	STD 1700
Tanker-GW1	VOCs	Benzene	96.9	ug/L	STD 0.32
Tanker-GW1	VOCs	Ethylbenzene	756	ug/L	STD 1.1
Tanker-GW1	VOCs	Toluene	1130	ug/L	STD 6.4
Tanker-GW1	VOCs	Xylene Mixture	4410	ug/L	STD 26

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23192
Invoice to: Paterson Group

Report Number: 1722851
Date Submitted: 2017-11-27
Date Reported: 2017-11-28
Project: PE4169
COC #: 193287

Guideline = O.Reg 153-T2-Ind/Com-Coarse

VOCs

Analyte	Batch No	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Time Sampling Date Sample I.D.	1334681 GW (Reg 153) .: 2017-11-24 Tanker-G W1	1334682 GW (Reg 153) .: 2017-11-23 GW2
Benzene	337492	0.5	ug/L	STD 0.32		96.9*	7.9*
Ethylbenzene	337492	0.5	ug/L	STD 1.1		756*	43.8*
Toluene	337492	0.5	ug/L	STD 6.4		1130*	36.8*
Xylene Mixture	337493	0.5	ug/L	STD 26		4410*	228*
Xylene, m/p-	337492	0.4	ug/L			3360	180
Xylene, o-	337492	0.4	ug/L			1050	47.6

Misc/Others

Analyte	Batch No	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Time Sampling Date Sample I.D.	1334681 GW (Reg 153) .: 2017-11-24 Tanker-G W1	1334682 GW (Reg 153) .: 2017-11-23 GW2
Petroleum Hydrocarbons F1	290004	20	ug/L	STD 55		23200*	1340*
Petroleum Hydrocarbons F1	290004	20	ug/L			16800	1020
Petroleum Hydrocarbons F2	337507	20	ug/L	STD 230		6090*	760*
Petroleum Hydrocarbons F3	337507	50	ug/L	STD 1700		2700*	340
Petroleum Hydrocarbons F4	337507	50	ug/L	STD 3300		<50	<50

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23192
Invoice to: Paterson Group

Report Number: 1722851
Date Submitted: 2017-11-27
Date Reported: 2017-11-28
Project: PE4169
COC #: 193287

Guideline = O.Reg 153-T2-Ind/Com-Coarse

PHC Surrogates Rec

Lab I.D.
Sample Matrix
Sample Time
Sampling Date
Sample I.D.

1334681
GW (Reg
153)

2017-11-24
Tanker-G
W1

1334682
GW (Reg
153)

2017-11-23
GW2

Analyte **Batch No** **MRL** **Units** **Guideline**

Alpha-androstrane	337507	0	%		56	98
-------------------	--------	---	---	--	----	----

VOC Surrogates

Lab I.D.
Sample Matrix
Sample Time
Sampling Date
Sample I.D.

1334681
GW (Reg
153)

2017-11-24
Tanker-G
W1

1334682
GW (Reg
153)

2017-11-23
GW2

Analyte **Batch No** **MRL** **Units** **Guideline**

Toluene-d8	337492	0	%		90	96
------------	--------	---	---	--	----	----

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23192
Invoice to: Paterson Group

Report Number: 1722851
Date Submitted: 2017-11-27
Date Reported: 2017-11-28
Project: PE4169
COC #: 193287

Quality Assurance Summary

Batch No	Analyte	Blank	QC % Rec	QC Limits	Spike % Rec	Spike Limits	Dup % RPD	Duplicate Limits
290004	Petroleum Hydrocarbons F1	<20 ug/L	108	60-140	103	60-140	0	0-30
290004	Petroleum Hydrocarbons F1-BTEX							
337492	Benzene	<0.5 ug/L	87	60-130	84	50-140	0	0-30
337492	Ethylbenzene	<0.5 ug/L	89	60-130	86	50-140	0	0-30
337492	m/p-xylene	<0.4 ug/L	88	60-130	87	50-140	0	0-30
337492	o-xylene	<0.4 ug/L	86	60-130	83	50-140	0	0-30
337492	Toluene	<0.5 ug/L	91	60-130	90	50-140	0	0-30
337493	Xylene Mixture							
337507	Petroleum Hydrocarbons F2	<20 ug/L	100	60-140	91	60-140	0	0-30
337507	Petroleum Hydrocarbons F3	<50 ug/L	100	60-140	91	60-140	0	0-30
337507	Petroleum Hydrocarbons F4	<50 ug/L	100	60-140	91	60-140	0	0-30

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23192
Invoice to: Paterson Group

Report Number: 1722851
Date Submitted: 2017-11-27
Date Reported: 2017-11-28
Project: PE4169
COC #: 193287

Test Summary

Batch No	Analyte	Instrument	Preparation Date	Analysis Date	Analyst	Method
290004	Petroleum Hydrocarbons F1	GC/FID	2017-11-28	2017-11-28	TJB	CCME O.Reg 153/04
290004	Petroleum Hydrocarbons F1-BTEX	GC/FID	2017-11-28	2017-11-28	TJB	CCME O.Reg 153/04
337492	Benzene	GC/MS	2017-11-28	2017-11-28	TJB	V 8260B
337492	Ethylbenzene	GC/MS	2017-11-28	2017-11-28	TJB	V 8260B
337492	m/p-xylene	GC/MS	2017-11-28	2017-11-28	TJB	V 8260B
337492	o-xylene	GC/MS	2017-11-28	2017-11-28	TJB	V 8260B
337492	Toluene	GC/MS	2017-11-28	2017-11-28	TJB	V 8260B
337493	Xylene Mixture	GC/MS	2017-11-28	2017-11-28	TJB	V 8260B
337507	Petroleum Hydrocarbons F2	GC/FID	2017-11-28	2017-11-28	JLD	CCME O.Reg 153/04
337507	Petroleum Hydrocarbons F3	GC/FID	2017-11-28	2017-11-28	JLD	CCME O.Reg 153/04
337507	Petroleum Hydrocarbons F4	GC/FID	2017-11-28	2017-11-28	JLD	CCME O.Reg 153/04

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Mark D'Arcy
PO#: 23192
Invoice to: Paterson Group

Report Number: 1722851
Date Submitted: 2017-11-27
Date Reported: 2017-11-28
Project: PE4169
COC #: 193287

Petroleum Hydrocarbons - CCME Checklist

Samples were analysed by Eurofins Ottawa Method AMCCME2, "Petroleum Hydrocarbons in Water and Soil, CCME/TPH", "Petroleum Hydrocarbons in Water and Soil, CCME/TPH". These methods comply with the reference method for the CCME CWS PHC and are validated for use in the laboratory. Eurofins Ottawa is accredited by CALA (ISO 17025) for all CCME F1-F4 fractions as listed in this report. Eurofins Mississauga is accredited by SCC (ISO 17025) for all CCME F1-F4 fractions as listed in this report. Data for QC samples (blank, duplicate, spike) are available on request

Holding/Analysis Times	Yes/No	If NO, then reasons
All fractions analyzed within recommended hold times/analysis times?	Yes	
F1		
nC6 and nC10 response factors within 30% of toluene	Yes	
BTEX was subtracted from F1 fraction	Yes	
If YES, was F1-BTEX (C6-C10) reported	Yes	
F2		
nC10, nC16 and nC34 response factors within 10% of their average (F2-F4)	Yes	
Linearity within 15% (F2-F4)	Yes	
Napthalene was subtracted from F2 fraction		Napthalene (PAH) not requested/analysed
If YES was F2-Napthalene reported		
F3		
PAH (selected compounds) subtracted from F3 fraction		PAH not requested/analysed
If YES was F3-PAH reported		
F4		
C50 response factor within 70% of nC10+nC16+nC34 average	Yes	
Chromatogram descended to baseline by retention time of C50	Yes	
if NO was F4 (C34-C50) gravimetric reported		

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO: 23285
Project: PE4169
Custody: 114165

Report Date: 20-Dec-2017
Order Date: 14-Dec-2017

Order #: 1750398

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1750398-01	Tanker- GW2
1750398-02	Exc. Well 1
1750398-03	Exc. Well 2
1750398-04	MW3-GW1

Approved By:



Tim McCooey
Senior Advisor

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23285

Report Date: 20-Dec-2017

Order Date: 14-Dec-2017

Project Description: PE4169

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	18-Dec-17	18-Dec-17
PHC F1	CWS Tier 1 - P&T GC-FID	16-Dec-17	18-Dec-17
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	18-Dec-17	20-Dec-17

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23285

Report Date: 20-Dec-2017

Order Date: 14-Dec-2017

Project Description: PE4169

Client ID:	Tanker- GW2	Exc. Well 1	Exc. Well 2	MW3-GW1
Sample Date:	13-Dec-17	13-Dec-17	13-Dec-17	13-Dec-17
Sample ID:	1750398-01	1750398-02	1750398-03	1750398-04
MDL/Units	Water	Water	Water	Water

Volatiles

Benzene	0.5 ug/L	0.7	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	1.0	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	7.8	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	3.1	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	2.2	3.1	<0.5	<0.5
Xylenes, total	0.5 ug/L	5.2	3.1	<0.5	<0.5
Toluene-d8	Surrogate	86.3%	85.0%	84.6%	85.1%

Hydrocarbons

F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	403	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	351	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23285

Report Date: 20-Dec-2017

Order Date: 14-Dec-2017

Project Description: PE4169

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	70.0		ug/L		87.5	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23285

Report Date: 20-Dec-2017

Order Date: 14-Dec-2017

Project Description: PE4169

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
Benzene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: Toluene-d8	68.2		ug/L		85.3	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23285

Report Date: 20-Dec-2017

Order Date: 14-Dec-2017

Project Description: PE4169

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	2020	25	ug/L		101	68-117			
F2 PHCs (C10-C16)	1460	100	ug/L		81.0	60-140			
F3 PHCs (C16-C34)	3570	100	ug/L		96.0	60-140			
F4 PHCs (C34-C50)	2510	100	ug/L		101	60-140			
Volatiles									
Benzene	29.6	0.5	ug/L	ND	74.0	50-140			
Ethylbenzene	38.6	0.5	ug/L	ND	96.6	50-140			
Toluene	40.0	0.5	ug/L	ND	100	50-140			
m,p-Xylenes	78.2	0.5	ug/L	ND	97.8	50-140			
o-Xylene	37.8	0.5	ug/L	ND	94.6	50-140			
Surrogate: Toluene-d8	62.1		ug/L		77.6	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23285

Report Date: 20-Dec-2017

Order Date: 14-Dec-2017

Project Description: PE4169

Qualifier Notes:

Login Qualifiers :

Container(s) - Bottle and COC sample ID don't match - PHC bottle reads only "MW3" for the sample ID.

Applies to samples: MW3-GW1

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

LABORATORIES LTD.

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RESPONSIVE
RELIABLE .

Paracel ID: 1750398

18
com

Chain of Custody

№ 114165

Page 1 of 1

Client Name: Peterson Group		Project Reference: PE4169		Turnaround Time:	
Contact Name: MARK D'ARCY		Quote #		<input type="checkbox"/> 1 Day <input type="checkbox"/> 3 Day	
Address: 154 Colonnade Rd. S Ottawa, ON		PO # 23285		<input type="checkbox"/> 2 Day <input checked="" type="checkbox"/> Regular	
Telephone: 613-226-7381		Email Address: mdarcy@petersongroup.ca gvanlunen@petersongroup.ca		Date Required:	
Criteria: <input checked="" type="checkbox"/> O. Reg. 153/04 (As Amended) Table 3 <input type="checkbox"/> RSC Filing <input type="checkbox"/> O. Reg. 558/00 <input type="checkbox"/> PWQO <input type="checkbox"/> CCME <input type="checkbox"/> SUB (Storm) <input type="checkbox"/> SUB (Sanitary) Municipality: <input type="checkbox"/> Other:					
Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)				Required Analyses	
Parcel Order Number: 1750398		Matrix	Air Volume	# of Containers	Sample Taken
Sample ID/Location Name				Date	Time
1	Tanker - GW2	GW		3	DEC 13/17 PM
2	Exc. Well 1			3	
3	Exc. Well 2			3	
4	MW3 - GW1 ✓			3	
5					
6					
7					
8					
9					
10					
Comments: NO. 4 = Sample ID on PHC and 23285 read = MW3.					Method of Delivery: Parcel
Relinquished By (Sign): [Signature]		Received by Driver Depot: [Signature]		Received at Lab: [Signature]	
Relinquished By (Print): Greg L		Date/Time: 14/12/17 140		Date/Time: DEC 14 2017 04:47	
Date/Time: Dec 14/17		Temperature: 21 °C		Date/Time: 2/14/17 5:10pm	
		Temperature: 19.6 °C		pH Verified By:	

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO: 23354
Project: PE4169
Custody: 115610

Report Date: 4-Jan-2018
Order Date: 2-Jan-2018

Order #: 1801064

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID
1801064-01

Client ID
Tanker- GW3

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23354

Report Date: 04-Jan-2018

Order Date: 2-Jan-2018

Project Description: PE4169

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	4-Jan-18	4-Jan-18
PHC F1	CWS Tier 1 - P&T GC-FID	2-Jan-18	4-Jan-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	3-Jan-18	4-Jan-18

Certificate of Analysis

Report Date: 04-Jan-2018

Client: Paterson Group Consulting Engineers

Order Date: 2-Jan-2018

Client PO: 23354

Project Description: PE4169

Client ID:	Tanker- GW3	-	-	-
Sample Date:	02-Jan-18	-	-	-
Sample ID:	1801064-01	-	-	-
MDL/Units	Water	-	-	-

Volatiles

Benzene	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
Toluene-d8	Surrogate	108%	-	-	-

Hydrocarbons

F1 PHCs (C6-C10)	25 ug/L	<25	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23354

Report Date: 04-Jan-2018

Order Date: 2-Jan-2018

Project Description: PE4169

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	84.4		ug/L		105	50-140			

Certificate of Analysis

Report Date: 04-Jan-2018

Client: Paterson Group Consulting Engineers

Order Date: 2-Jan-2018

Client PO: 23354

Project Description: PE4169

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
Benzene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: Toluene-d8	84.5		ug/L		106	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23354

Report Date: 04-Jan-2018

Order Date: 2-Jan-2018

Project Description: PE4169

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1670	25	ug/L		83.6	68-117			
F2 PHCs (C10-C16)	1560	100	ug/L		86.4	60-140			
F3 PHCs (C16-C34)	3560	100	ug/L		95.8	60-140			
F4 PHCs (C34-C50)	2570	100	ug/L		103	60-140			
Volatiles									
Benzene	27.2	0.5	ug/L		68.1	60-130			
Ethylbenzene	40.2	0.5	ug/L		101	60-130			
Toluene	40.2	0.5	ug/L		100	60-130			
m,p-Xylenes	80.4	0.5	ug/L		101	60-130			
o-Xylene	40.0	0.5	ug/L		100	60-130			
Surrogate: Toluene-d8	78.2		ug/L		97.7	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23354

Report Date: 04-Jan-2018

Order Date: 2-Jan-2018

Project Description: PE4169

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

CCME PHC additional information:

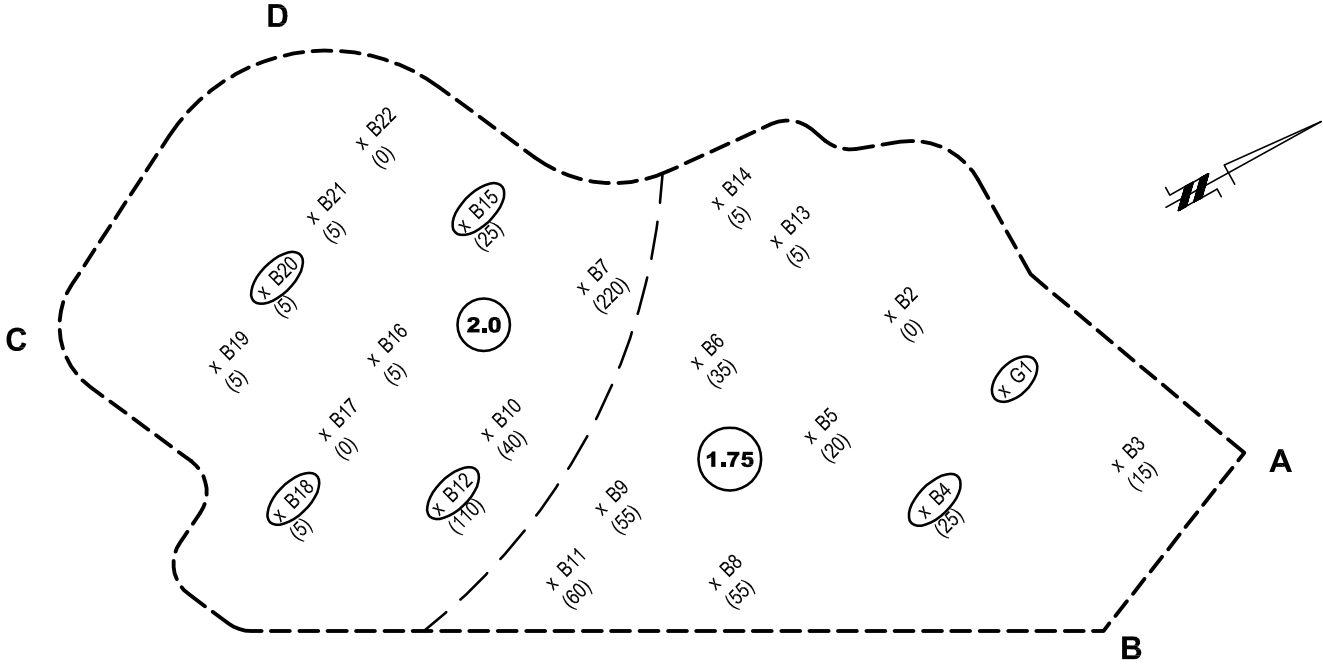
- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.



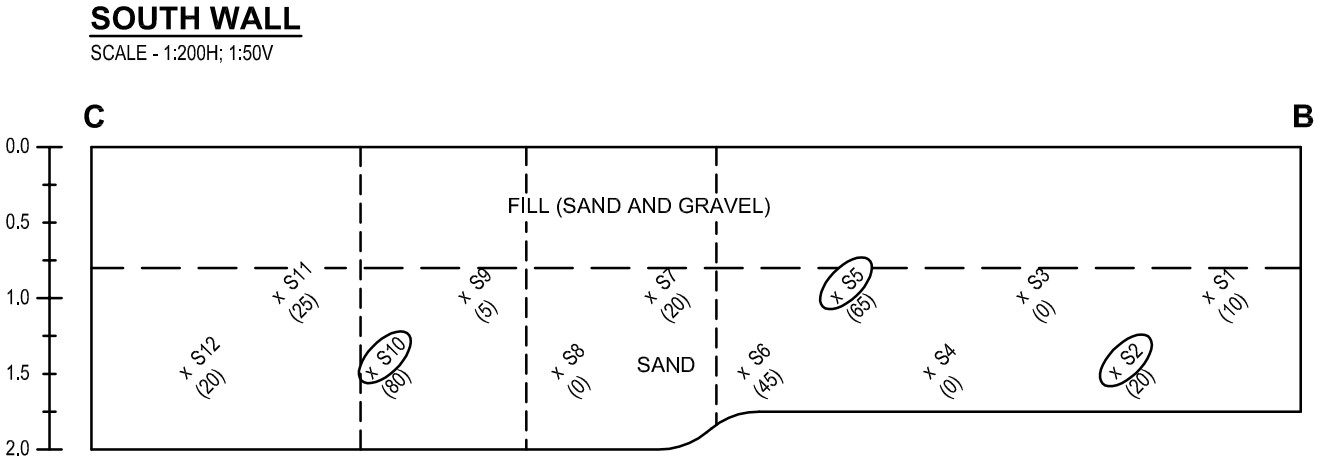
LEGEND:

- MONITORING WELL LOCATION
- MONITORING WELL LOCATION BY OTHERS
- DESTROYED MONITORING WELL LOCATION BY OTHERS

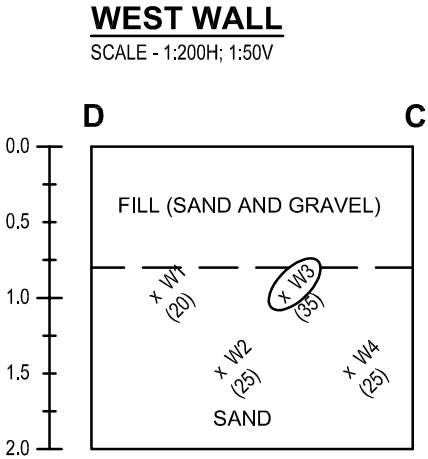
<div><div>patersongroup</div><div>consulting engineers</div><div>154 Colonnade Road South Ottawa, Ontario K2E 7J5 Tel: (613) 226-7381 Fax: (613) 226-6344</div></div>					<div>W.O. STINSON & SON LIMITED</div> <div>ENVIRONMENTAL SITE REMEDIATION</div> <div>5545 ALBION ROAD</div> <div>OTTAWA, ONTARIO</div> <div>Title: SITE PLAN</div>	Scale:	1:400	Date:	12/2017
						Drawn by:	MPG	Report No.:	PE4169-LET.01
						Checked by:	GVL	Dwg. No.:	PE4169-1
						Approved by:	MSD	Revision No.:	0
	0								
NO.	REVISIONS		DATE	INITIAL					



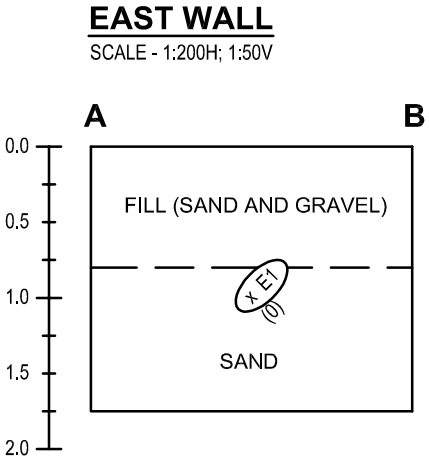
REMEDIATION EXCAVATION - BASE PLAN
SCALE - 1:200



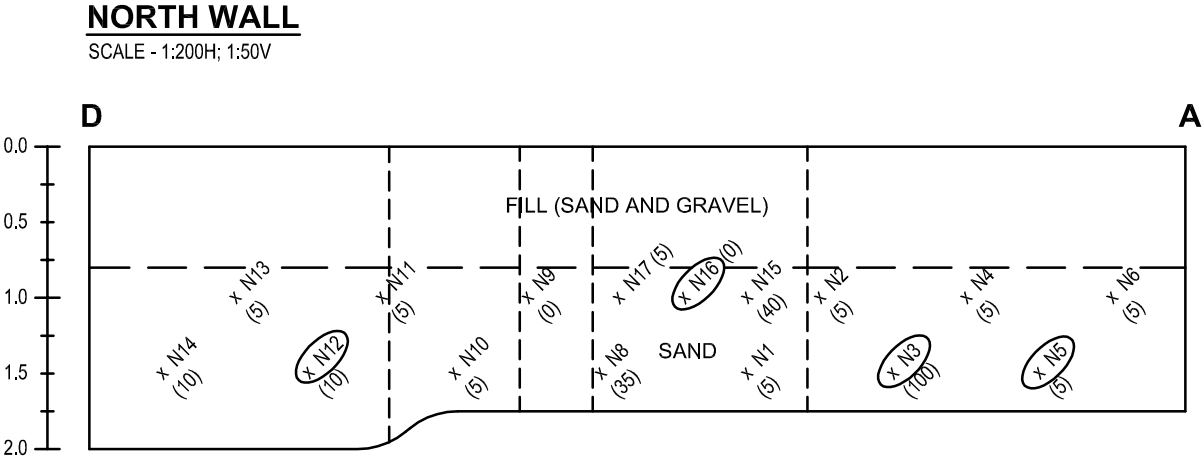
SOUTH WALL
SCALE - 1:200H; 1:50V



WEST WALL
SCALE - 1:200H; 1:50V



EAST WALL
SCALE - 1:200H; 1:50V



NORTH WALL
SCALE - 1:200H; 1:50V

- LEGEND:
- x W1 SOIL SAMPLE LOCATION
 - x N12 ANALYZED SOIL SAMPLE LOCATION
 - (25) HEADSPACE VAPOUR READING (ppm)
 - (2.0) DEPTH OF EXCAVATION (m)

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

0			
NO.	REVISIONS	DATE	INITIAL

W.O. STINSON & SON LIMITED
ENVIRONMENTAL SITE REMEDIATION
5545 ALBION ROAD
OTTAWA, ONTARIO
Title: SITE REMEDIATION PLAN

Scale:	AS SHOWN	Date:	12/2017
Drawn by:	MPG	Report No.:	PE4169-LET.01
Checked by:	GVL	Dwg. No.:	PE4169-2
Approved by:	MSD	Revision No.:	0