PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

University of Ottawa
Eastern Portion of 200 Lees Avenue,
Ottawa, Ontario

FINAL REPORT

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REPORTING HISTORY

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Draft	26/09/2011	Phase Two ESA Draft Report
Version 2	17/11/2011	Phase Two ESA Draft Report Revised
Final	09/12/2011	Phase Two ESA Final Report

EXECUTIVE SUMMARY

Franz Environmental Inc. (FRANZ) was retained by the University of Ottawa to complete a Phase Two Environmental Site Assessment (ESA) at 200 Lees Avenue, in Ottawa, Ontario. The portion of the property under consideration in this Phase Two ESA (the "Site") is the eastern portion of the 200 Lees property. The Site is approximately 36,000 m^2 in area and is bordered by the Rideau River, Highway 417, and includes a one-storey building known as Building A. The University intends to redevelop the Site, which is currently used as a parking lot, into an open-air stadium.

The Phase Two ESA was focussed on confirming or rejecting soil and ground water impacts in four Areas of Potential Environmental Concern (APECs) previously identified by the Phase One ESA completed by FRANZ at the Site:

- APEC 1: Cinder and ash fill layer;
- APEC 2: Fuel Storage;
- APEC 3: Rail Spur; and
- APEC 4: Off-site coal tar impacts.

Each of the four previously identified APECs and the potential migration of contaminants to Rideau River were investigated through the Phase Two ESA. During the intrusive investigation, three main stratigraphy units, as described in historical reports, were characterized:

- Sand and Gravel Fill
- Cinder and Ash Fill
- Glacial Till

In order to prepare this Phase Two ESA report, FRANZ conducted a review of applicable Site Condition Standards and background information including the Phase One ESA, development of a sampling and analysis plan, completion of the site investigation, and review and evaluation of information collected.

The Phase Two ESA field investigation included the following activities:

- Drilling sixteen deep (>1.5 m) boreholes, six of which were completed as monitoring wells;
- Drilling three shallow (1.5 m) boreholes along the rail spur alignment (APEC 3);
- Installation of four vapour probes;
- Collection of soil, ground water, crawl space air and soil vapour samples.

Ontario environmental regulations divide the Site into two portions: the area within 30 metres of the Rideau River and the area more than 30 metres from the river. Site Condition Standards are more stringent in the area within 30 metres of the river (Table 9) than for the area more than 30 metres from the river (Table 3). Soil and ground water conditions are therefore discussed separately for each area.

Soil samples collected from the fill material in the majority of the boreholes advanced further than 30 metres from the river exhibited concentrations of multiple metals above the applicable Site Condition Standards. These impacts were observed across the Site, with a maximum near Building A. These soil samples also exhibited polycyclic aromatic hydrocarbons (PAH) above applicable Site Condition Standards.

Soil samples collected from the fill material in the majority of the boreholes located within the 30m buffer of the Rideau River also exhibited concentrations of multiple metals and PAHs above the applicable Site Condition Standards, and also exhibited one exceedance of petroleum hydrocarbon Standards.

Site ground water was found to flow primarily towards the southeast, i.e., the Rideau River. Ground water in the northern part of the Site, however, flows northwards, likely influenced by a nearby pumping system to the north.

Concentrations of petroleum hydrocarbons (PHC), metals, semi-volatile organic compounds (SVOC), phenols, polycyclic aromatic hydrocarbons, and volatile organic compounds in ground water were below the applicable MOE Table 3 and Table 9 Standards in all analysed ground water samples.

While elevated levels of metals and polycyclic aromatic hydrocarbons are present in soil in most site areas, the absence of ground water impacts indicates that these soil impacts are likely stable and are not migrating offsite.

Soil vapour and indoor air results did not exhibit any exceedances of applicable and adopted guidelines for volatile contaminants of potential concern at the Site.

Based on the results of the field investigation, FRANZ evaluated the APECs identified previously. Soil impacts are consistent with the results of previous investigations and confirm that the dumping of incinerated materials (i.e., **APEC 1**) is a cause of environmental concern at the Site.

FRANZ did not find evidence of impacts from the fuel storage tanks associated with Building A in **APEC 2**. No PHC exceedances were reported in soil samples collected from two boreholes advanced adjacent to the tank nor from a water sample collected in the closest monitoring well. FRANZ was not able to investigate the area immediately adjacent to the underground storage tank adjacent to Building A, as its exact size was unknown. As a result, FRANZ is unable to confirm or refute the existence of localized PHC impacts around the tank.

The nature of impacts traditionally associated with rail spurs are similar to those observed elsewhere on the Site as a result of cinder and ash dumping. Scattered metals and SVOC/PAH exceedances in the fill materials were observed in shallow boreholes in **APEC 3**; however, no visual observations indicated that railbed material remains on site. The analytical results, while exhibiting exceedances, did not differ substantially from impacts observed in fill throughout the Site. As a result, APEC 3 should be considered as part of the broader cinder and ash fill at the Site.

Based on the absence of PAH impacts in ground water analytical results, FRANZ did not find evidences of potential migration of contaminants associated with activities at the former gasification plant located northwest of the Site (**APEC 4**).

This executive summary should be read in conjunction with the main report and is subject to the same limitations described in Appendix J.

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1.0 INTRODUCTION

1.1 Site Description

Franz Environmental Inc. (FRANZ) was retained by the University of Ottawa (uOttawa) to complete a Phase Two Environmental Site Assessment (ESA) on a portion of the 200 Lees Avenue property, in Ottawa, Ontario. This report has been prepared in accordance with FRANZ proposal dated August 3, 2011. The portion of the property under consideration in this Phase Two ESA is the eastern portion of the 200 Lees property as shown on Figure 1 (Appendix A). This portion of the 200 Lees Avenue property is the Phase Two property and is referred to as “the Site” in this report.

The Site is located on two parcels of land with Property Identifier Numbers of 042030732 and 042030731. The legal description of the parcel of land where the Site is located is CON D RF PT LOT G RP4R 299; PARTS 6 9 & 10 LESS 5R 5009; PARTS 1 TO 8 LESS 5R 5015; PARTS 1 & 2.

The Site is approximately 36,000 m^2 in area and is bordered by the Rideau River, Highway 417, and includes all of the building known as “Building A.” The University intends to redevelop the Site, which is currently used as a parking lot, into an open-air stadium.

The Site is bordered to the west by four interconnected buildings that are part of the 200 Lees Avenue complex and are owned and occupied by the University of Ottawa. Properties adjacent to each side of the subject property are as follows:

- North of the Site: Adjacent to the northwestern portion of the property is Lees Avenue. Adjacent to the northeastern portion of the property is a bike trail and Highway 417.
- East of the Site: Adjacent to the northeastern portion of the property is Highway 417.
- Adjacent to the south and east portion of the property is the Rideau River.

1.2 Property Ownership

FRANZ was retained by the University of Ottawa, the owner of the Site, specifically,

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1.3 Current and Proposed Future Uses

The Site is generally flat lying with a moderate slope to the southeast. The majority of the Site is occupied by an asphalt parking lot. Building A, adjacent to the parking lot, occupies the west side of the Site (see Figure 2; Appendix A). Building A is a rectangular shaped building located in the southeast portion of the 200 Lees building complex. This is a one-story building with a crawl space throughout except in the northeast corner where a boiler room is located in a basement area. The building has classrooms and laboratories. At the time of the site reconnaissance, only one lecture hall was in use as a classroom. The remaining classrooms and laboratories are used for work spaces and storage by a number or different departments at the University.

The University proposes to renovate the existing Building A, including partial demolition, renovation and reconstruction. The improved Building A will be used to house athletic support facilities including classrooms and meeting rooms, change-rooms, washrooms, first aid and therapy rooms, and storage rooms.

It is our understanding that the University proposes to construct an open-air stadium on the portion of the Site that is currently used as a university parking lot. This open-air stadium will cover a small portion of the southeast corner of existing Building A. A proposed building construction plan is shown on Figure 3 (Appendix A). The playing surface will be engineered turf over a granular base and will operate as a temporary structure under positive pressure. A dome is proposed to cover a portion of the engineered turf from about November through about May. Open-air bleachers are proposed to accommodate approximately 4,000 people. These open-air bleachers are proposed to be located along the south side of the engineered turf. The open-air bleachers will not be covered by the proposed dome.

The proposed use of the Site is as an open-air stadium, not an indoor sports field, an enclosed stadium or an indoor gymnasium. As defined by the regulation, the open-air stadium under consideration would be a “stadium.” Both the current and proposed uses are defined by the Regulation as Community land use. A Record of Site Condition (RSC) can be obtained for any site, but is mandatory when the owner wishes to change the use of the Site from a “less sensitive” land use to a “more sensitive” use. The types of land use are laid out in the regulation as follows:

- Agricultural or other use,
- Commercial use,
- Community use,
- Industrial use,
- Institutional use,
- Parkland use, and

- Residential use.

The types of property use are divided into three broad categories in the Environmental Protection Act (EPA), as shown below:

Table 1-1: Property Use Categories and Sensitivity in the Environmental Protection Act

Land Use	**Industrial Commercial Community**	**Residential Parkland Institutional**	**Agricultural**
Increasing Sensitivity	Least Sensitive	→	Most Sensitive

As both current and proposed uses of the Site fall under the “community” definition of the applicable regulation (O.Reg 153/04), FRANZ believes that section 168.3.1 of the EPA would allow the new use; therefore, an RSC may not be mandatory and this Phase Two ESA can be considered for due diligence assessment purposes only.

1.4 Applicable Site Condition Standard

The applicable Site Condition Standards were determined according to sections 34 to 43.1 of the Ontario Regulation 153/04 *Records of Site Condition – Part XV.1 of the Act* (as amended).

1.4.1 Rationale for Soil and Ground Water Standards

Ontario’s 2004 *Environmental Protection Act* (EPA), specifically Sections XV.1 and XV.2, outlines the regulatory requirements in Ontario for environmental site assessment and remediation. Supporting documents are published periodically outlining the appropriate Standards to be applied to environmental media. The most recent such document is *Soil, Ground Water and Sediment Standards for Use at Contaminated Sites in Ontario*, dated April 15, 2011. Less frequently, the Ministry of the Environment publishes detailed documentation outlining the assumptions and calculations behind the Standards. The most recent such document is *Rationale for the Development of Soil, Ground Water and Sediment Standards for Use at Contaminated Sites in Ontario*, dated April 15, 2011.

1.4.1.1 Non-potable Ground Water

Non-potable ground water Site Condition Standards were used given that:

- The Site, and all other properties located, in whole or in part, within 250 m of the boundaries of the phase property are supplied by the City of Ottawa’s municipal water system and have no wells installed for the extraction of ground water;
- The Site is not located in an area designated in a municipal official plan as a wellhead protection area or other designation identified by the municipality for the protection of ground water;

- No objection to that application of the non-potable ground water Site Condition Standards is expected from the City of Ottawa.

1.4.1.2 Full-depth

The full depth Site Condition Standards may be used for any intended property.

1.4.1.3 Grain Size

Based on the results of the intrusive investigation, FRANZ analyzed grain size at the Site for the purpose of determining the appropriate Site Condition Standards. Site grain size was determined to be coarse (see Section 5.4).

1.4.1.4 Selected Soil and Ground Water Standards

FRANZ selected the following Site Condition Standards to evaluate the analytical data from soil and ground water samples analysed during this Phase Two investigation:

- Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act **Table 3: Full Depth** Generic Site Condition Standards in a **Non-Potable Ground Water** Condition with **coarse** grained soil and **community land** use (dated April 15, 2011).

Due to the proximity of the Rideau River to the Site, analytical results from samples collected within a 30m buffer of the Rideau River shoreline were assessed with respect to:

- Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act **Table 9:** Generic Site Condition Standards **for Use within 30 m of a Water Body** in a **Non-Potable Ground Water** Condition with **coarse** grained soil and **community land** use (dated April 15, 2011).

The boundary between the application of MOE Table 3 Site Condition Standards (SCSs) and the MOE Table 9 SCSs is shown on Figure 2 (Appendix A).

1.4.2 Rationale for the Tolerable/Reference Concentrations for Soil Vapour and Indoor Air

1.4.2.1 Benzene, Toluene, Ethylbenzene, Xylenes and Napthalene

While the current Ontario Standards do not include comparative values for soil vapour or indoor air, the scientific rationale for soil and ground water standards includes such values for calculation of migration models. Values for benzene, toluene, ethylbenzene, xylenes, and napthalene were obtained from toxicological reference concentrations for inhalation from Table B-1 of the rationale document, *Rationale for the Development of Soil, Ground Water and Sediment Standards for Use at Contaminated Sites in Ontario* (Ontario Ministry of the Environment, 2009).

1.4.2.2 PHC Fractions

The Ontario Standards are based on the Canada-Wide Standards for Petroleum Hydrocarbons in Soil (CWS-PHC) and the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG).

The TPHCWG report on *Development of Fraction Specific Reference Doses and Reference Concentrations for Total Petroleum Hydrocarbons* (Exxon Biomedical Sciences *et al*., 1997) used an indicator/surrogate approach to determine reference concentrations for specific PHC fractions. The TPHCWG separated PHC fractions by carbon-equivalent numbers and into aromatic and aliphatic groups. Based on the breakdown of PHC fractions by weight in the CWS-PHC Scientific Rationale Document (Table 3.7 of that report), the aromatic and aliphatic reference fractions can be combined by weighted addition to determine an appropriate reference concentration (RfC). The recommended composition and RfCs for the TPHCWG PHC fractions are presented in Table 1-2 and Table 1-3, below.

Table 1-2: Assumed Composition of PHC Fractions by Mass

TPH Sub-Fraction	Fraction 1	Fraction 2
Aliphatics		
C6-C8	0.55	
C>8-C10	0.36	
C>10-C12		0.36
C>12-C16		0.44
Aromatics		
C>7-C8		
C>8-C10	0.09	
C>10-C12		0.09
C>12-C16		0.11
Total	1	1

Adapted from CCME, 2008b, Table 3.7

Table 1-3: Reference Concentration, PHC Fractions

	RfC (mg/m^3)
Aliphatics	
C6-C8	18.4
C>8-C10	1
C>10-C12	1
C>12-C16	1
Aromatics	
C>7-C8	0.4
C>8-C10	0.2
C>10-C12	0.2
C>12-C16	0.2

Adapted from CCME, 2008b, Table 3.4

The appropriate RfC for the CWS-PHC-defined fraction F1 can therefore be calculated as:

$$RfC_F = \sum_{aliphatics}(mf_x)(RfC_x) + \sum_{aromatics}(mf_x)(RfC_x)$$

Where RfC_F is the reference concentration for a CWS-PHC fraction (e.g., F1), mf_x is the mass fraction of the subcomponent (see Table 1-2) and RfC_x is the reference concentration of the subcomponent (see Table 1-3).

For PHC fraction F1, this calculation is:

$$RfC_{F1} = (0.55)(18.4) + (0.36)(1) + (0.09)(0.2)$$
$$= 11 mg/m^3$$

For PHC fraction F2, this calculation is:

$$RfC_{F2} = (0.36)(1) + (0.44)(1) + (0.09)(0.2) + (0.11)(0.2)$$
$$= 0.84 mg/m^3$$

For PHC fractions F3 and F4, the volatility is not considered sufficiently high to warrant vapour pathway calculations in the CWS-PHC.

1.4.3 Attenuating Soil Vapour Concentrations

The approach often adopted for soil vapour guidelines is to use values from the indoor air guidelines and to provide a set of instructions for adjusting the analytical data so that it may be compared to the guidelines, as soil vapour samples do not represent the air that any human receptor would breathe regularly. Soil vapour samples represent air that may move from the soil, through building basements or floor slabs, into the "breathing air" of a building. During this migration process, the convective and diffusive forces moving contaminated vapour also dilute the concentrations of the contaminants. As a result, analytical data requires "attenuation," or reduction from the levels observed in soil vapour samples to the expected levels that would be found in areas where receptors would be exposed.

British Columbia, the only jurisdiction in Canada which currently provides guidance on soil vapour sampling, in the *Technical Guidance on Contaminated Sites, September 2010: Vapour Investigation and Remediation* (BC MOE, 2010), recommends that sites with volatile or semi-volatile substances should be assessed by:

a. predicting the indoor and/or outdoor air concentration (C_{air}) of every volatile or semi-volatile potential contaminant of concern (PCOC) using the highest concentration of each PCOC measured in soil and/or ground water and a defensible vapour intrusion model, or

b. predicting the indoor and/or outdoor air concentration (C_{air}) of every volatile or semi-volatile substance using (i) the highest concentration of each substance measured in soil vapour and (ii) the following equation:

$$C_{air} = C_{vapour}\alpha$$

Where C_{air} is the estimated indoor and/or outdoor air concentration of the substance, C_{vapour} is the measured subsoil or sub-slab vapour concentration of the substance, and α is the vapour attenuation factor, provided in the BC Guidance.

The resulting C_{air} is then compared to a reference concentration (RfC) for the PCOC. If $C_{air} \leq$ RfC for every substance, then risks associated with vapour exposure at the Site are considered acceptable and no further vapour pathway assessment is recommended.

Based on the BC Guidance, *Table 2. Default vapour attenuation factors*, FRANZ has used an attenuation factor of 2.0×10^{-2} based on the sample depth of < 1 metre below ground surface (m bgs) and the potential for vapour intrusion to indoor air (enclosure dome) at a community use site.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Site covers an area of approximately 36,000 m^2. About one third of the Site is occupied by an asphalt parking lot (12,500 m^2). Building A, adjacent to the parking lot, occupies the west side of the Site (see Figure 2; Appendix A).

Building A is a rectangular shaped building located in the southeast portion of the 200 Lees building complex and is approximately 6,800 metres square in size. Building A has a crawl space throughout, except in the northeast corner, where a boiler room is located in a basement area. Each corridor of Building A has an access grate to the crawl space. The building contains classrooms and laboratories. Between the building and the parking lot there is a maintained lawn area, where there are apparent fill and vent pipes for an underground storage tank. Based on interviews conducted by FRANZ during the Phase One ESA in July 2011, there is an underground storage tank (UST) present in this location that previously served as the back-up fuel source for the hot water boilers in the basement of Building A. The tank has reportedly not been used during uOttawa's ownership of the Site.

Prior to the Phase Two ESA investigation conducted by FRANZ, there were two ground water monitoring wells in the centre of the parking lot and one near the southeast corner of Building A. The parking lot wells were completed with flush mounts; the well to the southeast of Building A was completed with a stick-up casing.

The southeast corner of the asphalt parking lot consists of a hoarding enclosure that holds the University's garbage and compost. This area is also used to store larger outdoor items such as picnic tables, dumpsters and a composting shed.

2.1.1 Water Bodies and Areas of Natural Significance

The Rideau River forms the southern and eastern boundary of the property. The Rideau Valley Conservation Authority has jurisdiction inside the "Regulation Limit," which is defined as the 100 year flood limit plus 15 metres.

According to O.Reg. 153/04 (as revised), an area of natural significance can be any one of the following:

- An area reserved or set apart as a provincial park or conservation reserve under the Provincial Parks and Conservation Reserves Act, 2006.
- An area of natural and scientific interest (life science or earth science) identified by the Ministry of Natural Resources as having provincial significance.
- A wetland identified by the Ministry of Natural Resources as having provincial significance.

- An area designated by a municipality in its official plan as environmentally significant, however expressed, including designations of areas as environmentally sensitive, as being of environmental concern and as being ecologically significant.
- An area designated as an escarpment natural area or an escarpment protection area by the Niagara Escarpment Plan under the Niagara Escarpment Planning and Development Act.
- An area identified by the Ministry of Natural Resources as significant habitat of a threatened or endangered species.
- An area which is habitat of a species that is classified under section 7 of the Endangered Species Act, 2007 as a threatened or endangered species.
- Property within an area designated as a natural core area or natural linkage area within the area to which the Oak Ridges Moraine Conservation Plan under the Oak Ridges Moraine Conservation Act, 2001 applies.
- An area set apart as a wilderness area under the Wilderness Areas Act;

FRANZ prepared Table 2-1 in order to assess whether the Site, or any portion of the Site, is an area of natural significance.

Table 2-1: Assessment of Areas of Natural Significance

Assessment Category	Accept or Reject as Applicable to the Site	Rationale
An area reserved or set apart as a provincial park or conservation reserve under the Provincial Parks and Conservation Reserves Act, 2006.	Reject	According to Ontario’s Crown Land Use Policy; there are no Provincial Parks, Recommended Provincial Parks, Conservation Reserves, Recommended Conservation Reserves, Forest Reserves, Wilderness Areas Enhanced Management Areas, General Use Areas, or Provincial Wildlife Areas In the Phase One Study Area. http://www.lio.ontario.ca/imf-ows/imf.jsp?site=clupa_en
An area of natural and scientific interest (life science or earth science) identified by the Ministry of Natural Resources as having provincial significance.	Reject	According to the Ministry of Natural Resources there are no areas of natural or scientific interest in the Phase One study area. https://www.biodiversityexplorer.mnr.gov.on.ca/nhicWEB/mainSubmit.do

Assessment Category	Accept or Reject as Applicable to the Site	Rationale
A wetland identified by the Ministry of Natural Resources as having provincial significance.	Reject	No wetlands present on site
An area designated by a municipality in its official plan as environmentally significant, however expressed, including designations of areas as environmentally sensitive, as being of environmental concern and as being ecologically significant.	Reject	No inclusion of the Site in the City of Ottawa's Official Plan
An area designated as an escarpment natural area or an escarpment protection area by the Niagara Escarpment Plan under the Niagara Escarpment Planning and Development Act.	Reject	The Site is not within the Niagara Escarpment Area
An area identified by the Ministry of Natural Resources as significant habitat of a threatened or endangered species.	Accept	The woodland area on the Site and the Rideau River have been identified by the Ministry of Natural Resources as species at risk and fish nursery habitat.
An area which is habitat of a species that is classified under section 7 of the Endangered Species Act, 2007 as a threatened or endangered species.	Accept	According to the Ministry of Natural Resources, Kemptville District there are is the potential for the habitat of 3 Threatened, 1 Endangered, and 2 species of Special Concern in the Phase One study area. Additionally, the Site fronts the Rideau River which has documented fish nursery habitat. Mitigative measures have been provided for any work being done on the Site (see Appendix G of the FRANZ Phase one ESA report).
Property within an area designated as a natural core area or natural linkage area within the area to which the Oak Ridges Moraine Conservation Plan under the Oak Ridges Moraine Conservation Act, 2001 applies.	Reject	The Site is not within the Oak Ridges Moraine

As areas of natural significance were identified within the Phase One study area, and the Site may contain areas of natural significance, they should be addressed in any future risk assessment.

2.1.2 Topography and Surface Water Drainage

The Site is generally flat lying with a moderate slope to the southeast (Figure 2; Appendix A). The south side of the Site slopes steeply to the Rideau River. Surface drainage from the Site is expected to flow towards the various storm drains located on the property and to be directed towards the storm outfall located along the west limit of the property that discharges to the Rideau River. An intermittent ditch is also located along the north side of the property.

2.2 Past Investigations

The following provides a summary of findings from relevant previous studies at and nearby the Site provided to FRANZ. Instrumentation associated with historical site investigations are presented on Figure 4 (Appendix A). Historical soil and groundwater chemistry is presented in Appendix B.

2.2.1 McRostie & Associates Foundation Investigation (1962)

The investigation was conducted prior to the construction of the technical institute which later became the Algonquin College, and was conducted to evaluate the foundation capacity of the material at the Site to receive the institute buildings. The buildings and parking lot configuration used for this investigation corresponds to the current site layout.

Recommendations for building construction are presented in the report. The report presents a description of all boreholes completed. General site conditions at the Site are described as: "consisting of approximately 6 m (20 feet) of fill comprised of soil and refuse plus a significant amount of ashes and cinders. Beneath the fill is about 7.6 m (25 feet) of medium dense to dense glacial till (a mixture of boulders, gravel, sand, silt and clay) and beneath the till is shale (rock) of the Billings Formation. The upper meters of shale is weathered and in places is fractured. Ground water levels were in general 4.6m (15 to 20 feet) below the present surface and these can be considered to be near the low point in the seasonal variation."

2.2.2 Gartner Lee Associates Ltd. Methane Migration Study (1980)

The report was commissioned by the City to identify and document waste disposal areas within the City of Ottawa, to investigate their physical settings, and to determine whether methane gas migration from the sites would cause a hazard to specific structures. The report identifies nineteen abandoned waste disposal sites in the City, one of which is the 200 Lees Avenue property. The eastern portion of the 200 Lees Avenue property, the Site, appears to be part of the landfill as outlined by the report, although the extent of the landfill area appears to be only south of the former railway tracks.

Site 12 is the relevant landfill described in the report, although the Riverside Drive landfill (Site 10 in the report), the Nunts Farm landfill (Site 11) and unnamed Site 13 are within the study area. Sites 10, 11 and 13 are across the river from the Site.

The Site 12 landfill is described as a 15 acre site that received wastes primarily from the Lees Avenue incinerator, which was located on the north side of Lees Avenue. The report indicates that disposal began earlier than 1933 and continued until 1947. The majority of the waste is believed to consist of incinerator ash and other burnt wastes, approximately 3-5 metres deep.

The report recommends monitoring for methane around buildings on Site 12, including all Algonquin College buildings at 200 Lees that were present at the time.

2.2.3 Gartner Lee Associates Ltd. Methane Study (1984)

The 1984 methane study was conducted as a follow-up to the 1980 study, as further sites were identified. Site 28 is identified as “Government Property” on Lees Avenue, adjacent to Site 12, and opposite the former incinerator. This area was apparently filled from 1933 to 1938, and consists mainly of ash and cinder. The report indicates that no gas was detected within refuse found in the area.

2.2.4 Health Unit Coal Tar Memo (1986)

This memo, produced by the Ottawa-Carleton Health Unit, describes the uses of coal tar and the potential health hazards associated with exposure. The memo indicates that the Medical Officer of Health and senior inspectors visited four apartment buildings on Lees Avenue to “evaluate whether coal tar presents a health hazard to residents of these buildings.”

Evidence of coal tar was found in the parking levels and basements of buildings to the west of the 200 Lees Avenue property (at 170 and 180 Lees); however, other buildings investigated (169 and 190 Lees) appeared unaffected.

Conditions under which coal tar can present a hazard were enumerated, and precautions for workers removing coal tar were advised.

2.2.5 Coal Tar Fact Sheets (1986)

Fact Sheet #1 describes the events leading to the contamination of the Rideau River by coal tar in April 1986. Coal tar was used in the production of gas for lighting and heating at the coal gasification plant on Lees Avenue which operated from approximately the early 1900s to the mid-1950s. The area became the site of the Lees Avenue Transitway station and Highway 417 underpass in the 1980s. In 1986, coal tar material reached the Rideau River from a storm sewer connected to the Lees Avenue Transitway pumping station. Consulting firms were hired at the time to control the contaminants on the Transitway property (Conestoga Rovers contracted by the City of Ottawa), to study the extent of contamination in the Rideau River and collect and treat any coal tar material reaching the river (Proctor and Redfern Ltd., contracted by the Ontario Ministry of the Environment), and to conduct hydrogeological studies of the general area (Intera Technologies Ltd., contracted by the Ontario Ministry of the Environment).

Fact Sheet #2 describes waste from coal tar plants, which was one component of the waste material deposited at the 200 Lees Avenue property. At the Lees Avenue facility, the main by-products were tars and gas cleaning waste. The main constituents of the tars were mainly polycyclic aromatic hydrocarbons (PAHs) with minor amounts of light aromatics such as phenols, benzene, toluene, and xylenes. The gas cleaning waste originated from the use, typically, of iron oxide which resulted in waste containing various sulphur and nitrogen (i.e., cyanide, ammonia, and nitrate) compounds.

Fact Sheet #3 presents the results of the characterisation of the coal tar impact in the Rideau River and describes the contamination observed at the time. The fact sheet indicates that the contaminated area extends about 120 metres along the shoreline, by about 40 metres into the river. The contamination is commonly found as droplets mixed with the riverbed sediment. The area of greatest concentration is by the Transitway bridge. In that area, the riverbed is littered with debris such as trees, automobile parts, bicycles, rocks, steel girders and construction rubble.

Fact Sheet #4 describes the various areas impacted by contaminants along Lees Avenue. The fact sheet indicates that elevated concentrations of benzene, toluene and xylenes were found on the south side of Lees Avenue; lower levels were found on the 170 and 200 Lees Avenue properties.

Fact Sheet #5 presents the results of air monitoring conducted in the Lees Avenue Transitway station area. The samples from ambient air were analysed for 25 PAHs and for BTEX. The results revealed no exceedance of air quality standards.

Fact Sheet #6 presents the results of surface water testing in the Rideau River. The results suggest that the water is essentially not contaminated by PAHs. The results suggest that the coal tar is not moving to any great extent into the water.

2.2.6 INTERA Technologies Ltd. Hydrogeology Study (1987)

The INTERA Technologies Ltd. (INTERA) hydrogeology study describes the investigation of soil and ground water conditions on Lees Avenue around the former coal gasification facility to the west of the Site. The study was prompted by the discovery of “oily and tar-like” material in the pumphouse of the Lees Transitway station.

The report reviews historical data from the National Map Collection, the City of Ottawa, the National Air Photo Library, Consumers’ Gas and Currie Products Ltd. to determine potential sources of environmental impacts. The report finds that the coal gasification plant was the "most important waste generating facility in the Lees Avenue area." The gasification plant used coal to generate gas, which was used as a source of heat and lighting. The report identifies by-products of the plant as tars; sludges; tar liquors and ammonia liquors; spent iron oxide; ash, slag and clinkers; dust, off-grade coal and coke.

The report also identifies a tar distillation plant, on the site of what is now 170 Lees Avenue, as a potential source of environmental impacts. The tar distillation plant used some of the 4,000 L of tar generated by the coal gasification plant to produce roofing pitch, roof and foundation coatings, and lighter distillation fractions. The report indicates that liquid wastes were not disposed of on-site, although product storage did take place in aboveground storage tanks.

The report also identifies landfilling, railway use, coal yards (on the area that is now Highway 417), and snow dumping (to the north of Highway 417) as potential sources of environmental impacts.

INTERA performed an intrusive investigation of the subsurface by advancing 47 observation wells in the area around the former coal gasification plant and 15 miniature piezometers at the shoreline of the Rideau River. INTERA also performed slug tests and pump tests to assess the ground water conditions in the area. The slug and pump tests showed hydraulic conductivity values ranging from 3 x 10^{-5} to 2 x 10^{-5} m/s for the alluvium (i.e., glacial till), 1 x 10^{-5} to 8 x 10^{-6} m/s for the shale bedrock, and 1 x 10^{-4} to 3 x 10^{-7} for fill.

INTERA observed tar saturated soils in its intrusive investigation around the building at 170 Lees Avenue, and on the properties between Lees Avenue and Highway 417. One impacted location was observed on the 200 Lees property, in the northwest corner, well away from the Site. Concentrations of naphthalene, benzo(a)pyrene, benzene and ethylbenzene were observed in similar locations; however, ground water impacts were observed at 200 Lees Avenue much closer to the Site.

2.2.7 Golder Associates Ltd. Geotechnical Report (2000)

Before purchasing the 200 Lees property, the University of Ottawa retained Golder Associates Ltd. (Golder) to provide a more complete assessment of the environmental and geotechnical conditions at the Site. Golder advanced test pits and boreholes; installed monitoring wells; and collected soil and ground water samples.

The Golder Geotechnical Report identified a fill layer underlying the Site, varying from 0.6 to 5 metres in thickness. Bedrock was encountered between 10 to 12 m bgs throughout the Site. Ground water elevation was found to be between three and eight metres below ground surface, with the ground water on the northern half of the 200 Lees property flowing towards the Transitway pumping station and ground water on the southern half of the 200 Lees property flowing towards the Rideau River.

Golder found that site soils exhibited exceedances of the then-current Ontario Standards for metals throughout the Site, and PAHs in isolated locations. The impacts were associated with the cinder and ash fill. Golder did not find any exceedances of Ontario Standards in ground water.

2.2.8 CH2M Hill Canada Ltd. Risk Assessment (2002)

Algonquin College retained CH2M Hill Canada Ltd. (CH2M Hill) to complete a human health and ecological risk assessment for the 200 Lees Avenue property.

The report describes the history of the Site and indicates that it was used as a landfill by the City of Ottawa between 1906 and 1947. The major component of the waste shipped to the landfill was ash, cinder and other burnt waste from the Lees Avenue incinerator; however, the report indicates that the Site "may also have received domestic waste, although it has been reported that historical geotechnical borehole logs have not shown any evidence of this."

The CH2M Hill summarizes key findings of previous historical reviews, including the following:

- The City of Ottawa operated an incinerator between 1913 and 1921 at the Site.
- Waste from the coal gasification plant may have been disposed of on site.
- The majority of material disposed was cinder and ash, with some brick, glass and metal fragments.

CH2M Hill conducted a site investigation in support of the risk assessment. The investigation included surface soil sampling, installing two ground water wells, measuring ground water elevations, collecting round water samples, collecting vapour samples, and collecting soil samples from crawl spaces.

Exceedances of the Ontario Standards current at the time were found in the soil samples collected in the crawl space below Building A, for lead, boron and antimony. No exceedances of contemporary standards were found in soil samples collected in crawl spaces below buildings B, C or D. Surface soil sampling found lead, zinc and benzo(a)pyrene exceedances at surface soils in all areas sampled.

Ground water exceedances of Standards current at the time were found at two site wells (for copper and lead); however, the exceedances were attributed to sampling methodology as the samples were not field filtered.

CH2M Hill also collected 23 soil samples from the riverbank and five sediment samples from the Rideau River in support of the risk assessment. The report indicated that areas of the riverbank showed exposed cinder and ash fill, and that 22 of 23 soil samples collected on the bank exhibited exceedances of the contemporary Ontario Standard for lead. The soil samples also exhibited exceedances for other metals (arsenic, copper and zinc) and PAHs (benzo(a)pyrene and dibenzo(a,h)anthracene).

CH2M Hill found that Rideau River sediments adjacent to 200 Lees Avenue exhibited concentrations of lead and copper in excess of the lowest observable effects limits, as defined by Ontario. PAHs also observed effects levels in sediment at some samples. Subsequent upgradient sediment sampling confirmed that sediment quality adjacent to the Site is not significantly different from sediment quality upstream in the Rideau River.

The human health portion of the risk assessment was conducted in accordance with the Ontario Guidelines in place at the time and the ecological portion was completed in accordance with Canadian Council of Ministers of the Environment guidance. The conclusions of the risk assessment were as follows:

- Risks to daily users of the Site, now and in the future, were acceptable.
- Maintenance workers, who may come into contact with subsurface soils, should use proper protective equipment and perform their duties in accordance with a health and safety plan.
- Plants, soil invertebrates, mammals and birds should be able to survive, grow and reproduce at the Site.
- The Site has minimal impact on sediment in the Rideau River adjacent to the Site.

As a result, “no significant remedial action or rehabilitation” was proposed for the Site.

2.2.9 FRANZ Health and Safety Plan (2007)

The Risk Management Health and Safety Plan (HASP) was developed by FRANZ in support of the recommendations in the CH2M HILL Risk Assessment.

This Risk Management HASP set out responsibilities; established personnel protection standards and mandatory safety practices and procedures; and provided for contingencies that could arise during site activities that could involve encountering impacted subsurface soils and ground water at the Site.

The Risk Management HASP laid out precautions for maintenance workers, including use of personal protective equipment, minimizing subsurface work and dust reduction. The HASP also laid out maintenance and monitoring requirements for the Site.

2.2.10 Golder Associates Ltd. Overview (2007)

Golder was retained by the University of Ottawa to summarize and consolidate previous environmental and geotechnical reports prepared for the 200 Lees property. The review did not include field work and was solely based on a review of previous studies.

The report details the history of the Site and does not provide any information not found in previous reports.

Geotechnical conditions were summarized as follows: the cinder and ash fill layer is typically found to be approximately three to six metres thick across the 200 Lees property, ranging from very loosely to very densely packed. Native overburden is found below the cinder and ash fill. For the Phase One ESA Site, the native material is composed of heterogeneous glacial till. Bedrock is found at depths between 10 and 13 metres m bgs. Ground water is found between 3 and 8.5 metres below ground surface.

The report describes environmental conditions in the subsurface, based on previous reports. The cinder and ash layer and coal tar impacts are discussed in similar terms as previous reports.

Golder also discusses site redevelopment considerations, including geotechnical aspects of new building construction. Golder also summarizes regulatory requirements for environmental issues at the Site for redevelopment. The report indicates that the Ministry of the Environment has expressed concern that redevelopment of the shoreline could contaminate the Rideau River. The report also indicates that the Rideau Valley Conservation Authority has jurisdiction inside the “Regulation Limit,” which is defined as the 100 year flood limit plus 15 metres.

2.2.11 FRANZ Draft Phase One ESA (2007)

FRANZ was retained by the University of Ottawa to complete a Phase One ESA for the entire 200 Lees Avenue property in support of potential redevelopment of the eastern portion of the property. The Phase One ESA was never finalized.

FRANZ conducted the Phase One ESA according to its standard procedures, which generally reflect the requirements outlined in the following documents:

- “Phase One Environmental Site Assessment”, Canadian Standards Association (CSA) Standard CSA Z768-01, 2001; and
- Environmental Site Investigation Procedures, Phase One Environmental Site Assessments”, Canadian Mortgage and Housing Corporation (CHMC) Standard 11 9907-02, 1993.

FRANZ identified the following issues of potential environmental concern during the Phase One ESA:

- A fill layer of cinder and ash, as described in previous reports.
- An area of soil and ground water PAH contamination in the northwestern portion of the 200 Lees property (and not on the current Site)
- Impacts associated with the rail spur, which formerly bisected the current Site.

- The potential presence of heating oil AST and UST within the northeastern corner of Building A.
- Six unidentified structures within the southern limit of the western parking lot (i.e., outside the current Site). The draft Phase One ESA indicated that it was not possible to confirm the nature of these structures or the fate of the construction material following demolition.
- The draft Phase One ESA reported that site buildings housed various laboratory activities for almost 40 years. The fate of the liquid and dry waste produced at the laboratories was not confirmed. If disposed directly in the ground (i.e., via dry floor drains), the area underneath site buildings could be impacted by a variety of laboratory chemicals, including solvents. If disposed through the municipal sanitary sewer, waste water from the laboratory could have infiltrated below the buildings via potential leaks in the underground conduits.

No recommendations or conclusions were provided in the draft Phase One ESA.

2.2.12 FRANZ Phase One ESA (2011)

The University of Ottawa retained FRANZ to complete a Phase One ESA for the eastern portion of 200 Lees Avenue, including Building A. The Phase One was conducted in accordance with Ontario Regulation 153/04 (as amended) for due diligence and in support of site construction plans.

In July 2011, FRANZ conducted a records review, a site visit, and interviews with persons knowledgeable about the Site, and an evaluation of the information gathered from the records review, site visit and interviews. Based on the findings, FRANZ identified four Areas of Potential Environmental Concern (APECs) at the Site (see Figure 2, Appendix A):

APEC 1: Cinder and ash fill layer. Present across most of the Site and has been observed to have an average thickness of 3 to 6 m. The layer contains soil exhibiting concentrations of various polycyclic aromatic hydrocarbons and metals in excess of Ontario Standards.

APEC 2: Fuel Storage. Inside the mechanical room of Building A and a potential underground storage tank location adjacent to the mechanical room. The storage tanks found inside Building A appeared to be well-contained are not expected to have leaked; however, the sump beside the generator in the mechanical room and the lack of records pertaining to the suspected underground storage tank adjacent to the building indicate that this is an area of potential environmental concern. The contaminants of potential concern for this APEC are petroleum hydrocarbons and benzene, toluene, ethylbenzene and xylenes.

APEC 3: Rail Spur. Based on historical aerial photographs, the parking lot covering most of the Site was constructed in two phases. A railroad historically cut across the current parking lot and marked the limit of the first phase of the parking lot. This railroad was also present during the landfilling period and may indicate the eastern limit of the landfill material. The surficial soil underneath the former railroad alignment may contain polycyclic aromatic hydrocarbons and metals.

APEC 4: Off-site coal tar impacts. Area of soil and ground water polycyclic aromatic hydrocarbon contamination previously investigated, and located on the northwestern portion of the 200 Lees property, beyond the Site boundary. This is referred to as the “coal tar” impact associated with activities at the former gasification plant. While these impacts are not on the Site, they have the potential to migrate over time, and therefore the western boundary of the Site is identified as an APEC.

Based on the Areas of Potential Environmental Concern identified in the Phase One ESA, a Phase Two ESA was recommended at the Site for due diligence purposes.

2.2.13 Historical Analytical Results

FRANZ has reviewed historical analytical results provided in some previous reports for comparison to current MOE Table 3 and Table 9 SCSs, and Phase Two ESA results. Soil and ground water analytical results are presented in Tables B-1 to B-4 in Appendix B.

Historical soil analytical results collected from APEC 1, contained concentrations of cadmium, copper, lead, mercury and zinc above the current MOE Table 3 SCSs. Reported concentrations of various PAHs including acenaphthyene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and chrysene, among others, also exceeded the current MOE Table 3 SCSs.

The historical soil samples collected from within a 30m buffer of the Rideau River (i.e, results compared to Table 9) exhibited concentrations of antimony, barium, cadmium, copper, lead, mercury, molybdenum, selenium, silver and zinc exceeding the MOE Table 9 SCSs. Concentrations of acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene, also exceeded MOE Table 9 SCSs in this area.

All historical ground water analytical results reported concentrations below MOE Table 3 and Table 9 SCSs.

3.0 SCOPE OF THE INVESTIGATION

3.1 Overview of Site Investigation

FRANZ conducted the Phase Two ESA in conformance with the Ontario Regulation 153/04 (as amended), Canada Standards Association (CSA) Standard Z768-00: Phase II Environmental Site Assessment (2006), and the MOE document entitled: *Guideline on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario* (MOE, 1996).

The Phase Two investigation included the following activities:

- Development and implementation of a Site-Specific Health and Safety Plan (HSP) during field activities;
- Locating aboveground and subsurface utilities on the Site through the use of both public and private utility locators;
- Retaining the services of a drilling subcontractor to complete the proposed drilling program at the Site;
- Drilling sixteen deep (>1.5 m) boreholes, six of which were completed as monitoring wells;
- Drilling three shallow (1.5 m) boreholes along the rail spur alignment;
- Installation of four vapour probes;
- Supervising the borehole drilling, monitoring well and vapour probe installation program including logging and sampling of soils encountered during drilling, and directing the drilling subcontractor on monitoring well construction and installation;
- Developing newly installed monitoring wells at the Site to remove foreign material introduced during drilling and to prepare monitoring wells for sampling;
- Monitoring ground water elevations in each newly installed (6) and existing (4) monitoring wells;
- Collection of ground water samples from each newly installed (6) and existing (4) monitoring wells;
- Collection of five soil vapour samples, one from each vapour probe (one duplicate);
- Collection of three crawl space air samples, one at each of two locations in Building A (one duplicate);
- Conducting an elevation survey of the instrumentation including monitoring wells for the purposes of determining ground water flow directions;
- Submitting soil, ground water, and air samples for laboratory analysis of contaminants of concern;
- Reviewing and interpreting the analytical results by comparison with applicable regulatory standards; and
- Preparing a report documenting the findings of the Phase Two ESA.

3.2 Media Investigated

Based on the results of the previous studies, subsurface soil and ground water quality, and potential soil vapour intrusion, were assessed at the Site as part of the Phase Two ESA. No sediment samples were collected as no bodies of water were present on site. The locations of site instrumentation are shown in Figure 5; Appendix A. Ten deep boreholes (FZ-BH11-1D to FZ-BH11-10D) were advanced at depths greater than 1.5 m bgs to assess the subsurface soil quality. Six additional deep boreholes were completed as monitoring wells (FZ-MW11-1 to FZ-MW11-6) to assess the ground water quality. Three shallow boreholes (FZ-BH11-1S, FZ-BH11-3S, and FZ-BH11-4S) were advanced at depth of 1.5 m bgs in the railway right-of-way alignment. Four vapour probes (FZ-VP11-1 to FZ-VP11-4) were installed in boreholes at selected locations within the parking lot and lawn areas for the collection of five soil vapour samples (including one duplicate). Three air samples (including one duplicate) were collected at two crawl space locations (NECRAWL and SECRAWL) in Building A to assess potential soil vapour intrusion using SUMMA Canisters.

Selected soil samples were submitted for analyses of:

- acid extractable metals by Inductively coupled plasma mass spectroscopy (ICP-MS);
- polycyclic aromatic hydrocarbons (PAHs);
- petroleum hydrocarbon fractionation (PHC F1-F4).
- semi volatile organic compounds (SVOCs);
- phenols;
- benzene, toluene, ethylbenzene and xylenes (BTEX);
- petroleum hydrocarbons (PHCs F1-F4);
- volatile organic compounds (VOCs);
- pH;
- toxicity characteristic leaching procedure (TCLP) for metals and BTEX;
- grain size; and
- fraction organic carbon (FOC).

Ground water samples were analysed for:

- metals;
- polycyclic aromatic hydrocarbons (PAHs);
- semi volatile organic compounds (SVOCs);
- phenols;
- benzene, toluene, ethylbenzene and xylenes (BTEX);
- petroleum hydrocarbons (PHCs F1-F4); and
- volatile organic compounds (VOCs).

The soil vapour and crawl space air samples were submitted for analyses of:

- benzene, toluene, ethylbenzene and xylenes (BTEX);
- petroleum hydrocarbons (PHCs F1-F2); and
- naphthalene.

The proposed sampling and analysis plan is included in Appendix D.

3.3 Phase One Conceptual Site Model

FRANZ completed a Phase One Conceptual Site Model (CSM) as part of the Phase One ESA in July 2011 (see Section 2.2.12). The Phase One CSM illustrates the results of the Phase One ESA and provides the basis for the Phase Two ESA. The Phase One CSM is shown in Figures 6 and 7, Appendix A. The CSM shows:

- Existing buildings and structures,
- Water bodies located in whole or in part on the Phase One study area,
- Areas of natural significance located in whole or in part on the Phase One study area,
- Drinking water wells on the Site,
- Roads within the Phase One study area
- Uses of properties adjacent to the Site,
- Areas where any potentially contaminating activity has occurred (including tank locations), and
- Areas of potential environmental concern.

3.3.1 Potentially Contaminating Activities

Potentially contaminating activities on-site (or that may have impacted areas on-site) are Asphalt and Bitumen Manufacturing, Coal Gasification; Gasoline and Associated Products Stored in Fixed Tanks; Commercial Autobody Shops, Treatment of Sewage, Rail Yards, Tracks and Spurs; and Waste Disposal and Waste Management. These activities and their locations are shown on the CSM figure, Figure 7 in Appendix A.

3.3.2 Contaminants of Potential Concern

Contaminants of potential concern that may be present on the Site include PAHs, metals, PHCs, and BTEX.

3.3.3 Underground Utilities, Migration and Transport

Site utilities are generally buried, including gas lines, power, water, sanitary and storm sewer. Ground water is found at the Site between three and five metres below ground surface. Utility trenches for hydro, gas and water are likely above this level and will therefore not act as preferential pathways for contaminants. Sanitary and storm sewer lines may be within the saturated zone of ground water and could act as preferential pathways.

Historical ground water sampling conducted at the Site has not indicated ground water impacts via this pathway.

3.3.4 Regional and Site-Specific Geology and Hydrogeology

The uppermost bedrock in the vicinity of the Site is composed of the Billings Formation dark grey to black, fine-grained fissile, thinly bedded shale. Shale bedrock is generally encountered at depths approximately 10 to 12 meters m bgs at the Site and slopes to the southeast towards the Rideau River. Below the shale is the Eastview Formation limestone which is approximately 6 m thick and also dips to the southeast. There is a localized bedrock low at the Transitway and the Rideau River.

The overburden in the vicinity of the Site is complex; however, based on previous reports, there are at least two units above the bedrock: glacial till, and cinder and ash fill.

The fill at or in the vicinity of the Site consists of a wide variety of materials from industrial, construction and landfill use. The fill varies widely in classification and description; however, common to all boreholes and test pits, the fill material consists of ash, cinders, sand, brick, wood, coal and glass. The fill layer is commonly referred to as the “cinder and ash fill layer”. The fill was described as thickest at the Site. Historic records indicate that the fill, placed prior to the construction of the on-site buildings, has raised the site elevation by 7 to 8 metres. This is observable by comparing the current site elevation to the Rideau River, assuming that the original elevation of the area was very close to the water. The thickness of fill in the borings varies between about 0.6 to 7.6 metres, but typically is about 3 to 6 metres across much of the property. The depth to the fill ranges from just below the surface to one m bgs.

The glacial or basal till overlies the bedrock. It varies in thickness and is discontinuous, sometimes increasing in thickness where the bedrock elevation decreases. The till is very dense and stiff and is generally sandy and silty with varying amounts of clay and gravel. The glacial till generally extends to the surface of the bedrock at depths of 10.2 to 13.1 m bgs.

The current ground water flow system is complex due to the presence of several hydraulic sinks. These sinks are a result of the Transitway, the bus ramp and the parking garages of the high-rise buildings and their associated drainage/dewatering systems. The Transitway has a drainage system that maintains the ground water level several meters below Lees Avenue.

The shallow ground water from the north half of the Site is expected to flow towards the west (i.e., towards the below grade Transitway) and to the north (i.e., towards Highway 417). Shallow ground water from the southern half is expected to flow south and southeast towards the Rideau River. Depths to ground water were reported to be between 3 and 8 m bgs at the 200 Lees property and 3 to 5 metres below ground surface on the Site.

Ground water velocity was estimated by previous consultants working at the Site to range between 0.21 to 210 m/yr, depending on the type of overburden material encountered. The ground water flow in the fill is expected to be near the top of this range. Perched water tables in the fill were observed at the Site. The fill at the Site, which consists of landfill and waste material, is very porous and considerably more permeable than the underlying fine alluvium material. The resulting effect is that infiltrating precipitation passes quickly through the fill material but "ponds" at the surface of the natural material because of a lower infiltration rate.

3.3.5 Assessment of Uncertainty

Historical intrusive investigations have provided extensive characterization of the subsurface conditions at the 200 Lees property (see Section 2.2). As such, the CSM provided in the Phase One ESA was relatively certain.

3.4 Deviations from Sampling and Analysis Plan

Due to the presence of buried utilities, the deep and shallow boreholes proposed to be advanced on the northwest portion of the Site (APEC 4) were removed from the proposed program (see Appendix D). As a result, the number of deep monitoring wells was reduced from seventeen to sixteen, and the number of shallow boreholes along the rail spur alignment was reduced from five to four. Existing wells (CH-MW01-1 and CH-MW01-2) were used to assess potential impacts associated with APEC 4.

Drilling locations in the vicinity of APEC 2 UST/AST (FZ-BH11-8D and FZ-BH11-1S) were displaced a few meters based on utilities locates. Additionally, drilling locations in the southeast corner of the asphalt parking lot (FZ-BH11-4S and FZ-VP11-1) were slightly moved into the lawn area due to the presence of the hording enclosure (see Section 2.1).

Due to the shallow refusal and dry conditions in the vicinity of APEC 2 UST, confirmed by the advance of borehole FZ-BH11-8D, the location of the monitoring well FZ-MW11-3 was changed to the location of the shallow borehole FZ-BH11-2S; therefore, this sampling location is referred to as FZ-MW11-3/FZ-BH11-2S on the site instrumentation map and the number of shallow boreholes was reduced to three (see Figure 5, Appendix A).

Additional soil analyses, including fraction organic carbon (FOC) and petroleum hydrocarbon fractionation (PHC F1-F4), were included in the sampling and analysis plan to provide additional information to support any future risk assessment.

Indoor air sampling is notoriously susceptible to interference from sources other than environmental contamination. In order to reduce the potential for cross contamination from sources not related to soil and ground water impacts, and based on the presence of a crawl space below Building A, FRANZ collected three crawl space air samples (including one duplicate) instead of the larger number (6) originally planned.

3.5 Impediments

No physical impediments or denial of access were faced during the Phase Two investigation.

4.0 INVESTIGATION METHOD

4.1 General

The Phase Two ESA methodology and results are presented in the following sections. Photographs taken during field activities are provided in Appendix E.

4.1.1 Health and Safety

Prior to commencing intrusive investigations, a Site-Specific Health and Safety Plan (HASP) was developed and implemented. The HASP identified and mitigated potential physical and chemical hazards associated with the work. The HASP also provided procedures to be followed in the event of an emergency.

A health and safety kick-off meeting and job safety analysis were conducted to inform on-site personnel of the potential risks and appropriate mitigative actions, as well as to address any health and safety concerns of on-site staff.

The HASP has been retained on file by FRANZ.

4.1.2 Utility Clearances

Prior to the start of investigation, FRANZ contacted local utility companies to request they locate underground installations at and in the vicinity of the Site. MultiVIEW Locates Inc. (MultiVIEW) was retained by FRANZ to clear public and private utilities within the proposed work area. Service utility clearances were obtained from MultiVIEW on August 5, 8, and 10, 2011 prior to the borehole drilling program.

4.2 Drilling and Excavating

FRANZ supervised the drilling of boreholes on the property by Strata Soil Sampling Inc. (Strata) from August 10 to August 12, 2011. The borehole drilling program consisted of advancing twenty boreholes at the Site, including sixteen deep boreholes, three shallow boreholes, and four boreholes advanced for the installation of vapour probes.

Strata supplied and operated a Geoprobe® 7822DT (direct push) rubber track machine equipped with a 2.25” (57 mm) Macro Core sampling system to advance the boreholes. The boreholes were advanced to a maximum depth of 10.7 metres below ground surface (m bgs).

Each borehole was continuously inspected in 1.5 m interval soil cores retrieved in 57 mm clear disposable PVC liners. Relatively undisturbed soil conditions were logged for soil characteristics, olfactory observations and evidence of contamination. The number and frequency of the soil samples collected were based on the stratigraphy and the thickness of layers identified during the soil core inspection (see Section 4.3). Disposable nitrile gloves, replaced after collecting each sample, were worn when handling sampling tools and samples.

Photos taken during drilling are provided in Appendix E. Field observations and soil sampling information at each borehole location are recorded in the individual borehole logs presented in Appendix F.

Soil cores generated during the work program were placed in one 182 litre (40 gallons) drum to be subsequently disposed by Lacombe Waste Services, of Ottawa.

4.3 Soil Sampling

Soil samples were collected for field logging. Selected samples, based on the expected degree of potential impacts, were submitted for laboratory analysis. Due to the low recovery and limited amount of soil available for the wide range of chemical analyses proposed, limited vapour screening using sealable polyethylene bags was implemented. Soil samples to be analyzed were placed directly into laboratory-supplied sample containers giving priority to metal, PAHs and SVOCs analysis of fill materials based on historical findings (Section 2.2.13). Soil samples for potential BTEX, and/or PHC F1 as well as VOCs analyses were collected using a dedicated plastic plunger and a small volume of soil was placed immediately in to a pre-weighted vial of methanol for preservation prior to submission to the analytical laboratory.

Samples for analysis were placed in laboratory supplied glass jars and stored in coolers. Samples were cooled immediately upon collection and maintained in a cold state until submitted under chain-of-custody documentation to Maxxam Analytics Inc. (Maxxam) in Ottawa, Ontario. Maxxam is accredited by the Canadian Association for Laboratory Accreditation (CALA) and the Standards Council of Canada (SCC) to perform the requested analyses. Selected soil samples were submitted for analysis as per the analysis plan described in Section 3.2.

A geological description of soil and samples based on the borehole logs (Appendix F) for each borehole and monitoring well location is presented in Table 4-1. Deep boreholes not completed as monitoring wells were designated as FZ-BH11-XX, whereas deep boreholes completed as monitoring wells were designated as FZ-MW11-XX, where XX is the sequential order in which they are advanced within each APEC. XXD refers to deep boreholes, whereas XXS refers to shallow boreholes.

Table 4-1: Borehole / Monitoring Well General Geology Summary

APEC	**Borehole / Monitoring Well ID**	**Geological Description (Depth in m bgs)**	**Sample Collected (Depth in m bgs)**	**Sample ID**
APEC 1 Cinder and ash fill layer	FZ-BH11-1D	0.0 – 2.7: Sand & Gravel FILL 2.7 – 4.5: Cinder & Ash FILL 4.5 – 10.4: GLACIAL TILL	4.2 – 4.5 6.6 – 7.5	FZ-BH11-1D*
	FZ-BH11-2D	0.0 – 2.4: Cinder & Ash FILL 2.4 – 4.1: Silty Sand & Gravel FILL 4.1 – 5.4: Cinder & Ash FILL 5.4 – 10.7: GLACIAL TILL	0.4 – 2.9 4.1 – 4.3 5.1 – 5.3	FZ-BH11-2D*
	FZ-BH11-3D	0.0 – 1.1: Sand & Gravel FILL 1.1 – 4.3: Cinder & Ash FILL 4.3 – 9.1: GLACIAL TILL	1.1 – 1.5	FZ-BH11-3D
	FZ-BH11-4D	0.0 – 1.9: Sand & Gravel FILL 1.9 – 4.5: Cinder & Ash FILL 4.5 – 8.5: GLACIAL TILL	1.9 – 2.2 1.9 – 2.2 3.6 – 4.5	FZ-BH11-4D FZ-BH11-4D-A FZ-BH11-4D-B
	FZ-BH11-5D	0.0 – 1.0: Gravel FILL 1.0 – 2.3: Cinder & Ash FILL 2.3 – 8.2: GLACIAL TILL	1.0 – 2.3 2.3 – 4.5	FZ-BH11-5D-A FZ-BH11-5D-B
	FZ-BH11-6D	0.0 – 3.5: Sand & Gravel FILL 3.5 – 4.1: Cinder & Ash FILL 4.1 – 9.9: GLACIAL TILL	3.5 – 4.1 9.0 – 9.9	FZ-BH11-6D-A FZ-BH11-6D-B
	FZ-BH11-7D	0.0 – 0.9: Gravel FILL 0.9 – 2.5: Sand & Gravel FILL 2.5 – 8.1: GLACIAL TILL	0.9 – 2.5 2.5 – 3.0 6.3 – 7.5	FZ-BH11-7D-A FZ-BH11-7D-B FZ-BH11-7D-C
	FZ-MW11-1	0.0 – 4.5: Sand & Gravel FILL 4.5 – 8.8: GLACIAL TILL	1.9 -2.2 3.0 – 3.6	FZ-MW11-1-A FZ-MW11-1-B

APEC	Borehole / Monitoring Well ID	Geological Description (Depth in m bgs)	Sample Collected (Depth in m bgs)	Sample ID
	FZ-MW11-2	4.0 – 1.1: Sand & Gravel FILL 1.1 – 2.9: Cinder & Ash FILL 2.9 – 10.4: GLACIAL TILL	1.1 – 2.9 2.9 – 3.0	FZ-MW11-2-A FZ-MW11-2-B
APEC 2 Fuel Storage	FZ-BH11-8D	0.0 – 1.1: Sand & Gravel FILL 1.1 – 3.0: Cinder & Ash FILL 3.0 – 3.9: GLACIAL TILL	2.6 – 3.0 3.4 - 3.9	FZ-BH11-8D-A FZ-BH11-8D-B
	FZ-MW11-3/FZ-BH11-2S	0.0 – 1.1: Sand & Gravel FILL 1.1 – 2.6: Cinder & Ash FILL 2.6 – 8.5: GLACIAL TILL	1.1 – 2.6	FZ-MW11-3
APEC 3 Rail Spur	FZ-BH11-9D	0.0 – 2.3: Cinder & Ash FILL 2.3 – 4.9: Silty Sand and Gravel FILL 4.9 – 5.2: Sand & Gravel FILL 5.2 – 9.1: GLACIAL TILL	0.8 – 2.2	FZ-BH11-9D
	FZ-BH11-10D	0.0 – 0.9: Sand & Gravel FILL 0.9 – 2.4: Cinder & Ash FILL 2.4 – 4.0: Silty Sand & Gravel FILL 4.0 – 4.9: Cinder & Ash FILL	0.9 – 1.5 4.3 – 4.5	FZ-BH11-10D-A FZ-BH11-10D-B
	FZ-BH11-1S	0.0 – 1.0: Sand & Gravel FILL 1.0 – 1.5: Cinder & Ash FILL	1.0 – 1.5	FZ-BH11-1S
	FZ-BH11-3S	0.0 – 1.1: Sand & Gravel FILL 1.1 – 1.5: Cinder & Ash FILL	1.1 – 1.5	FZ-BH11-3S
	FZ-BH11-4S	0.0 – 0.7: Sand & Gravel FILL 0.7 – 1.5: Cinder & Ash FILL	0.7 – 1.5	FZ-BH11-4S
Migration to River	FZ-MW11-4	0.0 – 4.3: Sand & Gravel FILL 4.3 – 6.9: Cinder & Ash FILL 6.9 – 9.1: GLACIAL TILL	4.3 – 4.5 5.0 – 5.6 5.6 – 6.0	FZ-MW11-4*

APEC	Borehole / Monitoring Well ID	Geological Description (Depth in m bgs)	Sample Collected (Depth in m bgs)	Sample ID
	FZ-MW11-5	0.0 – 2.1: Sand & Gravel FILL 2.1 – 2.5 Gravel FILL 2.5 – 4.1: Sand & Gravel FILL 4.1 – 4.5: Cinder & Ash FILL 4.5 – 8.7: GLACIAL TILL	0.6 – 1.5 0.6 – 1.5 4.1 – 4.5	FZ-MW11-5 FZ-MW11-5-A FZ-MW11-5-B
	FZ-MW11-6	0.0 – 2.8: Sand & Gravel FILL 2.8 – 4.1: Cinder & Ash FILL 4.1 – 7.3: GLACIAL TILL	0.7 – 2.1 2.8 – 4.1	FZ-MW11-6*

*Grab samples collected for different analyses

4.4 Field Screening Measurements

Due to the limited amount of soil available (low recovery) and the low volatility of the primary contaminants of concern, for the wide range of chemical analyses proposed, limited vapour screening using sealable polyethylene bags was implemented to identify potential petroleum hydrocarbon and/or volatile organic impacts. Vapour measurements were taken using a hand-held gas detector (RKI Eagle®). Vapour concentrations were measured in units of parts per million by volume (ppmv). The gas detector was operated in methane elimination mode. The readings were taken by placing the end of the intake tube of the gas detector into the headspace of the bagged soil samples after the soil had been disaggregated, and recording the maximum value attained. The gas detector was calibrated daily in the field to known concentrations of hexane. Chemicals the equipment can detect and associated detection limits are presented in Table 4-2.

Table 4-2: Gas Detector - Gases & Detectable Ranges

Gas	Measuring Range	Accuracy * Which ever is greater
Standard Confined Space Gases		
Hydrocarbons (CH4, std)	0 - 100% LEL	± 5% of reading or ± 2% LEL (*)
	0 - 50,000 ppm	**± 50 ppm or ± 10% of reading (*)**

Oxygen (O2)	0 - 40% Vol.	± 0.5% O2
Carbon Monoxide (CO)	0 - 500 ppm	± 5% of reading or ± 5 ppm CO (*)
Hydrogen Sulfide (H2S)	0 - 100 ppm	± 5% of reading or ± 2 ppm H2S (*)
Super Toxics and Other Gases		
Ammonia (NH3)	0 - 75 ppm	± 10% of reading or ± 5% of full scale (*)
Arsine (AsH3)	0 - 1 ppm 0 - 200 ppb	
Chlorine (Cl2)	0 - 3 ppm	
Chlorine Dioxide (ClO2)	0 - 1 ppm	
Fluorine (F2)	0 - 5 ppm	
Hydrogen Fluoride (HF)	0 - 9 ppm	
Hydrogen Chloride (HCl)	0 - 15 ppm	
Hydrogen Cyanide (HCN)	0 - 30 ppm	
Hydrogen Selenide (H2Se)	0 - 0.2 ppm	
Hydrogen Sulfide (H2S)	0 - 1 ppm 0 - 30 ppm	
Nitrogen Dioxide (NO2)	0 - 15 ppm	
Ozone (O3)	0 - 1 ppm	
Nitric Oxide (NO)	0 - 100 ppm	
Phosphine (PH3)	0 - 1 ppm	
Silane (SiH4)	0 - 15 ppm	

Sulfur Dioxide (SO2)	0 - 6 ppm	
IR Sensors		
Carbon Dioxide (CO2) (IR Sensor)	0 - 5,000 ppm 0 - 10,000 ppm 0 - 5% Vol. 0 - 20% Vol. 0 - 60% Vol.	± 5% of reading or ± 2% of full scale (*)
Methane (CH4) (IR Sensor)	0 - 100% LEL 0 - 100% Vol.	
Isobutane (iC4H10) (IR Sensor)	0 - 100% LEL 0 - 30% Vol.	

Source: http://www.rkiinstruments.com/pages/eagle.htm

At sampling depths where soil sample recoveries were insufficient to permit field screening, the available soil material was placed directly into laboratory supplied jars for potential laboratory analysis and no soil material was available for vapour readings.

Procedures for checking calibration of the equipment are included as part of FRANZ's Standard Operating Procedures (*SOP T-001 Field Instrument Calibration and Maintenance*) in the Sampling and Analysis Plan (Appendix D).

4.5 Ground Water Monitoring Well Installation

FRANZ installed six monitoring wells as part of the intrusive investigation at the Site, labelled as FZ-MW11-1 to FZ-MW11-6. The monitoring wells were installed in boreholes advanced by Strata between August 10 and August 12, 2011, to investigate ground water conditions and to obtain ground water samples for subsequent laboratory analysis. Photos taken during the monitoring well installation are provided in Appendix E. The soil sample collection during the advance of the boreholes is described in Section 4.3. Borehole and monitoring well logs are presented in Appendix F.

The monitoring wells were constructed in conformance with procedures specified in Ontario Regulation (O.Reg) 903 (as amended). The ground water monitoring wells were completed with 1.5" (40 mm) diameter, flush-threaded polyvinyl chloride (PVC) well screens and solid riser. Well materials were delivered to the Site pre-washed and packed in sealed polyethylene bags where they remained until use. All monitoring wells were installed with a 3 m long well screen and solid riser to grade. A tight fitting slip-on cap was placed at the bottom of the screen. A clean silica sand filter pack was placed in the borehole annulus surrounding the well screen to approximately 30 cm above the top of screen. Bentonite Hole plug was placed in the borehole annulus above the sand pack to prevent infiltration of surface water. The top of the well was sealed with a compression J-Plug fitting. A load-bearing protective steel cover is placed over the top of the well at ground surface. The monitoring wells were registered as a cluster in accordance with O.Reg 903 well tag A 094096 installed on well (FZ-MW11-4). A summary of the monitoring well installation details is presented in Table 4-3. A copy of the cluster well information submitted to the MOE by Strata is in Appendix F.

Table 4-3: Monitoring Well Installation Summary

Monitoring Well	**Well Diameter / Material**	**Completion**	**Top of Pipe Elevation (m asl)**	**Screened Interval (m bgs)**	**Screened Interval (m asl)**	**Screen Details**
FZ-MW11-1	40 mm / PVC	Flush Mount	60.85	4.6 - 7.6	53.25 – 56.25	#10 Slot (i.e., 2.54 mm wide)
FZ-MW11-2	40 mm / PVC	Flush Mount	61.78	5.5 - 8.5	53.28 – 56.28	#10 Slot
FZ-MW11-3	40 mm / PVC	Flush Mount	61.98	5.2 – 8.2	53.78 – 56.78	#10 Slot
FZ-MW11-4	40 mm / PVC	Flush Mount	62.09	6.1 – 9.1	52.99 – 55.99	#10 Slot
FZ-MW11-5	40 mm / PVC	Flush Mount	61.51	4.5 – 7.5	54.01 – 57.01	#10 Slot
FZ-MW11-6	40 mm / PVC	Flush Mount	60.85	4.3 – 7.3	53.55 – 56.55	#10 Slot

GW: ground water
m bgs: metres below ground surface - measured from a reference point on well casing
m asl: metres above sea level - wells surveyed with reference to geodetic benchmark. Absolute gw elevations are calculated by subtracting the water levels from wellhead elevation.

Monitoring wells were developed between August 15 and August 21, 2011 by using a Geotech GeoPump® portable peristaltic pump to purge three well volumes from the newly-installed monitoring wells. Because of low recovery rates, a single well volume was removed from monitoring wells FZ-MW11-1, FZ-MW11-2, and FZ-MW11-6. The nature of the soil surrounding the monitoring wells meant that it was not always possible to purge the wells until the water was completely clear. Water was purged from the wells through dedicated 9.5 mm diameter low density polyethylene (LDPE) tubing. The polyethylene tubing was replaced at each monitoring well.

4.6 Ground Water Field Measurement of Water Quality Parameters

Prior to field monitoring, the depth to ground water was measured at each well. Measurements of field parameters were made with a Horiba U-52® water quality meter with a flow-through cell, capable of measuring indicator field parameters - pH, Eh, dissolved oxygen (DO), turbidity, specific conductance, and temperature. The water quality meter was calibrated daily in the field using standards provided.

The tubing intake was lowered slowly into the water column to minimize mixing of ground water and the intake was positioned in the centre of the saturated screen interval (based on the depth to well bottom measurements conducted prior to purging). During monitoring, the Geotech GeoPump® peristaltic pump was connected to the outlet from the peristaltic pump and this to the Horiba U-52® water quality meter to monitor ground water conditions in wells with relatively high recharge rates. Measurements were collected at defined intervals (typically ten minutes). Stabilization was considered to be achieved when parameters had stabilized for three successive readings.

For wells with very low recharge rates (FZ-MW11-1, FZ-MW11-2, FZ-MW11-4, FZ-MW11-5, FZ-MW11-6), water quality parameters were typically not collected at the time of sampling, as all water removed from the wells was required for analytical purposes.

4.7 Ground Water Sampling

Ground water sampling activities were undertaken between August 17 and September 20, 2011 at new installed monitoring wells and the existing wells (BH00-4, BH00-5, CH-MW01-1, and CH-MW01-2). Because the low recovery rate, ground water sampling at monitoring wells FZ-MW11-5 and FZ-MW11-6 was finalized on August 25, whereas sampling at well FZ-MW11-1 and FZ-MW11-2 was completed on September 2, 2011.

Prior to sample collection, the depth to ground water was measured at each well. Low flow purging and sampling was accomplished using dedicated LDPE tubing, the Geotech GeoPump® peristaltic pump, and the Horiba U-52® water quality meter with the flow-through cell. Physical and geochemical parameters and well drawdown were monitored and recorded at five to ten minute intervals during purging. Once water quality parameters stabilized, ground water samples were collected

Ground water samples were collected directly into laboratory supplied containers containing appropriate preservatives. Samples were cooled immediately upon collection and maintained in a cold state until submitted under chain-of-custody documentation to Maxxam for analysis of contaminants listed in Section 3.2.

No evidence of PHC, such as free product, film or sheen, or PHC odours were observed in the ground water at any of the test locations during ground water monitoring and sampling.

4.8 Sediment Sampling

No sediment samples were collected during the Phase Two ESA investigation as no water bodies are present within the Site.

4.9 Soil Vapour

Four soil vapour probes were installed on the Site on August 12, 2011. Three vapour probes (FZ-VP11-1 to FZ-VP11-3) were installed by advancing the vapour probe assembly with the Geoprobe® track-mounted direct push rig. One vapour probe (VP11-04) was installed in a borehole advanced by the direct-push rig. Vapour probe locations are presented in Figure 5, Appendix A. Vapour probe logs are included in Appendix F.

FZ-VP11-1 through FZ-VP11-3 consisted of Geoprobe® soil vapour implants that were inserted down the bore when the appropriate depth has been reached, approximately 1 mbgs. The probes are 152 mm in length and are constructed with double woven stainless steel wire screen.

VP1104 consisted of a Solinst® Model 615 piezometer, which has a cylindrical filter screen within a 20 mm stainless steel drive-point body. The screened portion of the piezometer was 30 cm long. Six-millimetre internal diameter sample tubing was attached directly to the top of the screened portion. One hundred and fifty-centimetre long, 19 mm ID threaded steel rods were attached to the drive points, and the assembly was placed into a borehole advanced by the direct-push rig.

In both types of vapour probes, silica sand was placed in the annulus around the vapour probes, and bentonite was used to seal the probe from the surface air.

4.9.1 Collection of Soil Vapour Samples

Before sampling, the vapour probes were purged with Gilian GilAir® constant flow air sampling pumps with low-flow attachments. A Bios DryCal® pump calibration kit was used to ensure accurate flow rates. The pumps for vapour probes were calibrated to pump 50 mL/minute. The total purge volume was three “probe volumes,” or three times the volume of the soil vapour probes. The silica sand backfill was included in the calculation of soil vapour probe volume.

The Gilian GilAir® pumps were attached to the sampling train with low-density polyethylene (LDPE) t-joints. A ball valve was connected between the pumps and the t-joint so that the pumps could be turned off without allowing any ambient air into the sampling train. Samples were collected in 1.4 L stainless steel SUMMA® canisters. A sample of air from each vapour probe was drawn directly from the sample tubing using a laboratory calibrated valve/flow regulator calibrated for 8 hour sampling. The pre-evacuated SUMMA® canisters were opened, enabling collection of time-weighted air samples. Twenty minute samples were collected. The SUMMA® canisters were obtained from Maxxam Analytics in Mississauga Ontario and returned after sampling for volatile petroleum hydrocarbon and naphthalene analysis. The target compounds were selected based on preliminary soil sampling results obtained during the Phase Two ESA field program.

Leak testing was performed on the soil vapour sampling systems by covering the sampling apparatus and probe head with a large container and saturating the area under the shroud with helium. If leaks are present in the sampling apparatus, or if the seal above the vapour probes is being short-circuited (i.e., if ambient air is leaking into the soil vapour), helium will be detected in the line during purging. FRANZ removed the personal sampling pump and tested the line conditions with an MGD-2002 multi-gas detector. In no case was helium in the line more than 10% of the measured value of helium in the shroud, which is generally evaluated as acceptable.

Photos taken during the soil vapour sampling are provided in Appendix E.

4.10 Crawl Space Air Sampling

Two air samples (NECRAWL and SECRAWL) were collected from the crawlspace under the Building A, in the area most likely to be affected by the potential soil contamination on the Site (i.e., the east side of the building), to assess whether the vapour migration pathway was active. The air sampling was conducted by FRANZ personnel between August 22 and 23, 2011. Locations of the crawl space air sample collection are presented in Figure 5, Appendix A.

A pre-sampling inspection was completed prior to the sampling event to identify conditions that would affect the testing of crawl space air quality. The inspection included the evaluation of the type of structure, physical conditions and air flow under the building. The sampling location was selected to be as close as possible to the source of contamination, and as far as possible from possibly confounding influences (e.g., cleaning products).

Crawl Space air samples were collected into specially prepared 6 L stainless steel SUMMA® canisters. SUMMA® canisters were placed into crawl space locations in two areas of Block A. Air was drawn directly from the crawl space using a laboratory calibrated valve/flow regulator. The pre-evacuated SUMMA® canisters were opened, enabling collection of time-weighted air samples. Indoor air samples were collected over a period of 24 hours in order to obtain a representative sample.

The SUMMA® canisters were obtained from Maxxam in Mississauga, Ontario, and returned after sampling for benzene, toluene, ethylbenzene and xylenes (BTEX), PHC fraction F1 and F2 analysis and naphthalene. The samples were transported to the project laboratory in Mississauga accompanied by a Chain of Custody form.

Photos taken during the crawl space air sampling are provided in Appendix E.

4.11 Analytical Testing

FRANZ used Maxxam Analytics Inc. (Maxxam) as the provider of analytical services for this project. Maxxam is a full service laboratory and offers environmental testing across the full range of parameters required for this project. Maxxam is a Canadian Association of Laboratory Accreditation Inc. (CALA) accredited laboratory with a well defined QA/QC plans.

The laboratory program included verification that the selected analytical methods had minimum detection limits which are less than the Standards associated with O.Reg. 153/04 (as revised).

Laboratory analysis of soil, ground water samples was conducted primarily in Maxxam's Mississauga, Ontario facility, with certain parameters (PHCs) analyzed in Ottawa, ON, and PAHs and PHC fractionation in soils conducted in Bedford, NS.

Analysis of soil vapour and indoor air was conducted by Maxxam in Mississauga, ON.

The following soil, ground water, and air samples were analyzed as part of this Phase Two ESA:

Table 4-4: Soil Samples Collected in the Sampling and Analysis Plan

Sample Location	APEC	Sample ID	Depth (m)	Analytical Parameters
FZ-BH11-1D	APEC 1	FZ-BH11-1D	4.20 – 4.50	SVOCs, PAHs, PHCs
		FZ-BH11-1D	6.60 – 7.50	metals, phenols, grain size
FZ-BH11-2D	APEC 1	FZ-BH11-2D	0.42 – 2.85	phenols, PHCs, pH
		FZ-BH11-2D	4.00 – 4.25	SVOCs, grain size
		FZ-BH11-2D	5.10 – 5.30	PAHs, metals
FZ-BH11-3D	APEC 1	FZ-BH11-3D	1.10 – 1.50	SVOCs, PAHs, metals
FZ-BH11-4D	APEC 1	FZ-BH11-4D	1.88 – 2.20	SVOCs, PAHs, pH
		FZ-BH11-4D	3.62 – 4.50	VOCs, BTEX/PHC F1, TCLP, grain size
		FZ-BH11-4D-A	1.88 – 2.20	metals
		FZ-BH11-4D-B	3.62 – 4.50	metals

Sample Location	APEC	Sample ID	Depth (m)	Analytical Parameters
FZ-BH11-5D	APEC 1	FZ-BH11-5D-A	1.00 – 2.25	SVOCs, PAHs, metals, phenols, grain size, pH
		FZ-BH11-5D-B	2.25 – 4.50	metals
FZ-BH11-6D	APEC 1	FZ-BH11-6D-A	3.45 – 4.12	SVOCs, PAHs, metals, phenols, PHCs, pH
		FZ-BH11-6D-B	9.00 – 9.90	metals
FZ-BH11-7D	APEC 1	FZ-BH11-7D-A	0.90 – 2.45	SVOCs, PAHs, metals, grain size
		FZ-BH11-7D-B	2.45 – 3.00	VOCs, BTEX/PHC F1
		FZ-BH11-7D-C	6.27 – 7.50	Phenols, PHC F2-F4, TCLP
		DUP-2	6.27 – 7.50	PHC F2-F4
FZ-MW11-1	APEC 1	FZ-MW11-1-A	1.92 – 2.22	PHC F2-F4, TCLP metals
		FZ-MW11-1-B	3.00 – 3.62	SVOCs, PAHs, metals, phenols, pH
FZ-MW11-2	APEC 1	FZ-MW11-2-A	1.05 – 2.85	SVOCs, PAHs, metals, grain size, pH, PHC fractionation
		FZ-MW11-2-B	2.85 – 3.00	VOCs, BTEX/PHC F1, grain size
FZ-BH11-9D	APEC 1/Migration to River	FZ-BH11-9D	0.80 – 2.20	VOCs, SVOCs, PAHs, metals, phenols, PHCs
FZ-BH11-8D	APEC1/APEC 2	FZ-BH11-8D-A	2.60 – 3.00	metals
		FZ-BH11-8D-B	3.42 – 3.90	SVOCs, PAHs, metals, PHC F2-F4
FZ-MW11-3/FZ-BH11-2S	APEC/2APEC 2	FZ-MW11-3	1.05 – 2.55	SVOCs, PAHs, metals, PHCs, grain size, PHC fractionation
		DUP-5	1.05 – 2.55	SVOCs

Sample Location	APEC	Sample ID	Depth (m)	Analytical Parameters
FZ-BH11-10D	APEC 1	FZ-BH11-10D-A	0.90 – 1.50	SVOCs, PAHs, metals, phenols, PHC F2-F4
		FZ-BH11-10D-B	4.25 – 4.50	metals
FZ-BH11-1S	APEC 3	FZ-BH11-1S	1.00 – 1.50	PAHs, metals, grain size
		DUP-3	1.0 – 1.50	PAHs, metals
FZ-BH11-3S	APEC 3	FZ-BH11-3S	1.05 - 1.50	PAHs, metals
		DUP-4	1.05 - 1.50	PAHs, metals
FZ-BH11-4S	APEC 3	FZ-BH11-4S	0.70 – 1.50	PAHs, metals
FZ-MW11-4	APEC1/Migration to River	FZ-MW11-4	4.25 – 4.50	metals
		FZ-MW11-4	5.04 – 5.55	PAHs
		FZ-MW11-4	5.55 – 6.00	phenols
FZ-MW11-5	APEC1/Migration to River	FZ-MW11-5	0.55 – 1.50	PAHs, phenols, FOC
		FZ-MW11-5-A	0.55 – 1.50	metals
		FZ-MW11-5-B	4.10 – 4.50	metals
FZ-MW11-6	APEC1/Migration to River	FZ-MW11-6	0.70 – 2.10	FOC
		FZ-MW11-6	2.80 – 4.10	PAHs, metals, phenols
		DUP-1	2.80 – 4.10	PAHs, metals, phenols

Table 4-5: Ground Water Samples Collected in the Sampling and Analysis Plan

Sample Location	**APEC**	**Screen interval (mbgs)**	**Analytical Parameters**
FZ-MW11-1	APEC 1	4.6 - 7.6	PAHs, metals, PHCs
FZ-MW11-2	APEC 1	5.5 - 8.5	PAHs, metals, PHCs
BH00-5	APEC 1	4.0 – 7.0	VOCs, SVOCs, metals, phenols
BH00-4	APEC 1/APEC2	3.5 – 6.5	VOCs, PAHs, metals, phenols, PHCs
FZ-MW11-3	APEC1/APEC 2	5.2 – 8.2	PAHs, metals
FZ-MW11-4	APEC1/Migration to River	6.1 – 9.1	PAHs, metals, phenols, PHCs
FZ-MW11-5	APEC 1/Migration to River	4.6 – 7.6	Metals, SVOCs
FZ-MW11-6	APEC1/Migration to River	4.3 – 7.3	metals, PAHs
CH-MW01-1	APEC 4	3.0 – 6.0	SVOCs, metals
CH-MW01-2	APEC 4/Migration to River	3.5 – 8.0	SVOCs, metals, phenols, PHCs

Table 4-6: Air Samples Collected in the Sampling and Analysis Plan

Sample Location	**APEC**	**Analytical Parameters**
FZ-VP11-1	APEC 1	BTEX, PHC F1-F2, naphthalene
FZ-VP11-2	APEC 1	BTEX, PHC F1-F2, naphthalene (DUP02)
FZ-VP11-3	APEC 1	BTEX, PHC F1-F2, naphthalene
FZ-VP11-4	APEC 2	BTEX, PHC F1-F2, naphthalene

NECRAWL	APEC 2	BTEX, PHC F1-F2, naphthalene (DUP)
SECRAWL	APEC 2	BTEX, PHC F1-F2, naphthalene

4.12 Residue Management Procedures

Residue materials generated during the Phase Two ESA field activities included soil cores generated during the drilling program and purged ground water. Soil cores were placed in one 182 litre (40 gallons) drum to be subsequently disposed by Lacombe Waste Services, of Ottawa. No evidence of ground water impacts was identified by this investigation and purged ground water was discharged on the ground surface. The Residue Management plan is provided as Appendix G.

4.13 Elevation Surveying

FRANZ retained Farley Smith & Denis Surveying Ltd. services to conduct a survey of the ground elevation at each FRANZ borehole and the elevation of the top of riser of each new and existing monitoring well. Land survey activities were completed on August 24, 2011. The survey was conducted relative to an elevation benchmark comprising the National Capital Commission (N.C.C.) monument No 019680250, a plug in concrete on the sidewalk, 28-29 metres south of the bridge over Highway 417 on Alta Vista Drive, having an elevation of 66.295 metres. The monitoring well elevations were used in determining the ground water flow direction(s) beneath the Site. The land survey of the Site, including new borehole and monitoring well locations, are presented in Appendix H.

4.14 Quality Assurance and Quality Control Measures

A quality assurance (QA) program is a system of documented checks, which validate the reliability of a data set. The checks are known as quality control (QC) procedures. On all environmental monitoring projects, good QA/QC systems are necessary to achieve project goals. For this project, FRANZ designed and implemented the QA/QC program to meet requirements for:

- Standardized data collection to facilitate valid temporal comparison of data across multiple years of sampling events; and
- High levels of confidence in the quality of the data to allow for:
    - Effective review by independent reviewers; and
    - Sound decision making regarding the long-term management of the Site.

The field QA program consisted of the following elements:

- Proper documentation of all aspects of the sampling program that could potentially cause sampling bias; the documentation included daily field summary sheets, separate filing of field notes, chain-of-custody forms and memos written when any major deviation from ideal protocol occurs (e.g., an ice-pack melts, a bottle is broken, etc.).
- Used of laboratory supplied sampling containers that were pre-charged by the laboratory with chemicals required for preservation.
- Unique sample names for each sample which could be reference back to the location where the sample was collected. Each sampling container was labelled using the laboratory supplied label. Information included on the label was sample ID, Company Name, Analysis Required, Date, Time, and any preservation required.
- Submission of a trip blank when VOC analysis was required in ground water.
- Sample handling occurred in accordance with the laboratory guidance and the FRANZ Sampling Plan.
- Any deviation from the sampling methodology or plan was recorded in the field notebook.
- Decontamination of sampling equipment during soil and ground water sampling stages; all re-usable soil sampling apparatus such as trowels and interface probes were successively washed with alconox detergent and rinsed with distilled water.
- The accuracy of field instruments such as pH and conductivity were checked frequently with up-to-date standards and calibrated when necessary. As a minimum, their accuracy was checked daily in the field prior to sampling.
- FRANZ is aware of the sample holding time requirements. Samples were delivered to the laboratory immediately following the sampling, either directly by our personnel or by courier. Samples were immediately transferred and stored in coolers with ice packs to hold the sample temperature at approximately 4°C.
- A minimum of 10% of all soil, ground water and air samples were submitted as blind duplicates for QA/QC purposes and comparison.

Laboratory QA/QC measures included analysis of laboratory replicate samples, method blanks, spiked method blanks, surrogate standard recoveries, and the use of analytical methods in accordance with the CALA, SCC and MOE guidelines. Laboratory QA/QC is documented in the certificates of analysis provided in Appendix I.

The sampling procedure and the laboratory analytical precision were evaluated by submitting field duplicate samples and comparing the duplicate results to the results of the original samples. For each set of blind duplicates, the relative percent difference (RPD) was calculated using the following formula:

$$\mathbf{RPD} = |\, X_1 - X_2 \,| \,/\, X_{avg} \times 100$$

where, X_1 and X_2 are the duplicate concentrations and $X_{average}$ is the mean of these two values. The duplicate results were evaluated using criteria developed by Zeiner (1994), which draws from several data validation guidelines developed by the United States Environmental Protection Agency (USEPA). According to these criteria, the RPD for duplicate samples should be less than 20% for aqueous samples, and less than 40% for solid samples. RPDs can be calculated only when the compound is detected in both the original and the duplicate sample at a concentration above the method detection limit. Alternative criteria are used to evaluate duplicate pairs where one or both of the results is less than five times the detection or quantitation limit, or where one or both of the results is less than the detection or quantitation limit (i.e., nd or ‘not-detected’). A full description of the criteria is provided in Table 4-7, below.

Table 4-7: Criteria for the Evaluation of Duplicate Sample Results

Result A	Result B	Criteria for Acceptable Precision	
		Aqueous (water)	**Solid (soil)**
Organic			
nd	nd	acceptable precision, no evaluation required	
nd	positive	result B - 0.5 x QL < QL	result B - 0.5 x QL < 2 x QL
positive and > 5 x QL	positive and > 5 x QL	RPD < 20%	RPD < 40%
positive and < or = 5 x QL	positive	|result B - result A| < QL	|result B - result A| < 2 x QL
Inorganic			
nd	nd	acceptable precision, no evaluation required	
nd	positive	result B - IDL < LRL	result B - IDL < 2 x LRL
positive and > 5 x LRL	positive and > 5 x LRL	RPD < 20%	RPD < 40%
positive and < or = 5 x LRL	positive	|result B - result A| < QL	|result B - result A| < 2 x QL

Source: Zeiner, S.T., 1994

Notes:

nd – not detected

QL – quantitation limit

RPD – relative percent difference, $\frac{|X_1 - X_2|}{X_{average}} \times 100$

IDL – instrument detection limit

LRL – laboratory reporting limit

For air and soil vapour samples, the Massachusetts Department of Environmental Protection recommends that RPDs be calculated for duplicate pairs and deemed acceptable if the value is below 25%, in accordance with the US EPA’s air sampling and analysis methods (Commonwealth of Massachusetts, 2004). Because the air and soil vapour sampling techniques and laboratory analyses are based on EPA methods, FRANZ has adopted the 25% value for this project.

5.0 REVIEW AND EVALUATION

5.1 Geology

Table 4-1 in Section 4.3 summarizes the local geology based on the Phase Two ESA intrusive investigation. Three main units, referred to as the sand and gravel fill, the cinder and ash fill, and the glacial till were identified. Details of soil stratigraphy observed in the boreholes advanced at the Site are presented in the attached logs (Appendix F). Figures 13 and 14 (Appendix A) provide a cross-sectional view of the site, including the different stratigraphy, thickness, and depth compared to the elevation benchmark National Capital Commission monument No 019680250.

A layer of debris-free brown sand and gravel fill materials ranging in thickness from approximately 0.7 m to 4.5 m was present as the uppermost unit and was observed at the majority of the borehole locations. In general, this unit was found to be less than 1.1 m thick in the central area of the parking lot and tends to become thicker towards the northeast sector and along the lawn area, mimicking the Rideau River boundary.

The cinder and ash fill underlying the sand and gravel fill consisted of ash staining sand and gravel soil generally hosting debris such as cinder, broken glass, ceramic, brick, metal, wood and coal. This layer appears to be thick at the east (2.6 – 3.2 m) and south (2.6 m) portions of the Site, divided by the former rail spur footprint. Although the cinder and ash fill varies widely in classification and description, cinder seems to be more dominant in the eastern portion. Poor soil fill recovery (< 20%) was reported in boreholes FZ-BH11-1D and FZ-MW11-4, located in the southern portion of the Site.

FRANZ identified a 1.6 to 2.6 m layer of gray silty sand and gravel fill inserted in between the cinder and ash fill in boreholes FZ-BH11-2D, FZ-BH9-D, and FZ-BH10-D (see Table 4-1 in Section 4.3). No debris was encountered in this unit. These boreholes are located in the southeast portion of and may indicate a differential fill pattern in the area.

Material encountered in the glacial till unit during borehole drilling generally consisted of a mix of gray dense and stiff silty sand and gravel to clayey soil, with some cobbles at the bottom of the unit (refusal). Average soil recovery in this unit was above 75%. Depth to refusal was 8.5 m bgs on average. The deepest refusal was reached at 10.7 m bgs in the south portion of the Site, whereas it was reached at 3.9 m bgs in borehole FZ-BH11-8D and at 4.9 m bgs in borehole FZ-BH11-10D along the center of the property. According to Golder (2007), CH2M Hill (2002), and Intera (1987), shale bedrock is generally encountered at depths approximately 10 to 12 m bgs and slopes to the southeast towards the Rideau River.

No particular odours were noted during the inspection and collection of soil samples.

Only one unconfined aquifer was identified on site and was investigated by the Phase Two ESA ground water sampling program. Fill material constituted by debris and coarse sand, and the upper part of the glacial till constituted of sand and gravels, form the unconfined aquifer at the Site. No confining aquitards have been identified. The low water recovery rates observed at some wells during the ground sampling program suggests the presence of higher clay content in the glacial till in the south portion of the Site.

5.2 Ground Water Elevations and Flow Direction

Monitoring well elevations, measured ground water levels on August 17, 2011 and ground water elevations are summarized in Table 5-1 below.

Table 5-1: Ground water Levels

Monitoring Well	Well Installed By	Installation Year	Wellhead Elevation (m asl)	Water Level (m bgs) – August 2011	GW Elevation (m asl) – August 2011
CH-MW01-1	CH2M Hill	2001	62.34	6.23	56.11
CH-MW01-2	CH2M Hill	2001	62.88	4.54	58.34
BH00-4	Golder	2000	61.65	3.78	57.87
BH00-5	Golder	2000	61.64	3.67	57.97
FR-MW11-1	FRANZ	2011	60.85	6.06	54.79
FR-MW11-2	FRANZ	2011	61.78	7.74	54.04
FR-MW11-3	FRANZ	2011	61.98	4.44	57.54
FR-MW11-4	FRANZ	2011	62.09	6.02	56.07
FR-MW11-5	FRANZ	2011	61.51	5.84	55.67
FR-MW11-6	FRANZ	2011	60.86	4.50	56.36

GW: ground water
m bgs: metres below ground surface - measured from a reference point on well casing

m asl: metres above sea level - wells surveyed with reference to geodetic benchmark. Absolute gw elevations are calculated by subtracting the water levels from wellhead elevation.

Previous studies (CH2M Hill, 2002; Golder, 2000; Intera, 1987) have indicated that the shallow ground water flow direction at the Site is multidirectional. The shallow ground water from the north half of the Site is expected to flow towards the west (i.e., towards the below grade

Transitway) and to the north (i.e., towards Highway 417). Shallow ground water from the southern half is expected to flow south and southeast towards the Rideau River.

The interpreted direction of ground water flow based on depth to water measured on September 2, 2011 at the Site is presented in Figure 8 (Appendix A). Ground water contours indicate that in general ground water flows towards Rideau River; however, a water divide appears to occur in the vicinity of well FZ-MW11-3. This divide is likely influenced by pumping of the ground water treatment system operated on an adjacent property to address coal tar impacts.

Sanitary and storm sewer lines may be within the saturated zone of ground water and could act as preferential pathways; however, no impacts were detected in ground water during the Phase Two ESA investigation.

5.3 Hydraulic Gradients

Although an area-wide monitoring well network is not available at the 200 Lees Ave property, the limited area of the Site and the moderate horizontal hydraulic gradient (0.01 – 0.03 m/m, average 0.02 m/m) towards the river suggest a limited variability in the ground water direction in the southern portion of the Site towards the Rideau River.

5.4 Soil Texture

Two soil samples representative of the sand and gravel fill, six representative of the cinder and ash fill, and two representative of the glacial till were submitted for grain size analysis. The results indicate that both fill materials contain less than 50% by mass of soil particles that are less than 75 µm in mean diameter and may be classified as coarse textured in accordance with O.Reg. 153/04 (as revised). The complete grain size analysis results are provided in Table C-9 (Appendix C).

5.5 Soil Field Screening

FRANZ attempted to measure headspace vapour concentrations measured in the soil samples recovered during drilling. Soil headspace vapour concentrations in samples collected from boreholes FZ-BH11-1D, FZ-MW11-4, and FZ-BH11-2D on day 1 were 0 ppmv. Because of the low recovery in some boreholes and the wide range of chemical analyses included in the work plan, head space vapour concentrations was not measured for most soil samples. Petroleum hydrocarbon odours and/or staining were not evident on soil samples from any borehole.

5.6 Soil Quality

Thirty eight soil samples and five field duplicate soil samples from the nineteen borehole locations were submitted to Maxxam for laboratory analysis (see Table 4-4 in Section 4.11). Major COCs are metals and SVOC/PAHs in soil associated to historical industrial activities. No contaminants related to either chemical or biological transformations have been identified. The majority of the COCs pose low mobility and are relatively persistent under the current subsurface environment. Limited partitioning into ground water media has been confirmed by the absence of impacts in the ground water.

Sampling locations are presented in Figure 5; Appendix A. Soil analytical results, including sampling depths, are presented in Table C-1 to Table C-16 (Appendix C) and the applicable MOE Standards are provided for comparison. As indicated previously, soil from boreholes advanced within 30 metres of the Rideau River was compared to MOE Table 9 SCSs; soil from other areas was compared to MOE Table 3 SCSs.

Analytical results for soil samples which had exceedances of the MOE Standards are presented in Figures 9 to 12 (Appendix A). Copies of the laboratory Certificates of Analysis are provided in Appendix I. The soil analytical results indicated that light or dense aqueous phase liquids are not present on site.

The results of the laboratory soil analyses indicated the following:

5.6.1 Concentrations below MOE SCSs

- No **PHC/BTEX** exceedances in soil were detected above Table 3 SCSs. No exceedances were reported near the suspected fuel storage area (APEC 2).
- Concentrations of **phenols** were near and below the detection limits for all the soil samples collected (see Table C-5a and Table C-5b, Appendix C). Although some detection limits were raised due to matrix interferences and sample dilution, no phenols exceedances were reported.
- Analyzed **VOC** parameters were not detected in the four soil samples collected (see Table C-6a and Table C-6b, Appendix C). Although some detection limits were raised due to matrix interferences and sample dilution, no VOC exceedances have been reported in the past in this area.

5.6.2 MOE Table 3 SCS Exceedances

Soil samples collected from the fill material in the majority of the boreholes exhibited concentrations of multiple **metals** above the applicable Standards (see Table C-3a, Appendix C). Primary metals of concern at each unit are:

- Cinder and Ash FILL (APEC 1): Lead, zinc, arsenic, copper, and cadmium throughout the Site.
- Cadmium in glacial till in FZ-BH11-5D-B and FZ-BH11-6DB.

The maximum metal concentrations were detected in the Cinder & Ash FILL in borehole FZ-BH11-8D located near Building A (see Figure 9, Appendix A).

PAHs exceedances were detected primarily in the Cinder and Ash FILL layer (see Table C-4a, Appendix C). PAHs of concern are:

- Cinder & Ash FILL (APEC 1): Benzo(a)pyrene, benzo(a)anthracene, fluoranthene, acenaphthylene, benzo(b)fluoranthene, phenanthrene, anthracene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3)-cd)pyrene and in the central area of the Site.

The maximum PAH concentrations were detected in the Cinder & Ash FILL in boreholes FZ-BH11-2D, FZ-MW11-3, and FZ-BH11-6D, located in the central portion of the parking lot (see Figure 10, Appendix A). **SVOC** concentrations also confirmed the elevated PAH concentrations detected in the Cinder and Ash FILL in boreholes FZ-MW11-3 and FZ-BH11-6D. Differences in concentrations of PAHs are suspected to occur due to heterogeneities in the soil matrix.

5.6.3 MOE Table 9 SCS Exceedances

Soil samples collected from the fill material in the majority of the boreholes located within the 30m buffer of the Rideau River exhibited concentrations of multiple **metals** above the applicable MOE Standards (see Table C-3b, Appendix C). Primary metals of concern at each unit are:

- Sand & Gravel FILL: Lead, antimony, and mercury in the south-eastern portion of the Site (FZ-MW-5).
- Cinder & Ash FILL: Lead, antimony, copper, mercury and molybdenum throughout the lawn area.

The maximum metal concentrations were detected in the Cinder & Ash FILL in borehole FZ-MW11-5, which also yielded barium concentrations above MOE Table 9 SCSs (see Figure 11, Appendix A).

Within the 30-m buffer from Rideau River, **PAHs** exceedances were detected primarily in the Cinder and Ash FILL layer (see Table C-4b, Appendix C). The maximum PAH concentrations were detected in the Cinder & Ash FILL (APEC 1) in boreholes FZ-MW11-4 and FZ-MW11-6 (see Figure 12, Appendix A).

One PHC exceedance was found in FZ-BH11-9D for **PHCs**. The sample exceeded the Table 9 Standard for PHC Fraction F4.

As presented in Table C-7 (Appendix C), toxicity characteristic leachate preparation (**TCLP**) analytical results meet the requirements of the Schedule 4 Leachate Quality Criteria (made under O.Reg. 558/00) with the exception of leachable benzene. The detection limit was above the criteria for the one parameter. Benzene was not detected but was analyzed at a slightly higher detection limit.

5.7 Ground Water Quality

Ten ground water samples and three QA/QC samples were submitted to Maxxam for laboratory analysis (see Table 4-4 in Section 4.11). Sampling locations are presented in Figure 5; Appendix A. All ground water samples were collected at well depth. Ground water analytical results are presented in Tables C-10 to C-14 (Appendix C), and the applicable MOE Tables 3 and 9 Standards are provided for comparison. The laboratory certificates of analysis for the ground water samples are provided in Appendix I. All dissolved metals samples were field filtered prior to collection as per the laboratory requirements.

Concentrations of PHCs, metals, SVOCs, phenols, PAHs, and VOCs were below the applicable MOE Table 3 and Table 9 Standards in all analysed ground water samples. This is consistent with the historical analytical results reported for the Site (Section 2.2.13).

5.8 Soil Vapour and Crawl Space Air Quality

Six air samples and three QA/QC samples were submitted to Maxxam for laboratory analysis (see Table 4-4 in Section 4.11). Soil vapour and crawl space air results are presented in Tables C-15 and C-16 (Appendix C). Table C-1 of *Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario,* December 22, 2009 using inhalation chronic TRV Standards is provided for comparison. The laboratory certificates of analysis for the air samples are provided in Appendix I.

The soil vapour analytical results were attenuated (multiplied) by a factor of 2.0×10^{-2} in accordance with the BC guidance for shallow soil contamination vapour sampling (see Section 1.4.3).

None of the soil vapour or crawl space air results exhibited attenuated concentrations above the applicable guideline for BTEX, PHC F1, F2 or naphthalene.

5.9 Quality Assurance and Quality Control Results

Five field duplicate soil sample (DUP-1 to DUP5) and two field duplicate ground water samples (MW11-DUP1 and MW11-DUP2) were submitted to the laboratory for analysis. The duplicate soil samples were analyzed for PAHs, metals, phenols, PHC F2-F4, and SVOCs. The duplicate ground water samples were analyzed for SVOCs, metals, phenols, PHCs, and VOCs. Additionally, one crawl space air duplicate (DUP-AUG11) and one soil vapour duplicate (DUP02-AUG11) were submitted to Maxxam for analysis. The analytical results for the field duplicates were compared to the primary sample results and, where concentrations in both samples were greater than 5 times the laboratory reportable detection limit (RDL). RPDs were calculated using the procedures outlined in Section 4.14. The results of the calculated RPDs are presented along with the analytical results in Appendix C and are summarized below:

Soil:

- RPDs between sample FZ-MW11-6 and its duplicate sample DUP-1 ranged from 5% to 100%, above the level which is acceptable for soil as defined by Zeiner (see Table C-3b to B-5b, Appendix C) and Table 4-7.
- RPD between sample FZ-BH11-7D-C and its duplicate sample DUP-2 were not calculated since concentrations were not detected in either sample (see Table C-1a, Appendix C).
- RPDs between sample FZ-BH11-1S and its duplicate sample DUP-3 ranged from 0% to 29%, slightly above the level recommended by Zeiner (see Table C-3a and C-4a, Appendix C).
- RPDs between sample FZ-BH11-3S and its duplicate sample DUP-4 ranged from 0% to 81% (see Table C-3a and C-4a, Appendix C).
- RPDs between sample FZ-MW11-3 and its duplicate sample DUP-5 ranged from 70% to 104%, which is slightly above the alert limit for soil samples (see Table C-5a, Appendix C), all above recommended levels.

These exceedances of acceptable levels for RPDs obtained in soil samples highlights the difficulty in obtaining true soil duplicates. While every effort was made in the field to obtain good-quality duplicates, other sampling requirements (especially for volatile components) prohibit any additional soil handling or mixing than that outlined in the field procedures section above. FRANZ considers that the high RPD obtained in the field program for samples underline the contingent nature of soil sampling and the need to estimate the extent of soil contamination conservatively.

Ground water:

- PHC, SVOC and phenol concentrations were not detected in either sample (CHMW01-2 and MW11-DUP1) and therefore, RPDs were not calculated. RPDs calculated for analyzed metal parameters were less than the limit indicated by Zeiner (see Tables C-10b to C-13b, Appendix C).
- VOC concentrations were not detected in either sample (BH00-5 and MW11-DUP2) and therefore, RPDs were not calculated (see Table C-14, Appendix C).

Air:

- RPDs between sample NECRAWL-AUG11 and its duplicate sample DUP-AUG11 for BTEX and PHC F1 ranged from 15% to 70%. RPD for PHC F2 was 113%, potentially associated with time-dependant ventilation events. See Table C-15 (Appendix C).
- RPDs between sample VP11-2-AUG11 and its duplicate sample DUP02-AUG11 for BTEX and PHC F1-F2 ranged from 28% to 91% (see Table C-15, Appendix C), above the acceptable level of 25%.

- Naphthalene concentrations were not detected in any sample; therefore, RPDs were not calculated (see Table C-16, Appendix C).

Trip blank ground water for VOC analysis was provided by the laboratory and accompanied FRANZ personnel during field activities. The trip blank sample was analyzed for VOCs and concentrations of all analyzed VOC parameters in the trip blank sample were less than the laboratory RDL (see Table C-14, Appendix C). These results indicate that the potential for laboratory or field cross contamination of analyses samples is considered negligible.

Additionally, a trip blank air sample for BTEX, PHC F1-F2, and naphthalene analysis was also provided. All parameters exhibited concentrations below the laboratory RDL (see Tables C-15 and C-16, Appendix C).

All samples submitted to the laboratory were handled in accordance with the Analytical Protocol with respect to holding time, preservation method, storage requirement, and container type.

Certificates from the laboratory were received for every samples submitted. The certificates provided by the laboratory comply with subsection 47(3) of the regulation and copies are provided in Appendix I.

In the general comments section of the laboratory certificates, there is a summary of all qualifications made during analysis. The qualifications include:

1. SVOC analysis – soil: Due to the sample matrix some of the samples required dilutions. Detection limits were adjusted accordingly.
2. Soluble Boron – soil: Due to high concentration of non target analytes, sample required dilution. Detection limits was adjusted accordingly (FZ-BH11-3D only).
3. Hexavalent Chromium – soil: Due to colour interferences, some samples required dilution. Detection limits were adjusted accordingly.
4. VOC analysis – soil: Detection limit was adjusted for low sample weight (FZ-BH11-4D only).
5. VOC analysis (ZHE leachates) – soil: Sample jar had headspace before leaching was performed on this sample. Please view results with discretion (FZ-MW11-1-A only).
6. SVOC analysis – Detection limits were adjusted for high moisture content (FZ-MW11-2-A only)
7. Ground water – all sample bottles contained visual sediment, which was included in the analysis as per the Protocol for Analytical Methods Used in the Assessment of Properties under part XV.1 of the Environmental Protection Act.

Sample FZ-MW11-1-A was one of three samples submitted for VOC leachate analysis. None of the samples were above the laboratory detection limit; therefore, the qualification made by the laboratory did not affect the overall objectives or decisions made. The increase in the detection limit due to sample matrix for the SVOCs and the high moisture content for FZ-MW11-2-A raised the detection limit over the applicable Standards for soil. This can also be said for the VOC analysis on FZ-BH11-4D where the detection limit was increased due to low sample weight. When comparing the SVOC results to those that did not have a raised detection limit, all parameters had concentrations below the applicable Standards. While, this suggests that the samples with SVOCs with raised detection limits would not have concentrations above Standards, this would have to be confirmed if a Record of Site Condition Tier II or higher risk assessment was to be conducted through additional confirmation sampling. Additionally, the SVOCs with raised detection limits in soil were not detected in ground water. The increase with detection limits does not affect the overall decision making and the objectives of the Phase Two ESA.

5.10 Phase Two Conceptual Site Model

5.10.1 Potential Contaminating Activities

The Phase One ESA (FRANZ, 2011), identified seven potentially contaminating activities as defined by Table 2 of Schedule D of O.Reg. 153/04 (Figure 7; Appendix A). The off-site potentially contaminating activities included:

1. Tar Distillation Plant: West of the Site, near current 170 Lees Avenue;
2. Coal Gasification: Northwest of the Site;
3. Gasoline and Associated Products in Fixed Tanks: North of the Site
4. Commercial Autobody Shop: North of the Site; and
5. Treatment of Sewage: North of the Site

The on-site potentially contaminating activities included:

1. Gasoline and Associated Products in Fixed Tanks: Storage Tanks inside Building A and suspected underground storage tank adjacent to Building A;
2. Rail Yards, Tracks and Spurs: Bisecting the parking lot; and
3. Waste Disposal and Waste Management: Below surface of current parking lot.

5.10.2 Areas of Potential Environmental Concern (APECs)

Four APECs were identified based on the results of the Phase One ESA.

APEC 1: Cinder and ash fill layer. Present across most of the Site and has been observed to have an average thickness of 3 to 6 m. The layer contains soil exhibiting concentrations of various polycyclic aromatic hydrocarbons and metals in excess of Ontario Standards.

APEC 2: Fuel Storage. Inside the mechanical room of Building A and a potential underground storage tank location adjacent to the mechanical room. The storage tanks found inside Building A appeared to be well-contained are not expected to have leaked; however, the sump beside the generator in the mechanical room and the lack of records pertaining to the suspected underground storage tank adjacent to the building indicate that this is an area of potential environmental concern. The contaminants of potential concern for this APEC are petroleum hydrocarbons and benzene, toluene, ethylbenzene and xylenes.

APEC 3: Rail Spur. Based on historical aerial photographs, the parking lot covering most of the Site was constructed in two phases. A railroad historically cut across the current parking lot and marked the limit of the first phase of the parking lot. This railroad was also present during the landfilling period and may indicate the eastern limit of the landfill material. The surficial soil underneath the former railroad alignment may contain polycyclic aromatic hydrocarbons and metals.

APEC 4: Off-site coal tar impacts. Area of soil and ground water polycyclic aromatic hydrocarbon contamination previously investigated, and located on the northwestern portion of the 200 Lees property, beyond the Site boundary. This is referred to as the “coal tar” impact associated with activities at the former gasification plant. While these impacts are not on the Site, they have the potential to migrate over time, and therefore the western boundary of the Site is identified as an APEC.

5.10.3 Subsurface Structures

Site utilities are generally buried, including gas lines, power, water, sanitary and storm sewer. Ground water is found at the Site between three and five metres below ground surface. Utility trenches for hydro, gas and water are likely above this level and will therefore not act as preferential pathways for contaminants. Sanitary and storm sewer lines may be within the saturated zone of ground water and could act as preferential pathways; however, no impacts were detected in ground water during the Phase Two ESA investigation.

5.10.4 Physical Setting

The proposed open-air stadium and bleacher locations, in reference to the existing site layout is shown in Figure 3; Appendix A. The section of Building A which would require demolition is also included in Figure 3.

Figure 13 and 14 (Appendix A) are north / south and east / west cross sections for the site. Included in the cross sections, is the stratigraphy from ground surface to bedrock, depth to bedrock, areas where the soil collected was above applicable Standards, the chemicals of concern, the concentrations exceeding Standards, depths to water tables for each well, layers of fill and the 30 m boundary from the Rideau River. The unconfined aquifer is constituted by the fill material and upper glacial till unit. General horizontal hydraulic gradient is 0.02 m/m towards the river.

Depth to bedrock ranged from 4.0 m bgs to 10.7 m bgs. There were two boreholes where refusal was quite shallow compared to the rest, FR-BH11-8D and FR-BH11-10D, both these boreholes were in APEC 3: Former Rail Bed; however, the remaining borehole in APEC 3 had a much greater depth to bedrock at 10.7 m bgs.

The ground water elevation in August 2011 was from 54.04 m asl to 58.34 m asl. The depth to ground water was between 3.67 m bgs to 7.74 m bgs.

5.10.5 Location of Contaminants above Applicable Standards

Each of the four previously identified APECs and the potential migration of contaminants to Rideau River were investigated through the Phase Two ESA. During the intrusive investigation, three main stratigraphy units, as described in historical reports, were characterized:

- Sand and Gravel FILL
- Cinder and Ash FILL
- Glacial TILL

Conclusions based on these findings for each APEC are discussed in the following sections. Figures 9 through 12 (Appendix A) show the areas where concentration of chemicals was greater than applicable Standards. Overall, scattered distribution of contaminants were found in both the parking lot portion and the lawn area. SVOC/PAH impacts appear to be more related to the Cinder & Ash Layer down gradient towards the south-eastern boundary of the Site..

APEC 1: Cinder and Ash Layer

The Phase Two investigation of the Cinder and Ash Layer (APEC 1) involved drilling nineteen boreholes and sampling new and existing monitoring wells. Soil analytical results confirmed the presence of various metals and SVOCs/PAHs exceeding the applicable Standards throughout APEC 1, including both the parking lot portion and the lawn area within the 30 m buffer from Rideau River.

The highest metal concentrations are associated with the cinder and ash fill. The cinder and ash layer thickness appear to be greater in the south portion of the Site. Major wastes forming the fill material include ash and cinder as well as a few amounts (less than 50%) of other debris such as broken glass and pieces of bricks. No evidence of domestic wastes was noted during the investigations.

Both metal and SVOC/PAH impacts in the fill material extend further down gradient towards the south-eastern boundary of the Site as evidenced by the elevated concentrations exhibited at FZ-BH11-9D. Figure 13 and Figure 14 (Appendix A) show cross sections along the flow path indicating exceedances along the south-eastern boundary of the Site. Soil impacts are consistent with the results of previous investigations and confirm that the dumping of incinerated materials at the Site.

Ground water analytical results did not contain any chemical above applicable Standards.

APEC 2: Fuel Storage

FRANZ did not find evidence of impacts from the fuel storage tanks associated with Building A. No PHC exceedances were reported in samples collected from boreholes FZ-BH11-8D or FZ-MW11-3. No PHC exceedances were reported in ground water samples collected from the newly installed well FZ-MW11-3 or the existing well BH00-4. Ground water analytical results did not contain any chemicals above applicable Standards.

FRANZ was not able to investigate the area immediately adjacent to the underground storage tank adjacent to Building A, as its exact size was unknown. As a result, FRANZ is unable to confirm or refute the existence of localized petroleum impacts around the tank.

APEC 3: Rail Spur

The nature of impacts traditionally associated with rail spurs (metals and PAHs) are similar to those observed elsewhere on the site as a result of cinder and ash dumping. FRANZ investigated the rail spur in an attempt to determine whether specific impacts attributable to the former rail spur were present on the Site. Scattered metals and SVOC/PAH exceedances in the fill materials were observed in shallow boreholes in APEC 3; however, no visual observations indicated that rail bed material remains on site. Ground water analytical results did not contain any chemicals above applicable Standards.

The analytical results, while exhibiting exceedances, did not differ substantially from impacts observed in fill throughout the Site. As a result, APEC 3 should be considered as part of the broader cinder and ash fill at the Site.

APEC 4: Off-site coal tar impacts

Based on the absence of PAH impacts in ground water analytical results within the investigated area, FRANZ did not find evidences of potential migration of contaminants associated with activities at the former gasification plant located northwest of the Site.

Potential Migration to River

Three monitoring wells (FZ-MW11-4, FZ-MW11-5, FZ-MW11-6) were installed during the Phase Two ESA in order to assess potential migration of contaminates off-property towards Rideau River. Ground water analytical results were compared to MOE Table 9 SCSs. No ground water exceedances were reported at these locations. A higher frequency of detected PAHs was observed at FZ-MW11-4 in the southern portion of the Site, which is consistent with the elevated concentrations of PAHs identified in soils.

While elevated levels of metals and PAHs are present in soil in most site areas, the absence of ground water impacts indicates that these soil impacts are likely stable and are not migrating in ground water to the Rideau River.

5.10.6 Vapour Intrusion

Four soil vapour probes were installed on the Site, one adjacent to Building A. Two indoor vapour samples were collected in the crawl space of Building A in the areas most likely to be affected by the soil contamination and to assess if the vapour migration pathway is active. None of the soil vapour or crawl spaces air results contained attenuated concentrations above the applicable guidelines for BTEX, PHC F1 and F2, or naphthalene.

5.10.7 Site Model

Figure 15 (Appendix A) outlines the conceptual human and ecological receptors on the Site, and primary exposure routes. Both site users and construction works (during the construction of the open-air stadium) may be exposed to the contaminants of concern through dermal contact with the soil and inhalation of soil particles. Ecological receptors could include terrestrial mammals, birds, and invertebrates and any predators. Terrestrial plants may also be a receptor. There is no evidence of contaminant migration or leaching from soil to ground water; therefore, it is unlikely that climatic or meteorological conditions will influence the distribution of contaminants, including temporal fluctuations in ground water.

6.0 CONCLUSIONS

6.1 Summary

FRANZ Environmental Inc. conducted a Phase Two Environmental Site Assessment for a portion of 200 Lees Ave (Site), Ottawa to establish the environmental conditions of the Site with respect to the recently amended Ministry of Environment (MOE) Table 3 and Table 9 Site Condition Standards (SCSs). Specifically, the Phase Two ESA investigated four Areas of Potential Environmental Concerns (APECs) identified at the Site by a Phase One ESA completed by FRANZ in 2011.

- APEC 1: Cinder and ash fill layer;
- APEC 2: Fuel Storage;
- APEC 3: Rail Spur; and
- APEC 4: Off-site coal tar impacts.

6.2 Soil Stratigraphy

Each of the four previously identified APECs and the potential migration of contaminants to Rideau River were investigated borehole drilling and soil sampling, monitoring well installation, ground water monitoring and sampling, soil vapour installation, and soil vapour/crawl space air sampling. During the intrusive investigation three main stratigraphy units were characterized.

Sand and Gravel Fill

This layer was characterized as debris-free brown sand and gravel fill materials. The thickness ranged from approximately 0.7 m to 4.5 m and was observed at the majority of the borehole locations. In general, this unit was found to be less than 1.1 m thick in the central area of the parking lot and tends to become thicker towards the northeast sector and along the lawn area, mimicking the Rideau River boundary.

Cinder and Ash Fill

The cinder and ash fill underlying the sand and gravel fill consisted of ash staining sand and gravel soil generally hosting debris such as cinder, broken glass, ceramic, brick, metal, wood and coal. This layer appears to be thick at the east (2.6 – 3.2 m) and south (2.6 m) portions of the Site, divided by the former rail spur footprint. Although the cinder and ash fill varies widely in classification and description, cinder seems to be more dominant in the eastern portion. FRANZ identified a 1.6 to 2.6 m layer of gray silty sand and gravel fill inserted in between the cinder and ash fill in the boreholes located in the southeast portion of site and may indicate a differential fill pattern in the area.

Glacial Till

Material encountered in the glacial till unit during borehole drilling generally consisted of a mix of grey dense and stiff silty sand and gravel to clayey soil, with some cobbles at the bottom of the unit (refusal). The deepest refusal was reached at 10.7 m bgs in the south portion of the Site, whereas it was between 3.9 m bgs and 4.9 m bgs along the center of the property, in the area of the former rail bed. According to previous studies, shale bedrock is generally encountered at depths approximately 10 to 12 m bgs and slopes to the southeast towards the Rideau River.

6.3 Regulations

Ontario Environmental Regulations divide the Site into two portions: the area within 30 metres of the Rideau River and the area more than 30 metres from the river. Site Condition Standards (SCS) are more stringent in the area within 30 metres of the river (MOE Table 9) than for the area more than 30 metres from the river (MOE Table 3). Soil and ground water conditions are therefore discussed separately for each area.

6.4 Analytical Results

6.4.1 APEC 1: Cinder and Ash fill layer

Cinder and ash fill layer, due to former landfilling over the entire Site, was identified as APEC 1. Soil impacts are consistent with the results of previous investigations and confirm that the dumping of incinerated materials is a cause of environmental concern at the Site. PHCs, metals, VOCs, SVOCs, and PAHs above MOE Table 3 and 9 Standards are summarized in Table 6-1 to Table 6-8.

Table 6-1: APEC-1: Soil Analytical Results, PHCs–Table 9 SCS

APEC		**O.Reg. 153/04 Table 9[1]**	**APEC 1/ Migration to River**
Soil Description			**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-9D**
Sample ID			**FZ-BH11-9D**
Sample Depth (m)			0.8-1.5
Sample Date			10/08/2011
Analysis Date			15/08/11 - 22/08/11
Laboratory Certificate (Maxxam Job)			B1C2151
% Moisture			16.0
Parameters (µg/g)	Benzene	0.02	<0.02
	Toluene	0.2	0.04
	Ethylbenzene	0.05	<0.02
	m,p-Xylenes	---	0.03
	o-Xylenes	---	0.03
	Total Xylenes	0.05	0.05
	PHC fraction F1 (C6-C10)	25	<10
	PHC fraction F1 (C6-C10) - BTEX	25	<10
	PHC fraction F2 (C10-C16)	10	<10
	PHC fraction F3 (C16-C34)	240	77
	PHC fraction F4 (C34-C50)	120	140
	Chromatogram to baseline at nC50	---	No

20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table 6-2: APEC-1: Soil Analytical Results, Metals –Table 3 SCS

APEC		**O.Reg. 153/04 Table 3[1]**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**
Soil Description			**Cinder and Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**GLACIAL TILL**	**GLACIAL TILL**
Borehole / Monitoring Well			**FZ-BH11-2D**	**FZ-BH11-3D**	**FZ-BH11-4D**	**FZ-BH11-4D**	**FZ-BH11-5D**	**FZ-BH11-5D**	**FZ-BH11-6D**
Sample ID			**FZ-BH11-2D**	**FZ-BH11-3D**	**FZ-BH11-4D-A**	**FZ-BH11-4D-B**	**FZ-BH11-5D-A**	**FZ-BH11-5D-B**	**FZ-BH11-6D-B**
Sample Depth (m)			5.1-5.3	1.1-1.5	1.9-2.2	3.6-4.5	1.0-2.3	2.3-4.5	9.0-9.9
Sample Date			10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011
Analysis Date			18/08/11 - 22/08/11	18/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11
Metals (µg/g)	Hot Water Ext. Boron (B)	2	1.1	1.4	0.87	0.65	0.81	0.3	0.15
	Acid Extractable Antimony (Sb)	40	83	4.3	3.6	33	2.4	0.2	<0.2
	Acid Extractable Arsenic (As)	18	26	13	12	27	21	2	4
	Acid Extractable Barium (Ba)	670	220	250	220	110	160	260	37
	Acid Extractable Cadmium (Cd)	1.9	5.4	1.3	6.6	0.5	16	8.8	8
	Acid Extractable Copper (Cu)	230	440	170	180	57	180	86	60
	Acid Extractable Lead (Pb)	120	900	710	510	510	260	24	21
	Acid Extractable Nickel (Ni)	270	53	22	24	30	22	37	24
	Acid Extractable Zinc (Zn)	340	2600	640	480	210	220	100	46
	Acid Extractable Mercury (Hg)	3.9	0.29	0.76	0.64	0.13	0.7	<0.05	<0.05

Table 6-2: APEC-1: Soil Analytical Results, Metals –Table 3 SCS (continued)

APEC		**O.Reg. 153/04 Table 3[1]**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1 /APEC 2**	**APEC 1 /APEC 2**
Soil Description			**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder and Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-10D**	**FZ-MW11-2**	**FZ-BH11-10D**	**FZ-BH11-8D**	**FZ-MW11-3**
Sample ID			**FZ-BH11-10D-A**	**FZ-MW11-2-A**	**FZ-BH11-10D-B**	**FZ-BH11-8D-A**	**FZ-MW11-3**
Sample Depth (m)			0.9-1.5	1.1-2.9	4.3-4.5	2.6-3.0	1.1-2.6
Sample Date			11/08/2011	11/08/2011	11/08/2011	11/08/2011	12/08/2011
Analysis Date			19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	23/08/11 - 25/08/11
Metals (µg/g)	Hot Water Ext. Boron (B)	2	0.59	3.5	1	0.86	1.4
	Acid Extractable Antimony (Sb)	40	11	24	9.5	25	8.6
	Acid Extractable Arsenic (As)	18	29	20	17	41	15
	Acid Extractable Barium (Ba)	670	380	270	450	780	510
	Acid Extractable Cadmium (Cd)	1.9	1.9	1.7	14	13	1.4
	Acid Extractable Copper (Cu)	230	450	430	130	580	410
	Acid Extractable Lead (Pb)	120	1300	2400	1200	2800	1100
	Acid Extractable Nickel (Ni)	270	650	27	26	100	32
	Acid Extractable Zinc (Zn)	340	990	800	1200	4500	1000
	Acid Extractable Mercury (Hg)	3.9	0.95	19	0.21	0.46	2.1

20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table 6-3: APEC-1: Soil Analytical Results, Metals –Table 9 SCS

APEC		O.Reg. 153/04 Table 9[1]	APEC 1/ Migration to River	APEC 1/ Migration to River	APEC 1/ Migration to River	APEC 1/ Migration to River	APEC 1/ Migration to River	APEC 1/ Migration to River
Soil Description			Cinder & Ash FILL	Cinder & Ash FILL	Sand & Gravel FILL	Cinder & Ash FILL	Cinder & Ash FILL	Cinder & Ash FILL
Borehole / Monitoring Well			FZ-BH11-9D	FZ-MW11-4	FZ-MW11-5	FZ-MW11-5	FZ-MW11-6	Duplicate of FZ-MW11-6
Sample ID			FZ-BH11-9D	FZ-MW11-4	FZ-MW-5-A	FZ-MW-5-B	FZ-MW11-6	DUP-1
Sample Depth (m)			0.8-2.2	4.3-4.5	0.6-1.5	4.1-4.5	2.8-4.1	2.8-4.1
Sample Date			10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011
Analysis Date			18/08/11 - 22/08/11	18/08/11 - 22/08/11	18/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11
Metals (µg/g)	Acid Extractable Antimony (Sb)	1.3	11	0.3	2.2	9	6.7	11
	Acid Extractable Arsenic (As)	18	7	2	6	17	38	42
	Acid Extractable Barium (Ba)	220	110	120	130	240	100	120
	Acid Extractable Cadmium (Cd)	1.2	0.7	0.3	0.6	25	0.3	0.9
	Acid Extractable Copper (Cu)	92	120	11	56	350	170	220
	Acid Extractable Lead (Pb)	120	150	14	170	450	470	520
	Acid Extractable Molybdenum (Mo)	2	0.7	2.3	2	3.4	4.5	5.2
	Acid Extractable Selenium (Se)	1.5	<0.5	<0.5	0.7	1	2.1	2.6
	Acid Extractable Mercury (Hg)	0.27	0.45	0.05	1.1	0.21	0.34	0.41

🟨 20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
▨ 20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table 6-4: APEC-1: Soil Analytical Results, PAH –Table 3 SCS

APEC		**O.Reg. 153/04 Table 3[1]**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**
Soil Description			**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-3D**	**FZ-BH11-4D**	**FZ-BH11-5D**
Sample ID			**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-3D**	**FZ-BH11-4D**	**FZ-BH11-5D-A**
Sample Depth (m)			4.2-4.5	5.1-5.3	1.1-1.5	1.9-2.2	1.0-2.3
Sample Date			10/08/2011	10/08/2011	10/08/2011	11/08/2011	11/08/2011
Analysis Date			23/08/2011	22/08/2011	18/08/2011	22/08/2011	20/08/2011
PAH (µg/g)	Acenaphthylene	0.15	0.076	0.92	0.22	0.36	0.072
	Anthracene	0.67	0.63	3.1	1.4	5.2	0.19
	Benzo(a)anthracene	0.96	0.66	8.9 (2)	3.6	7.7 (2)	0.62
	Benzo(a)pyrene	0.3	0.44	7.4	2.9	5.1	0.52
	Benzo(b)fluoranthene	0.96	0.31	6.8 (2)	2.8	4.9	0.5
	Benzo(k)fluoranthene	0.96	0.22	3.8	1.5	2.7	0.28
	Chrysene	9.6	0.64	8.0 (2)	3.4	6.7	0.65
	Dibenz(a,h)anthracene	0.1	0.068	1.2	0.47	0.91	0.089
	Fluoranthene	9.6	1.5	19 (2)	11 (2)	19 (2)	1.3
	Fluorene	62	0.24	0.74	0.44	2.4	0.05
	Indeno(1,2,3-cd)pyrene	0.76	0.22	4	1.6	2.6	0.29
	Naphthalene	9.6	0.38	0.23	0.1	0.54	0.031
	Phenanthrene	12	1.4	11 (2)	5.8	19 (2)	0.68

Table 6-4: APEC-1: Soil Analytical Results, PAH –Table 3 SCS (continued)

APEC		**O.Reg. 153/04 Table 3**^{1}	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1/APEC 2**	**APEC 1/APEC 2**
Soil Description			**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-6D**	**FZ-MW11-2**	**FZ-BH11-10D**	**FZ-MW11-3**	**Duplicate of FZ-MW11-3**
Sample ID			**FZ-BH11-6D-A**	**FZ-MW11-2-A**	**FZ-BH11-10D-A**	**FZ-MW11-3**	**DUP 5**
Sample Depth (m)			3.5-4.1	1.1-2.9	0.9-1.5	1.1-2.6	1.1-2.6
Sample Date			11/08/2011	11/08/2011	11/08/2011	12/08/2011	12/08/2011
Analysis Date			22/08/2011	22/08/2011	22/08/2011	25/08/2011	25/08/2011
PAH (µg/g)	Acenaphthylene	0.15	0.3	1.1	0.38	0.77	---
	Anthracene	0.67	16 (2)	4.4	5.5	4	6
	Benzo(a)anthracene	0.96	3.7	7.3	10 (2)	5.9	10
	Benzo(a)pyrene	0.3	1.3	6.5	6.4	5	6
	Benzo(b)fluoranthene	0.96	1.5	5.8	5.9	4.1	---
	Benzo(k)fluoranthene	0.96	0.84	3.5	3.3	2.5	4
	Chrysene	9.6	3.1	7.8 (2)	9.9 (2)	5.5	10
	Dibenz(a,h)anthracene	0.1	0.16	1.1	1.1	1	<5
	Fluoranthene	9.6	26 (2)	19 (2)	24 (2)	16	25
	Fluorene	62	24 (2)	7.2	2.6	2.2	4
	Indeno(1,2,3-cd)pyrene	0.76	0.44	3.5	3	2.9	<8
	Naphthalene	9.6	47 (2)	2	0.73	0.79	<3
	Phenanthrene	12	51 (2)	19 (2)	23 (2)	11	28

20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
▨ 20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table 6-5: APEC-1: Soil Analytical Results, PAH –Table 9 SCS

APEC		**O.Reg. 153/04 Table 9[1]**	**APEC 1/ Migration to River**	**APEC 1/ Migration to River**	**APEC 1/ Migration to River**	**APEC 1/ Migration to River**	**APEC 1/ Migration to River**
Soil Description			**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Sand & Gravel FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-9D**	**FZ-MW11-4**	**FZ-MW11-5**	**FZ-MW11-6**	**Duplicate of FZ-MW11-6**
Sample ID			**FZ-BH11-9D**	**FZ-MW11-4**	**FZ-MW11-5**	**FZ-MW11-6**	**DUP-1**
Sample Depth (m)			0.8-2.2	5.0-5.6	0.6-1.5	2.8-4.1	2.8-4.1
Sample Date			10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011
Analysis Date			18/08/2011	23/08/2011	20/08/2011	23/08/2011	22/08/2011
PAH (µg/g)	1-Methylnaphthalene[3]	0.59	0.16	0.3	0.13	0.99	1.2
	2-Methylnaphthalene[3]	0.59	0.19	0.51	0.042	1.8	1.9
	Acenaphthene	0.072	0.38	1.1	0.053	7.4 (2)	2.6
	Acenaphthylene	0.093	1.2	2.2	0.22	0.49	0.87
	Anthracene	0.22	3.4	8.7 (2)	0.32	16 (2)	12 (2)
	Benzo(a)anthracene	0.36	11 (2)	28 (2)	0.91	22 (2)	17 (2)
	Benzo(a)pyrene	0.3	7.6 (2)	20 (2)	0.97	15 (2)	10 (2)
	Benzo(b)fluoranthene	0.47	6.3 (2)	17 (2)	0.74	13 (2)	8.7 (2)
	Benzo(g,h,i)perylene	0.68	3.6	11 (2)	0.63	8 (2)	4.3
	Benzo(k)fluoranthene	0.48	3.7	11 (2)	0.4	7.6 (2)	4.2
	Chrysene	2.8	11 (2)	27 (2)	0.94	20 (2)	16 (2)
	Dibenz(a,h)anthracene	0.1	1.1	2.9	0.16	2.3	1.4
	Fluoranthene	0.69	26 (2)	45 (2)	1.5	53	41
	Fluorene	0.19	0.95	1.9	0.11	8.3 (2)	3.8
	Indeno(1,2,3-cd)pyrene	0.23	3.5	11 (2)	0.52	6.7	4.1
	Naphthalene	0.09	0.27	1.4	0.11	4.9	3.2
	Phenanthrene	0.69	17 (2)	21 (2)	1.1	55 (2)	45 (2)
	Pyrene	1	21 (2)	43 (2)	1.5	41 (2)	32 (2)

20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
▨ 20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table 6-6: APEC-1: Soil Analytical Results, VOCs–Table 3 SCS

APEC		**O.Reg. 153/04 Table 3[1]**	**APEC 1**
Soil Description			**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-4D**
Sample ID			**FZ-BH11-4D**
Sample Depth (m)			3.6-4.5
Sample Date			11/08/2011
Analysis Date			18/08/2011
Laboratory Certificate			B1C2240
% Moisture			
VOC (µg/g)	Bromomethane	0.05	<0.2
	1,2-Dichloroethane	0.05	<0.2
	1,1-Dichloroethylene	0.064	<0.2
	1,2-Dichloropropane	0.16	<0.2
	1,1,1,2-Tetrachloroethane	0.087	<0.2
	1,1,2,2-Tetrachloroethane	0.05	<0.2
	1,1,2-Trichloroethane	0.05	<0.2
	Trichloroethylene	0.91	<0.2
	Vinyl Chloride	0.032	<0.06

20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
▨ 20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table 6-7: APEC-1: Soil Analytical Results, SVOCs–Table 3 SCS

APEC		**O.Reg. 153/04 Table 3^1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1/APEC 2**	**APEC 1/APEC 2**
Soil Description			**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-3D**	**FZ-MW11-4D**	**FZ-BH11-5D**	**FZ-BH11-6D**	**FZ-MW11-2**	**FZ-BH11-10D**	**FZ-MW11-3**	**Duplicate of FZ-MW11-3**
Sample ID			**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-3D**	**FZ-BH11-4D**	**FZ-BH11-5D-A**	**FZ-BH11-6D-A**	**FZ-MW11-2-A**	**FZ-BH11-10D-A**	**FZ-MW11-3**	**DUP 5**
Sample Depth (m)			4.2-4.5	4.1-4.3	1.1-1.5	1.9-2.2	1.0-2.3	3.5-4.1	1.1-2.9	0.9-1.5	1.1-2.6	1.1-2.6
Sample Date			10/08/2011	10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	12/08/2011	12/08/2011
Analysis Date			15/08/11 - 18/08/2011	16/08/11 - 18/08/2011	16/08/2011	16/08/2011	16/08/11 - 18/08/11	16/08/11 - 18/08/11	16/08/2011	16/08/11 - 18/08/11	19/08/2011	19/08/2011
SVOC (µg/g)	1,2,4-Trichlorobenzene	3.2	<0.5	<0.3	<1	<1	<0.5	<0.5	<5	<3	<5	<5
	2,4,6-Trichlorophenol	3.8	<1	<0.5	<2	<2	<1	<1	<10	<5	<10	<10
	2,4-Dichlorophenol	3.4	<1	<0.5	<2	<2	<1	<1	<10	<5	<10	<10
	2,4-Dinitrotoluene	1.2	<1	<0.5	<2	<2	<1	<1	<10	<5	<10	<10
	2,6-Dinitrotoluene	1.2	<1	<0.5	<2	<2	<1	<1	<10	<5	<10	<10
	2-Chlorophenol	3.1	<0.8	<0.4	<2	<2	<0.8	<0.8	<8	<4	<8	<8
	3,3'-Dichlorobenzidine	1	<5	<3	<10	<10	<5	<5	<50	<50	<50	<50
	Acenaphthylene	0.15	<0.5	<0.3	<1	<1	<0.5	<0.5	<5	<3	<5	<5
	Anthracene	0.67	0.6	<0.2	1.5	<0.6	0.5	7.1	4	5	15	6
	Benzo(a)anthracene	0.96	1	<0.3	3	<1	0.9	3.6	6	7	25	10
	Benzo(a)pyrene	0.3	0.7	<0.3	3	<1	0.7	1.2	6	5	19	6
	Benzo(b/j)fluoranthene	0.96	<1	<0.5	3	<2	<1	2	<10	7	22	<10
	Benzo(g,h,i)perylene	9.6	<1	<0.5	<2	<2	<1	<1	<10	<5	<10	<10
	Benzo(k)fluoranthene	0.96	0.4	<0.2	1.6	<0.6	0.4	0.9	4	3	10	4
	Bis(2-chloroethyl)ether	0.5	<2	<1	<4	<4	<2	<2	<20	<10	<20	<20
	Bis(2-ethylhexyl)phthalate	28	<10	<5	<20	<20	<10	<10	<100	<50	<100	<100
	Chrysene	9.6	1	<0.3	3	<1	0.9	2.8	7	7	24	10
	Dibenz(a,h)anthracene	0.1	<0.5	<0.3	<1	<1	<0.5	<0.5	<5	<3	<5	<5
	Diethyl phthalate	0.5	<2	<1	<4	<4	<2	<2	<20	<20	<20	<20
	Dimethyl phthalate	0.5	<2	<1	<4	<4	<2	<2	<20	<20	<20	<20
	Fluoranthene	9.6	2.2	<0.3	8	<1	1.8	24	19	16	75	25
	Fluorene	62	0.3	<0.2	<0.6	<0.6	<0.3	23	6	<2	4	4
	Indeno(1,2,3-cd)pyrene	0.76	<0.8	<0.4	<2	<2	<0.8	<0.8	<8	<4	<8	<8
	Naphthalene	9.6	0.5	<0.2	<0.6	<0.6	<0.3	42	<3	<2	<3	<3
	p-Chloroaniline	0.5	<2	<1	<4	<4	<2	<2	<20	<10	<20	<20
	Pentachlorophenol	2.9	<1	<0.5	<2	<2	<1	<1	<10	<5	<10	<10
	Phenanthrene	12	2.7	<0.3	6	<1	1.9	43	23	17	58	28

20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table 6-8: APEC-1: Soil Analytical Results, SVOC –Table 9 SCS

APEC		**O.Reg. 153/04 Table 9[1]**	**APEC 1/ Migration to River**
Soil Description			**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-9D**
Sample ID			**FZ-BH11-9D**
Sample Depth (m)			0.8-2.2
Sample Date			10/08/2011
Analysis Date			16/08/11 - 18/08/11
Parameters (µg/g)	1,2,4-Trichlorobenzene	0.05	<1
	1-Methylnaphthalene	0.59	<0.6
	2,4,5-Trichlorophenol	0.1	<2
	2,4,6-Trichlorophenol	0.1	<2
	2,4-Dichlorophenol	0.1	<2
	2,4-Dimethylphenol	0.2	<4
	2,4-Dinitrophenol	2	<3
	2,4-Dinitrotoluene	0.5	<2
	2,6-Dinitrotoluene	0.5	<2
	2-Chlorophenol	0.1	<2
	2-Methylnaphthalene[3]	0.59	<0.6
	3,3'-Dichlorobenzidine	1	<10
	Acenaphthene	0.072	<0.6
	Acenaphthylene	0.093	<1
	Anthracene	0.22	<0.6
	Benzo(a)anthracene	0.36	1
	Benzo(a)pyrene	0.3	<1
	Benzo(b/j)fluoranthene	0.47	<2
	Benzo(g,h,i)perylene	0.68	<2
	Benzo(k)fluoranthene	0.48	<0.6
	Biphenyl	0.05	<1
	Bis(2-chloroethyl)ether	0.5	<4
	Bis(2-chloroisopropyl)ether	0.5	<2
	Bis(2-ethylhexyl)phthalate	5	<20
	Dibenz(a,h)anthracene	0.1	<1
	Diethyl phthalate	0.5	<4
	Dimethyl phthalate	0.5	<4
	Fluoranthene	0.69	2
	Fluorene	0.19	<0.6
	Indeno(1,2,3-cd)pyrene	0.23	<2
	Naphthalene	0.09	<0.6
	p-Chloroaniline	0.5	<4
	Pentachlorophenol	0.1	<2
	Phenanthrene	0.69	1
	Phenol	0.5	<2
	Pyrene	1	2

🟨 20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
▨ 20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

6.4.2 APEC 2: Fuel Storage

FRANZ did not find evidence of impacts from the fuel storage tanks associated with Building A in APEC 2. No PHC exceedances were reported in soil samples collected from two boreholes advanced adjacent to the tank nor from a water sample collected in the closest monitoring well. FRANZ was not able to investigate the area immediately adjacent to the underground storage tank adjacent to Building A, as its exact size was unknown. As a result, FRANZ is unable to confirm or refute the existence of localized impacts around the tank.

6.4.3 APEC 3: Rail Spur

The nature of impacts traditionally associated with rail spurs are similar to those observed elsewhere on the Site as a result of cinder and ash dumping. Scattered metals and metals and SVOC/PAH exceedances in the fill materials were observed in shallow boreholes in APEC 3; however, no visual observations indicated that rail bed material remains on site. The analytical results, while exhibiting exceedances, did not differ substantially from impacts observed in fill throughout the Site (see Table 6-9 to Table 6-10 below). As a result, APEC 3 should be considered as part of the broader Cinder and Ash fill at the Site.

Table 6-9: APEC-3: Soil Analytical Results, Metals –Table 3 SCS

APEC		**O.Reg. 153/04 Table 3[1]**	**APEC 3**	**APEC 3**	**APEC 3**	**APEC 3**	**APEC 3**
Soil Description			**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-1S**	**Duplicate of FZ-BH11-1S**	**FZ-BH11-3S**	**Duplicate of FZ-BH11-3S**	**FZ-BH11-4S**
Sample ID			**FZ-BH11-1S**	**DUP 3**	**FZ-BH11-3S**	**DUP 4**	**FZ-BH11-4S**
Sample Depth (m)			1.0-1.5	1.0-1.5	1.1-1.5	1.1-1.5	0.7-1.5
Sample Date			12/08/2011	12/08/2011	12/08/2011	12/08/2011	12/08/2011
Analysis Date			23/08/11 - 25/08/11	23/08/11 - 25/08/11	23/08/11 - 25/08/11	23/08/11 - 25/08/11	23/08/11 - 25/08/11
Metals (µg/g)	Hot Water Ext. Boron (B)	2	2.9	2.8	0.48	0.46	0.53
	Acid Extractable Antimony (Sb)	40	16	17	8	7.7	24
	Acid Extractable Arsenic (As)	18	8	9	19	20	22
	Acid Extractable Barium (Ba)	670	630	640	350	390	450
	Acid Extractable Cadmium (Cd)	1.9	2.7	3.3	1	1.3	1.6
	Acid Extractable Copper (Cu)	230	250	200	140	140	210
	Acid Extractable Lead (Pb)	120	650	710	700	760	1600
	Acid Extractable Nickel (Ni)	270	21	23	33	34	30
	Acid Extractable Zinc (Zn)	340	2400	2400	360	390	650
	Acid Extractable Mercury (Hg)	3.9	0.37	0.43	0.62	0.59	1.7

20	Denotes exceedances of O.Reg 511/09 Table 3 for Commercial-Industrial site w ith coarse-grained soil.
▨ 20	Denotes a detection limit above the Ontario 511/09 Standards Rationale Document.

Table 6-10: APEC-3: Soil Analytical Results, PAH –Table 3 SCS

APEC		**O.Reg. 153/04 Table 3[1]**	**APEC 3**	**APEC 3**	**APEC 3**	**APEC 3**	**APEC 3**
Soil Description			**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-1S**	**Duplicate of FZ-BH11-1S**	**FZ-BH11-3S**	**Duplicate of FZ-BH11-3S**	**FZ-BH11-4S**
Sample ID			**FZ-BH11-1S**	**DUP 3**	**FZ-BH11-3S**	**DUP 4**	**FZ-BH11-4S**
Sample Depth (m)			1.0-1.5	1.0-1.5	**1.05-1.5**	**1.05-1.5**	0.7-1.5
Sample Date			12/08/2011	12/08/2011	12/08/2011	12/08/2011	12/08/2011
Analysis Date			25/08/2011	25/08/2011	25/08/2011	25/08/2011	25/08/2011
PAH (µg/g)	Acenaphthylene	0.15	0.27	0.32	0.06	0.063	0.47
	Anthracene	0.67	1.3	2.2	0.15	0.16	2.6
	Benzo(a)anthracene	0.96	3	4	0.44	0.47	5.7
	Benzo(a)pyrene	0.3	2.7	3.6	0.54	0.52	5
	Benzo(b)fluoranthene	0.96	2.3	2.8	0.47	0.46	3.8
	Benzo(k)fluoranthene	0.96	1.5	1.8	0.3	0.29	2.3
	Chrysene	9.6	3	4	0.48	0.51	5.4
	Dibenz(a,h)anthracene	0.1	0.59	0.75	0.13	0.12	1
	Fluoranthene	9.6	7.5	12	0.95	1	14
	Fluorene	62	0.5	0.8	0.031	0.029	0.68
	Indeno(1,2,3-cd)pyrene	0.76	1.7	2.1	0.39	0.37	3.1
	Naphthalene	9.6	0.13	0.19	0.028	0.029	0.28
	Phenanthrene	12	4.1	7	0.46	0.47	8

20	Denotes exceedances of O.Reg 511/09 Table 3 for Commercial-Industrial site with coarse-grained soil.
▨ 20	Denotes a detection limit above the Ontario 511/09 Standards Rationale Document.

6.4.4 APEC 4: Off-site coal tar impacts

Based on the absence of PAH impacts in ground water analytical results, FRANZ did not find evidences of potential migration of contaminants associated with activities at the former gasification plant located northwest of the Site.

6.5 Risk Assessment Requirement

Based on the results on the Phase Two ESA, a human health risk assessment is warranted.

6.6 Statement by Qualified Person

This Phase Two ESA report was prepared in accordance with Ontario Regulation 153/04 *Records of Site Condition – Part XV.1 of the Act* under the *Environmental Protection Act* as amended. The Phase Two ESA was supervised by Stephen Livingstone, M.Sc., P.Geo., QP$_{ESA}$. All findings and conclusions of the phase one ESA are included in this report.

6.7 Signatures

We trust that this information satisfies your present requirements. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

This report is subject to the limitations described in Appendix J.

Miguel Madrid

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Catherine LeBlanc, B.Eng.
Assessor

Andrew Henderson, B.A.Sc., P.Eng.
Project Manager

Steve Livingstone, M.Sc., P.Geo., QP$_{ESA}$
Senior Review

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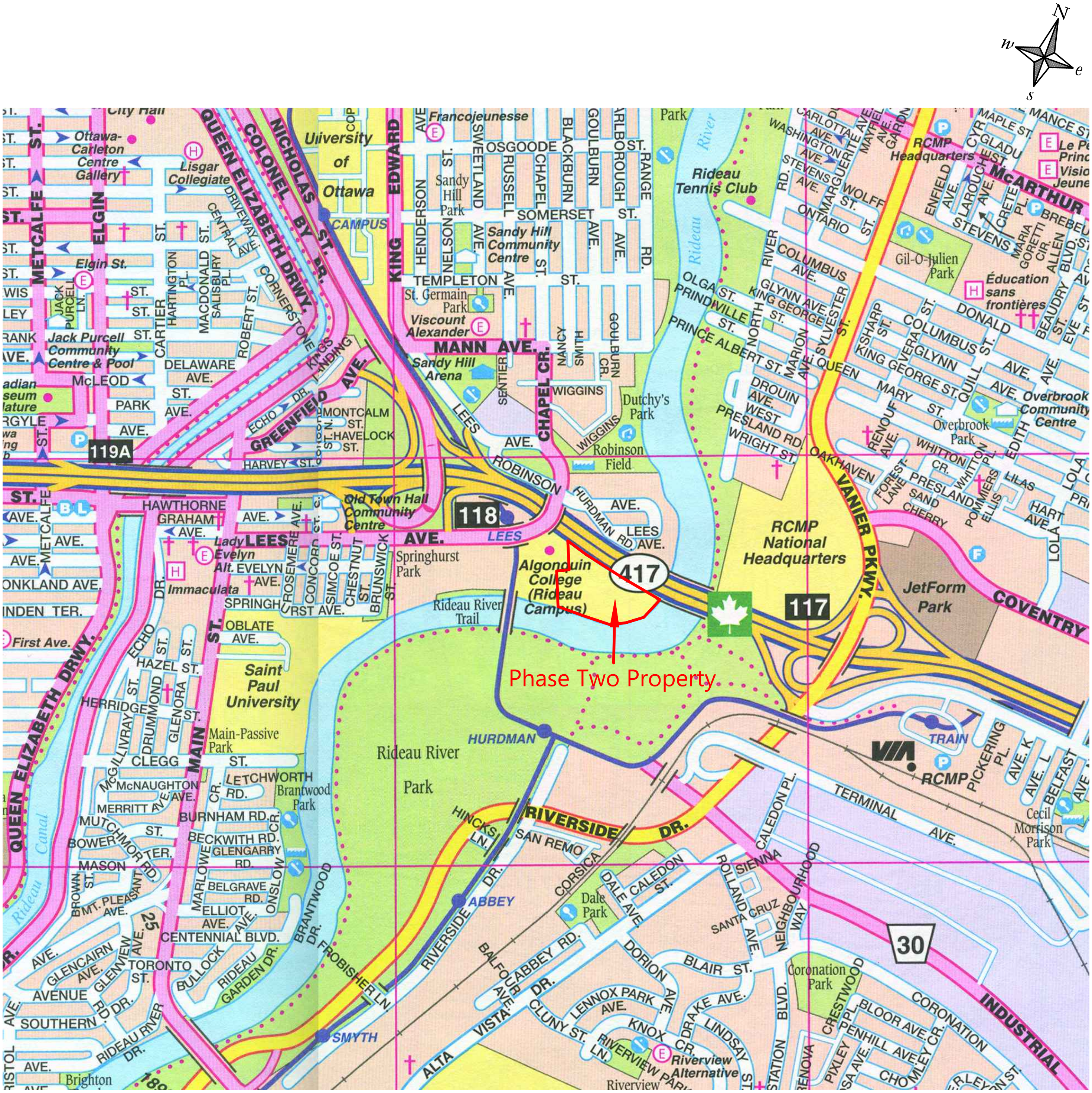
APPENDIX A

Figures



Title: Site Location

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project: Phase Two ESA
Eastern Portion of
200 Lees Avenue, Ottawa

Date: September 2011

Client: University of Ottawa

Scale 1:17000

500 400 300 200 100 0 250 500
metres

Figure 1

Reference:
"Ottawa-Gatineay StreetFinder", Rand McNally Canada Inc., 2003

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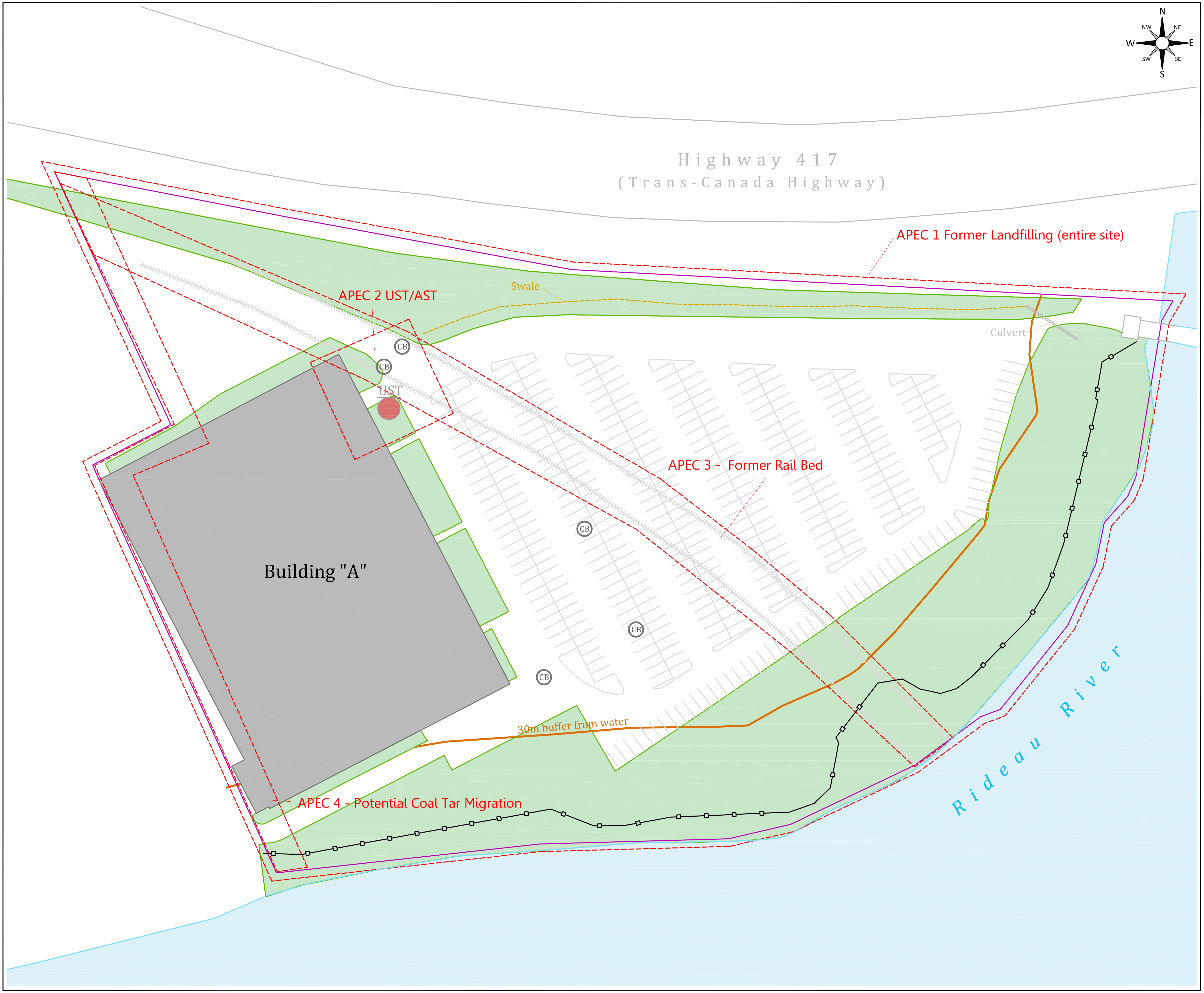

Legend

- Site Boundary
- Building
- Area of Potential Environmental Concern (APEC)
- Former Rail Alignment
- Fence
- Boundary between application of MOE Table 3 Standards vs. MOE Table 9 Standards
- CB Catch basin
- UST Approximate Location of Underground Storage Tank

Title: Site Features

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Project: Phase Two ESA
Eastern Portion of
200 Lees Avenue, Ottawa

Date: September 2011

Client: University of Ottawa

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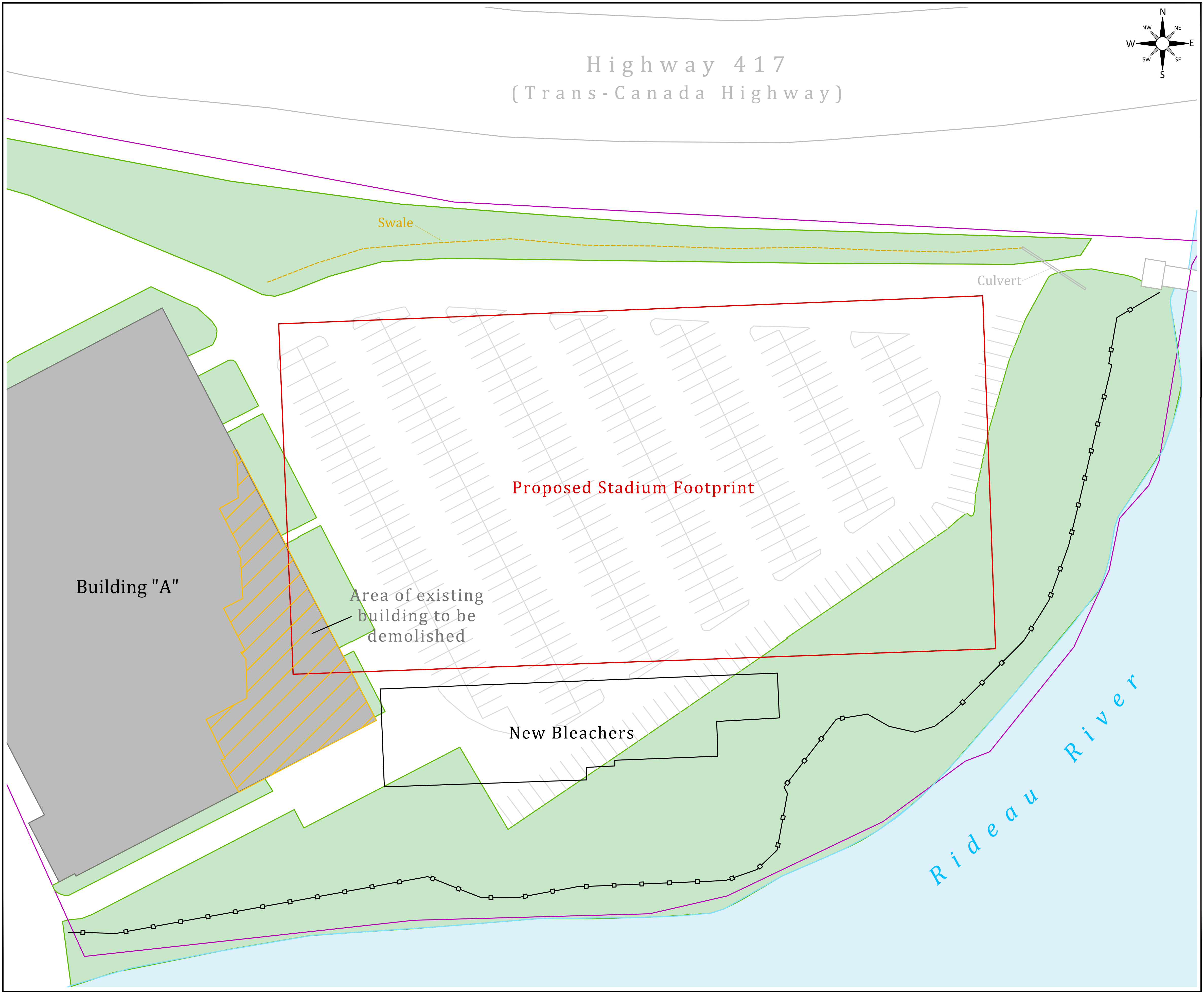

Title:
Proposed Building Construction

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Project:
Phase Two ESA
Eastern Portion of
200 Lees Avenue, Ottawa

Date:
September 2011

Client:
University of Ottawa

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Figure 3

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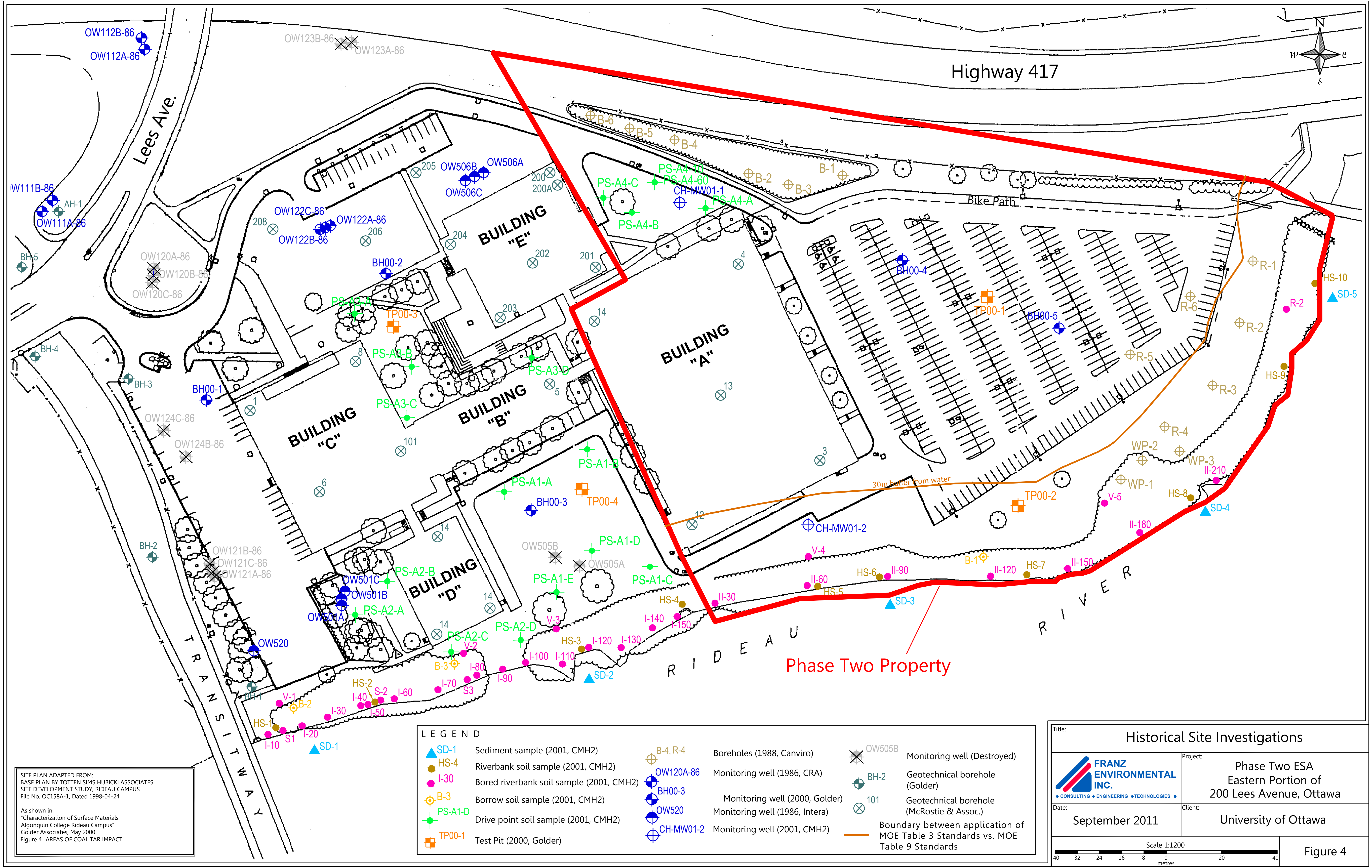

SITE PLAN ADAPTED FROM:
BASE PLAN BY TOTTEN SIMS HUBICKI ASSOCIATES
SITE DEVELOPMENT STUDY, RIDEAU CAMPUS
File No. OC158A-1, Dated 1998-04-24

As shown in:
"Characterization of Surface Materials
Algonquin College Rideau Campus"
Golder Associates, May 2000
Figure 4 "AREAS OF COAL TAR IMPACT"

LEGEND

▲ SD-1	Sediment sample (2001, CMH2)
● HS-4	Riverbank soil sample (2001, CMH2)
● I-30	Bored riverbank soil sample (2001, CMH2)
B-3	Borrow soil sample (2001, CMH2)
PS-A1-D	Drive point soil sample (2001, CMH2)
TP00-1	Test Pit (2000, Golder)
B-4, R-4	Boreholes (1988, Canviro)
OW120A-86	Monitoring well (1986, CRA)
BH00-3	Monitoring well (2000, Golder)
OW520	Monitoring well (1986, Intera)
CH-MW01-2	Monitoring well (2001, CMH2)
OW505B	Monitoring well (Destroyed)
BH-2	Geotechnical borehole (Golder)
⊗ 101	Geotechnical borehole (McRostie & Assoc.)
—	Boundary between application of MOE Table 3 Standards vs. MOE Table 9 Standards

Title:
Historical Site Investigations

FRANZ ENVIRONMENTAL INC.
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Project:
Phase Two ESA
Eastern Portion of
200 Lees Avenue, Ottawa

Date:
September 2011

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Scale 1:1200
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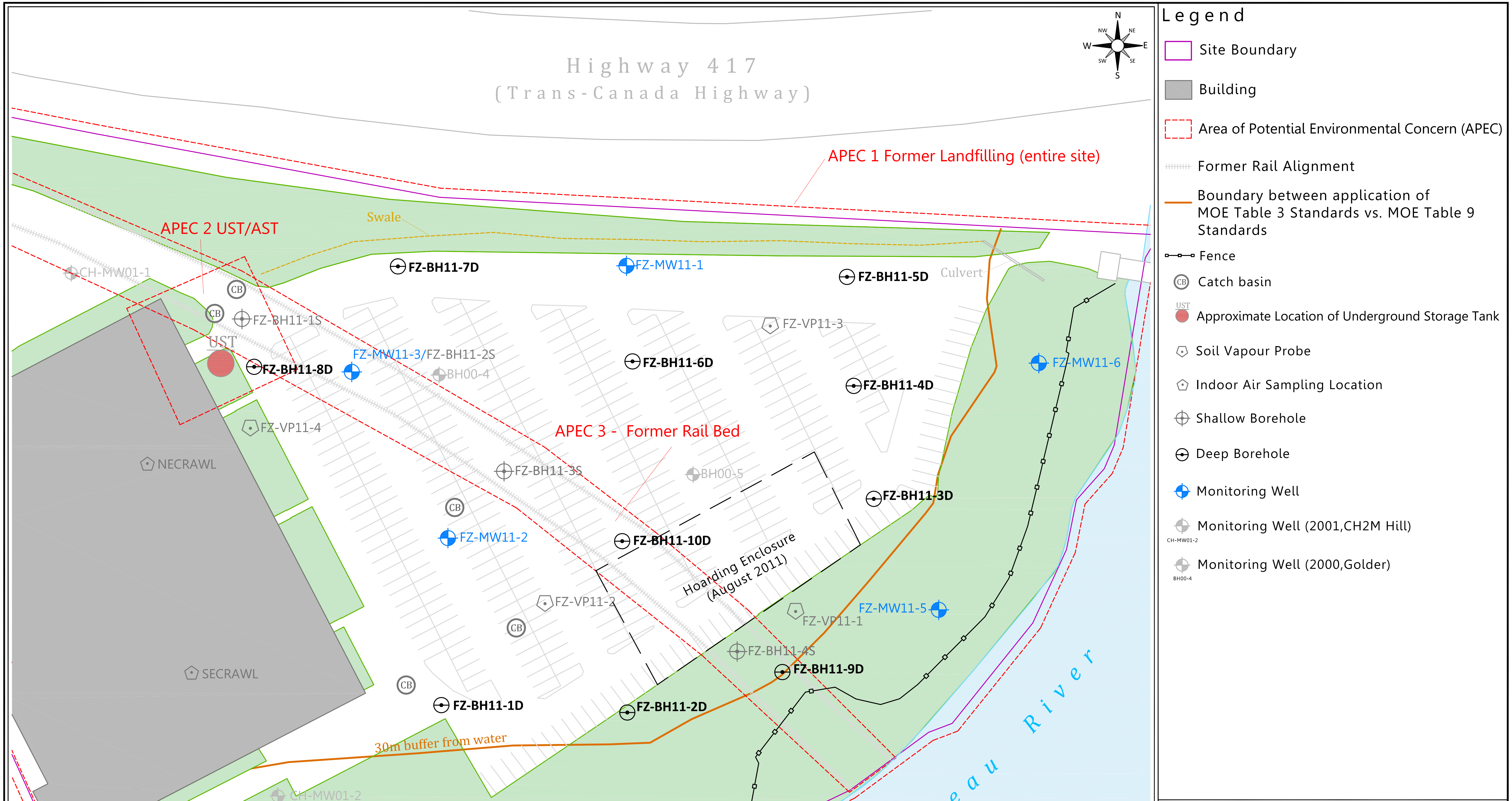

Title:
Phase Two Site Instrumentation

FRANZ ENVIRONMENTAL INC.
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Project:
Phase Two ESA
Eastern Portion of
200 Lees Avenue, Ottawa

Date:
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Figure 5

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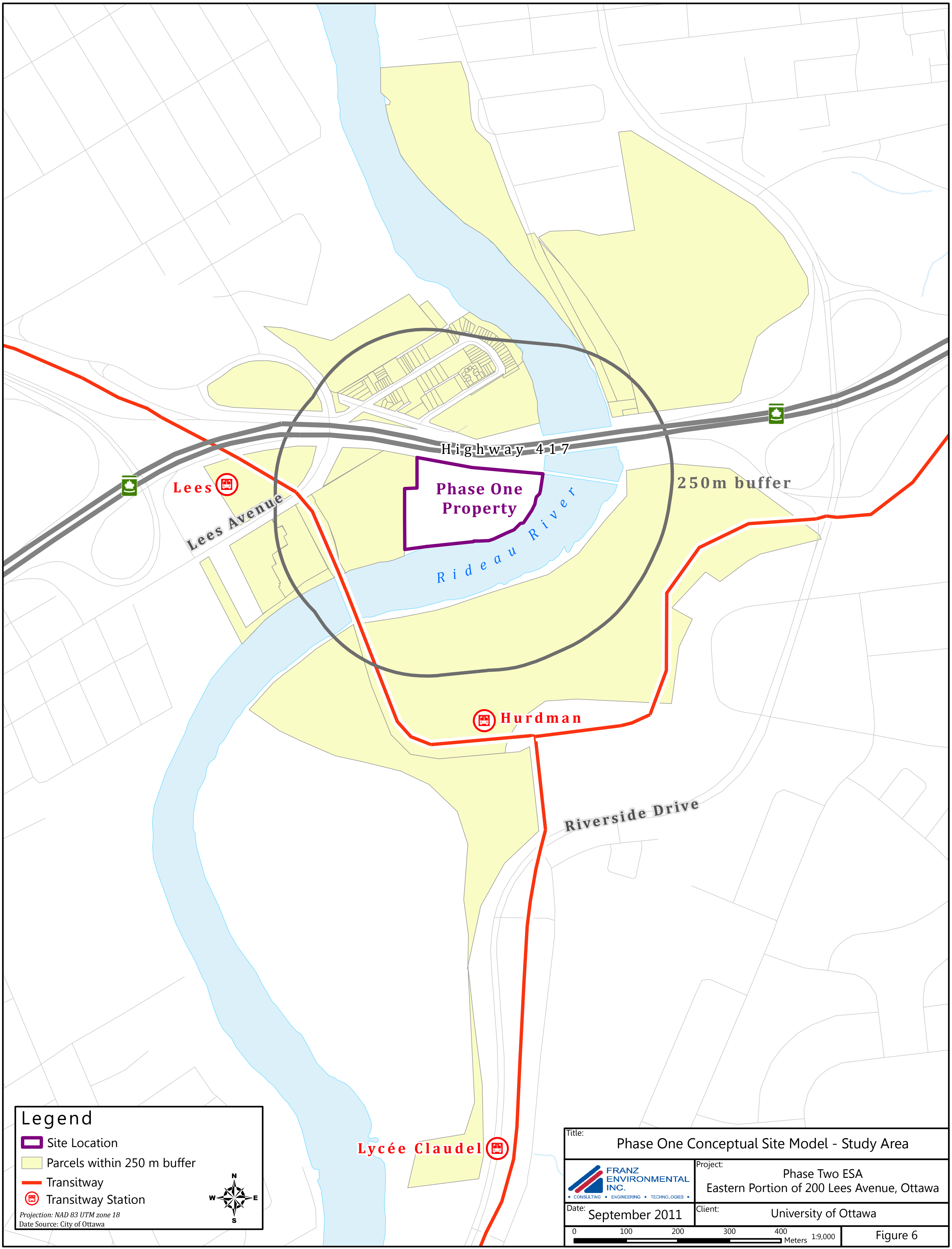

Projection: NAD 83 UTM zone 18
Date Source: City of Ottawa

Title:
Phase One Conceptual Site Model - Study Area

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Project:
Phase Two ESA
Eastern Portion of 200 Lees Avenue, Ottawa

Date: September 2011

Client: University of Ottawa

Figure 6

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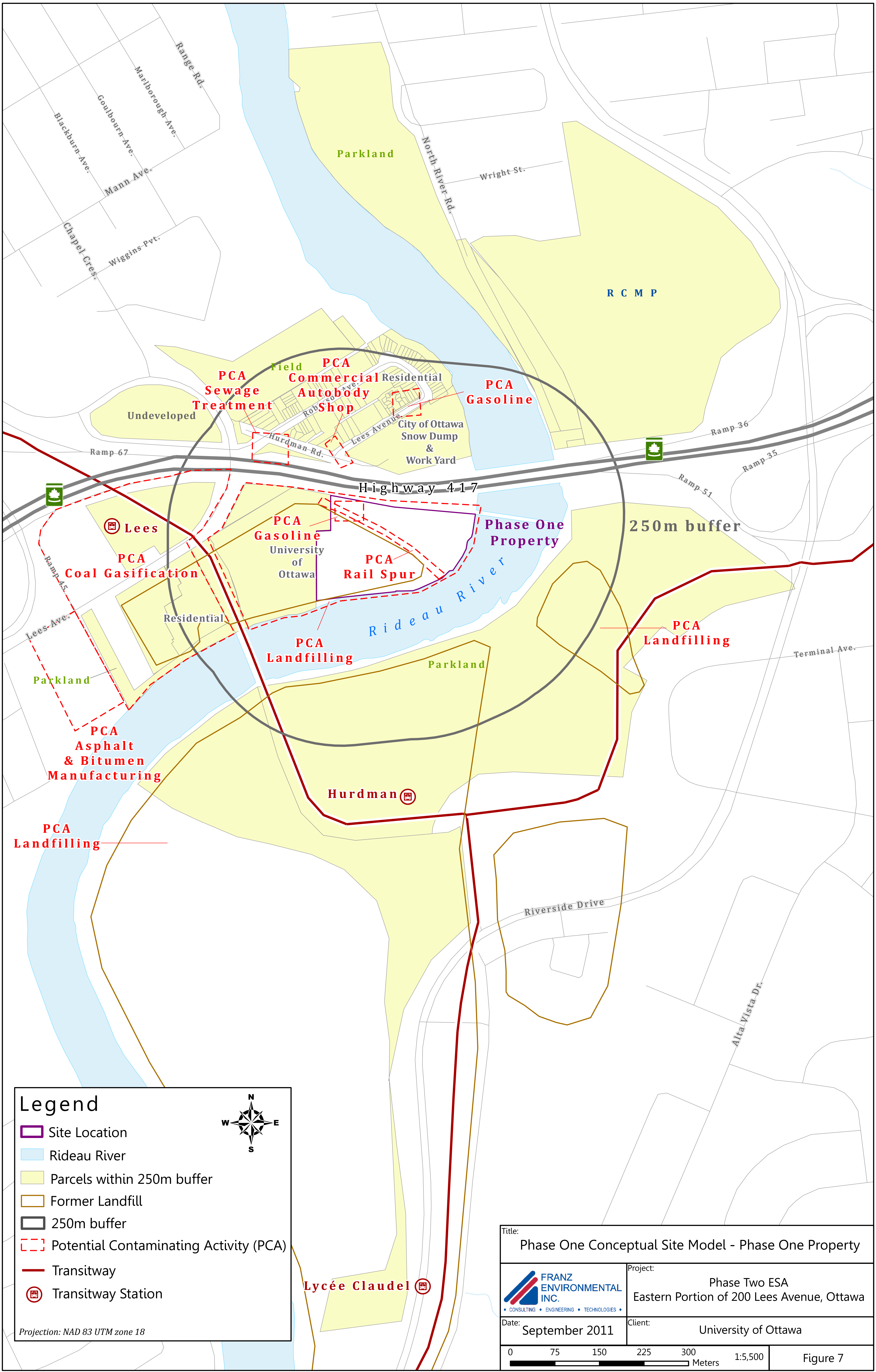

Title:
Phase One Conceptual Site Model - Phase One Property

FRANZ ENVIRONMENTAL INC.
◆ CONSULTING ◆ ENGINEERING ◆ TECHNOLOGIES ◆

Project:
Phase Two ESA
Eastern Portion of 200 Lees Avenue, Ottawa

Date: September 2011

Client: University of Ottawa

Figure 7

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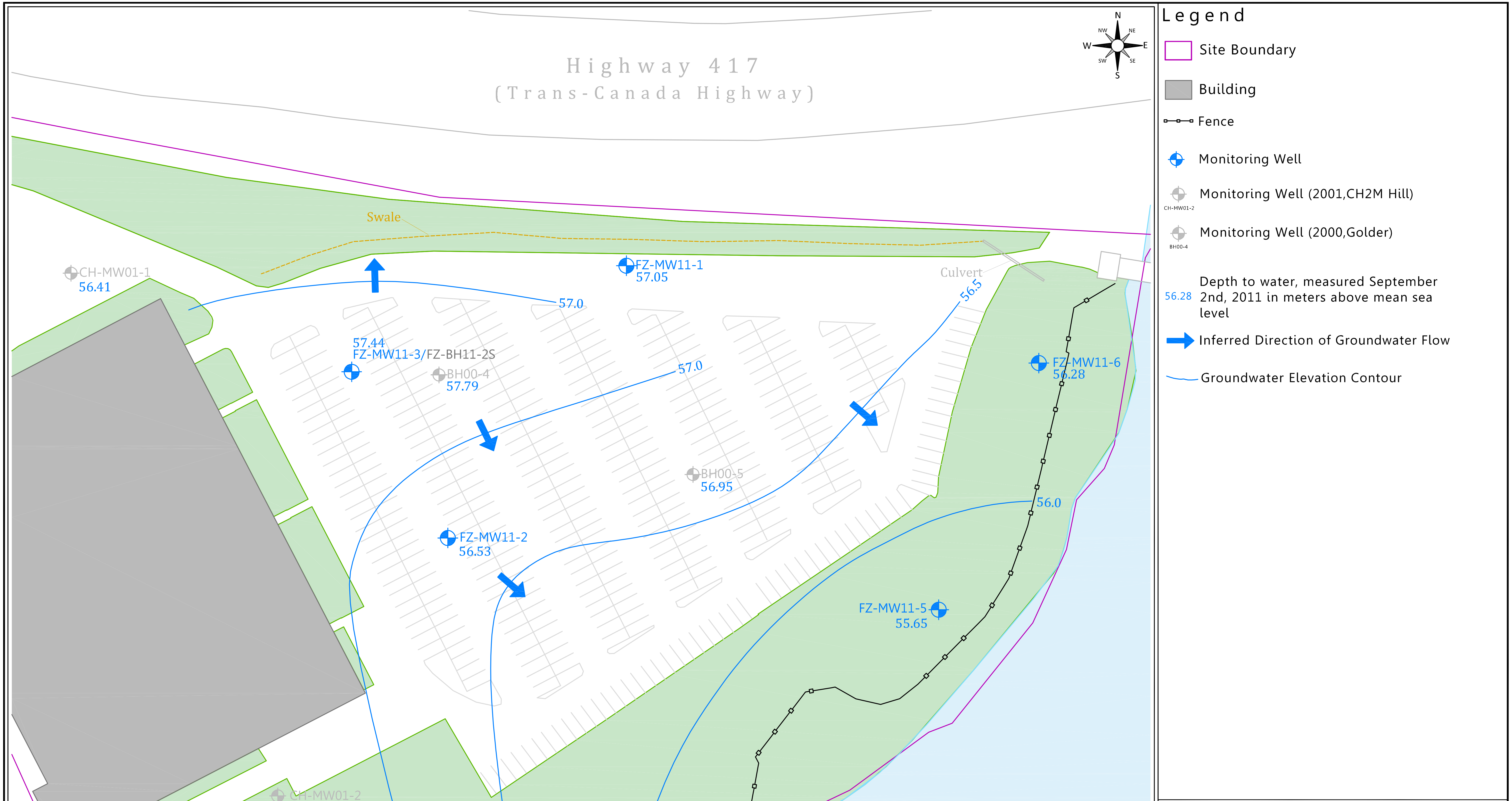

Title:
Groundwater Elevations and Contours - September 2011

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Project:
Phase Two ESA
Eastern Portion of
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Date:
September 2011

Client:
University of Ottawa

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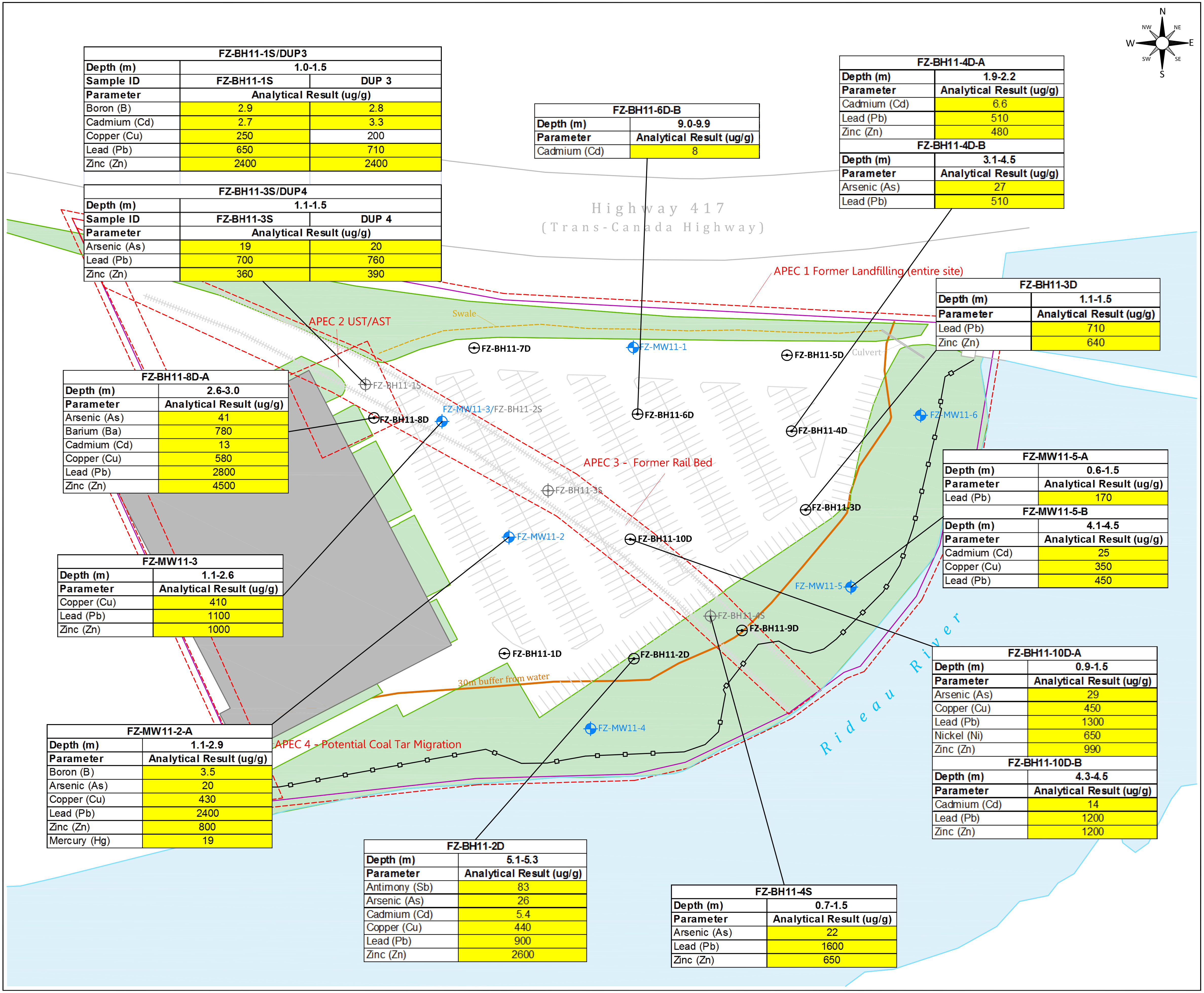


FZ-BH11-1S/DUP3		
Depth (m)	**1.0-1.5**	
Sample ID	**FZ-BH11-1S**	**DUP 3**
Parameter	**Analytical Result (ug/g)**	
Boron (B)	2.9	2.8
Cadmium (Cd)	2.7	3.3
Copper (Cu)	250	200
Lead (Pb)	650	710
Zinc (Zn)	2400	2400

FZ-BH11-3S/DUP4		
Depth (m)	**1.1-1.5**	
Sample ID	**FZ-BH11-3S**	**DUP 4**
Parameter	**Analytical Result (ug/g)**	
Arsenic (As)	19	20
Lead (Pb)	700	760
Zinc (Zn)	360	390

FZ-BH11-6D-B	
Depth (m)	**9.0-9.9**
Parameter	**Analytical Result (ug/g)**
Cadmium (Cd)	8

FZ-BH11-4D-A	
Depth (m)	**1.9-2.2**
Parameter	**Analytical Result (ug/g)**
Cadmium (Cd)	6.6
Lead (Pb)	510
Zinc (Zn)	480
FZ-BH11-4D-B	
Depth (m)	**3.1-4.5**
Parameter	**Analytical Result (ug/g)**
Arsenic (As)	27
Lead (Pb)	510

FZ-BH11-3D	
Depth (m)	**1.1-1.5**
Parameter	**Analytical Result (ug/g)**
Lead (Pb)	710
Zinc (Zn)	640

FZ-BH11-8D-A	
Depth (m)	**2.6-3.0**
Parameter	**Analytical Result (ug/g)**
Arsenic (As)	41
Barium (Ba)	780
Cadmium (Cd)	13
Copper (Cu)	580
Lead (Pb)	2800
Zinc (Zn)	4500

FZ-MW11-5-A	
Depth (m)	**0.6-1.5**
Parameter	**Analytical Result (ug/g)**
Lead (Pb)	170
FZ-MW11-5-B	
Depth (m)	**4.1-4.5**
Parameter	**Analytical Result (ug/g)**
Cadmium (Cd)	25
Copper (Cu)	350
Lead (Pb)	450

FZ-MW11-3	
Depth (m)	**1.1-2.6**
Parameter	**Analytical Result (ug/g)**
Copper (Cu)	410
Lead (Pb)	1100
Zinc (Zn)	1000

FZ-BH11-10D-A	
Depth (m)	**0.9-1.5**
Parameter	**Analytical Result (ug/g)**
Arsenic (As)	29
Copper (Cu)	450
Lead (Pb)	1300
Nickel (Ni)	650
Zinc (Zn)	990
FZ-BH11-10D-B	
Depth (m)	**4.3-4.5**
Parameter	**Analytical Result (ug/g)**
Cadmium (Cd)	14
Lead (Pb)	1200
Zinc (Zn)	1200

FZ-MW11-2-A	
Depth (m)	**1.1-2.9**
Parameter	**Analytical Result (ug/g)**
Boron (B)	3.5
Arsenic (As)	20
Copper (Cu)	430
Lead (Pb)	2400
Zinc (Zn)	800
Mercury (Hg)	19

FZ-BH11-2D	
Depth (m)	**5.1-5.3**
Parameter	**Analytical Result (ug/g)**
Antimony (Sb)	83
Arsenic (As)	26
Cadmium (Cd)	5.4
Copper (Cu)	440
Lead (Pb)	900
Zinc (Zn)	2600

FZ-BH11-4S	
Depth (m)	**0.7-1.5**
Parameter	**Analytical Result (ug/g)**
Arsenic (As)	22
Lead (Pb)	1600
Zinc (Zn)	650

Legend

☐ Site Boundary

▨ Building

☐ Area of Potential Environmental Concern (APEC)

Fence

Former Rail Alignment

Boundary between application of MOE Table 3 Standards vs. MOE Table 9 Standards

⊕ Shallow Borehole

⊖ Deep Borehole

⊕ Monitoring Well

Applicable Standards (O.Reg. 153/04)

Parameter	Table 3
	ug/g
Antimony (Sb)	40
Arsenic (As)	18
Barium (Ba)	670
Boron (B)	2
Cadmium (Cd)	1.9
Copper (Cu)	230
Lead (Pb)	120
Mercury (Hg)	3.9
Molybdenum (Mo)	40
Nickel (Ni)	270
Selenium (Se)	5.5
Zinc (Zn)	340

Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Coarse Soil, Community Land Use

🟨 Exceedances above Table 3 Standards

Title:
Soil Exceeding Table 3 SCSs - Metals

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:
Phase Two ESA
Eastern Portion of
200 Lees Avenue, Ottawa

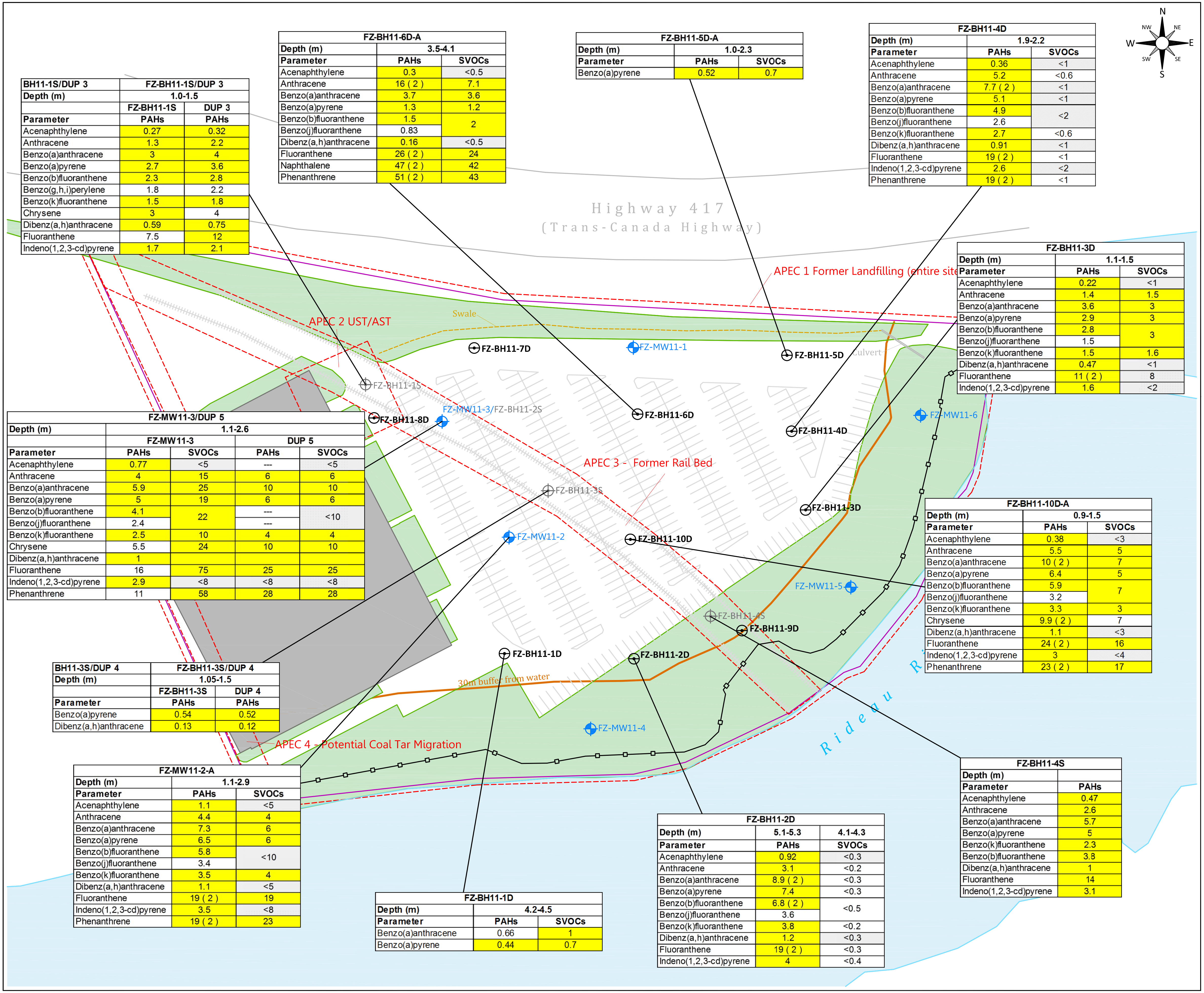
Date:
September 2011

Client:
University of Ottawa

Scale 1:1200
40 32 24 16 8 0 20 40
metres

Figure 9

Z:\Projects\2011\1329-1102 University of Ottawa 200 Lees Phase II ESA\Reporting\Figures\CAD\13291101_draft.dwg(layout)



BH11-1S/DUP 3	FZ-BH11-1S/DUP 3	
Depth (m)	1.0-1.5	
	FZ-BH11-1S	DUP 3
Parameter	PAHs	PAHs
Acenaphthylene	0.27	0.32
Anthracene	1.3	2.2
Benzo(a)anthracene	3	4
Benzo(a)pyrene	2.7	3.6
Benzo(b)fluoranthene	2.3	2.8
Benzo(g,h,i)perylene	1.8	2.2
Benzo(k)fluoranthene	1.5	1.8
Chrysene	3	4
Dibenz(a,h)anthracene	0.59	0.75
Fluoranthene	7.5	12
Indeno(1,2,3-cd)pyrene	1.7	2.1

FZ-BH11-6D-A		
Depth (m)	3.5-4.1	
Parameter	PAHs	SVOCs
Acenaphthylene	0.3	<0.5
Anthracene	16 (2)	7.1
Benzo(a)anthracene	3.7	3.6
Benzo(a)pyrene	1.3	1.2
Benzo(b)fluoranthene	1.5	2
Benzo(j)fluoranthene	0.83	
Dibenz(a,h)anthracene	0.16	<0.5
Fluoranthene	26 (2)	24
Naphthalene	47 (2)	42
Phenanthrene	51 (2)	43

FZ-BH11-5D-A		
Depth (m)	1.0-2.3	
Parameter	PAHs	SVOCs
Benzo(a)pyrene	0.52	0.7

FZ-BH11-4D		
Depth (m)	1.9-2.2	
Parameter	PAHs	SVOCs
Acenaphthylene	0.36	<1
Anthracene	5.2	<0.6
Benzo(a)anthracene	7.7 (2)	<1
Benzo(a)pyrene	5.1	<1
Benzo(b)fluoranthene	4.9	<2
Benzo(j)fluoranthene	2.6	
Benzo(k)fluoranthene	2.7	<0.6
Dibenz(a,h)anthracene	0.91	<1
Fluoranthene	19 (2)	<1
Indeno(1,2,3-cd)pyrene	2.6	<2
Phenanthrene	19 (2)	<1

FZ-BH11-3D		
Depth (m)	1.1-1.5	
Parameter	PAHs	SVOCs
Acenaphthylene	0.22	<1
Anthracene	1.4	1.5
Benzo(a)anthracene	3.6	3
Benzo(a)pyrene	2.9	3
Benzo(b)fluoranthene	2.8	3
Benzo(j)fluoranthene	1.5	
Benzo(k)fluoranthene	1.5	1.6
Dibenz(a,h)anthracene	0.47	<1
Fluoranthene	11 (2)	8
Indeno(1,2,3-cd)pyrene	1.6	<2

FZ-MW11-3/DUP 5				
Depth (m)	1.1-2.6			
	FZ-MW11-3		DUP 5	
Parameter	PAHs	SVOCs	PAHs	SVOCs
Acenaphthylene	0.77	<5	---	<5
Anthracene	4	15	6	6
Benzo(a)anthracene	5.9	25	10	10
Benzo(a)pyrene	5	19	6	6
Benzo(b)fluoranthene	4.1	22	---	<10
Benzo(j)fluoranthene	2.4		---	
Benzo(k)fluoranthene	2.5	10	4	4
Chrysene	5.5	24	10	10
Dibenz(a,h)anthracene	1			
Fluoranthene	16	75	25	25
Indeno(1,2,3-cd)pyrene	2.9	<8	<8	<8
Phenanthrene	11	58	28	28

FZ-BH11-10D-A		
Depth (m)	0.9-1.5	
Parameter	PAHs	SVOCs
Acenaphthylene	0.38	<3
Anthracene	5.5	5
Benzo(a)anthracene	10 (2)	7
Benzo(a)pyrene	6.4	5
Benzo(b)fluoranthene	5.9	7
Benzo(j)fluoranthene	3.2	
Benzo(k)fluoranthene	3.3	3
Chrysene	9.9 (2)	7
Dibenz(a,h)anthracene	1.1	<3
Fluoranthene	24 (2)	16
Indeno(1,2,3-cd)pyrene	3	<4
Phenanthrene	23 (2)	17

BH11-3S/DUP 4	FZ-BH11-3S/DUP 4	
Depth (m)	1.05-1.5	
	FZ-BH11-3S	DUP 4
Parameter	PAHs	PAHs
Benzo(a)pyrene	0.54	0.52
Dibenz(a,h)anthracene	0.13	0.12

FZ-MW11-2-A		
Depth (m)	1.1-2.9	
Parameter	PAHs	SVOCs
Acenaphthylene	1.1	<5
Anthracene	4.4	4
Benzo(a)anthracene	7.3	6
Benzo(a)pyrene	6.5	6
Benzo(b)fluoranthene	5.8	<10
Benzo(j)fluoranthene	3.4	
Benzo(k)fluoranthene	3.5	4
Dibenz(a,h)anthracene	1.1	<5
Fluoranthene	19 (2)	19
Indeno(1,2,3-cd)pyrene	3.5	<8
Phenanthrene	19 (2)	23

FZ-BH11-1D		
Depth (m)	4.2-4.5	
Parameter	PAHs	SVOCs
Benzo(a)anthracene	0.66	1
Benzo(a)pyrene	0.44	0.7

FZ-BH11-2D		
Depth (m)	5.1-5.3	4.1-4.3
Parameter	PAHs	SVOCs
Acenaphthylene	0.92	<0.3
Anthracene	3.1	<0.2
Benzo(a)anthracene	8.9 (2)	<0.3
Benzo(a)pyrene	7.4	<0.3
Benzo(b)fluoranthene	6.8 (2)	<0.5
Benzo(j)fluoranthene	3.6	
Benzo(k)fluoranthene	3.8	<0.2
Dibenz(a,h)anthracene	1.2	<0.3
Fluoranthene	19 (2)	<0.3
Indeno(1,2,3-cd)pyrene	4	<0.4

FZ-BH11-4S	
Depth (m)	
Parameter	PAHs
Acenaphthylene	0.47
Anthracene	2.6
Benzo(a)anthracene	5.7
Benzo(a)pyrene	5
Benzo(k)fluoranthene	2.3
Benzo(b)fluoranthene	3.8
Dibenz(a,h)anthracene	1
Fluoranthene	14
Indeno(1,2,3-cd)pyrene	3.1

Legend

- ☐ Site Boundary
- ▨ Building
- ☐ Area of Potential Environmental Concern (APEC)
- ─□─ Fence
- ┼┼┼ Former Rail Alignment
- ─ Boundary between application of MOE Table 3 Standards vs. MOE Table 9 Standards
- ⊕ Shallow Borehole
- ⊙ Deep Borehole
- ⊕ Monitoring Well

Applicable Standards (O.Reg. 153/04)

Parameter	Table 3
	ug/g
1-Methylnaphthalene	76
2-Methylnaphthalene	76
Acenaphthene	96
Acenaphthylene	0.15
Anthracene	0.67
Benzo(a)anthracene	0.96
Benzo(a)pyrene	0.3
Benzo(b)fluoranthene	0.96
Benzo(j)fluoranthene	
Benzo(g,h,i)perylene	9.6
Benzo(k)fluoranthene	0.96
Chrysene	9.6
Dibenz(a,h)anthracene	0.1
Fluoranthene	9.6
Fluorene	62
Indeno(1,2,3-cd)pyrene	0.76
Naphthalene	9.6
Phenanthrene	12
Pyrene	96

Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Coarse Soil, Community Land Use

🟨 Exceedances above Table 3 Standards

▨ Denotes a detection limit above the Ontario 511/09 Standards Rationale Document.

(2)Detection Limit was raised due to matrix interferences.

Title:
Soil Exceeding Table 3 SCSs - PAHs and SVOCs

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:
Phase Two ESA
Eastern Portion of
200 Lees Avenue, Ottawa

Date:
September 2011

Client:
University of Ottawa

Scale 1:1200
40 32 24 16 8 0 20 40
metres

Figure 10

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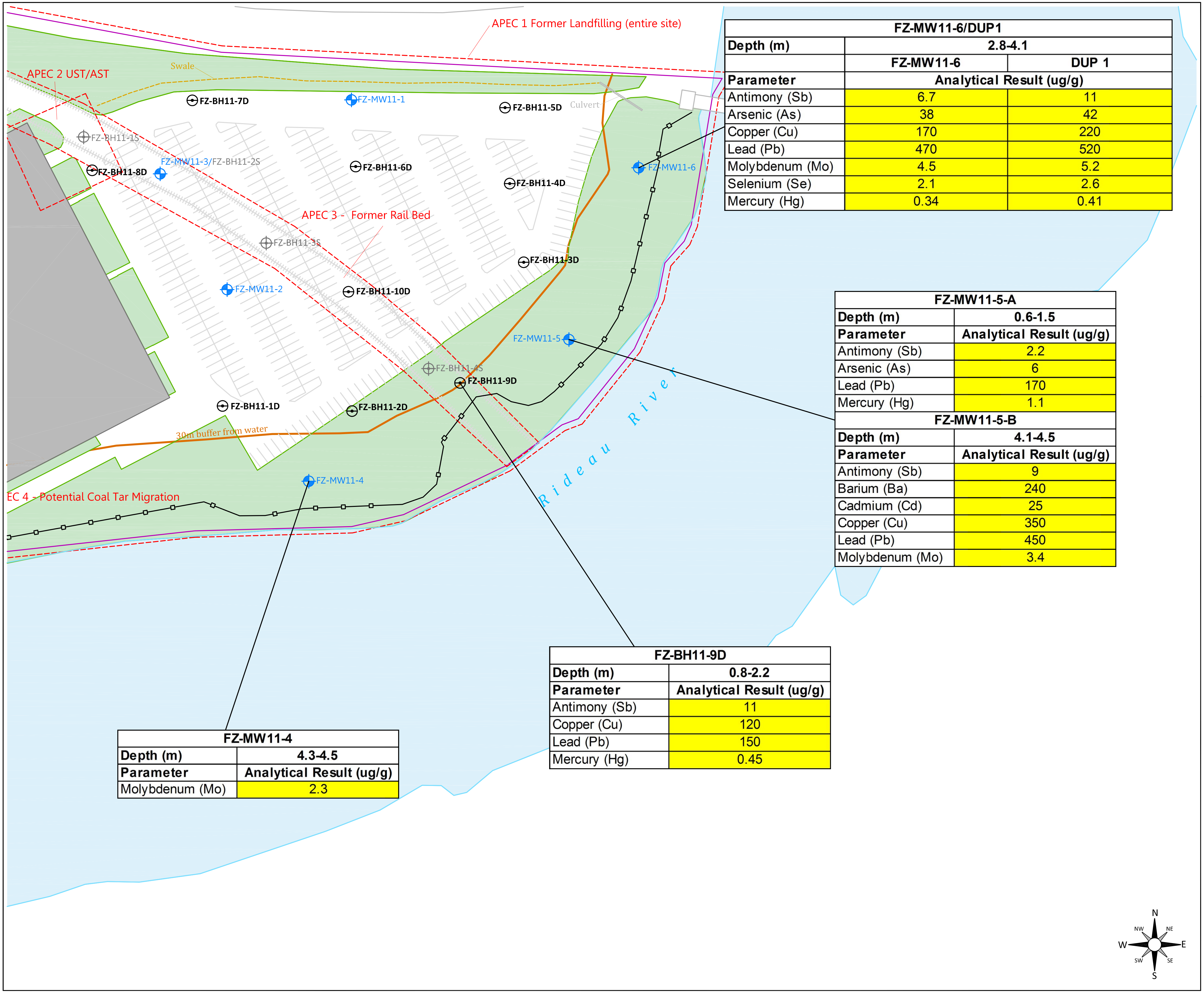


FZ-MW11-6/DUP1		
Depth (m)	2.8-4.1	
	FZ-MW11-6	DUP 1
Parameter	Analytical Result (ug/g)	
Antimony (Sb)	6.7	11
Arsenic (As)	38	42
Copper (Cu)	170	220
Lead (Pb)	470	520
Molybdenum (Mo)	4.5	5.2
Selenium (Se)	2.1	2.6
Mercury (Hg)	0.34	0.41

FZ-MW11-5-A	
Depth (m)	0.6-1.5
Parameter	Analytical Result (ug/g)
Antimony (Sb)	2.2
Arsenic (As)	6
Lead (Pb)	170
Mercury (Hg)	1.1
FZ-MW11-5-B	
Depth (m)	4.1-4.5
Parameter	Analytical Result (ug/g)
Antimony (Sb)	9
Barium (Ba)	240
Cadmium (Cd)	25
Copper (Cu)	350
Lead (Pb)	450
Molybdenum (Mo)	3.4

FZ-BH11-9D	
Depth (m)	0.8-2.2
Parameter	Analytical Result (ug/g)
Antimony (Sb)	11
Copper (Cu)	120
Lead (Pb)	150
Mercury (Hg)	0.45

FZ-MW11-4	
Depth (m)	4.3-4.5
Parameter	Analytical Result (ug/g)
Molybdenum (Mo)	2.3

Legend

Site Boundary

Building

Area of Potential Environmental Concern (APEC)

Fence

Former Rail Alignment

Boundary between application of MOE Table 3 Standards vs. MOE Table 9 Standards

Shallow Borehole

Deep Borehole

Monitoring Well

Applicable Standards (O.Reg. 153/04)

Parameter	Table 9
	ug/g
Antimony (Sb)	1.3
Arsenic (As)	18
Barium (Ba)	220
Cadmium (Cd)	1.2
Copper (Cu)	92
Lead (Pb)	120
Mercury (Hg)	0.27
Molybdenum (Mo)	2

Table 9: Generic Site Condition Standards for Use within 30 m
of a Water Body in a Non-Potable Ground Water
Coarse Soil, Community Land Use

🟨 Exceedances above Table 9 Standards

Title:
Soil Exceeding Table 9 SCSs - Metals

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:
Phase Two ESA
Eastern Portion of
200 Lees Avenue, Ottawa

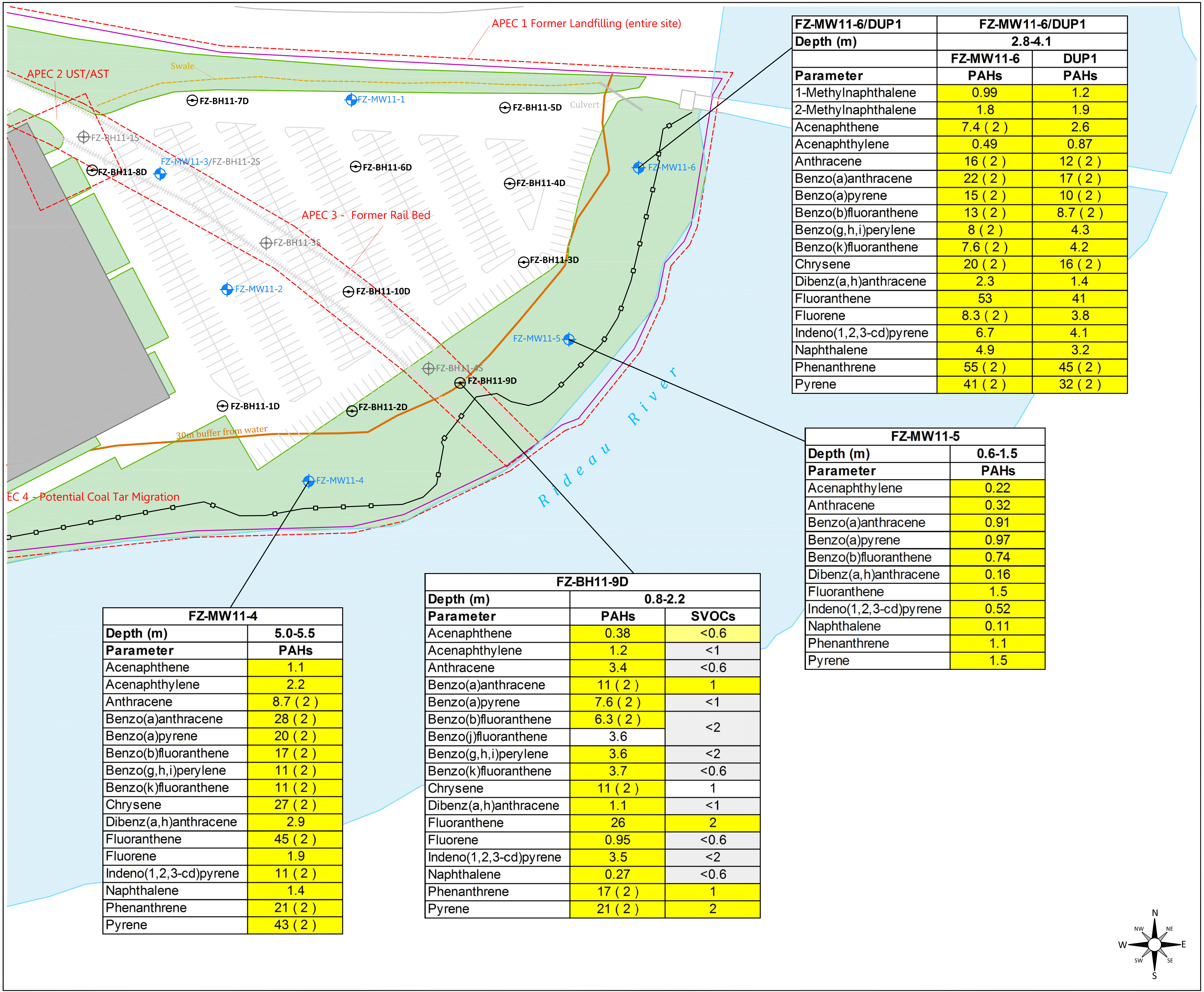
Date:
September 2011

Client:
University of Ottawa

Scale 1:1200
40 32 24 16 8 0 20 40
metres

Figure 11

Y:\Projects\2011\1329-1102 University of Ottawa 200 Lees Phase II ESA\Reporting\Figures\CAD\13291101_draft.dwg(layout)



FZ-MW11-6/DUP1	FZ-MW11-6/DUP1	
Depth (m)	**2.8-4.1**	
	FZ-MW11-6	**DUP1**
Parameter	**PAHs**	**PAHs**
1-Methylnaphthalene	0.99	1.2
2-Methylnaphthalene	1.8	1.9
Acenaphthene	7.4 (2)	2.6
Acenaphthylene	0.49	0.87
Anthracene	16 (2)	12 (2)
Benzo(a)anthracene	22 (2)	17 (2)
Benzo(a)pyrene	15 (2)	10 (2)
Benzo(b)fluoranthene	13 (2)	8.7 (2)
Benzo(g,h,i)perylene	8 (2)	4.3
Benzo(k)fluoranthene	7.6 (2)	4.2
Chrysene	20 (2)	16 (2)
Dibenz(a,h)anthracene	2.3	1.4
Fluoranthene	53	41
Fluorene	8.3 (2)	3.8
Indeno(1,2,3-cd)pyrene	6.7	4.1
Naphthalene	4.9	3.2
Phenanthrene	55 (2)	45 (2)
Pyrene	41 (2)	32 (2)

FZ-MW11-5	
Depth (m)	**0.6-1.5**
Parameter	**PAHs**
Acenaphthylene	0.22
Anthracene	0.32
Benzo(a)anthracene	0.91
Benzo(a)pyrene	0.97
Benzo(b)fluoranthene	0.74
Dibenz(a,h)anthracene	0.16
Fluoranthene	1.5
Indeno(1,2,3-cd)pyrene	0.52
Naphthalene	0.11
Phenanthrene	1.1
Pyrene	1.5

FZ-MW11-4	
Depth (m)	**5.0-5.5**
Parameter	**PAHs**
Acenaphthene	1.1
Acenaphthylene	2.2
Anthracene	8.7 (2)
Benzo(a)anthracene	28 (2)
Benzo(a)pyrene	20 (2)
Benzo(b)fluoranthene	17 (2)
Benzo(g,h,i)perylene	11 (2)
Benzo(k)fluoranthene	11 (2)
Chrysene	27 (2)
Dibenz(a,h)anthracene	2.9
Fluoranthene	45 (2)
Fluorene	1.9
Indeno(1,2,3-cd)pyrene	11 (2)
Naphthalene	1.4
Phenanthrene	21 (2)
Pyrene	43 (2)

FZ-BH11-9D		
Depth (m)	**0.8-2.2**	
Parameter	**PAHs**	**SVOCs**
Acenaphthene	0.38	<0.6
Acenaphthylene	1.2	<1
Anthracene	3.4	<0.6
Benzo(a)anthracene	11 (2)	1
Benzo(a)pyrene	7.6 (2)	<1
Benzo(b)fluoranthene	6.3 (2)	<2
Benzo(j)fluoranthene	3.6	
Benzo(g,h,i)perylene	3.6	<2
Benzo(k)fluoranthene	3.7	<0.6
Chrysene	11 (2)	1
Dibenz(a,h)anthracene	1.1	<1
Fluoranthene	26	2
Fluorene	0.95	<0.6
Indeno(1,2,3-cd)pyrene	3.5	<2
Naphthalene	0.27	<0.6
Phenanthrene	17 (2)	1
Pyrene	21 (2)	2

Legend

☐ Site Boundary

▨ Building

☐ Area of Potential Environmental Concern (APEC)

Fence

Former Rail Alignment

Boundary between application of MOE Table 3 Standards vs. MOE Table 9 Standards

⊕ Shallow Borehole

⊖ Deep Borehole

⊕ Monitoring Well

Applicable Standards (O.Reg. 153/04)

Parameter	Table 9
	ug/g
1-Methylnaphthalene	0.59
2-Methylnaphthalene	0.59
Acenaphthene	0.072
Acenaphthylene	0.093
Anthracene	0.22
Benzo(a)anthracene	0.36
Benzo(a)pyrene	0.3
Benzo(b)fluoranthene	0.47
Benzo(j)fluoranthene	---
Benzo(g,h,i)perylene	0.68
Benzo(k)fluoranthene	0.48
Chrysene	2.8
Dibenz(a,h)anthracene	0.1
Fluoranthene	0.69
Fluorene	0.19
Indeno(1,2,3-cd)pyrene	0.23
Naphthalene	0.69
Phenanthrene	---
Pyrene	1

Table 9: Generic Site Condition Standards for Use within 30 m
of a Water Body in a Non-Potable Ground Water
Coarse Soil, Community Land Use

🟨 Exceedances above Table 9 Standards

▨ Denotes a detection limit above the Ontario 511/09 Standards Rationale Document.

(2)Detection Limit was raised due to matrix interferences.

Title:

Soil Exceeding Table 9 SCSs - PAHs and SVOCs

FRANZ
ENVIRONMENTAL
INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:
Phase Two ESA
Eastern Portion of
200 Lees Avenue, Ottawa

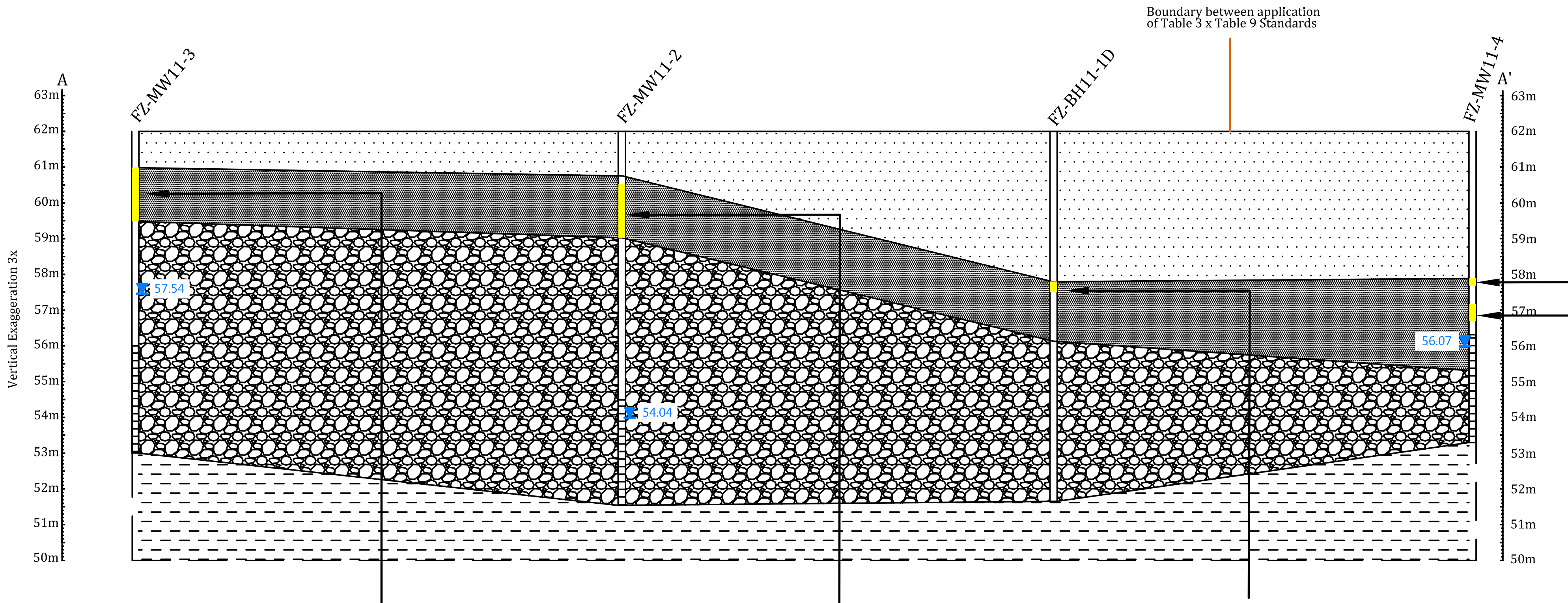
Date:
September 2011

Client:
University of Ottawa

Scale 1:1200
40 32 24 16 8 0 20 40
metres

Figure 12

Z:\Projects\2011\1329-1102 University of Ottawa 200 Lees Phase II ESA\Reporting\Figures\CAD\13291101_draft.dwg(layout)



FZ-MW11-4	
Depth (m)	**4.3-4.5**
Parameter	**Analytical Result (ug/g)**
Molybdenum (Mo)	2.3

FZ-MW11-2-A	
Depth (m)	**1.1-2.9**
Parameter	**Analytical Result (ug/g)**
Boron (B)	3.5
Arsenic (As)	20
Copper (Cu)	430
Lead (Pb)	2400
Zinc (Zn)	800
Mercury (Hg)	19

FZ-MW11-3	
Depth (m)	**1.1-2.6**
Parameter	**Analytical Result (ug/g)**
Copper (Cu)	410
Lead (Pb)	1100
Zinc (Zn)	1000

Applicable Standards (O.Reg. 153/04)

Parameter	Table 3
	ug/g
1-Methylnaphthalene	76
2-Methylnaphthalene	76
Acenaphthene	96
Acenaphthylene	0.15
Anthracene	0.67
Benzo(a)anthracene	0.96
Benzo(a)pyrene	0.3
Benzo(b)fluoranthene	0.96
Benzo(j)fluoranthene	
Benzo(g,h,i)perylene	9.6
Benzo(k)fluoranthene	0.96
Chrysene	9.6
Dibenz(a,h)anthracene	0.1
Fluoranthene	9.6
Fluorene	62
Indeno(1,2,3-cd)pyrene	0.76
Naphthalene	9.6
Phenanthrene	12
Pyrene	96

Applicable Standards (O.Reg. 153/04)

Parameter	Table 3	Table 9
	ug/g	ug/g
Antimony (Sb)	40	1.3
Arsenic (As)	18	18
Barium (Ba)	670	220
Boron (B)	2	1.5
Cadmium (Cd)	1.9	1.2
Copper (Cu)	230	92
Lead (Pb)	120	120
Mercury (Hg)	3.9	0.27
Molybdenum (Mo)	40	2
Nickel (Ni)	270	82
Selenium (Se)	5.5	1.5
Zinc (Zn)	340	290

FZ-MW11-3/DUP 5				
Depth (m)	**1.1-2.6**			
	FZ-MW11-3		**DUP 5**	
Parameter	**PAHs**	**SVOCs**	**PAHs**	**SVOCs**
Acenaphthylene	0.77	<5	---	<5
Anthracene	4	15	6	6
Benzo(a)anthracene	5.9	25	10	10
Benzo(a)pyrene	5	19	6	6
Benzo(b)fluoranthene	4.1	22	---	<10
Benzo(j)fluoranthene	2.4		---	
Benzo(k)fluoranthene	2.5	10	4	4
Chrysene	5.5	24	10	10
Dibenz(a,h)anthracene	1			
Fluoranthene	16	75	25	25
Indeno(1,2,3-cd)pyrene	2.9	<8	<8	<8
Phenanthrene	11	58	28	28

FZ-MW11-2-A		
Depth (m)	**1.1-2.9**	
Parameter	**PAHs**	**SVOCs**
Acenaphthylene	1.1	<5
Anthracene	4.4	4
Benzo(a)anthracene	7.3	6
Benzo(a)pyrene	6.5	6
Benzo(b)fluoranthene	5.8	<10
Benzo(j)fluoranthene	3.4	
Benzo(k)fluoranthene	3.5	4
Dibenz(a,h)anthracene	1.1	<5
Fluoranthene	19 (2)	19
Indeno(1,2,3-cd)pyrene	3.5	<8
Phenanthrene	19 (2)	23

FZ-MW11-4	
Depth (m)	**5.0-5.5**
Parameter	**PAHs**
Acenaphthene	1.1
Acenaphthylene	2.2
Anthracene	8.7 (2)
Benzo(a)anthracene	28 (2)
Benzo(a)pyrene	20 (2)
Benzo(b)fluoranthene	17 (2)
Benzo(g,h,i)perylene	11 (2)
Benzo(k)fluoranthene	11 (2)
Chrysene	27 (2)
Dibenz(a,h)anthracene	2.9
Fluoranthene	45 (2)
Fluorene	1.9
Indeno(1,2,3-cd)pyrene	11 (2)
Naphthalene	1.4
Phenanthrene	21 (2)
Pyrene	43 (2)

Legend

- ⬚ Sand and Gravel FILL
- ⬚ Cinder and Ash FILL
- ▨ GLACIAL TILL
- ⬚ SHALE BEDROCK
- ▼ GW Elevation (m) — Groundwater Elevation (Franz, August 2011)
- ▯ Monitoring Well Screen
- 50 — Concentration exceeds standards
- ▨ Denotes a detection limit above 511/09 Standards Rationale Document
- 0919-5 ▯ Sample collected at this depth above applicable standards.

Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Coarse Soil, Community Land Use

Table 9: Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Ground Water Coarse Soil, Community Land Use

(2)Detection Limit was raised due to matrix interferences.

Title:
Phase Two Conceptual Site Model - A-A' Cross Section

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:
Phase II ESA
Eastern Portion of 200
Lees Avenue, Ottawa

Date:
September 2011

Client:
University of Ottawa

Not to Scale

Figure 13

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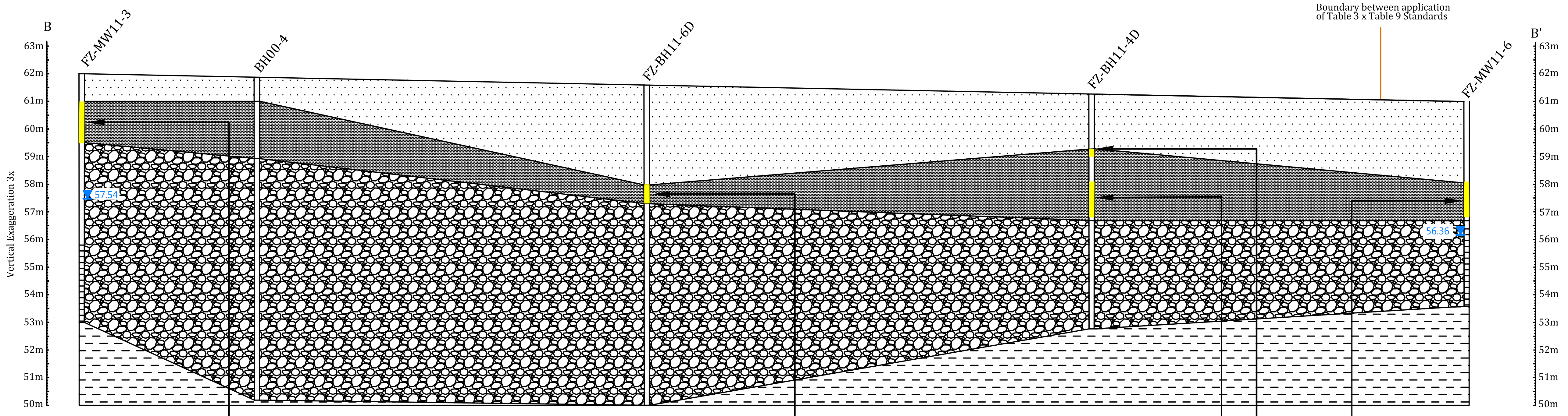


Applicable Standards (O.Reg. 153/04)

Parameter	Table 3
	ug/g
1-Methylnaphthalene	76
2-Methylnaphthalene	76
Acenaphthene	96
Acenaphthylene	0.15
Anthracene	0.67
Benzo(a)anthracene	0.96
Benzo(a)pyrene	0.3
Benzo(b)fluoranthene	0.96
Benzo(j)fluoranthene	
Benzo(g,h,i)perylene	9.6
Benzo(k)fluoranthene	0.96
Chrysene	9.6
Dibenz(a,h)anthracene	0.1
Fluoranthene	9.6
Fluorene	62
Indeno(1,2,3-cd)pyrene	0.76
Naphthalene	9.6
Phenanthrene	12
Pyrene	96

FZ-MW11-3	
Depth (m)	1.1-2.6
Parameter	Analytical Result (ug/g)
Copper (Cu)	410
Lead (Pb)	1100
Zinc (Zn)	1000

FZ-MW11-3/DUP 5				
Depth (m)	1.1-2.6			
	FZ-MW11-3		DUP 5	
Parameter	PAHs	SVOCs	PAHs	SVOCs
Acenaphthylene	0.77	<5	---	<5
Anthracene	4	15	6	6
Benzo(a)anthracene	5.9	25	10	10
Benzo(a)pyrene	5	19	6	6
Benzo(b)fluoranthene	4.1	22	---	<10
Benzo(j)fluoranthene	2.4		---	
Benzo(k)fluoranthene	2.5	10	4	4
Chrysene	5.5	24	10	10
Dibenz(a,h)anthracene	1			
Fluoranthene	16	75	25	25
Indeno(1,2,3-cd)pyrene	2.9	<8	<8	<8
Phenanthrene	11	58	28	28

FZ-BH11-6D-A		
Depth (m)	3.5-4.1	
Parameter	PAHs	SVOCs
Acenaphthylene	0.3	<0.5
Anthracene	16 (2)	7.1
Benzo(a)anthracene	3.7	3.6
Benzo(a)pyrene	1.3	1.2
Benzo(b)fluoranthene	1.5	2
Benzo(j)fluoranthene	0.83	
Dibenz(a,h)anthracene	0.16	<0.5
Fluoranthene	26 (2)	24
Naphthalene	47 (2)	42
Phenanthrene	51 (2)	43

FZ-BH11-4D-A	
Depth (m)	1.9-2.2
Parameter	Analytical Result (ug/g)
Cadmium (Cd)	6.6
Lead (Pb)	510
Zinc (Zn)	480
FZ-BH11-4D-B	
Depth (m)	3.1-4.5
Parameter	Analytical Result (ug/g)
Arsenic (As)	27
Lead (Pb)	510

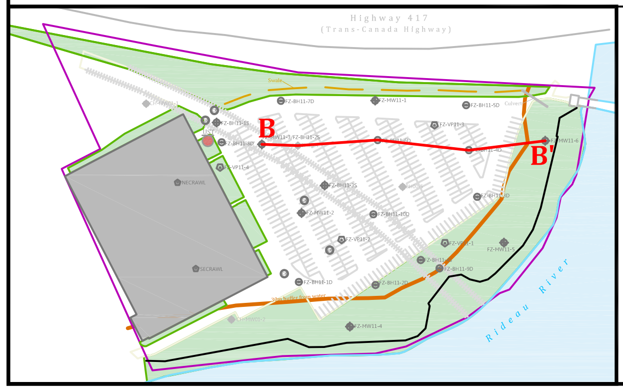
FZ-BH11-4D		
Depth (m)	1.9-2.2	
Parameter	PAHs	SVOCs
Acenaphthylene	0.36	<1
Anthracene	5.2	<0.6
Benzo(a)anthracene	7.7 (2)	<1
Benzo(a)pyrene	5.1	<1
Benzo(b)fluoranthene	4.9	<2
Benzo(j)fluoranthene	2.6	
Benzo(k)fluoranthene	2.7	<0.6
Dibenz(a,h)anthracene	0.91	<1
Fluoranthene	19 (2)	<1
Indeno(1,2,3-cd)pyrene	2.6	<2
Phenanthrene	19 (2)	<1

FZ-MW11-6/DUP1		
Depth (m)	2.8-4.1	
	FZ-MW11-6	DUP 1
Parameter	Analytical Result (ug/g)	
Antimony (Sb)	6.7	11
Arsenic (As)	38	42
Copper (Cu)	170	220
Lead (Pb)	470	520
Molybdenum (Mo)	4.5	5.2
Selenium (Se)	2.1	2.6
Mercury (Hg)	0.34	0.41

FZ-MW11-6/DUP1	Z-MW11-6/DUP1	
Depth (m)	2.8-4.1	
	FZ-MW11-6	DUP1
Parameter	PAHs	PAHs
1-Methylnaphthalene	0.99	1.2
2-Methylnaphthalene	1.8	1.9
Acenaphthene	7.4 (2)	2.6
Acenaphthylene	0.49	0.87
Anthracene	16 (2)	12 (2)
Benzo(a)anthracene	22 (2)	17 (2)
Benzo(a)pyrene	15 (2)	10 (2)
Benzo(b)fluoranthene	13 (2)	8.7 (2)
Benzo(g,h,i)perylene	8 (2)	4.3
Benzo(k)fluoranthene	7.6 (2)	4.2
Chrysene	20 (2)	16 (2)
Dibenz(a,h)anthracene	2.3	1.4
Fluoranthene	53	41
Fluorene	8.3 (2)	3.8
Indeno(1,2,3-cd)pyrene	6.7	4.1
Naphthalene	4.9	3.2
Phenanthrene	55 (2)	45 (2)
Pyrene	41 (2)	32 (2)

Applicable Standards (O.Reg. 153/04)

Parameter	Table 3	Table 9
	ug/g	ug/g
Antimony (Sb)	40	1.3
Arsenic (As)	18	18
Barium (Ba)	670	220
Boron (B)	2	1.5
Cadmium (Cd)	1.9	1.2
Copper (Cu)	230	92
Lead (Pb)	120	120
Mercury (Hg)	3.9	0.27
Molybdenum (Mo)	40	2
Nickel (Ni)	270	82
Selenium (Se)	5.5	1.5
Zinc (Zn)	340	290



Legend

Sand and Gravel FILL

Cinder and Ash FILL

GLACIAL TILL

SHALE BEDROCK

GW Elevation (m) Groundwater Elevation (Franz, August 2011)

Monitoring Well Screen

50 Concentration exceeds standards

▨ Denotes a detection limit above 511/09 Standards Rationale Document

0919-5 Sample collected at this depth above applicable standards.

Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Coarse Soil, Community Land Use

Table 9: Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Ground Water Coarse Soil, Community Land Use

(2)Detection Limit was raised due to matrix interferences.

Title:
Phase Two Conceptual Site Model - B-B' Cross Section

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:
Phase II ESA
Eastern Portion of 200
Lees Avenue, Ottawa

Date:
September 2011

Client:
University of Ottawa

Not to Scale

Figure 14

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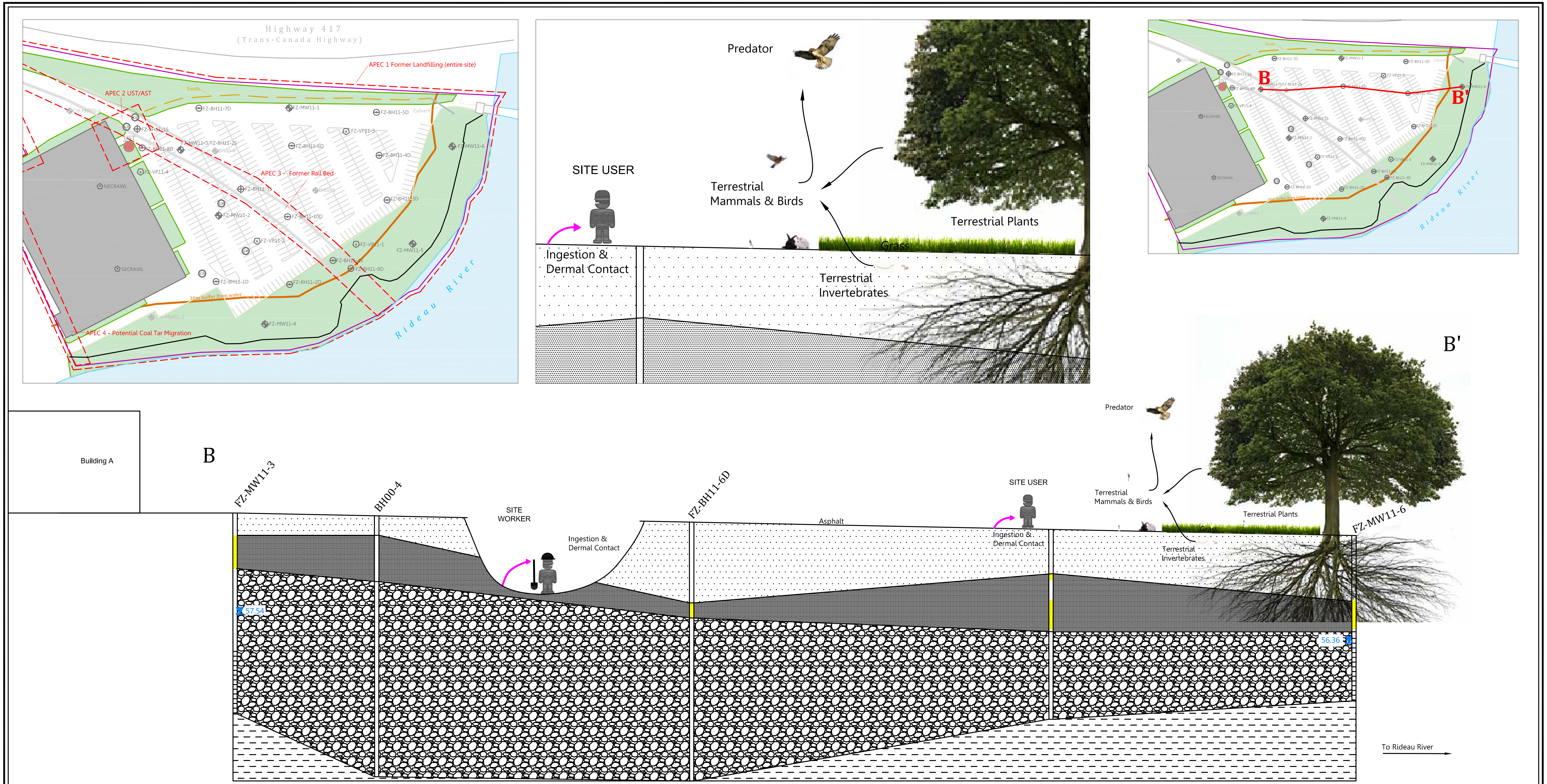

Legend

▭ Sand and Gravel FILL

▭ Cinder and Ash FILL

▨ GLACIAL TILL

▭ SHALE BEDROCK

▯ Monitoring Well Screen

0919-5 ▯ Sample collected at this depth above applicable standards.

▼ GW Elevation (m) Groundwater Elevation (Franz, August 2011)

Title:

Phase Two Conceptual Site Model

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:

Phase II ESA
Eastern Portion of 200
Lees Avenue, Ottawa

Date:

December 2011

Client:

University of Ottawa

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Figure 15

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APPENDIX B

Historical Analytical Results

Table B-1a
Soil Historical Analytical Results, Polycyclic Aromatic Hydrocarbons (PAHs) – Table 3 SCS

Location	**O.Reg. 153/04 Table 3[1]**	R-6	R-6	BH00-4 SA2	BH00-5 SA4	BH00--5 SA7	B-3
Sampling Date		1988	1988	2000	2000	2000	May-01
Sampling Depth (m)		2.29 --- 2.9	4.57 --- 5.18	1.52 --- 2.13	3.05 --- 3.66	5.33 --- 5.95	0 - 0.1
Consultant		CANVIRO	CANVIRO	Golder	Golder	Golder	CH2M Hill
Acenaphthene	96	0.06384	<0.0016	2.9	ND	ND	<2
Acenaphthylene	0.15	0.05269	<0.0016	0.5	ND	ND	<2
Anthracene	0.67	0.2809	<0.008	23.5	ND	ND	4.78
Benzo(a)anthracene	0.96	0.6792	<0.0056	43.2	ND	ND	2.82
Benzo(a)pyrene	0.3	0.5723	<0.0032	22.3	ND	ND	2.56
Benzo(b)fluoranthene	0.96	1.384	<0.00376	21.2	ND	ND	5.82
Benzo(k)fluoranthene	0.96	1.384	<0.00375	17.5	ND	ND	<2
Benzo(ghi)perylene	9.6	0.61	<0.0032	10.8	ND	ND	<2
Chrysene	9.6	0.7369	<0.0056	47	0.1	ND	2.75
Dibenzo(a,h)anthracene	0.1	0.3192	<0.0032	5.3	ND	ND	<2
Fluoranthene	9.6	0.8758	<0.00135	75.4	0.1	ND	6.85
Fluorene	62	0.09269	<0.0016	7.3	ND	ND	<2
Indeno(1,2,3---cd)pyrene	0.76	0.5838	<0.004	17	ND	ND	<2
Naphthalene	9.6	0.1396	<0.004	0.6	ND	ND	<2
Phenanthrene	12	0.6827	<0.00055	51.4	0.3	ND	2.29
Pyrene	96	0.7977	<0.00135	174	ND	ND	5.61

Notes: All units in ug/g.

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table B-1b
Soil Historical Analytical Results, Polycyclic Aromatic Hydrocarbons (PAHs) – Table 9 SCS

Location	**O.Reg. 153/04 Table 9**[1]	R-3	WP--1	WP-3	TP00-2 SA3	MW01-2 SS3
Sampling Date		1988	1988	1988	2000	Feb-01
Sampling Depth (m)		0.76 --- 1.37	0.76 --- 1.37	0.76 --- 1.37	3.1 --- 3.3	2.99 - 3.6
Consultant		CANVIRO	CANVIRO	CANVIRO	Golder	CH2M Hill
Acenaphthene	0.072	0.06193	0.22	0.5751	ND	<0.05
Acenaphthylene	0.093	0.6698	0.183	1.7857	0.1	<0.05
Anthracene	0.16	0.2792	0.5293	ND	0.2	0.15
Benzo(a)anthracene	0.22	0.8991	4.011	15.4676	1.1	0.73
Benzo(a)pyrene	0.3	1.0562	4.584	12.8322	3.4	0.72
Benzo(b)fluoranthene	0.47	1.17	8.7303	27.0946	1.2	1
Benzo(k)fluoranthene	0.48	1.17	8.7303	27.0946	0.5	0.32
Benzo(ghi)perylene	0.68	0.1742	3.4031	6.0084	0.6	0.33
Chrysene	2.8	0.887	3.9264	13.6008	1.2	0.66
Dibenzo(a,h)anthracene	0.1	0.1	1.2845	3.0042	0.4	<0.1
Fluoranthene	0.69	1.1324	6.4835	21.9077	2	0.79
Fluorene	0.19	0.1431	0.6781	2.2867	0.1	<0.05
Indeno(1,2,3-cd)pyrene	0.23	0.1977	3.1158	6.1733	1	0.32
Naphthalene	0.09	0.07077	0.2588	0.9106	0.5	---
Phenanthrene	0.69	0.7993	1.935	19.5572	1.4	0.61
Pyrene	1	1.0944	6.847	18.8376	1.7	0.84

Notes: All units in ug/g.

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
ND	Not Detected
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table B-2a
Soil Historical Analytical Results, Metals – Table 3 SCS

Location	**O.Reg. 153/04 Table 3[1]**	BH00-4 SA2	BH00-5 SA4	BH00-5 SA7	B-1	B-3
Sampling Date		2000	2000	2000	May-01	May-01
Sampling Depth (m)		1.52 - 2.13	3.05 - 3.66	5.33 - 5.95	0 - 0.1	0 - 0.1
Consultant		Golder	Golder	Golder	CH2M Hill	CH2M Hill
Parameter						
Antimony	40.0	8	3	2	<1	<1
Arsenic	18	13	9	2	11	17
Barium	670	213	84	112	311	543
Beryllium	8	ND	ND	ND	<0.5	0.7
Hot Water Ext. Boron	120	ND	ND	ND	<0.5	<0.5
Cadmium	1.9	1	ND	0.5	1	2
Chromium	160	51	26	36	30	35
Cobalt	80	ND	ND	1	7	9
Copper	230	536	41	82	164	218
Lead	120	2970	150	485	601	1070
Mercury	3.9	0.5	ND	1.8	0.58	0.91
Molybdenum	40	3	1	ND	3	4
Nickel	270	26	19	19	35	29
Selenium	5.5	4	1	ND	1	2
Silver	40	ND	ND	ND	2	2
Sodium	---	---	---	---	300	484
Thallium	3.3	ND	ND	ND	<1	<1
Vanadium	86	28	20	38	24	29
Zinc	340	415	82	197	543	658

Notes: All units in ug/g.

[1] Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).

(2)	interferences.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table B-2b
Soil Historical Analytical Results, Metals – Table 9 SCS

Location	**O.Reg. 153/04 Table 9**[1]	TP00-2 SA3	HS-5A	HS-5B	HS-6A	HS-6B	HS-7A
Sampling Date		2000	May-01	May-01	May-01	May-01	May-01
Sampling Depth (m)		3.1 - 3.3	0 - 0.1	0.1 - 0.3	0 - 0.1	0.1 - 0.3	0 -0.1
Consultant		Golder	CH2M Hill	CH2M Hill	CH2M Hill	CH2M Hill	CH2M Hill
Antimony	1.3	---	<1	<1	3	1	<1
Arsenic	18	13	4	13	14	16	5
Barium	220	115	100	448	394	446	174
Beryllium	2.5	ND	<0.5	1.1	0.6	0.6	<0.5
Hot Water Ext. Boron	36	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	1.2	6.7	<1	2	1	2	<1
Chromium	70	44	19	36	30	39	28
Cobalt	22	ND	5	8	8	8	6
Copper	92	741	61	166	136	207	73
Lead	120	3150	223	654	735	1000	435
Mercury	0.27	13.1	0.2	0.45	0.57	0.68	0.42
Molybdenum	2	1	1	2	3	4	1
Nickel	82	26	15	29	29	36	20
Selenium	1.5	2	<1	1	2	2	<1
Silver	0.5	ND	<1	2	2	2	1
Sodium	---	---	238	526	267	319	276
Thallium	1	ND	<1	<1	<1	<1	<1
Vanadium	86	34	17	34	26	27	24
Zinc	290	2780	186	648	551	752	346

Notes: All units in ug/g.

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table B-2b
Soil Historical Analytical Results, Metals – Table 9 SCS

Location	O.Reg. 153/04 Table 9[1]	HS-7B	HS-8A	HS-8B	HS-9A	HS-9B	HS-10A	HS-10B
Sampling Date		May-01	May-01	May-01	May-01	May-01	May-01	May-01
Sampling Depth (m)		0.1 - 0.3	0 - 0.1	0.1 - 0.3	0 - 0.1	0.1 - 0.3	0 - 0.1	0.1 - 0.3
Consultant		CH2M Hill	CH2M Hill	CH2M Hill	CH2M Hill	CH2M Hill	CH2M Hill	CH2M Hill
Antimony	1.3	1	<1	<1	<1	<1	<1	<1
Arsenic	18	13	9	6	5	4	4	3
Barium	220	327	326	242	202	163	127	248
Beryllium	2.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hot Water Ext. Boron	36	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	1.2	2	<1	<1	<1	<1	<1	<1
Chromium	70	37	42	41	26	19	14	16
Cobalt	22	8	9	9	7	6	5	6
Copper	92	197	134	95	65	51	81	60
Lead	120	787	652	400	352	227	230	3030
Mercury	0.27	0.51	0.52	0.52	0.2	0.15	0.46	0.22
Molybdenum	2	3	2	1	1.3	1	<1	1
Nickel	82	36	34	30	20.1	22	14	26
Selenium	1.5	1	1	1	<1	1	<1	<1
Silver	0.5	2	1	<1	<1	<1	<1	<1
Sodium	---	377	308	295	261	204	206	348
Thallium	1	<1	<1	<1	<1	<1	<1	<1
Vanadium	86	30	35	36	20.3	18	15	21
Zinc	290	699	632	315	292	182	259	1180

Notes: All units in ug/g.

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table B-3a
Ground Water Historical Analytical Results, Polycyclic Aromatic Hydrocarbons (PAHs) – Table 3 SCS

Location	**O.Reg. 153/04 Table 3[1]**	**BH00-4**	**BH00-5**
Sampling Date		2000	2000
Consultant		Golder	Golder
Acenaphthene	600	<0.1	<0.1
Acenaphthylene	1.8	<0.1	<0.1
Anthracene	2.4	<0.1	<0.1
Benzo(a)anthracene	4.7	<0.1	<0.1
Benzo(a)pyrene	0.81	<0.1	<0.1
Benzo(b)fluoranthene	0.75	<0.1	<0.1
Benzo(ghi)perylene	0.2	<0.1	<0.1
Benzo(j)fluoranthene	0.4	---	---
Benzo(k)fluoranthene	0.4	<0.1	<0.1
Chrysene	1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.52	<0.1	<0.1
Fluoranthene	130	<0.1	<0.1
Fluorene	400	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	0.2	<0.1	<0.1
Naphthalene	1400	<0.1	<0.1
Phenanthrene	580	0.2	<0.1
Pyrene	68	<0.1	<0.1

Notes: All units in ug/L.

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table B-3b
Soil Historical Analytical Results, Polycyclic Aromatic Hydrocarbons (PAHs) – Table 9 SCS

Location	**O.Reg. 153/04 Table 9[1]**	**MW01-2**
Sampling Date		2001
Consultant		CH2M Hill
Acenaphthene	600	<0.05
Acenaphthylene	1.4	<0.05
Anthracene	1	<0.05
Benzo(a)anthracene	1.8	0.05
Benzo(a)pyrene	0.81	<0.01
Benzo(b)fluoranthene	0.75	<0.05
Benzo(ghi)perylene	0.2	<0.1
Benzo(j)fluoranthene	0.4	<0.05
Benzo(k)fluoranthene	0.4	<0.05
Chrysene	0.7	<0.05
Dibenzo(a,h)anthracene	0.4	<0.1
Fluoranthene	73	<0.05
Fluorene	290	<0.05
Indeno(1,2,3-cd)pyrene	0.2	<0.1
Naphthalene	1400	0.078
Phenanthrene	380	<0.05
Pyrene	5.7	<0.05

Notes: All units in ug/L.

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	interferences.
RPD	Relative percent difference (See report for RPD
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
▨ 20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial /Commercial /Community Property Use, with coarse grain soil

Table B-4a
Ground Water Historical Analytical Results, Metals – Table 3 SCS

Location	**O.Reg. 153/04 Table 3^1**	**MW01-1**	**BH00-4**	**BH00-5**
Sampling Year		2001	2000	2000
Consultant		CH2M Hill	Golder	Golder
Antimony	20000	<100	<1	<1
Arsenic	1900	9	<1	<1
Barium	29000	220	60	160
Beryllium	67	<1	<2	<2
Total Boron	45000	190	210	200
Cadmium	2.7	0.73	<5	<5
Chromium	810	44	<10	<10
Cobalt	66	10	<10	<10
Copper	87	32	11	<5
Lead	25	36	<2	<2
Mercury	0.29	<0.1	<0.2	<0.2
Molybdenum	9200	12	<10	<10
Nickel	490	24	<10	<10
Selenium	63	3	3	1
Silver	1.5	<0.1	<10	<10
Sodium	2,300,000	320,000	1,230,000	243,000
Thallium	510	<2	<200	<200
Vanadium	250	43	<10	<10
Zinc	1100	91	<10	<10

Notes: All units in ug/L.

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table B-4b
Soil Historical Analytical Results, Metals – Table 9 SCS

Location	**O.Reg. 153/04 Table 9[1]**	**MW01-2**
Sampling Year		2001
Consultant		CH2M Hill
Antimony	16000	<100
Arsenic	1500	2
Barium	23000	150
Beryllium	53	<1
Total Boron	36000	490
Cadmium	2.1	<0.2
Chromium	640	<5
Cobalt	52	<5
Copper	69	<0.2
Lead	20	<1
Mercury	0.29	<0.1
Molybdenum	7300	<6
Nickel	390	<10
Selenium	50	<2
Silver	1.2	<0.1
Sodium	1800000	290000
Thallium	400	<2
Vanadium	200	<3
Zinc	890	53

Notes: All units in ug/L.

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

APPENDIX C

Phase Two Analytical Results

Table C-1a
Soil Analytical Results, Petroleum Hydrocarbons (PHCs) – Table 3 SCS

APEC	**O.Reg. 153/04 Table 3[1]**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**RPD Analysis**	**APEC 1**	**APEC 1**	**APEC 2**	**APEC 2**	**APEC 3**	**Max Value**	
Soil Description		**Cinder & Ash FILL**	**Cinder & Ash FILL**	**GLACIAL TILL**	**Cinder & Ash FILL**	**Sand & Gravel FILL**	**Sand & Gravel FILL**	**GLACIAL TILL**	**GLACIAL TILL**		**GLACIAL TILL**	**GLACIAL TILL**	**Cinder & Ash FILL**	**GLACIAL TILL**	**Cinder & Ash FILL**		
Borehole / Monitoring Well		**FZ-BH11-1D**	**FZ-BH11-3D**	**FZ-BH11-4D**	**FZ-BH11-6D-A**	**FZ-MW11-1-A**	**FZ-BH11-7D-B**	**FZ-BH11-7D-C**	**Duplicate of FZ-BH11-7D-C**		**FZ-MW11-2-B**	**FZ-BH11-7D-C**	**FZ-MW11-3**	**FZ-BH11-8D-B**	**FZ-BH11-10D-A**		
Sample ID		**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-4D**	**FZ-BH11-6D-A**	**FZ-MW11-1-A**	**FZ-BH11-7D-B**	**FZ-BH11-7D-C**	**DUP 2**		**FZ-MW11-2-B**	**DUP 2 Lab-Dup**	**FZ-MW11-3**	**FZ-BH11-8D-B**	**FZ-BH11-10D-A**		
Sample Depth (m)		4.2-4.5	0.4-2.9	3.6-4.5	3.5-4.1	1.9-2.2	2.5-3.0	6.3-7.5	6.3-7.5		2.9-3.0	6.3-7.5	1.1-2.6	3.4-3.9	0.9-1.5		
Sample Date		10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011	12/08/2011	12/08/2011	12/08/2011		11/08/2011	12/08/2011	12/08/2011	11/08/2011	11/08/2011		
Analysis Date		15/08/11 - 22/08/11	15/08/2011 - 16/08/11	18/08/2011	16/08/11 - 18/08/11	16/08/2011	19/08/2011	18/08/2011	18/08/2011		18/08/11 - 30/08/11	18/08/2011	18/08/11 - 19/08/11	16/08/2011	16/08/2011		
Laboratory Certificate		B1C2151	B1C2151	B1C2240	B1C2240	B1C2240	B1C3566	B1C3566	B1C3566		B1C2240	B1C3566	B1C3566	B1C2240	B1C2240		
% Moisture		20.0	16.0				9.3	7.3	7.5				18.0			**Concentration**	**Sample ID**
Parameters (µg/g)																	
Benzene	0.32	<0.02	<0.02	0.12	0.03	---	<0.02	---	---	---	<0.02	---	0.22	---	---	0.22	FZ-MW11-3
Toluene	68	<0.02	<0.02	0.4	0.13	---	<0.02	---	---	---	<0.05	---	0.25	---	---	0.4	FZ-BH11-4D
Ethylbenzene	9.5	<0.02	<0.02	0.16	0.13	---	<0.02	---	---	---	<0.02	---	0.06	---	---	0.16	FZ-BH11-4D
m,p-Xylenes	---	<0.02	<0.02	0.49	0.15	---	<0.02	---	---	---	<0.02	---	0.11	---	---	0.49	FZ-BH11-4D
o-Xylenes	---	<0.04	<0.04	0.3	0.33	---	<0.04	---	---	---	<0.02	---	0.19	---	---	0.33	FZ-BH11-6D-A
Total Xylenes	26	<0.04	<0.04	0.79	0.48	---	<0.04	---	---	---	<0.02	---	0.3	---	---	0.79	FZ-BH11-4D
PHC fraction F1 (C6-C10)	---	<10	<10	<10	<10	---	<10	---	---	---	<10	---	18	---	---	18	FZ-MW11-3
PHC fraction F1 (C6-C10) - BTEX	55	<10	<10	<10	<10	---	<10	---	---	---	<10	---	17	---	---	17	FZ-MW11-3
PHC fraction F2 (C10-C16)	230	<10	<10	---	160	<10	---	<10	<10	Acceptable	---	<10	26	<10	<10	160	FZ-BH11-6D-A
PHC fraction F3 (C16-C34)	1700	490	110	---	300	54	---	<10	<10	Acceptable	---	<10	560	<10	530	560	FZ-MW11-3
PHC fraction F4 (C34-C50)	3300	1100	29	---	67	14	---	<10	<10	Acceptable	---	<10	250	<10	200	1100	FZ-BH11-1D
Chromatogram to baseline at nC50	---	No	Yes	---	Yes	Yes	---	Yes	Yes	Acceptable	---	Yes	No	Yes	Yes	---	---

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-1b
Soil Analytical Results, Petroleum Hydrocarbons (PHCs) –Table 9 SCS

APEC		O.Reg. 153/04 Table 9[1]	APEC 1/ Migration to River
Soil Description			Cinder & Ash FILL
Borehole / Monitoring Well			FZ-BH11-9D
Sample ID			FZ-BH11-9D
Sample Depth (m)			0.8-1.5
Sample Date			10/08/2011
Analysis Date			15/08/11 - 22/08/11
Laboratory Certificate (Maxxam Job)			B1C2151
% Moisture			16.0
Parameters (µg/g)	Benzene	0.02	<0.02
	Toluene	0.2	0.04
	Ethylbenzene	0.05	<0.02
	m,p-Xylenes	---	0.03
	o-Xylenes	---	0.03
	Total Xylenes	0.05	0.05
	PHC fraction F1 (C6-C10)	25	<10
	PHC fraction F1 (C6-C10) - BTEX	25	<10
	PHC fraction F2 (C10-C16)	10	<10
	PHC fraction F3 (C16-C34)	240	77
	PHC fraction F4 (C34-C50)	120	140
	Chromatogram to baseline at nC50	---	No

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-2
Soil Analytical Results, PHC Fractionation

APEC			**APEC 1**	**APEC 2**
Soil Description			**Cinder & Ash FILL**	**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-MW11-2-A**	**FZ-MW11-3**
Sample ID			**FZ-MW11-2-A**	**FZ-MW11-3**
Sample Depth (m)			1.1-2.9	1.1-2.6
Sample Date			11/08/2011	12/08/2011
Analysis Date			26/08/2011	01/09/2011
Laboratory Certificate			B1C2240	B1C3566
Parameters (%)	**BTEX Compounds**			
	Benzene		<0.03	<0.03
	Toluene		<0.03	0.06
	Ethylbenzene		<0.03	<0.03
	Total Xylenes		<0.03	0.11
	Petroleum Hydrocarbons			
	F1-BTEX, C6-C10	Aliphilic C6-C8	<0.1	0.5
		Aliphilic C8-C10	1	0.9
		Aromatic >C8-C10	0.2	<0.1
	F2, C10-C16	Aliphilic >C10-C12	<8.0	<8.0
		Alliphilic >C12-C16	<15	<15
		Aromatic >C10-C12	8.6	6.3
		Aromatic >C12-C16	30	<15
	F3, C10-C16	Aliphilic >C16-C21	100	<15
		Aliphilic >C21-C32	600	61
		Aromatic >C16-C21	160	78
		Aromatic >C16-C32	720	200

Notes:

<20 Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20

Table C-3a
Soil Analytical Results, Metals –Table 3 SCS

APEC		O.Reg. 153/04 Table 3[1]	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1
Soil Description			**GLACIAL TILL**	**Cinder and Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**GLACIAL TILL**	**Cinder & Ash FILL**	**GLACIAL TILL**	**Sand & Gravel FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder and Ash FILL**	**Sand & Gravel FILL**
Borehole / Monitoring Well			**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-3D**	**FZ-BH11-4D**	**FZ-BH11-4D**	**FZ-BH11-5D**	**FZ-BH11-5D**	**FZ-BH11-6D**	**FZ-BH11-6D**	**FZ-MW11-1B**	**FZ-BH11-10D**	**FZ-MW11-2**	**FZ-BH11-10D**	**FZ-BH11-7D**
Sample ID			**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-3D**	**FZ-BH11-4D-A**	**FZ-BH11-4D-B**	**FZ-BH11-5D-A**	**FZ-BH11-5D-B**	**FZ-BH11-6D-A**	**FZ-BH11-6D-B**	**FZ-MW11-1-B**	**FZ-BH11-10D-A**	**FZ-MW11-2-A**	**FZ-BH11-10D-B**	**FZ-BH11-7D-A**
Sample Depth (m)			6.6-7.5	5.1-5.3	1.1-1.5	1.9-2.2	3.6-4.5	1.0-2.3	2.3-4.5	3.5-4.1	9.0-9.9	3.0-3.6	0.9-1.5	1.1-2.9	4.3-4.5	0.9-2.5
Sample Date			10/08/2011	10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	12/08/2011
Analysis Date			18/08/11 - 21/08/11	18/08/11 - 22/08/11	18/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 21/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	23/08/11 - 25/08/11
Laboratory Certificate			B1C2151	B1C2151	B1C2151	B1C2240	B1C2240	B1C2240	B1C2240	B1C2240	B1C2240	B1C2240	B1C2240	B1C2240	B1C2240	B1C3566
(CaCl2) pH				7.25				7.37		7.16		7.19		7.19		
Parameters (µg/g)	Hot Water Ext. Boron (B)	2	0.41	1.1	1.4	0.87	0.65	0.81	0.3	1.1	0.15	0.87	0.59	3.5	1	0.1
	Acid Extractable Antimony (Sb)	40	0.6	83	4.3	3.6	33	2.4	0.2	0.9	<0.2	<0.2	11	24	9.5	5.1
	Acid Extractable Arsenic (As)	18	3	26	13	12	27	21	2	6	4	3	29	20	17	2
	Acid Extractable Barium (Ba)	670	92	220	250	220	110	160	260	56	37	67	380	270	450	24
	Acid Extractable Beryllium (Be)	8	<0.2	<0.2	0.5	0.5	0.6	0.7	0.6	0.4	0.3	0.4	0.6	0.3	0.3	0.2
	Acid Extractable Boron (B)	120	<5	7	9	6	<5	<5	<5	<5	<5	<5	9	6	6	<5
	Acid Extractable Cadmium (Cd)	1.9	0.2	5.4	1.3	6.6	0.5	16	8.8	0.5	8	0.3	1.9	1.7	14	<0.1
	Acid Extractable Chromium (Cr)	160	10	35	24	24	31	18	65	10	14	17	44	19	24	8
	Acid Extractable Cobalt (Co)	80	3.9	13	6.7	8.6	11	14	15	4.2	9.4	6.5	10	6.5	11	4.2
	Acid Extractable Copper (Cu)	230	13	440	170	180	57	180	86	42	60	15	450	430	130	13
	Acid Extractable Lead (Pb)	120	39	900	710	510	510	260	24	49	21	10	1300	2400	1200	48
	Acid Extractable Molybdenum (Mo)	40	0.9	2.8	2.9	3	4.7	2.8	<0.5	1.5	1.5	1.2	6.2	3.6	1.3	<0.5
	Acid Extractable Nickel (Ni)	270	7.6	53	22	24	30	22	37	17	24	16	650	27	26	6.5
	Acid Extractable Selenium (Se)	5.5	<0.5	0.9	1.5	1.1	4	1.4	<0.5	0.6	0.6	<0.5	3.9	1.2	2.4	<0.5
	Acid Extractable Silver (Ag)	40	<0.2	0.3	1	0.7	<0.2	0.4	<0.2	<0.2	<0.2	<0.2	2.5	0.5	0.7	<0.2
	Acid Extractable Thallium (Tl)	3.3	0.07	0.1	0.16	0.27	0.63	0.16	0.29	0.17	0.11	0.15	0.24	0.19	0.33	0.08
	Acid Extractable Uranium (U)	33	0.6	0.52	0.75	0.6	1	0.89	0.73	0.52	0.71	0.79	0.57	0.31	0.81	0.45
	Acid Extractable Vanadium (V)	86	15	14	25	22	28	22	66	18	17	26	25	13	24	20
	Acid Extractable Zinc (Zn)	340	88	2600	640	480	210	220	100	70	46	33	990	800	1200	22
	Acid Extractable Mercury (Hg)	3.9	<0.05	0.29	0.76	0.64	0.13	0.7	<0.05	0.07	<0.05	<0.05	0.95	19	0.21	<0.05
	Chromium (VI)	8	<0.2	<0.4 (2)	<0.2	<0.2	<1	<1	<0.2	<0.4	<0.2	<2 (2)	<2	<2	<0.4	<0.2

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-3a
Soil Analytical Results, Metals –Table 3 SCS

APEC		O.Reg. 153/04 Table 3[1]	APEC 1/APEC 2	APEC 1/APEC 2	APEC 1/APEC 2	APEC 3	APEC 3	RPD Analysis	APEC 3	APEC 3	RPD Analysis	APEC 3	Max Value	
Soil Description			Cinder & Ash FILL	GLACIAL TILL	Cinder & Ash FILL	Cinder & Ash FILL	Cinder & Ash FILL		Cinder & Ash FILL	Cinder & Ash FILL		Cinder & Ash FILL		
Borehole / Monitoring Well			FZ-BH11-8D	FZ-BH11-8D	FZ-MW11-3	FZ-BH11-1S	Duplicate of FZ-BH11-1S		FZ-BH11-3S	Duplicate of FZ-BH11-3S		FZ-BH11-4S		
Sample ID			FZ-BH11-8D-A	FZ-BH11-8D-B	FZ-MW11-3	FZ-BH11-1S	DUP 3		FZ-BH11-3S	DUP 4		FZ-BH11-4S		
Sample Depth (m)			2.6-3.0	3.4-3.9	1.1-2.6	1.0-1.5	1.0-1.5		1.1-1.5	1.1-1.5		0.7-1.5		
Sample Date			11/08/2011	11/08/2011	12/08/2011	12/08/2011	12/08/2011		12/08/2011	12/08/2011		12/08/2011		
Analysis Date			19/08/11 - 22/08/11	19/08/11 - 22/08/11	23/08/11 - 25/08/11	23/08/11 - 25/08/11	23/08/11 - 25/08/11		23/08/11 - 25/08/11	23/08/11 - 25/08/11		23/08/11 - 25/08/11		
Laboratory Certificate			B1C2240	B1C2240	B1C3566	B1C3566	B1C3566		B1C3566	B1C3566		B1C3566		
(CaCl2) pH													Concentration	Sample ID
Parameters (µg/g)	Hot Water Ext. Boron (B)	2	0.86	0.18	1.4	2.9	2.8	4%	0.48	0.46	4%	0.53	3.5	FZ-MW11-2A
	Acid Extractable Antimony (Sb)	40	25	0.2	8.6	16	17	6%	8	7.7	4%	24	33	FZ-BH11-2D
	Acid Extractable Arsenic (As)	18	41	2	15	8	9	12%	19	20	5%	22	41	DUP-1
	Acid Extractable Barium (Ba)	670	780	43	510	630	640	2%	350	390	11%	450	780	FZ-BH11-8D-A
	Acid Extractable Beryllium (Be)	8	0.7	0.3	0.4	0.4	0.3	29%	0.8	0.9	12%	0.7	0.9	FZ-MW11-6
	Acid Extractable Boron (B)	120	9	<5	12	9	11	20%	8	7	13%	7	12	FZ-MW11-3
	Acid Extractable Cadmium (Cd)	1.9	13	<0.1	1.4	2.7	3.3	20%	1	1.3	26%	1.6	16	FZ-MW11-5-B
	Acid Extractable Chromium (Cr)	160	59	11	33	26	30	14%	23	25	8%	33	65	FZ-BH11-5D-B
	Acid Extractable Cobalt (Co)	80	16	4.2	7	6.9	7.4	7%	7.1	8.1	13%	8.7	16	FZ-BH11-8D-A
	Acid Extractable Copper (Cu)	230	580	15	410	250	200	22%	140	140	0%	210	580	FZ-BH11-8D-A
	Acid Extractable Lead (Pb)	120	2800	10	1100	650	710	9%	700	760	8%	1600	2800	FZ-BH11-8D-A
	Acid Extractable Molybdenum (Mo)	40	4.5	0.9	2.9	1.5	1.8	18%	5.3	5.6	6%	4.8	6.2	FZ-BH11-10D-A
	Acid Extractable Nickel (Ni)	270	100	12	32	21	23	9%	33	34	3%	30	650	FZ-BH11-10D-A
	Acid Extractable Selenium (Se)	5.5	2.9	<0.5	1.5	0.8	0.9	12%	2.8	2	33%	2.4	4	FZ-BH11-4D-B
	Acid Extractable Silver (Ag)	40	1.8	<0.2	0.7	0.5	0.6	18%	1.8	1.4	25%	2	2.5	FZ-BH11-10D-A
	Acid Extractable Thallium (Tl)	3.3	0.31	0.09	0.18	0.12	0.14	15%	0.15	0.17	13%	0.21	0.63	FZ-BH11-4D-B
	Acid Extractable Uranium (U)	33	0.54	0.48	0.45	0.38	0.44	15%	1.1	2.6	81%	0.63	2.6	DUP 4
	Acid Extractable Vanadium (V)	86	28	15	26	24	27	12%	24	27	12%	25	66	FZ-BH11-5D-B
	Acid Extractable Zinc (Zn)	340	4500	38	1000	2400	2400	0%	360	390	8%	650	4500	FZ-BH11-8D-A
	Acid Extractable Mercury (Hg)	3.9	0.46	<0.05	2.1	0.37	0.43	15%	0.62	0.59	5%	1.7	19	FZ-MW11-2A
	Chromium (VI)	8	<1	<0.2	<1	<2	<1	Acceptable	<1	<1	Acceptable	<1	---	---

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-3b
Soil Analytical Results, Metals –Table 9 SCS

		O.Reg. 153/04 Table 9[1]							RPD Analysis	Max Value	
APEC			**APEC 1/ Migration to River**	**APEC 1/ Migration to River**	**APEC 1/ Migration to River**	**APEC 1/ Migration to River**	**APEC 1/ Migration to River**	**APEC 1/ Migration to River**			
Soil Description			**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Sand & Gravel FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**			
Borehole / Monitoring Well			**FZ-BH11-9D**	**FZ-MW11-4**	**FZ-MW11-5**	**FZ-MW11-5**	**FZ-MW11-6**	**Duplicate of FZ-MW11-6**			
Sample ID			**FZ-BH11-9D**	**FZ-MW11-4**	**FZ-MW-5-A**	**FZ-MW-5-B**	**FZ-MW11-6**	**DUP-1**			
Sample Depth (m)			0.8-2.2	4.3-4.5	0.6-1.5	4.1-4.5	2.8-4.1	2.8-4.1			
Sample Date			10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011			
Analysis Date			18/08/11 - 22/08/11	18/08/11 - 22/08/11	18/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11	19/08/11 - 22/08/11			
Laboratory Certificate			B1C2151	B1C2151	B1C2240	B1C2240	B1C2240	B1C2240			
(CaCl2) pH										**Concentration**	**Sample ID**
Parameters (µg/g)	Hot Water Ext. Boron (B)	1.5	0.54	1.1	0.33	0.49	0.6	0.63	5%	1.1	FZ-MW11-4
	Acid Extractable Antimony (Sb)	1.3	11	0.3	2.2	9	6.7	11	49%	11	FZBH11-9D
	Acid Extractable Arsenic (As)	18	7	2	6	17	38	42	10%	42	DUP-1
	Acid Extractable Barium (Ba)	220	110	120	130	240	100	120	18%	240	FZ-MW-5-B
	Acid Extractable Beryllium (Be)	2.5	<0.2	0.4	0.4	0.5	1	<2 (2)	Acceptable	1	FZ-MW11-6
	Acid Extractable Boron (B)	36	5	<5	<5	<5	<5	<5	Acceptable	5	FZ-BH11-9D
	Acid Extractable Cadmium (Cd)	1.2	0.7	0.3	0.6	25	0.3	0.9	100%	25	FZ-MW-5-B
	Acid Extractable Chromium (Cr)	70	18	23	19	25	12	14	15%	25	FZ-MW-5-B
	Acid Extractable Cobalt (Co)	22	5.6	8	6.5	11	6.4	7	9%	11	FZ-MW-5-B
	Acid Extractable Copper (Cu)	92	120	11	56	350	170	220	26%	350	FZ-MW-5-B
	Acid Extractable Lead (Pb)	120	150	14	170	450	470	520	10%	520	DUP-1
	Acid Extractable Molybdenum (Mo)	2	0.7	2.3	2	3.4	4.5	5.2	14%	5.2	DUP-1
	Acid Extractable Nickel (Ni)	82	21	13	19	26	16	17	6%	26	FZ-MW-5-B
	Acid Extractable Selenium (Se)	1.5	<0.5	<0.5	0.7	1	2.1	2.6	21%	2.6	DUP-1
	Acid Extractable Silver (Ag)	0.5	0.3	<0.2	0.4	<0.2	0.2	0.3	40%	0.4	FZ-MW-5-A
	Acid Extractable Thallium (Tl)	1	0.15	0.08	0.14	0.27	0.34	0.38	11%	0.38	DUP-1
	Acid Extractable Uranium (U)	2.5	0.41	0.8	0.7	0.98	0.49	0.64	27%	0.98	FZ-MW-5-B
	Acid Extractable Vanadium (V)	86	21	34	24	28	20	24	18%	34	FZ-MW11-4
	Acid Extractable Zinc (Zn)	290	260	55	200	190	85	92	8%	260	FZ-BH11-9D
	Acid Extractable Mercury (Hg)	0.27	0.45	0.05	1.1	0.21	0.34	0.41	19%	1.1	FZ-MW-5-A
	Chromium (VI)	0.66	<0.2	<0.2	<0.4	<1	<1	<1	Acceptable	---	---

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-4a
Soil Analytical Results, Polycyclic Aromatic Hydrocarbons (PAHs) –Table 3 SCS

APEC		**O.Reg. 153/04 Table 3[1]**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**
Soil Description			**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Sand & Gravel FILL**	**Cinder & Ash FILL**	**Sand & Gravel FILL**	**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-3D**	**FZ-BH11-4D**	**FZ-BH11-5D**	**FZ-BH11-6D**	**FZ-MW11-1**	**FZ-MW11-2**	**FZ-BH11-7D**	**FZ-BH11-10D**
Sample ID			**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-3D**	**FZ-BH11-4D**	**FZ-BH11-5D-A**	**FZ-BH11-6D-A**	**FZ-MW11-1-B**	**FZ-MW11-2-A**	**FZ-BH11-7D-A**	**FZ-BH11-10D-A**
Sample Depth (m)			4.2-4.5	5.1-5.3	1.1-1.5	1.9-2.2	1.0-2.3	3.5-4.1	3.0-3.6	1.1-2.9	0.9-2.5	0.9-1.5
Sample Date			10/08/2011	10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	12/08/2011	11/08/2011
Analysis Date			23/08/2011	22/08/2011	18/08/2011	22/08/2011	20/08/2011	22/08/2011	22/08/2011	22/08/2011	24/08/2011	22/08/2011
Laboratory Certificate			B1C2151	B1C2151	B1C2151	B1C2240	B1C2240	B1C2240	B1C2240	B1C2240	B1C3566	B1C2240
% Moisture											4.0	
Parameters (µg/g)	1-Methylnaphthalene[3]	76	0.064	0.11	0.06	0.42	0.037	6.6 (2)	0.014	2.5	0.008	0.21
	2-Methylnaphthalene[3]	76	0.084	0.14	0.068	0.46	0.034	13 (2)	0.026	2.4	0.006	0.34
	Acenaphthene	96	0.2	0.49	0.36	1.9	0.034	21 (2)	0.052	3	<0.005	2
	Acenaphthylene	0.15	0.076	0.92	0.22	0.36	0.072	0.3	<0.005	1.1	<0.005	0.38
	Anthracene	0.67	0.63	3.1	1.4	5.2	0.19	16 (2)	0.068	4.4	<0.005	5.5
	Benzo(a)anthracene	0.96	0.66	8.9 (2)	3.6	7.7 (2)	0.62	3.7	0.021	7.3	<0.005	10 (2)
	Benzo(a)pyrene	0.3	0.44	7.4	2.9	5.1	0.52	1.3	0.006	6.5	0.007	6.4
	Benzo(b)fluoranthene	0.96	0.31	6.8 (2)	2.8	4.9	0.5	1.5	0.005	5.8	0.007	5.9
	Benzo(g,h,i)perylene	9.6	0.25	4.3	1.8	2.7	0.32	0.45	<0.005	3.8	0.009	3.1
	Benzo(j)fluoranthene	---	0.22	3.6	1.5	2.6	0.29	0.83	<0.005	3.4	<0.005	3.2
	Benzo(k)fluoranthene	0.96	0.22	3.8	1.5	2.7	0.28	0.84	<0.005	3.5	0.006	3.3
	Chrysene	9.6	0.64	8.0 (2)	3.4	6.7	0.65	3.1	0.022	7.8 (2)	0.006	9.9 (2)
	Dibenz(a,h)anthracene	0.1	0.068	1.2	0.47	0.91	0.089	0.16	<0.005	1.1	<0.005	1.1
	Fluoranthene	9.6	1.5	19 (2)	11 (2)	19 (2)	1.3	26 (2)	0.14	19 (2)	0.014	24 (2)
	Fluorene	62	0.24	0.74	0.44	2.4	0.05	24 (2)	0.059	7.2	<0.005	2.6
	Indeno(1,2,3-cd)pyrene	0.76	0.22	4	1.6	2.6	0.29	0.44	<0.005	3.5	0.007	3
	Naphthalene	9.6	0.38	0.23	0.1	0.54	0.031	47 (2)	0.075	2	0.007	0.73
	Perylene	---	0.12	1.9	0.71	1.3	0.13	0.35	0.008	1.3	<0.005	1.6
	Phenanthrene	12	1.4	11 (2)	5.8	19 (2)	0.68	51 (2)	0.28	19 (2)	0.014	23 (2)
	Pyrene	96	1.2	15 (2)	9.0 (2)	14 (2)	1.1	16 (2)	0.086	15 (2)	0.011	18 (2)

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
3	Methylnaphthalene standard applies to the sum of 1- and 2-methylnapthalene.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-4a
Soil Analytical Results, Polycyclic Aromatic Hydrocarbons (PAHs) –Table 3 SCS

APEC		O.Reg. 153/04 Table 3[1]	APEC 1/APEC 2	APEC 1/APEC 2	APEC 1/APEC 2	RPD Analysis	APEC 3	APEC 3	RPD Analysis	APEC 3	APEC 3	RPD Analysis	APEC 3	Max Value	
Soil Description			GLACIAL TILL	Cinder & Ash FILL	Cinder & Ash FILL		Cinder & Ash FILL	Cinder & Ash FILL		Cinder & Ash FILL	Cinder & Ash FILL		Cinder & Ash FILL		
Borehole / Monitoring Well			FZ-BH11-8D	FZ-MW11-3	Duplicate of FZ-MW11-3		FZ-BH11-1S	Duplicate of FZ-BH11-1S		FZ-BH11-3S	Duplicate of FZ-BH11-3S		FZ-BH11-4S		
Sample ID			FZ-BH11-8D-B	FZ-MW11-3	DUP 5		FZ-BH11-1S	DUP 3		FZ-BH11-3S	DUP 4		FZ-BH11-4S		
Sample Depth (m)			3.4-3.9	1.1-2.6	1.1-2.6		1.0-1.5	1.0-1.5		**1.05-1.5**	**1.05-1.5**		0.7-1.5		
Sample Date			11/08/2011	12/08/2011	12/08/2011		12/08/2011	12/08/2011		12/08/2011	12/08/2011		12/08/2011		
Analysis Date			22/08/2011	25/08/2011	25/08/2011		25/08/2011	25/08/2011		25/08/2011	25/08/2011		25/08/2011		
Laboratory Certificate			B1C2240	B1C3566	B1C3566		B1C3566	B1C3566		B1C3566	B1C3566		B1C3566		
% Moisture				18.0										Concentration	Sample ID
Parameters (µg/g)	1-Methylnaphthalene[3]	76	0.009	0.45	<3	Acceptable	0.12	0.17	34%	0.032	0.034	6%	0.2	6.6	FZ-BH11-6D-A
	2-Methylnaphthalene[3]	76	0.013	0.41	<3	Acceptable	0.091	0.11	19%	0.029	0.029	0%	0.21	13	FZ-BH11-6D-A
	Acenaphthene	96	0.039	0.8	---	---	0.26	0.55	72%	0.024	0.023	4%	0.36	21	FZ-BH11-6D-A
	Acenaphthylene	0.15	<0.005	0.77	---	---	0.27	0.32	17%	0.06	0.063	5%	0.47	0.77	FZ-MW11-3
	Anthracene	0.67	0.14	4	6	50%	1.3	2.2	51%	0.15	0.16	6%	2.6	16	FZ-BH11-6D-A
	Benzo(a)anthracene	0.96	0.21	5.9	10	69%	3	4	29%	0.44	0.47	7%	5.7	10	FZ-BH11-10D-A, DUP 5
	Benzo(a)pyrene	0.3	0.15	5	6	20%	2.7	3.6	29%	0.54	0.52	4%	5	7.4	FZ-BH11-2D
	Benzo(b)fluoranthene	0.96	0.15	4.1	---	---	2.3	2.8	20%	0.47	0.46	2%	3.8	6.8	FZ-BH11-2D
	Benzo(g,h,i)perylene	9.6	0.092	2.9	<10	Acceptable	1.8	2.2	20%	0.41	0.39	5%	3.3	4.3	FZ-BH11-2D
	Benzo(j)fluoranthene	---	0.089	2.4	---	---	1.5	1.8	18%	0.3	0.29	3%	2.3	3.6	FZ-BH11-2D
	Benzo(k)fluoranthene	0.96	0.087	2.5	4	60%	1.5	1.8	18%	0.3	0.29	3%	2.3	4	DUP 5
	Chrysene	9.6	0.22	5.5	10	82%	3	4	29%	0.48	0.51	6%	5.4	10	DUP 5
	Dibenz(a,h)anthracene	0.1	0.023	1	<5	Acceptable	0.59	0.75	24%	0.13	0.12	8%	1	1.2	FZ-BH11-2D
	Fluoranthene	9.6	0.52	16	25	56%	7.5	12	46%	0.95	1	5%	14	25	FZ-MW11-3
	Fluorene	62	0.047	2.2	4	82%	0.5	0.8	46%	0.031	0.029	7%	0.68	24	FZ-BH11-6D-A
	Indeno(1,2,3-cd)pyrene	0.76	0.08	2.9	<8	Acceptable	1.7	2.1	21%	0.39	0.37	5%	3.1	4	FZ-BH11-2D
	Naphthalene	9.6	0.029	0.79	<3	Acceptable	0.13	0.19	38%	0.028	0.029	4%	0.28	47	FZ-BH11-6D-A
	Perylene	---	0.043	1.3	---	---	0.67	0.88	27%	0.14	0.14	0%	1.3	1.9	FZ-BH11-2D
	Phenanthrene	12	0.44	11	28	155%	4.1	7	52%	0.46	0.47	2%	8	28	DUP 5
	Pyrene	96	0.39	12	20	67%	6	9.4	44%	0.76	0.83	9%	11	20	FZ-MW11-3

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
3	Methylnaphthalene standard applies to the sum of 1- and 2-methylnapthalene.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-4b
Soil Analytical Results, Polycyclic Aromatic Hydrocarbons (PAHs) –Table 9 SCS

	APEC	O.Reg. 153/04 Table 9[1]	APEC 1/ Migration to River	APEC 1/ Migration to River	APEC 1/ Migration to River	APEC 1/ Migration to River	APEC 1/ Migration to River	RPD Analysis	Max Value	
	Soil Description		Cinder & Ash FILL	Cinder & Ash FILL	Sand & Gravel FILL	Cinder & Ash FILL	Cinder & Ash FILL			
	Borehole / Monitoring Well		FZ-BH11-9D	FZ-MW11-4	FZ-MW11-5	FZ-MW11-6	Duplicate of FZ-MW11-6			
	Sample ID		FZ-BH11-9D	FZ-MW11-4	FZ-MW11-5	FZ-MW11-6	DUP-1			
	Sample Depth (m)		0.8-2.2	5.0-5.6	0.6-1.5	2.8-4.1	2.8-4.1			
	Sample Date		10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011			
	Analysis Date		18/08/2011	23/08/2011	20/08/2011	23/08/2011	22/08/2011			
	Laboratory Certificate		B1C2151	B1C2151	B1C2240	B1C2240	B1C2240		Concentration	Sample ID
	% Moisture									
Parameters (µg/g)	1-Methylnaphthalene[3]	0.59	0.16	0.3	0.13	0.99	1.2	19%	1.2	DUP-1
	2-Methylnaphthalene[3]	0.59	0.19	0.51	0.042	1.8	1.9	5%	1.9	DUP-1
	Acenaphthene	0.072	0.38	1.1	0.053	7.4 (2)	2.6	96%	7.4	FZ-MW11-6
	Acenaphthylene	0.093	1.2	2.2	0.22	0.49	0.87	56%	2.2	FZ-MW11-4
	Anthracene	0.22	3.4	8.7 (2)	0.32	16 (2)	12 (2)	29%	16	FZ-MW11-6
	Benzo(a)anthracene	0.36	11 (2)	28 (2)	0.91	22 (2)	17 (2)	26%	28	FZ-MW11-4
	Benzo(a)pyrene	0.3	7.6 (2)	20 (2)	0.97	15 (2)	10 (2)	40%	20	FZ-MW11-4
	Benzo(b)fluoranthene	0.47	6.3 (2)	17 (2)	0.74	13 (2)	8.7 (2)	40%	17	FZ-MW11-4
	Benzo(g,h,i)perylene	0.68	3.6	11 (2)	0.63	8 (2)	4.3	60%	11	FZ-MW11-4
	Benzo(j)fluoranthene	---	3.6	10 (2)	0.41	6.6	4.1	47%	10	FZ-MW11-4
	Benzo(k)fluoranthene	0.48	3.7	11 (2)	0.4	7.6 (2)	4.2	58%	11	FZ-MW11-4
	Chrysene	2.8	11 (2)	27 (2)	0.94	20 (2)	16 (2)	22%	27	FZ-MW11-4
	Dibenz(a,h)anthracene	0.1	1.1	2.9	0.16	2.3	1.4	49%	2.9	FZ-MW11-4
	Fluoranthene	0.69	26 (2)	45 (2)	1.5	53	41	26%	53	FZ-MW11-6
	Fluorene	0.19	0.95	1.9	0.11	8.3 (2)	3.8	74%	8.3	FZ-MW11-6
	Indeno(1,2,3-cd)pyrene	0.23	3.5	11 (2)	0.52	6.7	4.1	48%	11	FZ-MW11-4
	Naphthalene	0.09	0.27	1.4	0.11	4.9	3.2	42%	4.9	FZ-MW11-6
	Perylene	---	1.6	4.1	0.25	3.3	2	49%	4.1	FZ-MW11-4
	Phenanthrene	0.69	17 (2)	21 (2)	1.1	55 (2)	45 (2)	20%	55	FZ-MW11-6
	Pyrene	1	21 (2)	43 (2)	1.5	41 (2)	32 (2)	25%	43	FZ-MW11-4

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
3	Methylnaphthalene standard applies to the sum of 1- and 2-methylnapthalene.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-5a
Soil Analytical Results, Semi-Volatile Organic Compounds (SVOCs) and Phenols –Table 3 SCS

APEC		O.Reg. 153/04 Table 3[1]	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1
Soil Description			Cinder & Ash FILL	Cinder & Ash FILL	Cinder & Ash FILL	Cinder & Ash FILL	Cinder & Ash FILL	Cinder & Ash FILL	Sand & Gravel FILL	Cinder & Ash FILL
Borehole / Monitoring Well			FZ-BH11-1D	FZ-BH11-2D	FZ-BH11-3D	FZ-MW11-4D	FZ-BH11-5D	FZ-BH11-6D	FZ-MW11-1	FZ-MW11-2
Sample ID			FZ-BH11-1D	FZ-BH11-2D	FZ-BH11-3D	FZ-BH11-4D	FZ-BH11-5D-A	FZ-BH11-6D-A	FZ-MW11-1-B	FZ-MW11-2-A
Sample Depth (m)			4.2-4.5	4.1-4.3	1.1-1.5	1.9-2.2	1.0-2.3	3.5-4.1	3.0-3.6	1.1-2.9
Sample Date			10/08/2011	10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011
Analysis Date			15/08/11 - 18/08/2011	16/08/11 - 18/08/2011	16/08/2011	16/08/2011	16/08/11 - 18/08/11	16/08/11 - 18/08/11	16/08/11 - 18/08/11	16/08/2011
Laboratory Certificate			B1C2151	B1C2151	B1C2151	B1C2240	B1C2240	B1C2240	B1C2240	B1C2240
Parameters (µg/g)	1,2,4-Trichlorobenzene	3.2	<0.5	<0.3	<1	<1	<0.5	<0.5	<0.05	<5
	1-Methylnaphthalene	76	<0.3	<0.2	<0.6	<0.6	<0.3	8.1	<0.03	<3
	2,4,5-Trichlorophenol	10	<0.8	<0.4	<2	<2	<0.8	<0.8	<0.08	<8
	2,4,6-Trichlorophenol	3.8	<1	<0.5	<2	<2	<1	<1	<0.1	<10
	2,4-Dichlorophenol	3.4	<1	<0.5	<2	<2	<1	<1	<0.1	<10
	2,4-Dimethylphenol	390	<2	<1	<4	<4	<2	<2	<0.2	<20
	2,4-Dinitrophenol	59	<2	<0.8	<3	<3	<2	<2	<0.2	<20
	2,4-Dinitrotoluene	1.2	<1	<0.5	<2	<2	<1	<1	<0.1	<10
	2,6-Dinitrotoluene	1.2	<1	<0.5	<2	<2	<1	<1	<0.1	<10
	2-Chlorophenol	3.1	<0.8	<0.4	<2	<2	<0.8	<0.8	<0.08	<8
	2-Methylnaphthalene[3]	76	<0.3	<0.2	<0.6	<0.6	<0.3	15	0.04	<3
	3,3'-Dichlorobenzidine	1	<5	<3	<10	<10	<5	<5	<0.5	<50
	Acenaphthene	96	<0.3	<0.2	<0.6	1	<0.3	19	0.09	<3
	Acenaphthylene	0.15	<0.5	<0.3	<1	<1	<0.5	<0.5	<0.05	<5
	Anthracene	0.67	0.6	<0.2	1.5	<0.6	0.5	7.1	0.07	4
	Benzo(a)anthracene	0.96	1	<0.3	3	<1	0.9	3.6	<0.05	6
	Benzo(a)pyrene	0.3	0.7	<0.3	3	<1	0.7	1.2	<0.05	6
	Benzo(b/j)fluoranthene	0.96	<1	<0.5	3	<2	<1	2	<0.1	<10
	Benzo(g,h,i)perylene	9.6	<1	<0.5	<2	<2	<1	<1	<0.1	<10
	Benzo(k)fluoranthene	0.96	0.4	<0.2	1.6	<0.6	0.4	0.9	<0.03	4
	Biphenyl	52	<0.5	<0.3	<1	<1	<0.5	4.9	<0.05	<5
	Bis(2-chloroethyl)ether	0.5	<2	<1	<4	<4	<2	<2	<0.2	<20
	Bis(2-chloroisopropyl)ether	11	<1	<0.5	<2	<2	<1	<1	<0.1	<10
	Bis(2-ethylhexyl)phthalate	28	<10	<5	<20	<20	<10	<10	<1	<100
	Chrysene	9.6	1	<0.3	3	<1	0.9	2.8	<0.05	7
	Dibenz(a,h)anthracene	0.1	<0.5	<0.3	<1	<1	<0.5	<0.5	<0.05	<5
	Diethyl phthalate	0.5	<2	<1	<4	<4	<2	<2	<0.2	<20
	Dimethyl phthalate	0.5	<2	<1	<4	<4	<2	<2	<0.2	<20
	Fluoranthene	9.6	2.2	<0.3	8	<1	1.8	24	0.16	19
	Fluorene	62	0.3	<0.2	<0.6	<0.6	<0.3	23	0.1	6
	Indeno(1,2,3-cd)pyrene	0.76	<0.8	<0.4	<2	<2	<0.8	<0.8	<0.08	<8
	Naphthalene	9.6	0.5	<0.2	<0.6	<0.6	<0.3	42	0.11	<3
	p-Chloroaniline	0.5	<2	<1	<4	<4	<2	<2	<0.2	<20
	Pentachlorophenol	2.9	<1	<0.5	<2	<2	<1	<1	<0.1	<10
	Phenanthrene	12	2.7	<0.3	6	<1	1.9	43	0.38	23
	Phenol	9.4	<0.9	<0.5	<2	<2	<0.9	<0.9	<0.09	<9
	Pyrene	96	1.8	<0.3	7	<1	1.6	16	0.11	15
	Phenols-4AAP		<0.04	<0.04	---	---	<0.04	0.05	<0.04	---

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
3	Methylnaphthalene standard applies to the sum of 1- and 2-methylnapthalene.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-5a
Soil Analytical Results, Semi-Volatile Organic Compounds (SVOCs) and Phenols –Table 3 SCS

APEC		O.Reg. 153/04 Table 3[1]	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1/APEC 2	APEC 1/APEC 2	APEC 1/APEC 2	RPD Analysis	Max Value	
Soil Description			Sand & Gravel FILL	GLACIAL TILL	GLACIAL TILL	Cinder & Ash FILL	GLACIAL TILL	Cinder & Ash FILL	Cinder & Ash FILL			
Borehole / Monitoring Well			FZ-BH11-7D	FZ-BH11-7D	FZ-BH11-7D	FZ-BH11-10D	FZ-BH11-8D	FZ-MW11-3	Duplicate of FZ-MW11-3			
Sample ID			FZ-BH11-7D-A	FZ-BH11-7D-C	FZ-BH11-7D-C Lab-Dup	FZ-BH11-10D-A	FZ-BH11-8D-B	FZ-MW11-3	DUP 5			
Sample Depth (m)			1.0-2.5	6.3-7.5	6.3-7.5	0.9-1.5	3.4-3.9	1.1-2.6	1.1-2.6			
Sample Date			12/08/2011	12/08/2011	12/08/2011	11/08/2011	11/08/2011	12/08/2011	12/08/2011			
Analysis Date			19/08/2011	23/08/2011	23/08/2011	16/08/11 - 18/08/11	16/08/2011	19/08/2011	19/08/2011			
Laboratory Certificate			B1C3566	B1C3566	B1C3566	B1C2240	B1C2240	B1C3566	B1C3566		Concentration	Sample ID
Parameters (µg/g)	1,2,4-Trichlorobenzene	3.2	<0.05	---	---	<3	<0.05	<5	<5	Acceptable	0	
	1-Methylnaphthalene	76	<0.03	---	---	<2	<0.03	<3	<3	Acceptable	8.1	FZ-BH11-6D-A
	2,4,5-Trichlorophenol	10	<0.08	---	---	<4	<0.08	<8	<8	Acceptable	0	
	2,4,6-Trichlorophenol	3.8	<0.1	---	---	<5	<0.1	<10	<10	Acceptable	0	
	2,4-Dichlorophenol	3.4	<0.1	---	---	<5	<0.1	<10	<10	Acceptable	0	
	2,4-Dimethylphenol	390	<0.2	---	---	<10	<0.2	<20	<20	Acceptable	0	
	2,4-Dinitrophenol	59	<0.2	---	---	<8	<0.2	<20	<20	Acceptable	0	
	2,4-Dinitrotoluene	1.2	<0.1	---	---	<5	<0.1	<10	<10	Acceptable	0	
	2,6-Dinitrotoluene	1.2	<0.1	---	---	<5	<0.1	<10	<10	Acceptable	0	
	2-Chlorophenol	3.1	<0.08	---	---	<4	<0.08	<8	<8	Acceptable	0	
	2-Methylnaphthalene[3]	76	<0.03	---	---	<2	<0.03	<3	<3	Acceptable	15	FZ-BH11-6D-A
	3,3'-Dichlorobenzidine	1	<0.5	---	---	<50	<0.5	<50	<50	Acceptable	0	
	Acenaphthene	96	<0.03	---	---	<2	0.04	<3	<3	Acceptable	19	FZ-BH11-6D-A
	Acenaphthylene	0.15	<0.05	---	---	<3	<0.05	<5	<5	Acceptable	0	
	Anthracene	0.67	<0.03	---	---	5	0.1	15	6	86%	15	FZ-MW11-3
	Benzo(a)anthracene	0.96	<0.05	---	---	7	0.18	25	10	86%	25	FZ-MW11-3
	Benzo(a)pyrene	0.3	<0.05	---	---	5	0.14	19	6	104%	19	FZ-MW11-3
	Benzo(b/j)fluoranthene	0.96	<0.1	---	---	7	0.2	22	<10	Not Acceptable	22	FZ-MW11-3
	Benzo(g,h,i)perylene	9.6	<0.1	---	---	<5	<0.1	<10	<10	Acceptable	0	
	Benzo(k)fluoranthene	0.96	<0.03	---	---	3	0.08	10	4	86%	10	FZ-MW11-3
	Biphenyl	52	<0.05	---	---	<3	<0.05	<5	<5	Acceptable	4.9	FZ-BH11-6D-A
	Bis(2-chloroethyl)ether	0.5	<0.2	---	---	<10	<0.2	<20	<20	Acceptable	0	
	Bis(2-chloroisopropyl)ether	11	<0.1	---	---	<5	<0.1	<10	<10	Acceptable	0	
	Bis(2-ethylhexyl)phthalate	28	<1	---	---	<50	<1	<100	<100	Acceptable	0	
	Chrysene	9.6	<0.05	---	---	7	0.18	24	10	82%	24	FZ-MW11-3
	Dibenz(a,h)anthracene	0.1	<0.05	---	---	<3	<0.05	<5	<5	Acceptable	0	
	Diethyl phthalate	0.5	<0.2	---	---	<20	<0.2	<20	<20	Acceptable	0	
	Dimethyl phthalate	0.5	<0.2	---	---	<20	<0.2	<20	<20	Acceptable	0	
	Fluoranthene	9.6	<0.05	---	---	16	0.49	75	25	100%	75	FZ-MW11-3
	Fluorene	62	<0.03	---	---	<2	0.04	4	4	0%	23	FZ-BH11-6D-A
	Indeno(1,2,3-cd)pyrene	0.76	<0.08	---	---	<4	<0.08	<8	<8	Acceptable	0	
	Naphthalene	9.6	<0.03	---	---	<2	0.03	<3	<3	Acceptable	42	FZ-BH11-6D-A
	p-Chloroaniline	0.5	<0.2	---	---	<10	<0.2	<20	<20	Acceptable	0	
	Pentachlorophenol	2.9	<0.1	---	---	<5	<0.1	<10	<10	Acceptable	0	
	Phenanthrene	12	<0.05	---	---	17	0.46	58	28	70%	58	FZ-MW11-3
	Phenol	9.4	<0.09	---	---	<5	<0.09	<9	<9	Acceptable	0	
	Pyrene	96	<0.05	---	---	13	0.38	60	20	100%	60	FZ-MW11-3
	Phenols-4AAP		---	<0.04	<0.04	<0.04	---	---	---	---	0.05	FZ-BH11-6D-A

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
3	Methylnaphthalene standard applies to the sum of 1- and 2-methylnapthalene.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-5b
Soil Analytical Results, Semi-Volatile Organic Compounds (SVOCs) and Phenols –Table 9 SCS

		O.Reg. 153/04 Table 9[1]						RPD Analysis
APEC			APEC 1/ Migration to River	APEC 1/ Migration to River	APEC 1/ Migration to River	APEC 1/ Migration to River	APEC 1/ Migration to River	
Soil Description			Cinder & Ash FILL	Cinder & Ash FILL	Sand & Gravel FILL	Cinder & Ash FILL	Cinder & Ash FILL	
Borehole / Monitoring Well			FZ-BH11-9D	FZ-MW11-4	FZ-MW11-5	FZ-MW11-6	Duplicate of FZ-MW11-6	
Sample ID			FZ-BH11-9D	FZ-MW11-4	FZ-MW-5	FZ-MW11-6	DUP-1	
Sample Depth (m)			0.8-2.2	5.6-6.0	0.6-1.5	2.8-4.1	2.8-4.1	
Sample Date			10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011	
Analysis Date			16/08/11 - 18/08/11	18/08/2011	18/08/2011	18/08/2011	18/08/2011	
Laboratory Certificate			B1C2151	B1C2151	B1C2240	B1C2240	B1C2240	
Parameters (µg/g)	1,2,4-Trichlorobenzene	0.05	<1	---	---	---	---	---
	1-Methylnaphthalene	0.59	<0.6	---	---	---	---	---
	2,4,5-Trichlorophenol	0.1	<2	---	---	---	---	---
	2,4,6-Trichlorophenol	0.1	<2	---	---	---	---	---
	2,4-Dichlorophenol	0.1	<2	---	---	---	---	---
	2,4-Dimethylphenol	0.2	<4	---	---	---	---	---
	2,4-Dinitrophenol	2	<3	---	---	---	---	---
	2,4-Dinitrotoluene	0.5	<2	---	---	---	---	---
	2,6-Dinitrotoluene	0.5	<2	---	---	---	---	---
	2-Chlorophenol	0.1	<2	---	---	---	---	---
	2-Methylnaphthalene[3]	0.59	<0.6	---	---	---	---	---
	3,3'-Dichlorobenzidine	1	<10	---	---	---	---	---
	Acenaphthene	0.072	<0.6	---	---	---	---	---
	Acenaphthylene	0.093	<1	---	---	---	---	---
	Anthracene	0.22	<0.6	---	---	---	---	---
	Benzo(a)anthracene	0.36	1	---	---	---	---	---
	Benzo(a)pyrene	0.3	<1	---	---	---	---	---
	Benzo(b/j)fluoranthene	0.47	<2	---	---	---	---	---
	Benzo(g,h,i)perylene	0.68	<2	---	---	---	---	---
	Benzo(k)fluoranthene	0.48	<0.6	---	---	---	---	---
	Biphenyl	0.05	<1	---	---	---	---	---
	Bis(2-chloroethyl)ether	0.5	<4	---	---	---	---	---
	Bis(2-chloroisopropyl)ether	0.5	<2	---	---	---	---	---
	Bis(2-ethylhexyl)phthalate	5	<20	---	---	---	---	---
	Chrysene	2.8	1	---	---	---	---	---
	Dibenz(a,h)anthracene	0.1	<1	---	---	---	---	---
	Diethyl phthalate	0.5	<4	---	---	---	---	---
	Dimethyl phthalate	0.5	<4	---	---	---	---	---
	Fluoranthene	0.69	2	---	---	---	---	---
	Fluorene	0.19	<0.6	---	---	---	---	---
	Indeno(1,2,3-cd)pyrene	0.23	<2	---	---	---	---	---
	Naphthalene	0.09	<0.6	---	---	---	---	---
	p-Chloroaniline	0.5	<4	---	---	---	---	---
	Pentachlorophenol	0.1	<2	---	---	---	---	---
	Phenanthrene	0.69	1	---	---	---	---	---
	Phenol	0.5	<2	---	---	---	---	---
	Pyrene	1	2	---	---	---	---	---
	Phenols-4AAP		<0.04	<0.04	<0.04	<0.04	<0.04	Acceptable

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
3	Methylnaphthalene standard applies to the sum of 1- and 2-methylnapthalene.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-6a
Soil Analytical Results, Volatile Organic Compounds (VOCs) –Table 3 SCS

APEC		O.Reg. 153/04 Table 3[1]	APEC 1	APEC 1	APEC 1	Max Value	
Soil Description			Cinder & Ash FILL	GLACIAL TILL	GLACIAL TILL		
Borehole / Monitoring Well			FZ-BH11-4D	FZ-MW11-2	FZ-BH11-7D		
Sample ID			FZ-BH11-4D	FZ-MW11-2-B	FZ-BH11-7D-B		
Sample Depth (m)			3.6-4.5	2.9-3.0	2.5-3.0		
Sample Date			11/08/2011	11/08/2011	12/08/2011		
Analysis Date			18/08/2011	19/08/2011	19/08/2011		
Laboratory Certificate			B1C2240	B1C2240	B1C3566		
% Moisture					9.3	Concentration	Sample ID
Parameters (µg/g)	Acetone (2-Propanone)	16	<2	<0.5	<0.5	<2	FZ-BH11-4D
	Benzene	0.32	0.12	<0.02	<0.02	0.12	
	Bromodichloromethane	18	<0.2	<0.05	<0.05	<0.2	
	Bromoform	0.61	<0.2	<0.05	<0.05	<0.2	
	Bromomethane	0.05	<0.2	<0.05	<0.05	<0.2	
	Carbon Tetrachloride	0.21	<0.2	<0.05	<0.05	<0.2	
	Chlorobenzene	2.4	<0.2	<0.05	<0.05	<0.2	
	Chloroform	0.47	<0.2	<0.05	<0.05	<0.2	
	Dibromochloromethane	13	<0.2	<0.05	<0.05	<0.2	
	1,2-Dichlorobenzene	6.8	<0.2	<0.05	<0.05	<0.2	
	1,3-Dichlorobenzene	9.6	<0.2	<0.05	<0.05	<0.2	
	1,4-Dichlorobenzene	0.2	<0.2	<0.05	<0.05	<0.2	
	Dichlorodifluoromethane (FREON 12)	16	<0.2	<0.05	<0.05	<0.2	
	1,1-Dichloroethane	17	<0.2	<0.05	<0.05	<0.2	
	1,2-Dichloroethane	0.05	<0.2	<0.05	<0.05	<0.2	
	1,1-Dichloroethylene	0.064	<0.2	<0.05	<0.05	<0.2	
	cis-1,2-Dichloroethylene	55	<0.2	<0.05	<0.05	<0.2	
	trans-1,2-Dichloroethylene	1.3	<0.2	<0.05	<0.05	<0.2	
	1,2-Dichloropropane	0.16	<0.2	<0.05	<0.05	<0.2	
	cis-1,3-Dichloropropene	0.18	<0.09	<0.03	<0.03	<0.09	
	trans-1,3-Dichloropropene	0.18	<0.1	<0.04	<0.04	<0.1	
	Ethylbenzene	9.5	0.16	<0.02	<0.02	0.16	
	Ethylene Dibromide	0.05	<0.2	<0.05	<0.05	<0.2	
	Hexane	46	0.4	<0.05	<0.05	0.4	
	Methylene Chloride(Dichloromethane)	1.6	<0.2	<0.05	<0.05	<0.2	
	Methyl Isobutyl Ketone	31	<2	<0.5	<0.5	<2	
	Methyl Ethyl Ketone (2-Butanone)	70	<2	<0.5	<0.5	<2	
	Methyl t-butyl ether (MTBE)	11	<0.2	<0.05	<0.05	<0.2	
	Styrene	34	<0.2	<0.05	<0.05	<0.2	
	1,1,1,2-Tetrachloroethane	0.087	<0.2	<0.05	<0.05	<0.2	
	1,1,2,2-Tetrachloroethane	0.05	<0.2	<0.05	<0.05	<0.2	
	Tetrachloroethylene	4.5	<0.2	<0.05	<0.05	<0.2	
	Toluene	68	0.4	<0.02	<0.02	0.4	
	1,1,1-Trichloroethane	6.1	<0.2	<0.05	<0.05	<0.2	
	1,1,2-Trichloroethane	0.05	<0.2	<0.05	<0.05	<0.2	
	Trichloroethylene	0.91	<0.2	<0.05	<0.05	<0.2	
	Vinyl Chloride	0.032	<0.06	<0.02	<0.02	<0.06	
	p+m-Xylene	---	0.49	<0.02	<0.02	0.49	
	o-Xylene	---	0.3	<0.02	<0.02	0.3	
	Xylene (Total)	26	0.79	<0.02	<0.02	0.79	
	Trichlorofluoromethane (FREON 11)	4	<0.2	<0.05	<0.05	<0.2	

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-6b
Soil Analytical Results, Volatile Organic Compounds (VOCs) –Table 9 SCS

APEC		O.Reg. 153/04 Table 9[1]	APEC 1/ Migration to River
Soil Description			**Cinder & Ash FILL**
Borehole / Monitoring Well			**FZ-BH11-9D**
Sample ID			**FZ-BH11-9D**
Sample Depth (m)			0.8-2.2
Sample Date			10/08/2011
Analysis Date			22/08/2011
Laboratory Certificate			B1C2151
% Moisture			16.0
Parameters (µg/g)	Acetone (2-Propanone)	0.5	<0.5
	Benzene	0.02	<0.02
	Bromodichloromethane	0.05	<0.05
	Bromoform	0.05	<0.05
	Bromomethane	0.05	<0.05
	Carbon Tetrachloride	0.05	<0.05
	Chlorobenzene	0.05	<0.05
	Chloroform	0.05	<0.05
	Dibromochloromethane	0.05	<0.05
	1,2-Dichlorobenzene	0.05	<0.05
	1,3-Dichlorobenzene	0.05	<0.05
	1,4-Dichlorobenzene	0.05	<0.05
	Dichlorodifluoromethane (FREON 12)	0.05	<0.05
	1,1-Dichloroethane	0.05	<0.05
	1,2-Dichloroethane	0.05	<0.05
	1,1-Dichloroethylene	0.05	<0.05
	cis-1,2-Dichloroethylene	0.05	<0.05
	trans-1,2-Dichloroethylene	0.05	<0.05
	1,2-Dichloropropane	0.05	<0.05
	cis-1,3-Dichloropropene	0.05	<0.03
	trans-1,3-Dichloropropene	0.05	<0.04
	Ethylbenzene	0.05	<0.02
	Ethylene Dibromide	0.05	<0.05
	Hexane	0.05	<0.05
	Methylene Chloride(Dichloromethane)	0.05	<0.05
	Methyl Isobutyl Ketone	0.5	<0.5
	Methyl Ethyl Ketone (2-Butanone)	0.5	<0.5
	Methyl t-butyl ether (MTBE)	0.05	<0.05
	Styrene	0.05	<0.05
	1,1,1,2-Tetrachloroethane	0.05	<0.05
	1,1,2,2-Tetrachloroethane	0.05	<0.05
	Tetrachloroethylene	0.05	<0.05
	Toluene	0.2	0.04
	1,1,1-Trichloroethane	0.05	<0.05
	1,1,2-Trichloroethane	0.05	<0.05
	Trichloroethylene	0.05	<0.05
	Vinyl Chloride	0.02	<0.02
	p+m-Xylene	---	0.03
	o-Xylene	---	0.03
	Xylene (Total)	0.05	0.05
	Trichlorofluoromethane (FREON 11)	0.25	<0.05

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-7
Soil Analytical Results, Leachable Metals and BTEX

			O.Reg. 347 Schedule 4 Criteria[1]						
APEC				**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1**	**APEC 1/Migration to River**	**APEC 1/Migration to River**
Soil Description				**Cinder & Ash FILL**	**Sand & Gravel FILL**	**GLACIAL TILL**	**GLACIAL TILL**	**Sand & Gravel FILL**	**Sand & Gravel FILL**
Borehole / Monitoring Well				**FZ-BH11-4D**	**FZ-MW11-1**	**FZ-BH11-7D**	**FZ-BH11-7D**	**FZ-MW11-5**	**FZ-MW11-6**
Sample ID				**FZ-BH11-4D**	**FZ-MW11-1-A**	**FZ-BH11-7D-C**	**FZ-BH11-7D-C Lab-Dup**	**FZ-MW11-5**	**FZ-MW11-6**
Sample Depth				3.6-4.5	1.9-2.2	6.3-7.5	6.3-7.5	0.6-1.5	0.7-2.1
Sample Date				11/08/2011	11/08/2011	12/08/2011	12/08/2011	11/08/2011	11/08/2011
Analysis Date				17/08/11 - 19/08/11	17/08/11 - 19/08/11	22/08/2011	22/08/2011	19/08/2011	19/08/2011
Laboratory Certificate				B1C2240	B1C2240	B1C3566	B1C3566	B1C2240	B1C2240
APEC				APEC 1	APEC 1	APEC 1	APEC 1	Migration to River	Migration to River
Parameters	**Calculated Parameters**								
	TCLP - % Solids	%	---	100	100	100	---	---	---
	TCLP Extraction Fluid	N/A	---	FLUID 1	FLUID 1	FLUID 2	---	---	---
	Total Organic Carbon	mg/kg	---	---	---	---	---	26000	120000
	Total Organic Carbon (repeat #1)	mg/kg	---	---	---	---	---	26000	130000
	Total Organic Carbon (repeat #2)	mg/kg	---			---	---	27000	130000
	Metals								
	Leachable Mercury (Hg)	mg/L	0.1	<0.001	<0.001	<0.001	---	---	---
	Leachable Arsenic (As)	mg/L	2.5	<0.2	<0.2	<0.2	---	---	---
	Leachable Barium (Ba)	mg/L	100	0.9	0.4	1.1	---	---	---
	Hot Water Ext. Boron (B)	ug/g	---	---	---	---	---	---	---
	Leachable Boron (B)	mg/L	500	0.2	0.2	0.2	---	---	---
	Leachable Cadmium (Cd)	mg/L	0.5	<0.05	<0.05	<0.05	---	---	---
	Leachable Chromium (Cr)	mg/L	5	<0.1	<0.1	<0.1	---	---	---
	Leachable Lead (Pb)	mg/L	5	<0.1	<0.1	<0.1	---	---	---
	Leachable Selenium (Se)	mg/L	1	<0.1	<0.1	<0.1	---	---	---
	Leachable Silver (Ag)	mg/L	5	<0.01	<0.01	<0.01	---	---	---
	Leachable Uranium (U)	mg/L	10	<0.01	<0.01	<0.01	---	---	---
	BTEX & F1 Hydrocarbons								
	Leachable (ZHE) Benzene	ug/L	0.5	<0.8	<0.8	<0.8	<0.8	---	---
	Leachable (ZHE) Toluene	ug/L	---	<0.8	<0.8	<0.8	<0.8	---	---
	Leachable (ZHE) Ethylbenzene	ug/L	---	<0.8	<0.8	<0.8	<0.8	---	---
	Leachable (ZHE) o-Xylene	ug/L	---	<0.8	<0.8	<0.8	<0.8	---	---
	Leachable (ZHE) p+m-Xylene	ug/L	---	<2	<2	<2	<2	---	---
	Leachable (ZHE) Total Xylenes	ug/L	---	<2	<2	<2	<2	---	---
	Leachable (ZHE) F1 (C6-C10)	ug/L	---	---		<1000	<1000	---	---
	Leachable (ZHE) F1 (C6-C10) - BTEX	ug/L	---	---		<1000	<1000	---	---
	Surrogate Recovery (%)								
	Leachable (ZHE) 1,4-Difluorobenzene	%	---	103	103	100	100	---	---
	Leachable (ZHE) 4-Bromofluorobenzene	%	---	113	111	99	102	---	---
	Leachable (ZHE) D10-Ethylbenzene	%	---	101	107	97	98	---	---
	Leachable (ZHE) D4-1,2-Dichloroethane	%	---	102	103	99	100	---	---

Notes:

1	Ontario Regulation 347, Schedule 4 Leachate Quality Criteria.
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances of O.Reg 347 Schedule 4 Leachate Quality Criteria.

Table C-8
Soil Analytical Results, Fraction of Organic Carbon (FOC)

APEC		**APEC 1/Migration to River**	**APEC 1/Migration to River**	**Max Value**	
Soil Description		**Sand & Gravel FILL**	**Sand & Gravel FILL**		
Borehole / Monitoring Well		**FZ-MW11-5**	**FZ-MW11-6**		
Sample ID		**FZ-MW11-5**	**FZ-MW11-6**		
Sample Depth (m)		0.6-1.5	0.7-2.1		
Sample Date		11/08/2011	11/08/2011		
Analysis Date		19/08/2011	19/08/2011		
Laboratory Certificate		B1C2240	B1C2240	**Concentration**	**Sample ID**
Parameters (g/g)	Fraction of Organic Carbon (Rep. 1)	0.026	0.12	0.12	FZ- MW11-6
	Fraction of Organic Carbon (Rep. 2)	0.026	0.13	0.13	FZ- MW11-6
	Fraction of Organic Carbon (Rep. 3)	0.027	0.13	0.13	FZ- MW11-6
	Fraction of Organic Carbon (average)	0.026	0.13	0.13	FZ- MW11-6

Table C-9
Soil Analytical Results, Grain Size

APEC		APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 1	APEC 2	APEC 3
Soil Description		**GLACIAL TILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**	**GLACIAL TILL**	**Cinder & Ash FILL**	**Sand & Gravel FILL**	**Sand & Gravel FILL**	**Cinder & Ash FILL**	**Cinder & Ash FILL**
Borehole / Monitoring Well		**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-5D-A**	**FZ-MW11-2A**	**FZ-MW11-2-B**	**FZ-BH11-4D**	**FZ-BH11-7D-A**	**FZ-BH11-7D-A**	**FZ-MW11-3**	**FZ-BH11-1S**
Sample ID		**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-5D-A**	**FZ-MW11-2-A**	**FZ-MW11-2-B**	**FZ-BH11-4D**	**FZ-BH11-7D-A**	**FZ-BH11-7D-A Lab-Dup**	**FZ-MW11-3**	**FZ-BH11-1S**
Sample Depth (m)		6.6-7.5	4.0-4.3	1.0-2.3	1.1-2.9	2.9-3.0	3.6-4.5	0.9-2.5	0.9-2.5	1.1-2.6	1.0-1.5
Sample Date		10/08/2011	10/08/2011	11/08/2011	11/08/2011	11/08/2011	11/08/2011	12/08/2011	12/08/2011	12/08/2011	12/08/2011
Analysis Date		22/08/2011	22/08/2011	22/08/2011	22/08/2011	22/08/2011	24/08/2011	24/08/2011	24/08/2011	24/08/2011	24/08/2011
Laboratory Certificate		B1C2151	B1C2151	B1C2240	B1C2240	B1C2240	B1C3566	B1C3566	B1C3566	B1C3566	B1C3566
Parameters (%)	Grain Size	FINE	COARSE	COARSE	COARSE	FINE	COARSE	COARSE	COARSE	COARSE	COARSE
	Sieve - #200 (<0.075mm)	55	21	38	35	62	41	9.7	9.9	40	48
	Sieve - #200 (>0.075mm)	45	79	62	65	38	59	90	90	60	52

Table C-10a
Ground Water Analytical Results, Petroleum Hydrocarbons (PHCs) –Table 3 SCS

APEC		O.Reg. 153/04 Table 3^1	APEC 1	APEC 1	APEC 1	APEC 1/ APEC 2	APEC 1/ APEC 2		Max Value	
Borehole / Monitoring Well			**BH00-5**	**FZ-MW11-1**	**FZ-MW11-2**	**BH00-4**	**FZ-MW11-3**	**TRIP BLANK 3099**		
Sample ID			**BH00-5**	**FRMW11-1**	**FRMW11-2**	**BH00-4**	**MW11-3**	**TRIP BLANK 3099**		
Sample Date			18/08/2011	02/09/2011	02/09/2011	19/08/2011	19/08/2011	20/08/2011		
Analysis Date			24/08/2011	02/09/11 & 06/09/11	02/09/11 & 06/09/11	24/08/2011	24/08/2011	25/08/2011		
Laboratory Certificate			B1C7456	B1D5027	B1D5027	B1C7456	B1C7456	B1C7456	**Concentration**	**Sample ID**
Parameters (µg/L)	Benzene	44	---	<0.20	<0.20	---	<0.20	---	<0.20	FZ-MW11-1 to FZ-MW11-3
	Toluene	18000	---	<0.20	<0.20	---	0.24	---	0.24	FZ-MW11-3
	Ethylbenzene	2300	---	<0.20	<0.20	---	<0.20	---	<0.20	FZ-MW11-1 to FZ-MW11-3
	m,p-Xylenes	---	---	<0.20	<0.20	---	<0.20	---	<0.20	FZ-MW11-1 to FZ-MW11-3
	o-Xylenes	---	---	<0.40	<0.40	---	<0.40	---	<0.40	FZ-MW11-1 to FZ-MW11-3
	Total Xylenes	4200	---	<0.40	<0.40	---	<0.40	---	<0.40	FZ-MW11-1 to FZ-MW11-3
	PHC fraction F1 (C6-C10)	---	<25	<25	<25	<25	<25	<25	<25	BH00-5 to FZ-MW11-3
	PHC fraction F1 (C6-C10) - BTEX	750	<25	<25	<25	<25	<25	<25	<25	BH00-5 to FZ-MW11-3
	PHC fraction F2 (C10-C16)	150	<100	<100	<100	<100	<100	---	<100	BH00-5 to FZ-MW11-3
	PHC fraction F3 (C16-C34)	500	<100	<100	<100	<100	<100	---	<100	BH00-5 to FZ-MW11-3
	PHC fraction F4 (C34-C50)	500	<100	<100	<100	<100	<100	---	<100	BH00-5 to FZ-MW11-3
	Chromatogram to baseline at nC50		Yes	Yes	Yes	Yes	Yes	---	---	---

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-10b
Ground Water Analytical Results, Petroleum Hydrocarbons (PHCs) –Table 9 SCS

APEC		O.Reg. 153/04 Table 9[1]	APEC 1 /Migration to River	APEC 4 / Migration to River	APEC 4 / Migration to River	RDP Analysis	Max Value	
Borehole / Monitoring Well			FZ-MW11-4	CH-MW01-2	Duplicate of CHMW01-2			
Sample ID			MW11-4	CH-MW01-2	MW11-DUP1			
Sample Date			17/08/2011	18/08/2011	18/08/2011			
Analysis Date			24/08/2011	25/08/2011	25/08/2011			
Laboratory Certificate			B1C7456	B1C7456	B1C7456		Concentration	Sample ID
Parameters (µg/L)	Benzene	44	<0.20	<0.20	<0.20	Acceptable	<0.20	FZ-MW11-4 to Duplicate of CH-MW01-2
	Toluene	14000	0.27	<0.20	<0.20	Acceptable	0.27	FZ-MW11-4
	Ethylbenzene	1800	<0.20	<0.20	<0.20	Acceptable	<0.20	FZ-MW11-4 to Duplicate of CH-MW01-2
	m,p-Xylenes	---	<0.20	<0.20	<0.20	Acceptable	<0.20	FZ-MW11-4 to Duplicate of CH-MW01-2
	o-Xylenes	---	<0.40	<0.40	<0.40	Acceptable	<0.40	FZ-MW11-4 to Duplicate of CH-MW01-2
	Total Xylenes	3300	<0.40	<0.40	<0.40	Acceptable	<0.40	FZ-MW11-4 to Duplicate of CH-MW01-2
	PHC fraction F1 (C6-C10)	420	<25	<25	<25	Acceptable	<25	FZ-MW11-4 to Duplicate of CH-MW01-2
	PHC fraction F1 (C6-C10) - BTEX	420	<25	<25	<25	Acceptable	<25	FZ-MW11-4 to Duplicate of CH-MW01-2
	PHC fraction F2 (C10-C16)	150	<100	<100	<100	Acceptable	<100	FZ-MW11-4 to Duplicate of CH-MW01-2
	PHC fraction F3 (C16-C34)	500	<100	<100	<100	Acceptable	<100	FZ-MW11-4 to Duplicate of CH-MW01-2
	PHC fraction F4 (C34-C50)	500	<100	<100	<100	Acceptable	<100	FZ-MW11-4 to Duplicate of CH-MW01-2
	Chromatogram to baseline at nC50		Yes	Yes	Yes	Acceptable	---	---

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-11a
Ground Water Analytical Results, Metals –Table 3 SCS

APEC		O.Reg. 153/04 Table 3[1]	APEC 1	APEC 1	APEC 1	APEC 1/ APEC 2	APEC1/APEC 2	APEC 4	Max Value	
Borehole / Monitoring Well			BH00-5	FZ-MW11-1	FZ-MW11-2	BH00-4	FZ-MW11-3	CH-MW01-1		
Sample ID			BH00-5	FRMW11-1	FRMW11-2	BH00-4	MW11-3	CHMW01-1		
Sample Date			18/08/2011	02/09/2011	02/09/2011	19/08/2011	19/08/2011	19/08/2011		
Analysis Date			25/08/11 - 29/08/11	06/09/11 - 07/09/11	06/09/11 - 07/09/11	25/08/11 - 29/08/11	25/08/11 - 29/08/11	25/08/11 - 29/08/11		
Laboratory Certificate			B1C7456	B1D5027	B1D5027	B1C7456	B1C7456	B1C7456	Concentration	Sample ID
Parameters (µg/L)	Dissolved Cesium (Cs)	---	<0.2	---	---	<0.2	<0.2	<0.2	<0.2	BH00-5 to CH-MW01-1
	Dissolved Rubidium (Rb)	---	0.4	---	---	1.1	5.9	0.8	0.8	CH-MW01-1
	Dissolved Antimony (Sb)	20000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	BH00-5 to CH-MW01-1
	Dissolved Arsenic (As)	1900	<1	2	1	<2 (2)	<2 (2)	<2 (2)	2	FZ-MW11-1
	Dissolved Barium (Ba)	29000	290	110	1200	69	21	210	1200	FZ-MW11-2
	Dissolved Beryllium (Be)	67	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	BH00-5 to CH-MW01-1
	Dissolved Boron (B)	45000	91	320	50	370	200	200	370	BH00-4
	Dissolved Cadmium (Cd)	2.7	<0.1	<0.1	0.1	0.2	<0.1	0.1	0.2	BH00-4
	Dissolved Chromium (Cr)	810	<5	<5	<5	<5	<5	<5	<5	BH00-5 to CH-MW01-1
	Chromium (VI)	140	<5	<5	<5	<5	<5	<5	<5	BH00-5 to CH-MW01-1
	Dissolved Cobalt (Co)	66	2 (2)	4	1	2 (2)	<0.5	<1 (2)	4	FZ-MW11-1
	Dissolved Copper (Cu)	87	<1	1	<1	2	<1	2	2	BH00-4, CH-MW01-1
	Dissolved Lead (Pb)	25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	BH00-5 to CH-MW01-1
	Mercury (Hg)	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	BH00-5 to CH-MW01-1
	Dissolved Molybdenum (Mo)	9200	1.8	18	21	1.6	2.5	<0.5	21	FZ-MW11-2
	Dissolved Nickel (Ni)	490	2 (2)	5	7	10 (2)	<1	3 (2)	10	BH00-4
	Dissolved Selenium (Se)	63	<2	2	2	<2	<2	9	9	CH-MW01-1
	Dissolved Silver (Ag)	1.5	<0.1	<0.1	<0.1	0.1	0.2	0.5	0.5	CH-MW01-1
	Dissolved Sodium (Na)	2300000	460000	220000	270000	820000	720000	550000	820000	BH00-4
	Dissolved Thallium (Tl)	510	<0.05	<0.05	<0.05	0.07	<0.05	0.06	0.07	BH00-4
	Dissolved Uranium (U)	420	2.9	1.7	2.6	4.3	0.2	2	2	BH00-4
	Dissolved Vanadium (V)	250	1	1.5	3.1	<1 (2)	<1 (2)	<1 (2)	3.1	FZ-MW11-2
	Dissolved Zinc (Zn)	1100	<5	19	<5	<5	<5	<5	19	FZ-MW11-1

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-11b
Ground Water Analytical Results, Metals –Table 9 SCS

APEC		O.Reg. 153/04 Table 9[1]	APEC 1 /Migration to River	APEC 1 /Migration to River	APEC 1 /Migration to River	APEC 4/ Migration to River	APEC 4/ Migration to River	RPD Analysis	Max Value	
Borehole / Monitoring Well			**FZ-MW11-5**	**FZ-MW11-4**	**FZ-MW11-6**	**CH-MW01-2**	**Duplicate of CH-MW01-2**			
Sample ID			**F2-MW11-5**	**MW11-4**	**F2-MW11-6**	**CHMW01-2**	**MW11-DUP1**			
Sample Date			21/08/2011	17/08/2011	20/08/2011	18/08/2011	18/08/2011			
Analysis Date			25/08/11 - 29/08/11	25/08/11 - 29/08/11	25/08/11 - 29/08/11	25/08/11 - 29/08/11	25/08/11 - 29/08/11			
Laboratory Certificate			B1C7456	B1C7456	B1C7456	B1C7456	B1C7456		**Concentration**	**Sample ID**
Parameters (µg/L)	Dissolved Cesium (Cs)	---	<0.2	<0.2	<0.2	<0.2	<0.2	Acceptable	<0.2	FZ-MW11-5 to Duplicate of CH-MW01-2
	Dissolved Rubidium (Rb)	---	2.6	15	1.7	45	46	2%	46	Duplicate of CH-MW01-2
	Dissolved Antimony (Sb)	16000	<0.5	<0.5	<0.5	<0.5	<0.5	Acceptable	<0.5	FZ-MW11-5 to Duplicate of CH-MW01-2
	Dissolved Arsenic (As)	1500	<1	<1	<2 (2)	2	2	0%	2	CH-MW01-2, Duplicate of CH-MW01-2
	Dissolved Barium (Ba)	23000	120	69	150	120	120	0%	150	FZ-MW11-6
	Dissolved Beryllium (Be)	53	<0.5	<0.5	<0.5	<0.5	<0.5	Acceptable	<0.5	FZ-MW11-5 to Duplicate of CH-MW01-2
	Dissolved Boron (B)	36000	170	710	91	420	420	0%	710	FZ-MW11-4
	Dissolved Cadmium (Cd)	2.1	0.1	<0.1	0.1	<0.1	<0.1	Acceptable	0.1	FZ-MW11-6
	Dissolved Chromium (Cr)	640	<5	<5	<5	<5	<5	Acceptable	<5	FZ-MW11-5 to Duplicate of CH-MW01-2
	Chromium (VI)	110	<5	<5	<5	<5	<5	Acceptable	<5	FZ-MW11-5 to Duplicate of CH-MW01-2
	Dissolved Cobalt (Co)	52	1 (2)	<1 (2)	7 (2)	<0.5	<0.5	Acceptable	7	FZ-MW11-6
	Dissolved Copper (Cu)	69	3	<1	2	<1	<1	Acceptable	3	FZ-MW11-5
	Dissolved Lead (Pb)	20	<0.5	1.3	<0.5	<0.5	<0.5	Acceptable	1.3	FZ-MW11-4
	Mercury (Hg)	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	Acceptable	<0.1	FZ-MW11-5 to Duplicate of CH-MW01-2
	Dissolved Molybdenum (Mo)	7300	12	1.3	6.5	0.9	1	11%	12	FZ-MW11-5
	Dissolved Nickel (Ni)	390	13	<2 (2)	8 (2)	<1	<1	Acceptable	13	FZ-MW11-5
	Dissolved Selenium (Se)	50	<2	<2	<2	<2	<2	Acceptable	<2	FZ-MW11-5 to Duplicate of CH-MW01-2
	Dissolved Silver (Ag)	1.2	<0.1	0.2	<0.1	<0.1	<0.1	Acceptable	0.2	FZ-MW11-4
	Dissolved Sodium (Na)	1800000	350000	390000	580000	300000	300000	0%	580000	FZ-MW11-6
	Dissolved Thallium (Tl)	400	<0.05	<0.05	<0.05	<0.05	<0.05	Acceptable	<0.05	FZ-MW11-5 to Duplicate of CH-MW01-2
	Dissolved Uranium (U)	330	7.3	2.3	4.1	0.4	0.4	0%	7.3	FZ-MW11-5
	Dissolved Vanadium (V)	200	<0.5	1.3	<1 (2)	1.6	1.6	0%	1.6	CH-MW01-2, Duplicate of CH-MW01-2
	Dissolved Zinc (Zn)	890	20	15	6	<5	<5	Acceptable	20	FZ-MW11-5

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-12a
Ground Water Analytical Results, Polycyclic Aromatic Hydrocarbons (PAHs) –Table 3 SCS

APEC		**O.Reg. 153/04 Table 3[1]**	**APEC 1**	**APEC 1**	**APEC 1/ APEC 2**	**APEC 1/ APEC 2**	**Max Value**	
Borehole / Monitoring Well			**FZ-MW11-1**	**FZ-MW11-2**	**BH00-4**	**FZ-MW11-3**		
Sample ID			**FRMW11-1**	**FRMW11-2**	**BH00-4**	**MW11-3**		
Sample Date			02/09/2011	02/09/2011	19/08/2011	19/08/2011		
Analysis Date			06/09/2011	06/09/2011	26/08/2011	26/08/2011		
Laboratory Certificate			B1D5027	B1D5027	B1C7456	B1C7456	**Concentration**	**Sample ID**
Parameters (µg/L)	Acenaphthene	600	<0.05	<0.05	<0.05	<0.05	<0.05	FZ-MW11-1 to FZ-MW11-3
	Acenaphthylene	1.8	<0.05	<0.05	<0.05	<0.05	<0.05	
	Anthracene	2.4	<0.05	<0.05	<0.05	<0.05	<0.05	
	Benzo(a)anthracene	4.7	<0.05	<0.05	<0.05	<0.05	<0.05	
	Benzo(a)pyrene	0.81	<0.01	<0.01	<0.01	<0.01	<0.01	
	Benzo(b/j)fluoranthene	0.75	<0.05	<0.05	<0.05	<0.05	<0.05	
	Benzo(g,h,i)perylene	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	
	Benzo(k)fluoranthene	0.4	<0.05	<0.05	<0.05	<0.05	<0.05	
	Chrysene	1	<0.05	<0.05	<0.05	<0.05	<0.05	
	Dibenz(a,h)anthracene	0.52	<0.1	<0.1	<0.1	<0.1	<0.1	
	Fluoranthene	130	<0.05	<0.05	<0.05	<0.05	<0.05	
	Fluorene	400	<0.05	<0.05	<0.05	<0.05	<0.05	
	Indeno(1,2,3-cd)pyrene	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	
	1-Methylnaphthalene[3]	1800	<0.05	<0.05	<0.05	<0.05	<0.05	
	2-Methylnaphthalene[3]	1800	<0.05	<0.05	<0.05	<0.05	<0.05	
	Naphthalene	1400	<0.05	<0.05	<0.05	<0.05	<0.05	
	Phenanthrene	580	<0.03	<0.03	<0.03	<0.03	<0.03	
	Pyrene	68	<0.05	<0.05	<0.05	<0.05	<0.05	

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
3	Methylnaphthalene standard applies to the sum of 1- and 2-
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-12b
Ground Water Analytical Results, Polycyclic Aromatic Hydrocarbons (PAHs) –Table 9 SCS

APEC		**O.Reg. 153/04 Table 9[1]**	**APEC 1/Migration to River**	**APEC 1/Migration to River**	**Max Value**	
Borehole / Monitoring Well			**FZ-MW11-4**	**FZ-MW11-6**		
Sample ID			**MW11-4**	**F2-MW11-6-B**		
Sample Date			17/08/2011	25/08/2011		
Analysis Date			26/08/2011	30/08/2011		
Laboratory Certificate			B1C7456	B1D0755	**Concentration**	**Sample ID**
Parameters (µg/L)	Acenaphthene	600	<0.05	<0.05	<0.05	FZ-MW11-4 to FZ-MW11-6-B
	Acenaphthylene	1.4	<0.05	<0.05	<0.05	FZ-MW11-4 to FZ-MW11-6-B
	Anthracene	1	0.11	<0.05	0.11	FZ-MW11-4
	Benzo(a)anthracene	1.8	0.29	<0.05	0.29	FZ-MW11-4
	Benzo(a)pyrene	0.81	0.25	0.02	0.25	FZ-MW11-4
	Benzo(b/j)fluoranthene	0.75	0.31	<0.05	0.31	FZ-MW11-4
	Benzo(g,h,i)perylene	0.2	0.1	<0.1	0.1	FZ-MW11-4
	Benzo(k)fluoranthene	0.4	0.13	<0.05	0.13	FZ-MW11-4
	Chrysene	0.7	0.29	<0.05	0.29	FZ-MW11-4
	Dibenz(a,h)anthracene	0.4	<0.1	<0.1	<0.1	FZ-MW11-4 to FZ-MW11-6-B
	Fluoranthene	73	0.65	0.07	0.65	FZ-MW11-4
	Fluorene	290	<0.05	<0.05	<0.05	FZ-MW11-4 to FZ-MW11-6-B
	Indeno(1,2,3-cd)pyrene	0.2	0.2	<0.1	0.2	FZ-MW11-4
	1-Methylnaphthalene[3]	1500	<0.05	<0.05	<0.05	FZ-MW11-4 to FZ-MW11-6-B
	2-Methylnaphthalene[3]	1500	<0.05	<0.05	<0.05	FZ-MW11-4 to FZ-MW11-6-B
	Naphthalene	1400	<0.05	0.07	<0.05	FZ-MW11-4 to FZ-MW11-6-B
	Phenanthrene	380	0.4	0.08	0.4	FZ-MW11-4
	Pyrene	5.7	0.54	0.05	0.54	FZ-MW11-4

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
3	Methylnaphthalene standard applies to the sum of 1- and 2-
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-13a
Ground Water Analytical Results, Semi-Volatile Organic Compounds (SVOCs) and Phenols –Table 3 SCS

APEC		**O.Reg. 153/04 Table 3[1]**	**APEC 1**	**APEC 4**	**Max Value**	
Borehole / Monitoring Well			**BH00-5**	**CH-MW01-1**		
Sample ID			**BH00-5**	**CHMW01-1**		
Sample Date			18/08/2011	19/08/2011		
Analysis Date			23/08/11 - 26/08/11	26/08/2011		
Laboratory Certificate			B1C7456	B1C7456	**Concentration**	**Sample ID**
Parameters (µg/L)	1,2,4-Trichlorobenzene	180	<0.1	<0.1	<0.1	BH00-5 to CH-MW01-1
	1-Methylnaphthalene[3]	1800	<0.2	<0.2	<0.2	
	2,4,5-Trichlorophenol	1600	<0.2	<0.2	<0.2	
	2,4,6-Trichlorophenol	230	<0.2	<0.2	<0.2	
	2,4-Dichlorophenol	4600	<0.1	<0.1	<0.1	
	2,4-Dimethylphenol	39000	<0.5	<0.5	<0.5	
	2,4-Dinitrophenol	11000	<2	<2	<2	
	2,4-Dinitrotoluene	2900	<0.3	<0.3	<0.3	
	2,6-Dinitrotoluene	2900	<0.3	<0.3	<0.3	
	2-Chlorophenol	3300	<0.1	<0.1	<0.1	
	2-Methylnaphthalene[3]	1800	<0.2	<0.2	<0.2	
	3,3'-Dichlorobenzidine	640	<0.5	<0.5	<0.5	
	Acenaphthene	600	<0.2	<0.2	<0.2	
	Acenaphthylene	1.8	<0.2	<0.2	<0.2	
	Anthracene	2.4	<0.05	<0.05	<0.05	
	Benzo(a)anthracene	4.7	<0.05	<0.05	<0.05	
	Benzo(a)pyrene	0.81	<0.01	<0.01	<0.01	
	Benzo(b/j)fluoranthene	0.75	<0.05	<0.05	<0.05	
	Benzo(g,h,i)perylene	0.2	<0.05	<0.05	<0.05	
	Benzo(k)fluoranthene	0.4	<0.05	<0.05	<0.05	
	Biphenyl	1000	<0.1	<0.1	<0.1	
	Bis(2-chloroethyl)ether	300000	<0.5	<0.5	<0.5	
	Bis(2-chloroisopropyl)ether	20000	<0.5	<0.5	<0.5	
	Bis(2-ethylhexyl)phthalate	140	<1	<1	<1	
	Chrysene	1	<0.05	<0.05	<0.05	
	Dibenz(a,h)anthracene	0.52	<0.1	<0.1	<0.1	
	Diethyl phthalate	38	<0.1	<0.1	<0.1	
	Dimethyl phthalate	38	<0.1	<0.1	<0.1	
	Fluoranthene	130	<0.2	<0.2	<0.2	
	Fluorene	400	<0.2	<0.2	<0.2	
	Indeno(1,2,3-cd)pyrene	0.2	<0.1	<0.1	<0.1	
	Naphthalene	1400	<0.2	<0.2	<0.2	
	p-Chloroaniline	400	<1	<1	<1	
	Pentachlorophenol	62	<0.1	<0.1	<0.1	
	Phenanthrene	580	<0.1	<0.1	<0.1	
	Phenol	12000	<0.5	<0.5	<0.5	
	Pyrene	68	<0.05	<0.05	<0.05	

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
3	Methylnaphthalene standard applies to the sum of 1- and 2 methylnapthalene.
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-13b
Ground Water Analytical Results, Semi-Volatile Organic Compounds (SVOCs) and Phenols –Table 9 SCS

APEC		O.Reg. 153/04 Table 9[1]	APEC 1/Migration to River	APEC 4/ Migration to River	APEC 4/ Migration to River	RPD Analysis	Max Value	
Borehole / Monitoring Well			**FZ-MW11-6**	**CH-MW01-2**	**Duplicate of CHMW01-2**			
Sample ID			**F2-MW11-6-B**	**CH-MW01-2**	**MW11-DUP1**			
Sample Date			25/08/2011	18/08/2011	18/08/2011			
Analysis Date			01/09/2011	23/08/11 - 26/08/11	23/08/11 - 26/08/11			
Laboratory Certificate			B1D0755	B1C7456	B1C7456		**Concentration**	**Sample ID**
Parameters (µg/L)	1,2,4-Trichlorobenzene	180	<0.1	<0.1	<0.1	Acceptable	<0.1	FZ-MW11-6-B to Duplicate of CH-MW01-2
	1-Methylnaphthalene[3]	1500	<0.2	<0.2	<0.2	Acceptable	<0.2	
	2,4,5-Trichlorophenol	1300	<0.2	<0.2	<0.2	Acceptable	<0.2	
	2,4,6-Trichlorophenol	180	<0.2	<0.2	<0.2	Acceptable	<0.2	
	2,4-Dichlorophenol	3700	<0.1	<0.1	<0.1	Acceptable	<0.1	
	2,4-Dimethylphenol	31000	<0.5	<0.5	<0.5	Acceptable	<0.5	
	2,4-Dinitrophenol	9000	<2	<2	<2	Acceptable	<2	
	2,4-Dinitrotoluene	2300	<0.3	<0.3	<0.3	Acceptable	<0.3	
	2,6-Dinitrotoluene	2300	<0.3	<0.3	<0.3	Acceptable	<0.3	
	2-Chlorophenol	2600	<0.1	<0.1	<0.1	Acceptable	<0.1	
	2-Methylnaphthalene[3]	1500	<0.2	<0.2	<0.2	Acceptable	<0.2	
	3,3'-Dichlorobenzidine	500	<1 (1)	<0.5	<0.5	Acceptable	<1 (1)	FZ-MW11-6-B
	Acenaphthene	600	<0.2	<0.2	<0.2	Acceptable	<0.2	FZ-MW11-6-B to Duplicate of CH-MW01-2
	Acenaphthylene	1.4	<0.2	<0.2	<0.2	Acceptable	<0.2	
	Anthracene	1	<0.05	<0.05	<0.05	Acceptable	<0.05	
	Benzo(a)anthracene	1.8	<0.05	<0.05	<0.05	Acceptable	<0.05	
	Benzo(a)pyrene	0.81	0.01	<0.01	<0.01	Acceptable	0.01	FZ-MW11-6-B
	Benzo(b/j)fluoranthene	0.75	<0.05	<0.05	<0.05	Acceptable	<0.05	FZ-MW11-6-B to Duplicate of CH-MW01-2
	Benzo(g,h,i)perylene	0.2	<0.05	<0.05	<0.05	Acceptable	<0.05	
	Benzo(k)fluoranthene	0.4	<0.05	<0.05	<0.05	Acceptable	<0.05	
	Biphenyl	1700	<0.1	<0.1	<0.1	Acceptable	<0.1	
	Bis(2-chloroethyl)ether	240000	<0.5	<0.5	<0.5	Acceptable	<0.5	
	Bis(2-chloroisopropyl)ether	20000	<0.5	<0.5	<0.5	Acceptable	<0.5	
	Bis(2-ethylhexyl)phthalate	30	<1	<1	<1	Acceptable	<1	
	Chrysene	0.7	<0.05	<0.05	<0.05	Acceptable	<0.05	
	Dibenz(a,h)anthracene	0.4	<0.1	<0.1	<0.1	Acceptable	<0.1	
	Diethyl phthalate	30	<0.1	<0.1	<0.1	Acceptable	<0.1	
	Dimethyl phthalate	30	<0.1	<0.1	<0.1	Acceptable	<0.1	
	Fluoranthene	73	<0.2	<0.2	<0.2	Acceptable	<0.2	
	Fluorene	290	<0.2	<0.2	<0.2	Acceptable	<0.2	
	Indeno(1,2,3-cd)pyrene	0.2	<0.1	<0.1	<0.1	Acceptable	<0.1	
	Naphthalene	1400	<0.2	<0.2	<0.2	Acceptable	<0.2	
	p-Chloroaniline	320	<1	<1	<1	Acceptable	<1	
	Pentachlorophenol	50	<0.1	<0.1	<0.1	Acceptable	<0.1	
	Phenanthrene	380	<0.1	<0.1	<0.1	Acceptable	<0.1	
	Phenol	9600	<0.5	<0.5	<0.5	Acceptable	<0.5	
	Pyrene	5.7	<0.05	<0.05	<0.05	Acceptable	<0.05	

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act Table 9 Standards for Wells within 30 m of water body (Rideau River) with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
3	Methylnaphthalene standard applies to the sum of 1- and 2-methylnapthalene
RPD	Relative percent difference (See report for RPD calculation details)
80%	Denotes unacceptable RPD
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case, RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 9, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-14
Ground Water Analytical Results, Volatile Organic Compounds (VOCs) –Table 3 SCS

APEC		O.Reg. 153/04 Table 3[1]	APEC 1	APEC 1	RDP Analysis	APEC 1/ APEC 2		Max Value	
Borehole / Monitoring Well			**BH00-5**	**Duplicate of BH00-5**		**BH00-4**	**TRIP BLANK 3099**		
Sample ID			**BH00-5**	**MW11-DUP2**		**BH00-4**	**TRIP BLANK 3099**		
Sample Date			18/08/2011	18/08/2011		19/08/2011	20/08/2011		
Analysis Date			29/08/2011	29/08/2011		29/08/2011	29/08/2011		
Laboratory Certificate			B1C7456	B1C7456		B1C7456	B1C7456	**Concentration**	**Sample ID**
Parameters (µg/L)	Acetone (2-Propanone)	130000	<10	<10	Acceptable	<10	<10	<10	BH00-5 to TRIP Blank 3099
	Benzene	44	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	Bromodichloromethane	85000	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	Bromoform	380	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	Bromomethane	5.6	<0.5	<0.5	Acceptable	<0.5	<0.5	<0.5	
	Carbon Tetrachloride	0.79	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	Chlorobenzene	630	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	Chloroform	2.4	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	Dibromochloromethane	82000	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	1,2-Dichlorobenzene	4600	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	1,3-Dichlorobenzene	9600	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	1,4-Dichlorobenzene	8	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	Dichlorodifluoromethane (FREON 12)	4400	<0.5	<0.5	Acceptable	<0.5	<0.5	<0.5	
	1,1-Dichloroethane	320	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	1,2-Dichloroethane	1.6	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	1,1-Dichloroethylene	1.6	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	cis-1,2-Dichloroethylene	1.6	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	trans-1,2-Dichloroethylene	1.6	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	1,2-Dichloropropane	16	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	cis-1,3-Dichloropropene	5.2	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	trans-1,3-Dichloropropene	5.2	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	Ethylbenzene	2300	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	Ethylene Dibromide	0.25	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	Hexane	51	<0.5	<0.5	Acceptable	<0.5	<0.5	<0.5	
	Methylene Chloride(Dichloromethane)	610	<0.5	<0.5	Acceptable	<0.5	<0.5	<0.5	
	Methyl Isobutyl Ketone	140000	<5	<5	Acceptable	<5	<5	<5	
	Methyl Ethyl Ketone (2-Butanone)	470000	<5	<5	Acceptable	<5	<5	<5	
	Methyl t-butyl ether (MTBE)	190	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	Styrene	1300	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	1,1,1,2-Tetrachloroethane	3.3	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	1,1,2,2-Tetrachloroethane	3.2	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	Tetrachloroethylene	1.6	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	Toluene	18000	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	1,1,1-Trichloroethane	640	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	1,1,2-Trichloroethane	4.7	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	Trichloroethylene	1.6	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	Vinyl Chloride	0.5	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	
	p+m-Xylene	NV	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	o-Xylene	NV	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	Xylene (Total)	4200	<0.1	<0.1	Acceptable	<0.1	<0.1	<0.1	
	Trichlorofluoromethane (FREON 11)	2500	<0.2	<0.2	Acceptable	<0.2	<0.2	<0.2	

Notes:

1	Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the *Ontario Environmental Protection Act* Table 3 Standards for sites with non-potable drinking water in a non-stratified condition with coarse grained soil and community land use (dated April 15, 2011).
(2)	Detection Limit was raised due to matrix interferences.
RPD	Relative percent difference (See report for RPD calculation details).
80%	Denotes unacceptable RPD.
<20	Denotes Non-Detectable concentration (i.e., below RDL), in this case. RDL is 20
---	Not analysed or no criterion/guideline established.
20	Denotes exceedances MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil
20	Denotes a detection limit above MOE (2011) Standard - Table 3, Industrial/Commercial/Community Property Use, with coarse grain soil

Table C-15
Soil Vapour Crawl Space Air Analytical Results, Petroleum Hydrocarbons (PHCs)

			Soil Vapour						
APEC		**Soil Vapour**	**APEC 1**	**APEC 1**	**APEC 1**	**RPD Analysis**	**APEC 1**	**APEC 1**	**APEC 2**
Sample ID			**VP11-1-AUG11/1302**	**VP11-2-AUG11/1196**	**DUP02-AUG 11/255**		**TRIP02 AUG11/284**	**VP11-3-AUG11/1331**	**VP11-4-AUG11/358**
Sampling Date		**O.Reg. 153/04**[1]	25/08/2011	25/08/2011	25/08/2011		25/08/2011	25/08/2011	25/08/2011
Laboratory Certificate			B1D0820	B1D0820	B1D0820		B1D0820	B1D0820	B1D0820
Analysis Date			01/09/2011	01/09/2011	01/09/2011		01/09/2011	01/09/2011	01/09/2011
Attenuation Factor			2.0×10^{-2}	2.0×10^{-2}	2.0×10^{-2}		2.0×10^{-2}	2.0×10^{-2}	2.0×10^{-2}
BTEX µg/m³	Benzene	30	0.02	< 2.0E-2	< 2.0E-2	Acceptable	< 2.0E-2	0.04	0.48
	Toluene	5000	0.66	0.50	0.66	28%	< 4.0E-2	0.52	1.22
	Ethylbenzene	1000	0.12	0.06	0.12	67%	< 4.0E-2	0.06	< 4.0E-2
	Total Xylenes	700	0.46	0.22	0.48	74%	< 4.0E-2	0.20	0.12
PHCs µg/m³	F1-BTEX - C6-C10 (as Toluene)	11000	59.8	27.6	73.6	91%	< 1.0E-1	26.6	17.4
	F2 - C10-C16 (as Decane)	840	22.8	18.0	44.0	84%	< 1.0E-1	5.58	18.36

Notes: All units in ug/m³.

[1] Table B-1 of *Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario* December 22, 2009 using inhalation chronic TRV

20	Concentration Exceeds MOE (2011) Standard
20	Denotes a detection limit above MOE (2011) Standard
80%	Denotes unacceptable RPD
--- =	No criterion/guideline established
ND =	Analytical results are below laboratory RDL
NC =	Not calculated
RPD =	Relative percent difference

Table C-15
Soil Vapour Crawl Space Air Analytical Results, Petroleum Hydrocarbons (PHCs)

APEC		Soil Vapour	Crawl Space Air					Max Value	
			APEC 2	APEC 2	RPD Analysis	APEC 2	APEC 2		
Sample ID			NE CRAWL-AUG 11/1267	DUP-AUG11/T21628		TRIP-AUG11/1281	SE CRAWL-AUG11/T21648		
Sampling Date		O.Reg. 153/04[1]	23/08/2011	23/08/2011		23/08/2011	23/08/2011		
Laboratory Certificate			B1D0820	B1D0820		B1D0820	B1D0820		
Analysis Date			01/09/2011	01/09/2011		01/09/2011	01/09/2011		
Attenuation Factor			none	none		none	none	Concentration	Sample ID
BTEX µg/m³	Benzene	30	<1	<1	Acceptable	<1	2	2	VP11-4
	Toluene	5000	7	6	15%	<2	7	7	VP11-4
	Ethylbenzene	1000	3	3	Acceptable	<2	3	3	DUP02
	Total Xylenes	700	9	9	Acceptable	<2	10	10	DUP02
PHCs µg/m³	F1-BTEX - C6-C10 (as Toluene)	11000	15	31	70%	<5	73	73.6	DUP02
	F2 - C10-C16 (as Decane)	840	18	65	113%	<5	30	65	DUP02

Notes: All units in ug/m³.

1 Table B-1 of *Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario* December 22, 2009 using inhalation chronic TRV

20	Concentration Exceeds MOE (2011) Standard
20	Denotes a detection limit above MOE (2011) Standard
80%	Denotes unacceptable RPD

--- = No criterion/guideline established
ND = Analytical results are below laboratory RDL
NC = Not calculated
RPD = Relative percent difference

Table C-16
Soil Vapour Crawl Space Air Analytical Results, Naphthalene

		Crawl Space Air	Soil Vapour						
APEC			**APEC 1**	**APEC 1**	**APEC 1**	**RPD Analysis**	**APEC 1**	**APEC 1**	**APEC 2**
Sample ID			**VP11-1-AUG11/1302**	**VP11-2-AUG11/1196**	**DUP02- AUG11/255**		**TRIP02 AUG11/284**	**VP11-3-AUG11/1331**	**VP11-4-AUG11/358**
Sampling Date		**O.Reg. 153/04[1]**	25/08/2011	25/08/2011	25/08/2011		25/08/2011	25/08/2011	25/08/2011
Laboratory Certificate			B1D0820	B1D0820	B1D0820		B1D0820	B1D0820	B1D0820
Analysis Date			01/09/2011	01/09/2011	01/09/2011		01/09/2011	01/09/2011	01/09/2011
Attenuation Factor			2.0×10^{-2}	2.0×10^{-2}	2.0×10^{-2}		2.0×10^{-2}	2.0×10^{-2}	2.0×10^{-2}
$\mu g/m^3$	Naphthalene	3.70	< 4.0E-2	< 4.0E-2	< 4.0E-2	Acceptable	< 4.0E-2	< 4.0E-2	< 4.0E-2

Notes: All units in ug/m³.

[1] Table B-1 of *Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario* December 22, 2009 using inhalation chronic TRV

20	Concentration Exceeds MOE (2011) Standard
20	Denotes a detection limit above MOE (2011) Standard
80%	Denotes unacceptable RPD

--- = No criterion/guideline established
ND = Analytical results are below laboratory RDL
NC = Not calculated
RPD = Relative percent difference

Table C-16
Soil Vapour Crawl Space Air Analytical Results, Naphthalene

APEC		**Crawl Space Air**	**Crawl Space Air**				
			APEC 2	**APEC 2**		**APEC 2**	**APEC 2**
Sample ID			**NE CRAWL-AUG 11/1267**	**DUP-AUG11/T21628**	**RPD Analysis**	**TRIP-AUG11/1281**	**SE CRAWL-AUG11/T21648**
Sampling Date		**O.Reg. 153/04[1]**	23/08/2011	23/08/2011		23/08/2011	23/08/2011
Laboratory Certificate			B1D0820	B1D0820		B1D0820	B1D0820
Analysis Date			01/09/2011	01/09/2011		01/09/2011	01/09/2011
Attenuation Factor			none	none		none	none
µg/m³	Naphthalene	3.70	<2.0	<2.0	Acceptable	<2.0	<2.0

Notes: All units in ug/m³.

[1] Table B-1 of *Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario* December 22, 2009 using inhalation chronic TRV

20	Concentration Exceeds MOE (2011) Standard
20	Denotes a detection limit above MOE (2011) Standard
80%	Denotes unacceptable RPD
--- =	No criterion/guideline established
ND =	Analytical results are below laboratory RDL
NC =	Not calculated
RPD =	Relative percent difference

APPENDIX D

Sampling and Analysis Plan

FRANZ ENVIRONMENTAL INC.
◆ CONSULTING ◆ ENGINEERING ◆ TECHNOLOGIES ◆

Sampling Plan and Quality Assurance and Quality Control Plan

Phase Two Environmental Site Assessment
200 Lees Avenue, Ottawa, Ontario

Prepared for:

University of Ottawa
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K1N 6N5

Prepared by:

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Project No. 1329-1102
August 9, 2011

1.0 INTRODUCTION

Franz Environmental Inc. (FRANZ) was retained by the University of Ottawa to complete a Phase Two Environmental Site Assessment (ESA) at the Rideau Campus, located at 200 Lees Avenue, in Ottawa, Ontario. The portion of the property under consideration in the proposed Phase Two ESA (the "Site") is the eastern portion of the Rideau Campus property, excluding most areas within 30 metres of the river. The phase one property is approximately 30,000 m^2 in area and is bordered by a 30 metre buffer around the Rideau River, the Queensway, and includes a one-storey building known as Building A. The University intends to redevelop the phase one property, which is currently used as a parking lot, into a sports field.

The Phase Two ESA will be conducted in accordance with Ontario Regulation 153/04 *Records of Site Condition – Part XV.1 of the Act* (as amended, "O.Reg. 153/04") under the *Environmental Protection Act*. As such, it can form the basis for an application for a Record of Site Condition under the Act.

This plan is based on the Phase One ESA conducted by FRANZ entitled "Phase One Environmental Site Assessment, Rideau Campus, University of Ottawa, 200 Lees Avenue Ottawa, Ontario" and dated August 5, 2011.

1.1 Work Plan Objectives

This work plan is designed to fulfill the specific objectives of a site investigation plan outlined in O.Reg. 153/04, namely

1. To plan an investigation that will achieve the general objectives of a phase two environmental site assessment,
    i. through the use of an appropriate and complete information base concerning the phase two property, and

    ii. through the conduct of an investigation based both on information obtained before the phase two environmental site assessment begins and on the incorporation of information obtained during the phase two environmental site assessment.

2. To develop a sampling and analysis plan that will adequately assess all areas of the phase two property where contaminants may be present in land or water on, in or under the property.

3. To develop a quality assurance program that is designed to effectively limit errors and bias in sampling and analysis through implementation of assessment and control measures that will ensure data are useful, appropriate and accurate in the determination

of whether the phase two property, or any [record of site condition] property within it, meets applicable site condition standards and any standards specified in a risk assessment.

In order to fulfill the objectives, this work plan contains the following elements:

- proposed sampling locations and numbers;
- proposed sampling or measurement methods;
- parameters being sampled;
- description of objectives with rationale;
- proposed quality assurance and quality control (QA/QC) methods;
- proposed health and safety plan (provided under separate cover).

1.2 Results of the Phase I ESA

A Phase I ESA for the property (*Phase I Environmental Site Assessment, Rideau Campus, University of Ottawa, 200 Lees Avenue Ottawa, Ontario*) was recently completed by FRANZ in which four areas of potential environmental concern (APECs) were identified. The Site APECs are outlined below, followed by the proposed work program designed to characterize the presence and extent of the potential environmental impacts:

APEC 1: Cinder and ash fill layer. The layer is present across most of the site and known to be in average 3 to 6 m in thickness. The layer contains soil exhibiting concentrations of various polycyclic aromatic hydrocarbons and metals in excess of Ontario Standards.

APEC 2: Fuel Storage. During the site visit, FRANZ identified fuel storage inside the mechanical room of Building A and a potential underground storage tank location adjacent to the mechanical room. The storage tanks found inside Building A appear to be well-contained and does not appear to have leaked; however, the sump beside the generator in the mechanical room and the lack of records pertaining to the suspected underground storage tank adjacent to the building indicate that this is an area of potential environmental concern. The contaminants of potential concern for this APEC are petroleum hydrocarbons and benzene, toluene, ethylbenzene and xylenes.

APEC 3: Rail Spur. Historical aerial photographs indicate that the parking lot covering most of the phase two ESA site was constructed in two phases. A railroad historically cut across the current parking lot and marked the limit of the first phase of the parking lot. This railroad was also present during the landfilling period and may indicate the eastern limit of the landfill material. The surficial soil underneath the former railroad alignment may contain polycyclic aromatic hydrocarbons and metals.

APEC 4: Off-site coal tar impacts. An area of soil and groundwater polycyclic aromatic hydrocarbon contamination has been previously investigated, and is located on the northwestern portion of the 200 Lees property, outside the limits of the phase two property. This is referred to as the "coal tar" impact associated with activities at the former gasification plant. While these impacts are not on the phase two ESA site, they have the potential to migrate over time, and therefore the western boundary of the site is identified as an APEC.

Based on these APECs, FRANZ has developed a phase two ESA program consisting of seventeen boreholes to be advanced across the site, of which six will be completed as monitoring wells. FRANZ will also collect soil vapour samples from four locations and outdoor air samples. In addition to the six newly-installed wells, existing monitoring BH00-4, BH00-5 and CH-MW01 will be included for ground water assessment activities.

1.3 Health and Safety Plan

A site-specific Health and Safety Plan (HASP) has been developed for the site and has been retained on file by FRANZ.

2.0 SAMPLING PLAN – DRILLING AND SOIL SAMPLING

2.1 Rationale for Selection of Sampling System

The sampling points selected are shown on the attached figure (Figure 1, Appendix C-1). The rationale for the selection of sampling locations is as follows:

- To assess APEC 1, the cinder and ash fill layer, a modified grid plan of boreholes and wells to characterize site-wide impacts.
- To assess APEC 2, fuel storage, monitoring wells and boreholes are proposed in the area immediately surrounding the underground storage tank and generators.
- To assess APEC 3, the rail spur, shallow surface boreholes are proposed along the rail alignment to characterize the rail bed materials.
- To assess APEC 4, existing wells will be utilized to determine whether off-site impacts have migrated onto the site.

The boreholes and monitoring wells shall be designated as follows: boreholes as FZ-BH11-XX and monitoring wells as FZ-MW11-XX, where XX is the sequential order in which they are advanced within each APEC. XXD refers to deep boreholes, whereas XXS refers to shallow boreholes.

2.2 Sampling Media

The media to be investigated in the drilling and soil sampling portion of the investigation is soil.

2.3 Methodology

The boreholes will be advanced to a depth of approximately 6.1 metres below grade surface (mbgs) or where refusal is encountered, using a Geoprobe® 7822DT track machine (or equivalent) equipped with hollow stem augers. Each borehole will be continuously sampled in 1.5 m intervals. Soil stratigraphy will be observed for soil type, texture, colour, moisture content and visual and/or olfactory evidence of impacts. Soil from each sampling interval will be placed into sealable bags and laboratory supplied jars. The soil samples placed in the laboratory supplied jars will be stored immediately in coolers, with ice. Vapour readings will be measured in the headspace of the bagged soil samples and up to two soil samples from each borehole will be selected for submission to the laboratory. The first sample to be submitted will be selected based on the highest degree of potential impacts based on the field screening ("worst-case" sample) for volatile components. Samples for metals, polycyclic aromatic hydrocarbons and petroleum hydrocarbon fractions F3 and F4 will be selected based on previous sample results, and on the presence of impacts (cinder and ash fill). The second sample will be taken from near the base of the borehole, ensuring that the vertical extent of soil contamination has been reached ("clean-bottom" sample). In total, 17 boreholes are proposed to investigate soil quality across the phase two property (six of which will be completed as monitoring wells).

In addition to the 17 planned boreholes, FRANZ also proposes to advance five shallow boreholes in the railway right-of-way. These shallow boreholes will be advanced to 1.5 metres, where samples for metals and polycyclic aromatic hydrocarbons will be collected.

The proposed analytical program is presented in Table 1, below.

Table 1: Analytical Program, Soil.

APEC	**BHs & MWs**	**VOCs**	**SVOCs**	**PAHs**	**Metals**	**Phenol**	**BTEX F1**	**PHCs F2-F4**	**Grain Size**	**pH**	**TCLP (Reg. 558/00)**
APEC 1: Cinder and ash fill layer	9	3	9	9	18	6	6	6	6	6	3
APEC 2: Fuel Storage	3	0	0	3	3	0	6	6	2	0	0
APEC 3: Rail Spur	2 + 5 shallow	2	2	8	10	2	2	2	1	0	0
APEC 4: Off-site coal tar impacts	0	Migration to be assessed in the groundwater sampling program									
Potential for off-site migration of ground water	3	0	0	6	6	3	0	0	0	0	0
QA/QC		1	2	3	4	2	2	2	1	1	1
	Total	**6**	**13**	**29**	**41**	**13**	**16**	**16**	**10**	**7**	**4**

Vapour screening is a frequently used method to screen soil samples for the presence of volatile organic compounds, including petroleum hydrocarbon impacts. Screening is a useful tool for the selection of samples for subsequent laboratory analysis. Continuous soil vapour readings obtained from each soil sample can provide an indication of whether contaminants have entered the ground at the sampling location or whether they have migrated from some other source location. Screening can therefore aid in the identification or dismissal of possible contaminant sources.

Vapour screening will be completed for this study by partially filling zippered bags with soil. Soil samples will be stored at room temperature to allow headspace vapours to develop and equilibrate. The screening instrument will be a combustible gas detector (Eagle RKI) calibrated to hexane with methane elimination.

Field calibration procedure is presented in a FRANZ SOP in Appendix C-2.

3.0 SAMPLING PLAN – GROUND WATER

The monitoring wells will be constructed in general conformance with procedures specified in *Ontario Regulation 903 made under the Ontario Water Resources Act*. Each monitoring well will be constructed with 50 millimetre (mm) inside diameter polyvinyl chloride (PVC) pipe with a pre-slotted 3 m length screen attached to a solid PVC riser pipe extending to just below the ground surface. Monitoring well screens are installed to intersect the water table and a clean silica sand pack is placed in the annulus surrounding the screened portion of the well to a minimum of 0.3 metres above the top of the monitoring well screen. The annulus above the filter pack is sealed with bentonite and a load-bearing protective steel cover is placed over the top of the well at ground surface. In total, six new monitoring wells are proposed to be incorporated with the four existing Site wells for the investigation of ground water quality at the Site.

At the conclusion of the drilling activities, each of the borehole/monitoring well locations will be included in a survey to obtain location coordinates and geodetic elevation data.

Ground water conditions will be monitored at each of the existing and newly-installed monitoring wells by measuring fluid levels using a Solinst ® Water Level Meter (or equivalent). Prior to sampling, newly installed monitoring wells will be developed using overpumping techniques (or other appropriate means). Ground water conditions such as turbidity, colour, odour, etc. are continuously observed and recorded during development and purging activities. Ground water purging and sampling will be completed with a peristaltic pump. Ground water samples from each monitoring location will be placed into laboratory supplied bottles and stored immediately in coolers, with ice. In total, 10 ground water sampling locations are included as part of the proposed work program.

The analytical program is summarized in Table 2, below.

Table 2: Ground Water Analytical Program

APEC	**MWs**	**VOCs**	**SVOCs**	**PAHs**	**Metals**	**Phenol**	**BTEX F1**	**PHCs F2-F4**
APEC 1: Cinder and ash fill layer	4	2	2	2	4	2	4	4
APEC 2: Fuel Storage	1	0	0	1	1	0	1	1
APEC 3: Rail Spur	0	0	0	0	0	0	0	0
APEC 4: Off-site coal tar impacts	0	Addressed by analyzing PAHs in monitoring wells in APEC 1 and APEC 2, and at CH-MW01-2						
Potential for off-site migration of ground water	4	0	2	2	4	2	2	2
QA/QC		1	1	1	1	1	1	1
Total		**3**	**5**	**6**	**10**	**5**	**8**	**8**

4.0 SAMPLING PLAN – SOIL VAPOUR AND INDOOR AIR

4.1 Vapour Probes

In order to assess the potential for vapour migration of naphthalene and petroleum hydrocarbon compounds from impacted soil and ground water to outdoor air, FRANZ will install four vapour probes and collect two outdoor air samples at the phase two property.

The vapour probe assemblies consist of a stainless steel rod used as a drivepoint. Two vapour probes are connected to the rod at different depths. The probes consist of a slotted PVC tube, open at one end, and covered with permeable fabric. Fittings at the open end of the vapour probes connect the probes to small gauge low-density polyethylene (LDPE) tubing.

The vapour probes will be installed in boreholes, and areas around the probe will be backfilled with silica sand. The areas between probes and above the upper probe will be backfilled with bentonite chips and hydrated. The LDPE tubing will be guided through a short section of well screen and completed with a flush mount at the surface.

Vapour probes will be sampled by first purging with a personal sampling pump. When three “probe volumes” have been removed, valves in the sampling train will be opened to allow collection of the soil vapour sample. A sample of air from each vapour probe will be drawn directly from the sample tubing using a laboratory calibrated valve/flow regulator. Pre-evacuated SUMMA® canisters will then be opened, enabling collection of time-weighted air samples.

4.2 Indoor and Outdoor Air Sampling

FRANZ will collect six crawl space air and indoor air samples (including one duplicate) from five locations in Building A. Locations will be determined in the field, but will be selected to assess areas most likely to be impacted by APECs 1 and 2, and least likely to be affected by cross-contamination.

A pre-sampling inspection will be completed of all air sampling locations prior to the sampling event to identify conditions that would affect the testing of air quality. The inspection will include an evaluation of the type of structure, physical conditions and air flow under the building. The sampling locations will be selected to be as close as possible to the source of contamination, and as far as possible from possibly confounding influences (e.g., cleaning products).

Air samples will be collected in laboratory-prepared 6 L stainless steel SUMMA® canisters. Where possible, the canisters will be placed directly in the location where measurement is required. If this area is inaccessible for safety reasons, an air-collection tube will be directed into the area and attached to the canister.

In either case, a sample of air will be drawn from the air using a laboratory calibrated valve/flow regulator. The pre-evacuated SUMMA® canisters will be opened, enabling collection of time-weighted air samples. Indoor air samples will be collected over a period of 24 hours in order to obtain a representative sample.

Outdoor air samples will also be collected in pre-evacuated SUMMA® canisters with lab-calibrated valves and flow regulators. Twenty-four hour samples will be collected.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL

5.1 Field

A quality assurance (QA) program is a system of documented checks, which validate the reliability of a data set. The checks are known as quality control (QC) procedures. On all environmental monitoring projects, good QA/QC systems are necessary to achieve project goals. For this project, FRANZ has designed the QA/QC program to meet requirements for:

- Standardized data collection to facilitate valid temporal comparison of data across multiple years of sampling events; and
- High levels of confidence in the quality of the data to allow for:
    - Effective review by independent reviewers; and
    - Sound decision making regarding the long-term management of the site.

The field QA program will consist of the following elements:

- Proper documentation of all aspects of the sampling program that could potentially cause sampling bias; the documentation will include daily field summary sheets, separate filing of field notes, chain-of-custody forms and memos written when any major deviation from ideal protocol occurs (e.g., an ice-pack melts, a bottle is broken, etc.).
- Decontamination of sampling equipment during soil and groundwater sampling stages; all re-usable soil sampling apparatus such as trowels and interface probes will be successively washed with alconox detergend and rinsed with distilled water.
- The accuracy of field instruments such as pH and conductivity will be checked frequently with up-to-date standards and calibrated when necessary. As a minimum, their accuracy will be checked daily in the field prior to sampling.
- FRANZ is aware of the sample holding time requirements. Samples will be delivered to the laboratory immediately following the sampling, either directly by our personnel or by courier. Samples will be immediately transferred and stored in coolers with ice packs to hold the sample temperature at approximately 4°C.
- A minimum of 10% of all soil, ground water and air samples will be submitted as blind duplicates for QA/QC purposes and comparison.

5.1.1 Field Calibration

Field instruments will be calibrated daily and calibration documented in the field book. Proper calibration procedures are outlined in the FRANZ SOP in Appendix C-2.

5.1.2 Field Duplicates

FRANZ will collect field duplicates during the soil, ground water, soil vapour and indoor air investigations. The duplicates will be collected at a rate of one per ten primary samples.

5.2 Analytical Laboratory

FRANZ will use Maxxam Analytics Inc. (Maxxam) as the main provider of analytical services for this project. Maxxam is a full service laboratory and offers environmental testing across the full range of parameters required for this project. Maxxam is a Canadian Association of Laboratory Accreditation Inc. (CALA) accredited laboratory with a well defined QA/QC plans

The proposed laboratory program will include verification that the selected analytical methods will have minimum detection limits which are less than the Standards associated with O.Reg. 153/04.

5.3 QA/QC Analysis

5.3.1 Field Duplicates

To assess the reliability of the laboratory data, blind field duplicates will be collected in the soil, air and ground water sampling program.

For duplicates, the relative percent difference (RPD) will be calculated using the following formula:

$$RPD = \frac{\left|X_1 - X_2\right|}{X_{average}} \times 100$$

where, X_1 and X_2 are the duplicate concentrations and X_{average} is the mean of these two values. The duplicate results were evaluated using criteria developed by Zeiner[1], which draws from several data validation guidelines developed by the United States Environmental Protection Agency. According to these criteria, the RPD for duplicate samples should be less than 20% for aqueous samples, and less than 40% for solid samples. RPDs can be calculated only when the compound is detected in both the original and the duplicate sample at a concentration above the method detection limit. Alternative criteria are used to evaluate duplicate pairs where one or both of the results is less than five times the detection or quantitation limit, or where one or both of the results is less than the detection or quantitation limit (i.e. nd or 'not-detected'). A full description of the criteria is provided in Table 3.

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[1] Zeiner, S.T., *Realistic Criteria for the Evaluation of Field Duplicate Sample Results*, Proceedings of Superfund XV, November 29-December 1, 1994, Sheraton Washington Hotel, Washington, D.C.

Table 3: Criteria for the Evaluation of Duplicate Sample Results

		Criteria for Acceptable Precision	
Result A	**Result B**	**Aqueous (water)**	**Solid (soil)**
Organic			
nd	nd	acceptable precision, no evaluation required	
nd	positive	result B - 0.5 x QL < QL	result B - 0.5 x QL < 2 x QL
positive and > 5 x QL	positive and > 5 x QL	RPD < 20%	RPD < 40%
positive and < or = 5 x QL	positive	|result B - result A| < QL	|result B - result A| < 2 x QL
Inorganic			
nd	nd	acceptable precision, no evaluation required	
nd	positive	result B - IDL < LRL	result B - IDL < 2 x LRL
positive and > 5 x LRL	positive and > 5 x LRL	RPD < 20%	RPD < 40%
positive and < or = 5 x LRL	positive	|result B - result A| < QL	|result B - result A| < 2 x QL

Source: Zeiner, S.T., 1994

Notes:

nd – not detected

QL – quantitation limit

IDL – instrument detection limit

LRL – laboratory reporting limit

RPD – relative percent difference, $\frac{|X_1 - X_2|}{X_{average}} \times 100$

5.3.2 QA/QC Analysis – Laboratory

Laboratory QA/QC will be provided by the project laboratory, and will be evaluated by FRANZ. Typically, laboratory QA/QC consists of the techniques outlined in the following sections. This discussion is adapted from the Maxxam Analytics QA/QC interpretation guide[2]. All of the following laboratory QA/QC techniques are conducted at a rate of one per twenty field samples, with the exception of surrogate recovery, which is run for every organic sample.

5.3.2.1 Method Blank

A method blank is a control sample, free of the target parameters and of any substance which may interfere with that analysis. The method blank is processed through the entire analytical method including any extraction, digestion or any other preparation procedure. One method blank is run for every twenty field samples.

The method blank monitors background levels of target analytes introduced by the analytical process. Where concentrations of analytes in the method blank are found above the reportable detection limit, or greater than five times the method detection limit, the laboratory should repeat the analysis for all samples in the batch.

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[2] Maxxam Analytics. *Environmental QA/QC Interpretation Guide*. June, 2008. Available on request.

5.3.2.2 Blank Spike

A blank spike is a laboratory control sample free of target analytes and interferences, which is fortified with a known concentration of target analytes. The blank spike is processed through the entire analytical method including any extraction, digestion or any other preparation procedure. Results are expressed as a percentage recovery.

The blank spike monitors analyte recovery and potential loss during the preparation procedures, and serves to validate the calibration of the instrumentation or technique.

5.3.2.3 Matrix Spike

A second aliquot from a randomly chosen sample is fortified with a known concentration of target analytes. The sample is processed through the entire analytical method. Results are expressed as a percentage recovery.

The matrix spike evaluates any “matrix effects” caused by sample composition that may affect the recovery of analytes. One example of a matrix effect is the presence of peat in soils which tends to adsorb analytes such as benzene resulting in a poor matrix spike recovery. When matrix spike recoveries are below laboratory-acceptable standards, FRANZ will re-examine other analytical data to determine whether the laboratory analysis underestimates the potential for the presence of contaminants of concern.

5.3.2.4 Laboratory Duplicate

A laboratory duplicate is a second aliquot from a randomly chosen sample within an analytical batch processed through the entire analytical method. Similarly to the field duplicate, laboratory duplicates are expressed as the Relative Percent Difference between the two results.

The laboratory duplicate evaluates analytical precision and sample homogeneity at the laboratory, in the same way that the field duplicate evaluates the sampling methodology in the field. Values outside laboratory-acceptable limits indicate poor homogenization or problems with analysis.

5.3.2.5 Certified Reference Material

Certified reference materials are purchased samples that have been certified by a recognized agency to contain specified levels of selected constituents, when measured by specified standard procedures. Results are expressed as a percentage of the design value.

These materials are used for validating the performance of a method including precision, extraction/digestion efficiency. Certified reference materials and matrix spikes provide similar evaluations of laboratory QA/QC and may be substituted for each other.

5.3.2.6 Surrogate Recovery

Surrogates are compounds that have similar characteristics to analytes of interest but are not normally found in nature. Known surrogate concentrations are added to samples prior to analysis and recoveries are calculated and expressed as a percentage.

Surrogate recovery monitors the efficiency of organic extractions, instrument performance and provides within-run quality control.

APPENDIX C-1

Figure

Legend

▭ Site Boundary

■ Building

⬚ Area of Potential Environmental Concern (APEC)

— Boundary between application of MOE Table 3 Standards vs. MOE Table 9 Standards

┼┼┼ Former Rail Alignment

⊕ Proposed Monitoring Well

⊙ Proposed Borehole

⊕ Proposed Shallow Borehole (1.5m)

⬠ Proposed Soil Vapour Probe

⊕ Monitoring Well (2001,CMH2)
CH-MW01-2

⊕ Monitoring Well (2000, Golder)
BH00-4

Title:
Proposed Sampling Locations

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project:
Proposed Phase II ESA
Work Program
200 Lees Avenue, Ottawa, ON

Date:
July 2011

Client:
University of Ottawa

Scale 1:1000
20 16 12 8 4 0 10 20 30 40
metres

Figure 1

last saved by: cfernandes

Z:\Projects\2011\1329-1101 University of Ottawa 200 Lees\Figures\1-CAD\13291101_samplelocations-phaseII.dwg(layout)

APPENDIX C-2

Standard Operating Procedures

Objective

This document describes the maintenance and calibration requirements for various pieces of environmental monitoring equipment.

Work Scope

The procedures listed here within apply to all Franz employees and contractors who conduct environmental and/or remedial monitoring.

Introduction

To ensure consistent and accurate measurements, monitoring equipment must be properly maintained and calibrated. Records of the maintenance and calibration must also be kept for auditing purposes.

Preparation

Hazards:

- Chemical reagents used in calibrations (hazards are outlined in associated MSDS)
- Combustible and/or toxic gasses used for calibration of CGI's and PID's

Tools:

- Calibration Standards
- MSDS Binder

Tasks

1. *Maintenance of Field Equipment*

- Field equipment must be maintained in good operating condition, free of soiling and stored in the supplied equipment cases.

- Broken parts must be replaced or repaired prior to use.

- Equipment is decontaminated prior to storage.

2. *Water Quality Meters*

- Water quality meters are calibrated IAW manufacturers instruction using fresh chemical calibration solutions.
- Most equipment is supplied pre-calibrated and ready for use. Notwithstanding pre-calibration by suppliers, equipment must be calibration checked prior to use, ideally the same day as it is used.
- Equipment is calibration checked daily prior to use and recalibrated when results fail to provide stable readings within 10% of standard solution values.
- Dissolved oxygen meters are sensitive to changes in air pressure and must be recalibrated when used at a location with a significant change in elevation above sea level. Salinity also affects the operation of the probe, consult the manufacturers instruction when compensating for salinity.
- Record calibration results are recorded in field notes.

3. *Water Level Tapes and Interface probes*

Equipment Check

- Inspect the probe and tape for damage.
- Turn Sensitivity Dial fully clockwise.
- Depress the Battery Test button to test the battery and circuitry (excluding the probe when not in use).
- Submerse the probe in a container of tap water. This completes the circuit and activates the buzzer and light.

Routine Care

- After the depth to water has been recorded, the cable should be carefully rewound onto the reel, the probe wiped dry and placed into the probe holder.
- The probe, cable and reel can be cleaned with a phosphate free (non-abrasive) detergent and warm water.
- Use of a Water Level Meter Carrying Bag adds to the service life of the meter.

- Use of the Tape Guide adds to the life of the cable.

Battery Replacement

- battery type - alkaline, 9 volt.
- The battery is housed in a convenient battery drawer located in the faceplate of the Water Level Meter.
- To replace the battery, simply press the drawer in, lift then pull.
- The battery drawer should slide out of the faceplate enough to pull it out.
- Note the polarity and place another new battery in the drawer and slide it back into the faceplate.

Replacement Parts. The following parts can be provided should they become lost or damaged:

- Probes
- Reels
- Replacement cable with probe (Complete)
- Lights, switches, etc.
- Splice kits

4. Combustible Gas Detectors and PID's

- Combustible gas detectors must be calibrated prior to use and calibration checked daily.
- Use calibration methods specified by the manufacturer using an appropriate calibration gas.
- Calibrate meters in non hazardous locations in fresh air conditions.
- Allow meters to warm-up prior to commencing calibration procedures.
- Use 400 ppm hexane for standard field screening purposes.
- Use higher concentration calibration gasses in the LEL range for hygiene applications.

Document Type: Procedure

Approvals:

Document Owner: Stephen Livingstone	Date: 11/09/2006
President: Thomas Franz	Date: 11/09/2006
Quality Manager: Chris Ludwig	Date: 11/09/2006

Change History

Date	**Change(s)**
11/09/2006	Original Draft

Objective

This Standard Operating Procedure (SOP) describes the procedures used to obtain subsurface soil samples for visual logging, physical and/or chemical laboratory analyses. Subsurface soil samples are obtained during soil drilling programs and provide physical and chemical information on subsurface conditions. This document outlines the drilling protocols to ensure consistent and acceptable borehole drilling, monitoring well installation and information recording using the direct push methodology.

This SOP also provides a description of methods used in the collection of subsurface soil samples using the direct push methodology. Subsurface soil refers to unconsolidated material which may consist of one or a mixture of the following materials: gravel, sand, silt, clay, peat (or other organic soils), and or anthropogenic fill material. Subsurface soil sampling conducted in accordance with this SOP will promote consistency in sample collection and provide a basis for sample representativeness.

This SOP covers subsurface soil sampling by the direct push method, as this a common method used for obtaining samples of unconsolidated deposits.

Work Scope

The procedures listed herein apply to all Franz employees and contractors who conduct environmental and/or remedial monitoring.

Introduction

A qualified individual is responsible for overseeing proper borehole drilling procedures. Field personnel must ensure safety, while acquiring accurate, representative information about subsurface materials. Pertinent sampling information, cross-sections and stratigraphy shall be recorded on a formatted borehole log and/or the field logbook. To maintain data integrity, all measurements must be properly collected. Records of details and measurements must also be kept for auditing purposes.

Preparation

Health and Safety Considerations:

- Slips, trips, and falls.
- Splashes from contaminated water.
- Contact with contaminated soil.
- Exposure to contaminant vapours.
- Moving parts of mechanical equipment.
- Overhead utility wires.
- Buried infrastructure (e.g. power, water, sewer, etc).

The health and safety considerations for the site, including both potential physical and chemical hazards, should be addressed in the site-specific Health and Safety Plan (HASP). All field activities will be conducted in conformance with the HASP. In the absence of a site-specific HASP, work will be conducted according to Franz Environmental Inc.'s Health and Safety Policy and Procedures Manual.

Tools:

- Project Work-Plan and HASP;
- Combustible Gas Detector – Gastech ME1238 or equivalent for petroleum hydrocarbons and/or Photo ionization detector (PID) with 11.2 electron volt lamp for volatile organic compounds;
- Appropriate calibration gas for combustible gas detector/PID;
- Folding engineers ruler or tape measure;
- Small blade/trowel spatula/teaspoon;
- Utility knife;
- Sample pan (disposable aluminum pie or stainless steel mixing bowls);
- Plastic sheeting;
- Equipment decontamination materials (ex. 20 L buckets of water (soapy water and rinse water) and scrub brushes;
- Paper/shop (blue) disposable towels;
- Health and safety equipment (as required by HASP);
- Methyl hydrate;
- 2 L soil bags;
- Waterproof (indelible) marker pens (ex. double ended Sharpies);
- Field project notebook/pen;
- Field data sheets (boring logs);
- Ice/blue ice for sample preservation (keep in cooler out of direct sun (if possible) and replenish twice per day in summer months and daily in fall/winter sampling events);
- Disposable powder-free field gloves (example nitrile gloves)
- Plastic trash bags;
- ZiplockTM bags for sample protection
- Water level/product interface probe;
- Appropriate sample containers, labels, custody records, packing tape, cooler and ice/icepacks; and
- Wagon/toboggan and bungee cords for transporting material to remote well locations.

Requirements:

- Review required field QA/QC procedures for any fieldwork completed at this property;
- Experience in supervising borehole drilling rigs, and completing environmental monitoring including using various types of environmental monitoring equipment;
- Record all observations and/or comments and results on existing Report Forms.

Soil Sampling With Direct Push Sampling Methodologies

General Description

Direct Push Sampling methods involve collection of soil samples by driving the sampling tool directly into the ground using a percussion/probing machine and without the aid of hollow-stem augers or other casing-installed drilling methods. The soil sampler consists of a 1.2m seamless metal tube. A clear acetate liner/sleeve insert is required to extract an intact soil core/sample from the sampling device.

The sampler is directly pushed into the ground by the percussion/probing machine. A small diameter borehole is created as the sampling device is advanced downward. The macro-core sampler collects soil samples continuously and requires that an open borehole be maintained for representative soil sample recovery.

When the soil sampling device is retrieved from the borehole, the drive head, cutting shoe are removed, and the liner insert with sample is extracted from the sampling device.

Equipment Decontamination

The outer tube, and cutting shoe are the only pieces of sampling equipment that require decontamination prior to use and following collection of each soil sample, especially if sampling for analytical testing purposes is conducted. Site-specific requirements for equipment decontamination should be outlined in the work-plan. Equipment decontamination procedures are also outlined within SOPT- 00X - Decontamination of Equipment.

Sampling Procedures

This SOP assumes that the subcontractor will perform sampling; therefore, detailed procedures regarding sample aquisition are not provided.

Sampler Preparation and Sampling Procedures

- Decontaminate the sampler parts (cutting shoe, sample tube) before assembly;
- Assemble the sampler by first placing the liner over the inside end of the cutting shoe;
- Insert the liner/shoe assembly into the sample tube;
- Thread the cutting shoe into the sample tube;
- Tighten the cutting shoe with the shoe wrench;
- Thread the sampler onto the drive head;
- Using the percussion/probing machine, drive the sampler into the ground until the drive head reaches the ground surface. For deeper samples, the borehole walls must remain stable. The cutting shoe is designed with a tapered surface to limit sidewall scraping;
- For additional depths, add subsequent probe rods until the sampler reaches the targeted sample interval, then drive the sampler through the desired sample interval; and
- Use the direct push machine hydraulics to pull the sampler from the borehole.

Soil Sample Recovery from Macro-Cores

- Once removed from the borehole, the sampler must be unthreaded from the drive head;
- Unthread the cutting shoe from the sampler;
- Remove the liner/shoe assembly removed from the sample tube;
- Disconnect the cutting shoe from the liner which contains the soil sample;
- The recovered soil sample may now be viewed, logged, and extracted from the liner for soil sample collection for laboratory analyses;
- The drilling operator will cut the acetate liner open lengthwise to allow for soil logging and sampling.

Soil Sample Logging from Macro-Cores

- The macro-core will be immediately opened upon removal from the borehole;
- The exposed soil will then be screened for volatile organics with either a combustible gas detector or a PID depending on the type of investigation or as specified in the work-plan;
- If the Sampling Plan also requires individual soil sample headspace screening for volatile organic compounds, then a small portion of the soil sample shall be removed and properly contained for that purpose;
- Sample recovery will be determined by the project geologist/sampling engineer who will examine the soil core once the sampler is opened. The length of sample shall then be measured with a folding rule or tape measure;
- Any portion of the contents which are not considered part of the true sample (i.e., heaved soils or sloughing) will be discarded (generally when soils are present that are not considered representative of interval);
- If the sample recovery is considered inadequate for sample characterization or analytical testing purposes, another sample should be collected from the next vertical interval if possible before drilling is reinitiated;
- Adequate sample recovery for stratigraphic logging purposes and/or headspace organic vapor testing purposes should be approximately 15cm; and
- Adequate sample recovery for analytical testing purposes should be a minimum of 30cm and is somewhat dependent on the type of analytical testing required. In some cases, continuous sampling over a short interval, and compositing of the sample, may be required to satisfy analytical testing requirements. Larger diameter samplers may be used if large volumes of soil are required for analytical testing.

Analytical

- The sample will be removed from the acetate liner (once cut open) with a teaspoon or spatula;
- Placed into the appropriate sample container;
- The sample will be split if necessary to meet sampling program requirements;
- Sample splitting may be needed to provide individual samples for headspace testing, visual characterization, physical testing, analytical testing, or archiving requirments;
- Samples needed for analytical testing should be collected first. The work-plan should provide specific sample container requirements for each type of sample and should be referred to for guidance;
- Once filled, the sample containers should be properly capped, cleaned, and labelled;

- Chain-of-custody and sample preservation procedures initiated; and
- Sampling equipment should then be properly decontaminated.

Sample Containment - Volatile Organic Compounds (VOCs)

Soil sample collection for volatile organic compound (VOC) analysis is slightly more complex than collection of samples for other routine chemical or physical testing primarily because of the concern for the potential loss of volatiles during the sample collection procedure

- To limit the potential for loss of volatiles, the soil sample needs to be obtained as quickly as possible from the sleeve (collect first);
- The VOC sample should be obtained from a discrete portion of the entire sample interval (not composited/homogenized);
- The remainder of the recovered sample can then be composited, homogenized or split to meet the other testing requirements for other constituents; and
- The boring log and/or sample logbook should be filled out to indicate actual sample collection depths for VOC samples and other portions of the sample which may have been composited over a larger vertical interval.

Monitoring Well Installation and Development (Refer to Specific SOP)

Monitoring wells are installed in boreholes, test holes and excavations to facilitate monitoring of liquid levels within the subsurface. Equipment required for well installation is the same for borehole drilling.

Special Regulatory Requirements

Some jurisdictions require special procedures, permits and licences to complete borehole drilling and monitoring well installation. As an example, Ontario Reg. 903 must be complied with for all wells drilled on land falling under the jurisdiction of the Province of Ontario. Special Regulatory requirements must be identified in the work plan and followed in the field.

Document Type: Procedure

Approvals:

Document Owner:	Karl Reimer	Date: 21/04/2009
President:	Thomas Franz	Date:
Quality Manager:	Chris Ludwig	Date: 21/04/2009

Change History

Date	Change(s)

03/02/2006	Original Draft
04/16/2009	Second Version

Objective

This document outlines the protocols required to ensure consistent and acceptable monitoring well installation, development and information recording.

Work Scope

The procedures listed here within apply to all Franz employees and contractors who conduct environmental and/or remedial monitoring.

Introduction

A qualified individual is responsible for overseeing proper monitoring well installation procedures. Field personnel must ensure safety, while acquiring accurate, representative information about subsurface materials. Pertinent construction and development information shall be recorded on a formatted borehole log and/or the field logbook. To maintain data integrity, all measurements must be properly collected. Records of details and measurements must also be kept for auditing purposes.

Preparation

Hazards:

- slips, trips, and falls.
- splashes from contaminated water.
- contact with contaminated soil.
- exposure to contaminant vapours.
- moving parts of mechanical equipment.
- overhead utility wires.
- buried infrastructure (e.g. power, water, sewer, etc).

Tools:

- water level/product interface probe;
- measuring tape;
- disposable nitrile gloves; and
- field data sheets.

Requirements:

- Review required field QA/QC procedures for any fieldwork completed at this property; and
- Experience in supervising borehole drilling rigs, installation of monitoring wells, and completing environmental monitoring including using various types of environmental monitoring equipment.

Related Tasks

1. *Soil Sampling (Refer to Specific SOP)*

Soil samples are collected during drilling for soil classification, to obtain combustible vapour concentrations of the soil, and to obtain samples for chemical analysis.

2. Decontamination (Refer to Specific SOP)

Cross contamination is very serious issue and must be prevented through rigorous adherence to decontamination procedures. Special decontamination must be applied when sampling at sites where compounds with very low compliance limits are enforce ie. PCB's.

- sampling equipment must be decontaminated between samples IAW the SOP on decontamination;
- fresh disposables are used for each new sample; and
- augers and drilling equipment must be decontaminated between each borehole.

3. Monitoring Well Installation and Development

Monitoring wells are installed in boreholes, test holes and excavations to facilitate monitoring of liquid levels within the subsurface. Equipment required for well installation is the same for borehole drilling. A disposable bailer, a surge block or a pump can be used for well development.

- Standard monitoring wells are constructed from prefabricated Schedule 40 PVC well screen and solid riser. Other materials can be used depending on site specific conditions and as specified by the project manager.
- The well casing is installed at maximum lengths of 3 m to minimize damage to the threaded joints. Only threaded casing or screen is used.
- Standard well construction consists of Schedule 40, 51 mm inside diameter threaded PVC piping, washed and bagged. Other dimensions can be fitted to meet site specific needs.

- The borehole annulus is backfilled with clean silica sand to 30 cm above the well screen. The filtration media is placed into the borehole in a fashion to prevent the backfill material from bridging.
- A bentonite seal is placed above the sand pack to prevent surface water from entering the well. The top of the sand extends at least 30 cm above the top of the screened section of the casing before placing the bentonite.
- If required, the wells are completed with a lockable or a bolt-down well box/monument/road box set in concrete.
- If the monitoring well is installed at locations of traffic (e.g. roads, parking lots, etc), then a flush mount cover may be installed. The flush mount is set over the well casing and cemented in place, flush with the surrounding surface.
- Well construction details are recorded in the field.
- In wells installed to investigate for hydrocarbons or other LNAPLs, the screens must be set to intersect the water table interface.
- In wells installed to investigate potential DNAPL's, the screen should be set at the bottom of the well, directly at or above any confining layers.
- The monitoring wells are developed immediately following installation to reduce the accumulation and settling of fines by surging and removal of water until the purge water is clear or does not improve with further development.
- Where possible, wells are sampled at least 72 hours after completion of the well construction.

4. *Special Regulatory Requirements*

Some jurisdictions require special procedures, permits and licences to complete borehole drilling and monitoring well installation. As an example, Ontario Reg 903 must be complied with for all wells drilled on land falling under the jurisdiction of the Province of Ontario. Special Regulatory requirements must be identified in the work plan and followed in the field.

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Objective

This document outlines the required procedures for Purging and Sampling Groundwater.

Work Scope

The procedures listed here within apply to all Franz employees and contractors who conduct environmental and/or remedial monitoring.

Introduction

This standard operating procedure (SOP) provides direction for the collection of valid and representative samples of groundwater from monitoring wells. The scope is limited to applicable field operations/protocols for collection of groundwater samples.

This SOP considers a variety of sampling equipment when collecting representative groundwater samples. Respective provincial and/or federal regulations may specify equipment to be used. The project manager should therefore review the applicable regulatory requirements, if any, prior to the start of the field sampling program. Regulatory deviations from this SOP should be noted prior to the field program and documented in the project work plan. Representative ground-water sampling ensures that samples collected reflect the concentration of the constituents(s) of concern (COC) at a given time and location. Analytical results from representative samples reflect the variation in contaminant presence and concentration throughout a site.

To maintain data integrity, all measurements must be properly collected. Records of measurements must also be kept for auditing purposes.

Preparation

Groundwater sampling may result in exposure to chemical hazards associated with the formation sampled. Health and safety of employees must be adequate for protection from potential chemical exposures or other hazards.

These measures must be addressed in the project Health and Safety Plan (HASP). This plan requires approval by the health and safety person responsible for the project before work commences, must be distributed to all personnel performing sampling, and must be adhered to as field activities are performed.

Hazards:

- Exposure to potential COCs

- Slip, trips, and falls;
- Excessive noise (if entering an operating system); and
- Inhalation of fumes and/or vapours (if entering an operating system).

Based on the project team members, the following responsibilities are to be considered:

Project Manager

The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOP and the project-specific work plan.

Field Team

The field team must be familiar with the sampling procedures outlined within this SOP and with specific sampling, quality assurance, and health and safety requirements within the work plan (Sampling Plan, HASP). The field team are responsible for collection of groundwater samples and for proper documentation of sampling activities as during sample collection.

Tools

Groundwater sampling objectives will be defined in the work plan. The list of materials below identifies the equipment which may be used for groundwater sampling applications ranging from volume purging to low flow sampling. A project-specific list needs to be developed based upon objectives and factors such as the depth to groundwater, well construction, required purge volumes, and analytical parameters, to name a few. Various types of sampling equipment to be used may include:

Well Purging Equipment

- Bailers;
- Pumps: (submersible, peristaltic, centrifugal, or Waterra^{TM});

Field Instruments

- Individual or multi-parameter water quality meter(s) for temperature, pH, specific conductance, dissolved oxygen (DO) oxidation reduction potential (ORP), and turbidity
- Water level measuring device
- Interface probe or product detection paste

Sample Collection Equipment

- Reusable or disposable bailers;

- Peristaltic or bladder pump;
- Filtration equipment (filters, hand pump);
- Sample collection kit (bottles, labels, clear packing tape to anchor labels, sealable (Ziplock^{TM}) baggies for sample bottles, preservatives, indelible markers (sharpie) chain of custody records, cooler, ice)

General Field Equipment

- Project-specific sampling plans (SAP, QAPP, HASP)
- Sample collection records;
- Field notebook/pen;
- Waterproof (indelible) marker pens (ex. double ended Sharpies);
- Paint pens for identifying/reidentifying monitoring wells;
- Spray bottles containing decontamination solutions of (tap water and alconox solution, deionized water)
- 20L (5 gallon) buckets;
- Instrument calibration solutions (calibration gas for PID (if needed), calibration solutions for water quality meters);
- Extra batteries for water quality meter, water level probe, interface probe;
- Appropriate charger for rechargeable batteries (if needed);
- Power source (gas powered generator/12V marine battery);
- Jerry can (gasoline for generator if needed);
- Health and safety supplies – sunscreen, bug repellent, drinking water bottles, First-Aid kit;
- Field Tool box (hammers, ratchet set with 9/16 head (minimum) multihead screw driver, sharp knife/multi-tool, sparker and propane torch, road salt (for flush mount wells) , small snow shovel;
- Metal detector for locating flush mount wells (winter and summer months);
- Disposable bailer string (nylon or polypropylene, not cotton);
- 0.45 micron filters;

- Paper/shop (blue) disposable towels;
- Plastic sheeting;
- Ice/blue ice for sample preservation (keep in cooler out of direct sun (if possible) and replenish twice per day in summer months and daily in fall/winter sampling events);
- Disposable powder-free field gloves (example nitrile gloves)
- Plastic trash bags;
- Ziplock^{TM} bags for sample protection; and
- Wagon/toboggan and bungee cords for transporting material to remote well locations

This equipment list has been developed as an aid to field work. Depending on site-specific sampling needs, additional material and equipment may be necessary and should be identified before a sampling event starts. Conversely, not all items listed above may be needed for a single sampling event.

Additional SOPs are also available which provide procedures for different aspects of groundwater sampling. These SOPs include:

- SOP T-023 Packing Samples and Coolers;
- SOPT-001 Equipment Calibration and Maintenance; and
- SOPT -0XX Decontamination of Equipment

Requirements

- Review required field QA/QC procedures for any fieldwork completed at this property; and
- Experience in completing environmental monitoring including using various types of environmental monitoring equipment.

Related Tasks

Instrument Calibration

Field instruments will be calibrated according to the requirements of the project specific work plan and equipment calibration SOP.

Preparation for Sample Collection

Set up a clean working surface (plastic sheeting) around the monitoring well prior to opening the well plastic sheet with slit cut in the middle. Ensure that proper protective gear has been put on (as identified in the HASP). Disposable gloves will be removed and disposed of at a minimum of per monitoring well location.

Well Security and Condition

At each monitoring well location, observe the conditions of the well and surrounding area and make notes of unusual conditions in the field book/monitoring well log such as:

- Measuring point clarity;
- Padlocks (condition, are they keyed alike or not);
- Well pad (condition of concrete surrounding road box or protective riser);
- Protective road box or riser condition (missing bolts, severely rusted/compromised riser);
- Presence of water in the annular space or within road box; and/or
- Presence of insect/animal pests (bees, wasps, mice, etc).

Measuring Point Determination

At each monitoring well:

- Check for a visible measuring point (notch or visible mark) prior to placing water level probe into the well for a water level measurement;
- If no measuring point exists, it should be established, clearly marked, and identified on the sample collection sheet and the field logbook;
- The same measuring point should be used for subsequent sampling events;
- If this is a new point, an updated topographical survey will likely be required if determining groundwater flow direction; and
- If a new measuring point is required, choose either the “high side” or the “north side” of the well riser, and if more than one location requires a new measuring point, maintain consistency in choosing the side for measuring point location.

Free Product Determination

For Light Non Aqueous Phase Liquid (LNAPL) free product determination:

- Lower the interface probe into the monitoring well until the probe’s audible sound/light is triggered for the first layer (top);
- Record the measurement determined to the nearest 1mm by raising and lowering the tape continuously to converge on the exact measurement;
- Continue to lower the interface probe through the product layer until the “second” sound/light signal is registered;
- Record the measurement determined to the nearest 1mm by raising and lowering the tape continuously to converge on the exact measurement; and
- This second measurement represents the bottom of the LNAPL layer/top of groundwater layer or a secondary NAPL liquid. The measurement should be entered on the Groundwater Sample Collection Record or in the field book.

For Dense Non Aqueous Phase Liquid (DNAPL) free product determination:

- Lower the interface probe into the monitoring well until the probe’s audible sound/light is triggered for the first layer (top);

- Record the measurement determined to the nearest 1mm by raising and lowering the tape continuously to converge on the exact measurement;
- Continue to lower the interface probe through the upper layer until the “second” sound/light signal is registered;
- Record the measurement determined to the nearest 1mm by raising and lowering the tape continuously to converge on the exact measurement;
- This second measurement represents the bottom of the groundwater layer/top of DNAPL or a secondary liquid layer. The measurement should be entered on the Groundwater Sample Collection Record or in the field book.

Water Level Measurement

For water level measurements:

- Lower water level probe into the well until the audible sound/light is detected;
- Record the measurement determined to nearest 1mm by raising/lowering tape continuously to converge on the exact measurement;
- The measurement should be entered on the Groundwater Sample Collection Record or in the field book;
- Raise the tape out of the well while decontaminating the tape by pulling it through a wrapped paper towel soaked in alconox(phosphate free soap)/water mixture;
- The probe end shall be also be decontaminated immediately using a spray of alconox and water mixture followed by a spray rinse with distilled water;
- Generally, only that portion of the tape which enters the water table should be cleaned;
- It is important that the measuring tape is never placed directly on the ground surface or allowed to become kinked. Measuring devices, including interface probes, which come into contact with free product, will likely require more thorough decontamination (see SOPT-XXX).

Purge Volume Calculation

Monitoring wells designated for groundwater sample collection require purging of a known volume to remove stagnant water in the well. A single, casing volume of groundwater needs to be calculated by:

- Measuring depth to groundwater (as above);
- Measuring the total length of the water column (depth to bottom of monitoring well); and
- Well casing diameter.

For a single well volume calculation, use either the second page of the Groundwater Sample Collection Record (attached) which provides information used to compute the casing volume. The second page includes: a diagram, a numerical conversion table, and the standard calculation. The volume of standing water in the well (i.e., one purge volume) should be entered on the Groundwater Sample Collection Record.

Alternatively, using the water level obtained during monitoring, the known depth of the well and casing size (diameter) calculate the water-filled casing volume (cylinder):

- $V_{cyl} = \pi r^2 h$
- volume (L) = π x (casing diameter/2)^2 x depth of water ÷ 1,000
- r = (casing diameter)/2 in mm
- h = depth of water in m

Purging Technique

Objectives

- Purging must be performed for all groundwater monitoring wells to not only remove stagnant water from within the casing and gravel pack but to also ensure that a representative groundwater sample is obtained at the monitoring well; and

- There are three general types of non-dedicated equipment used for well purging and include: bailers, surface pumps (peristaltic/waterra^{TM}) and down-hole pumps. The purge method and equipment selected should be specified in the project work plan

General Notes on Purging

- If the well has an historical problem with high levels of sediment despite attempts at well development, then use low flow purging and sampling techniques.
- If the well has historical PAH detects then use low flow purging and sampling techniques.
- If purged water remains high in sediment, remove additional volumes, as necessary, until water becomes clear.
- If applicable, monitoring wells that contain Oxygen Release Compound (ORC) or Hydrogen Release Compound (HRC), for passive remediation purposes, shall be developed by removing a minimum of six well volumes.
- Regardless of the purge method: a minimum of temperature, pH, and specific conductance will be monitored with either each purge volume or on a specified time elapsement (low flow purging method) and recorded on the Groundwater Sample Collection Record;
- Additional water quality parameters may be required by the work plan. In general, purging will be considered complete following the withdrawal of at least 3 to 5 well volumes of groundwater (using bailers or waterra^{TM}) or in using low flow methods when all field parameters have stabilized to within the allowable range for three successive measurements;
- Purging a monitoring well “dry” may periodically happen in some low hydraulic conductivity formations. When the well recovers (ie the groundwater flows back into the monitoring well), a cascading effect may occur in the screened section which may volatilize some volatile organic compounds (VOCs). This may be considered unacceptable by regulatory agencies when VOCs are the target analyte of interest
- Purging a well to dryness, then sampling after it has recovered may be acceptable for other target analytes, however. Under low yield conditions, low-flow sampling pumps such as bladder pumps may be required for VOC sample collection.

Purging 3 -5 Monitoring Well Volumes

Bailing/Waterra^{TM} Overview

Bailers are constructed using a variety of materials including polyvinyl chloride (PVC), polyethylene (PE), stainless steel, and Teflon. Many bailers are disposable. Reusable bailers such as stainless steel and PVC must be decontaminated between uses.

Waterra foot valves are essentially bailer check valves which manually thread onto the bottom of standard pump tubing (polyethylene, teflon). The foot valves are available in a variety of diameters. The foot valves operate by manually or mechanically raising and lowering the valve assembly within the water column which raises the water level within the discharge tube. Flow rates usually in the vicinity of 1 gallon per minute can be achieved with these devices.

Measurements of the extraction rate (standard bailers for 2-inch diameter wells are 1L in volume), temperature, pH, and specific conductance should be made after each monitoring well volume is removed and documented on the Groundwater Sample Collection Record or in the field logbook. Samples may be collected after the required purge volume has been withdrawn.

Bailing/Waterra ^{TM} presents two potential problems with monitoring well purging:
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- Increased suspended solids may be present in samples as a result of the turbulence caused by raising and lowering the bailer through the water column, which may affect sample representativeness; and
- Bailing may not be feasible for deep or large diameter monitoring wells which require a large volume of water to be removed during purging because of the time involved with continuous insertion and removal/emptying of the bailer

Bailing Procedure

Bailer Approach

- Obtain a clean bailer and spool of clean polypropylene/nylon bailer cord
- Open the protective wrapping and expose the top end of the bailer and tie a double bowline knot, or equivalent, through the bailer loop
- Test the knot and the bailer itself to ensure that all knots and parts are secure prior to inserting the bailer into the well;
- Tie a hand loop at the end of the bailer cord;
- Raise the bailer by grasping a section of cord using each hand alternatively in a "rocking" or “windmill” action. This method requires that the sampler's hands be kept approximately 2-3 feet apart and that the bailer rope is alternately looped onto or off each hand as the bailer is raised and lowered;
- Grab the bailer with one hand as it emerges from the well;
- Pour the bailed groundwater from the bailer “gently” into a graduated bucket to measure the purged water volume ensuring that spillage outside the bucket is minimized;
- Repeat this procedure until one complete monitoring well purge volume of water is removed from the well;
- At each monitoring well volume extracted, place a small amount of purge water into a sample cup;

- Measure temperature, pH and specific conductance (and for other assigned parameters) and record the results on the Groundwater Sample Collection Record or in the field logbook
- Groundwater samples may be collected after the required purge volume has been withdrawn and the specific field parameters have been recorded.

Waterra^{TM} Approach

- Lift the tubing and foot valve out of the well and place the open end of the tubing within the graduated purge bucket opening;
- Hold the open end inside the bucket with a clamp, vice grips or hand (preferably vise grips or clamp);
- With the other hand raise and lower the tubing in a lift action approach to bring the groundwater to the surface;
- Repeat this procedure until one complete monitoring well purge volume of water is removed from the well; and
- At each monitoring well volume extracted, place a small amount of purge water into a sample cup;
- Measure temperature, pH and specific conductance (and for other assigned parameters);
- Record the results on the Groundwater Sample Collection Record or in the field logbook;
- Groundwater samples may be collected after the required purge volume has been withdrawn and the specific field parameters have been recorded.

Surface Pumps (Peristaltic and Centrifugal)

General

Purging using pumps at ground surface can be performed with peristaltic or centrifugal pumps if the groundwater level in the well is within approximately 6 m (20 feet) of the top of the well. Typically peristaltic pumps provide a purge rate in the range of 75-750 ml/min and are considered suitable for low flow purging situations where minimal disturbance of the water column is required.

In contrast, centrifugal pumps, pump between 20 to 150 litres/minute depending on pump capacity. If the pump has an adjustable throttle then discharge rates can be regulated. These pumps require polyethylene or teflon-lined polyethylene tubing as suction line. The pump may also require priming to initiate flow.

Peristaltic Pump Procedure

- Silicon (flexible) tubing must be used within the pump head (discuss with rental supplier need for sufficient length of flexible tubing), and should be installed as a first step (approximately 18-inches of tubing per monitoring wel-l application is needed);
- Briefly turn on the pump and determine which is the suction side and which is the discharge side (before any suction/discharge tubing lengths are connected);
- Attach suction and discharge lines to the peristaltic pump head (the tubing material, used for sample collection should be compatible with the target analytes);

- Uncoil the sufficient length of suction line, (long enough, to extend a sufficient depth into the static groundwater surface to account for drawdown to occur during pumping);
- Connect a sufficient length of discharge tubing to extend from the pump head to the purge bucket;
- Clamp the discharge tubing so that the discharge end remains inside the bucket when pumping;
- Start the pump and direct the discharge into a graduated bucket;
- Adjust the pumping rate with the speed control knob so that a smooth flowing discharge is attained;
- Measure the pumping rate in litres per minute by recording the time required to fill a known volume in a measuring cup;
- Pumping needs to be monitored to assure continuous discharge;
- If drawdown extends down to below the end of the suction line and causes the discharge to stop, the suction line will be lowered, slowly, into the well until pumping restarts
- Measurements of temperature, pH and specific conductance (and/or other assigned parameters) should be made after each monitoring well volume has been extracted and documented on the Groundwater Sample Collection Record or in the field logbook;
- Samples may be collected after the required purge volume has been removed;
- Project-specific sampling objectives such as VOCs may require that the sample be collected with a bailer; and
- Generally VOCs are collected last when utilizing peristaltic pumps.

Centrifugal Pump Procedure

Similar to the peristaltic pump procedure:

- Attach a new suction and discharge line to the centrifugal pump;
- Start the pump and record the stabilized rate of discharge;
- As with other well purging systems, measurement of temperature, pH, and specific conductance (or other parameters as required) will be made after each well purge volume has been removed;
- These measurements shall be recorded on the Groundwater Sample Collection Record or in the field logbook;
- Samples may be collected after the required purge volume has been removed; and
- Project specific sampling objectives may require that the sample be collected with a bailer.

Down Hole Pumps

General

Submersible pumps are useful where the depth to water table is greater than 6 m and or where the depth or diameter of the well requires that a large purge volume be removed before sample collection. Commonly available submersible pumps include the Johnson-Keck pump model SP-82, the Grunfos Ready-Flow 2 pump, and disposable marine galley pumps.

The use of bladder pumps (positive gas-displacement pumps) can also be used in well purging and sampling primarily because the pumps can be operated at low flow rates (less than 1 litre per minute).

Well Condition Check for Down Hole Pumps

A check of well condition may be required prior to inserting any down-well pump if the well has not been sampled for some time or if groundwater quality conditions are not known. The well condition check should include:

- A check of casing plumbness as a bent well casing could cause a pump to get stuck;
- Casing plumbness can be checked by lowering a clean cylindrical tube with the approximate pump dimensions into the well. If the well casing is not plumb then an alternative purging method should be used.
- The well inspection should also include a check of air quality or headspace conditions within the well for potentially explosive gasses and a check for free product which could foul the pump;
- Well casing headspace conditions can be monitored with a photoionization detector (PID); and
- The presence of free product should be determined before inserting the submersible pump into the well because free product may contaminate the pump's internal mechanisms making it extremely difficult to decontaminate. An interface probe should be used to check for free product.

Electric Submersible Pump Procedure

Once the above well conditions have been assessed, and assuming it’s safe to proceed:

- Slowly lower the submersible pump with attached discharge line into the monitoring well;
- Take notice of roughness or restriction within the well riser pipe;
- The pump intake should be placed in the midpoint of the screen (if screen is completely submerged) or at the midpoint of the static water column of the monitoring well if the screen is partially exposed. The power cord should be attached to the discharge line with an inert material (i.e., zip-ties) to prevent the power cord from getting stuck between the pump, discharge line, and the well casing;
- Secure the discharge line and power cord to the well casing, using duct tape or a clamp, taking care not to crimp or cut either the discharge line or power cord;
- Connect the power cord to the power source (i.e., rechargeable battery pack, auto battery, or generator);
- Turn the pump on;
- Voltage and amperage meter readings (for Grunfos pumps particularly) on the pump controller (if provided) should be monitored closely during purging;
- The operations manual for the specific pump used should be reviewed regarding changes in voltage/amperage and the potential impacts on pump integrity;
- Pumping should be discontinued if warning conditions occur and/or if the well is pumped to where drawdown falls below the pump's intake level;
- If drawdown continues to the extent that the well is pumped dry, the pump should be shut off and the well allowed to recharge. This on/off cycle may be necessary in order to purge the well properly;
- Measurements of the pumping rate, temperature, pH, and specific conductance (and/or other required parameters) should be made after each purge volume is removed and documented on the Groundwater Sample Collection Record or in the field logbook;
- Samples may be collected after the required purge volume has been withdrawn; and

- Project-specific sampling objectives may require that the sample be collected with a bailer.

Bladder Pump Procedure

To operate the bladder pump system:

- The pump intake should be placed in the mid-point of the screen (if screen is completely submerged) or at the midpoint of the static water column of the monitoring well if the screen is partially exposed;
- Secure to the well casing with a clamp;
- The generator and air compressor should then be turned on to activate pumping;
- The pump controller is used to vary the discharge rate to the required flow;
- Measurements of the pumping rate, temperature, pH, and specific conductance (and/or other required parameters) should be made after each purge volume is removed and documented on the Groundwater Sample Collection Record or in the field logbook;
- Samples may be collected after the required purge volume has been withdrawn; and
- Project-specific sampling objectives may require that the sample be collected with a bailer.

Low Flow/Low Stress Monitoring Well Purging Technique

Low Flow purging/sampling refers to velocity that groundwater is pulled into the pump intake, which is equivalent to the flow rate imparted on the aquifer formation in the vicinity of the well screen. Typically flow rates are on the order of 0.1 – 0.5 L/min but are dependent on site geology. In some locations coarse textured aquifer formations can withstand extractive flow rates at 1 L/min. Drawdown of groundwater surface is maintained within 0.1 m from start of pumping and once stabilization (over three successive measurements) of indicator parameters (pH, Specific conductivity, dissolved oxygen, temperature, turbidity, oxidation/reduction potential), have been reached, then groundwater samples for analytical purposes can be taken.

The general steps for conducting low flow/low stress sampling include:

- Calibrate PID, and water quality sonde (ex. Horiba U-22), document in field book calibration steps;
- Mob to first well, turn on PID, open well protective casing, remove riser cap and immediately record head space PID reading at top of riser, record team members, weather;
- Take measurement of: (a) depth to water, (b) total depth of well (if no well log available);
- Determine well volume for the monitoring well;
- Insert pump and tubing into well (if using down hole pump ex. Grundfos or bladder pump) or insert tubing for peristaltic pump, to approximate mid-point of saturated portion of screen or mid-point of the static water column, if screen partly exposed;
- To previous step, advance pump and tubing assembly gently into the monitoring well to minimize disturbance to bottom of well and then gently raise it up;
- Fasten the flow through cell to either the protective well casing, 5 gallon bucket, or field sampling table using duct tape;
- Connect inlet tubing from pump to bottom nipple of flow through cell;
- Connect outlet tubing from top of flow through cell with sufficient length to discharge into 20 litre pail;

- Insert water level tape into well and record new depth to water level (may change from initial measurement);
- Leave water level tape in well slightly out of water column;
- Place open handle measuring cup on bucket edge, place discharge tubing from flow through cell into the measuring cup;
- Turn on generator, turn on pump target an initial extraction rate at no more than 300ml/min. It should take approximately 2 minutes to fill the flow through cell;
- Target pumping rate may some time to achieve;
- When achieved, take readings of parameters: pH, temp, Cond, ORP, DO, Turbidity depth to water, Q (discharge), and time, at time zero (To);
- Use time elapsement of 3 to 5-minutes between readings;
- Watch for stabilizing of water quality parameters. Note: generally, pH, temp, ORP stabilize first. DO is generally last. For turbidity, the goal is as low as possible prior to sample collection;
- Parameter Stabilization has occurred when the following variability occurs:
  - Frequency of measurements every 3-5 minutes;
  - Q (discharge) = <500 mL/min
  - Draw down = less than 0.1m;
  - pH = +/- 0.1 units;
  - Temperature = +/- 0.1^{o}C;
  - Turbidity = <5 NTUs, OR +/- 10% (if TURB is not dropping);
  - DO = +/- 10 % OR +/- 0.2 mg/L; and
  - Specific conductivity = +/- 3 %.

Trouble Shooting for Low Flow/Low Stress Groundwater Sampling

- Turbidity is affected by: total suspended solids (TSS), tannins in water, iron bacteria floc, and micro bubbles. If turbidity does not/is not dropping, reduce discharge rate (turn down pump rate), look at flow through cell for floc, micro bubbles, examine tubing upstream of flowthrough cell for tannins or TSS. You may have to disconnect the cell, clean out and reconnect and resume pumping, if this is needed, make notes in the note section on sample log;
- Water level is dropping beyond 0.1m (10 cm) maximum allowable draw down. Reduce pumping rate and re-assess new water level. In a tight formation, the groundwater surface may recover (bounce back) to a new level, make note of this if it occurs;
- DO does not stabilize. Keep pumping, it can take awhile before stability occurs.
- A general order of occurrence of stability is: pH -> temp->Sp. Cond ->ORP (Eh) ->DO -> Turbidity.

Purge Water Containment and Disposal

Regardless of the purging method, purge water must be contained in buckets or drums for subsequent characterization and appropriate disposal. Secure the lid in place prior to leaving the site or leaving the drum unattended.

Some general rules for purge water containment:

- Ensure that a purge water drum contains sufficient headspace on drum top to allow for freezing in winter months;
- Ensure that drum labels are placed appropriately on each drum; and
- Ensure that drums are numbered with paintpen (best) or fluorescent paint/indelible marker and that a drum key with number and contents is maintained in the field book (sometimes drum labels fall off the drum)

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Single Well Hydraulic Tests

Field Protocol

1. Open well

2. Allow level to equilibrate

3. Measure and record static water level

Tests are ideally conducted in fully penetrating wells with screens fully below the water table. Tests can be conducted in other types of wells. In all cases, the following data are required as a minimum (top of casing elevation, static water level, screen elevation (top and bottom), diameter of well, diameter of borehole).

If a continuous water (pressure) measuring device (Levelogger, Hobo or other type of transducer) is being used, place it in the well before either type of test and allow it to equilibrate and measure at least one level.

1. Rising Head Test

    a. Pump out as much water from the test well as possible – pumping device must not be able to drain into the well when pumping is stopped
    b. Immediately measure water level using a water level tape (or use a water level recorder in the well (i.e. Levelogger)) – this is the level at time zero (T_0)
    c. Continue measuring the water level (and elapsed time) as it rises as frequently as possible (frequency depends on recovery of well)
    d. Test can cease when the level has recovered to static or at least 70% of amount drawn down

2. Falling Head Test

    a. Either add water to well or displace water using a solid rod or packer (lowered below the static level)

b. Immediately measure water level using a water level tape (or place a water level recorder in the well (i.e. Levelogger) – T_0
c. Continue measuring the water level (and elapsed time) as it drops as frequently as possible (frequency depends on recovery of well)
d. Test can cease when the level has recovered to static or at least 70% of the head decrease

Time vs. water level data are analysed using software such as Aquifer Test to determine hydraulic conductivity and other parameters (variety of methods are possible).

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Objective

This document describes the required procedures for packing samples and coolers as part of environmental monitoring. The objective is to provide adequate shipping protection for soil and or water samples to arrive at the analytical laboratory unbroken within an acceptable temperature range.

Work Scope

The procedures listed here within apply to all Franz employees and contractors who conduct environmental and/or remedial monitoring.

Introduction

To provide steps for the proper packing of collected soil and or water samples so that they can be shipped in a manner that minimizes sample breakage as well as maintain an acceptable shipping temperature to preserve sample integrity.

An effective method to ensure acceptable sample temperature upon receipt at laboratory is to maintain ice in sample cooler throughout the day and place recently collected samples in a Ziploc bag within the ice.

To maintain sample integrity throughout each field day, as samples are collected, begin to fill out the chain of custody. This is done so that sample identification, media, number of sample jars, and jar volumes, analytical methods turn-around-times etc. are checked. This approach is intended to bring sample temperatures into the acceptable range, reduce chain of custody errors at the end of the day rush when packing up the site, and placing samples in the coolers and attempting to get coolers out to the courier.

Preparation

Tools:

- Cooler;
- Bubble wrap or inert packing material;
- Ice (lots);
- Clear packing tape;
- Permanent marker (double ended Sharpies);
- Packing labels; and
- Ziploc baggies (1 gallon size).

Requirements:

- Experience completing environmental field sampling programs.

Tasks

1. *Packing Sample Bottles/Sample Jars*

- Wipe sample bottles/jars with shop towel to remove excess dirt from the container, and provide a “dry” surface for placement of sample labels;
- Place shop towel in trash bag;
- Label all the bottles to be sent to the lab for analyses. Double check the labels are properly filled out using a pen or marker that is not water-soluble;
- Place a layer of “clear packing tape” over the label and completely encompassing the circumference of the container to prevent label removal in the event of ice melt within the cooler;
- Do not write on the septum (lid insert) of Forty (40mL) VOC vials. If you do write on the cover always double check, so that the bottle label and cap have the same sample ID;
- 40 mL VOC vials should be placed in the laboratory provided bubble wrap pouches. Generally Three 40 mL vials will fit into the laboratory supplied bubble wrap pouch.
- To prevent breakage, place the vials so that there is no room for movement;
- Individually wrap in bubble wrap and tape closed the One (1) litre, 500 mL and 250 mL bottles;
- Place inside a Ziploc bag;
- If room inside the Ziploc bag, place 40ml VOC bubble wrap pouch inside the bag also;
- Fifty (50) mL soil jars should be wrapped in bubble wrap and placed one on top of each other in a ziplock bag (usually 4 per bag);
- Once the bottles are in ziplock bags, seal the Ziploc seal on the bags and tape tightly, this is to ensure that water from melting ice will not infiltrate into the bag;
- Place Ziploc bags inside the cooler with ice

2. *Packing Coolers*

- Check the cooler to determine if it has a water drain outlet at the bottom;
- Seal drain tightly with tape to prevent water from leaking out. (NOTE: Couriers will refuse to ship a leaking cooler);
- Place a layer of inert shipping material (if available) on cooler bottom, or place large piece of thick bubble wrap on cooler bottom;
- Make sure there is adequate bubble wrap so as to extend up the sidewalls of the cooler;
- Line the cooler with two, large, industrial strength garbage bags (one inside the other) so that all the packing will be performed in the bags. (NOTE: This is to prevent leaking once the ice melts);
- Place a generous layer of ice at the bottom of the garbage bags;
- Place and partially work into the ice layer, the packaged sample bottles;

- The bottles should be placed in such a way that they do not touch each other. As a general rule all bottles should be placed in an upright position;
- Place more ice around the packaged sample bags;
- Place a layer of ice on top of the samples bottles;
- This three step procedure will ensure that all bottles are surrounded by ice.
- If you are packing fifty (50) mL soil jars, placing a layer of bubble wrap between every row of samples and ice is recommended;
- Repeat these steps until cooler is almost full;
- Leave enough room so as to place a layer of bubble wrap on top of the garbage bag before closing the cooler;
- Squeeze out the air in the garbage bag and seal the bag with a tight knot or tape;
- If there is any void space it should be filled with a layer of bubble wrap or inert packing material;
- Remove the last sheet from the COMPLETELY filled out Chain of Custody form (COC);
- Place the remaining 3 pages of the COC in a Ziploc bag;
- SEAL the bag and tape it to the underside of the cooler lid inside the cooler;
- There may be more coolers than COC forms;
- Close the lid tightly;
- Place a TIGHT tape seal parallel to BUT covering the line where the cooler lid meets the cooler bottom (wrap the cooler with sufficient packing tape at all points of entry);
- Place a TIGHT tape seal completely around the cooler lid AND bottom at left, middle and right sides of the rectangular cooler;
- For the left and right sides of the cooler, if lid is hinged to the cooler bottom, place tape over the hinged portion tightly;
- Place signed and dated chain of custody seal across the opening between the lid and cooler bottom on the left or right side taped strip and place another clear tape cover over the seal;
- Place a shipping label (usually supplied by lab), indicate cooler 1 of 3, or 1 of 8, etc. if there is more than one cooler being sent on the same way bill.

3. Couriers And Way Bills

CLEARLY fill out every section of the waybill to include:

- The proper laboratory address and phone number (NOTE: the laboratory information is always written on the Chain of Custody form);
- Except on weekends, specify the FASTEST delivery service:
  - PUROLATOR, specify 9h00 AM delivery;
  - FEDEX check off the FedEx First Overnight box for h00 am delivery; and
  - Ask them to put a 9h00 AM sticker on the coolers (for Purolator and FedEx).
- FOR SATURDAY delivery when samples are shipped on a Friday:
  - FEDEX, if the samples are shipped on a Friday, check off the FEDEX Priority Overnight box and Saturday delivery (there is no first overnight on Saturdays); and
  - PUROLATOR, only check off the Saturday Box.

Document Type: Procedure

Approvals:

Document Owner:	Karl Reimer	Date: 04/21/2009
President:	Thomas Franz	Date:
Quality Manager:	Chris Ludwig	Date:

Change History

Date	**Change(s)**
14/11/2006	Original Draft
04/21/2009	First Revision

Objective

This procedure describes the requirements for completing a chain of custody for environmental sampling.

Work Scope

The procedures listed here within apply to all Franz employees and contractors who conduct environmental and/or remedial monitoring.

Introduction

To ensure timely and complete laboratory analysis, the chain of custody must be properly completed. Records of the chain of custody must also be kept for auditing purposes.

Preparation

Tools:

- Chain of Custody (CoC) forms.
- Hard-tipped pen with waterproof ink.

Requirements:

- Experience completing environmental monitoring.

Tasks

Project Contact information includes address where results and invoice are to be sent, telephone and fax numbers of the contact in case the laboratory has questions regarding the sample(s) or analytical request.

Site and Sampler information includes site name and/or location, project number and name(s) of individuals collecting the samples.

Additional info should include submission date, laboratory quote number, any additional forms in which the results are required (e.g. fax, electronic).

Sample Details should include for each sample submitted sample identification, sample date and time, sample matrix (groundwater, surface water, soil, sediment, etc.), number of containers filled, any field filtering and preservation completed, any lab filtering and/or preservation required, requested analyses.

Special Instructions includes any required detection limits, specific methodology, hazards of the sample(s) to laboratory personnel.

Required Guidelines includes indicating to which criteria or guidelines the results will be compared and allows the laboratory to aim for the required detection limits.

Include the date that the results are required, be specific (not 'ASAP' or 'next week').

Also include any other information that may be useful to the laboratory in the 'Notes' area.

When the sampler gives the samples to another individual (e.g. courier, laboratory staff) he/she must complete the 'Relinquished by' section including the date, time and signature and the person who accepts the samples must complete the 'Received by' section including the date, time and signature.

Every time the samples are given to another individual the 'Relinquished by' and the 'Received by' sections must be completed until the samples are received by the laboratory.

Document Type: Procedure

Approvals:

Document Owner: Greg Frank Date: 11/09/2006

President: Thomas Franz Date: 11/09/2006

Quality Manager: Chris Ludwig Date: 11/09/2006

Change History

Date	**Change(s)**
11/09/2006	Original Draft

Other Procedures Imposed by Client

If procedures are imposed on FRANZ by a client, the client procedures must be reviewed and revisions to the FRANZ Preferred Operating Procedure must be documented. The FRANZ project manager for this client and an office manager must approve the use of the client procedure in writing. The office manager must confirm in writing that the client procedure is equally safe (or even better than the FRANZ procedure). Documentation of the office manager approval of the client procedure must be placed in the invoice file or Master Services Contract file, or the Standing Offer Agreement file (in head office).

Hazard Prevention at Operating Gas Stations

To ensure that our drilling sub-contractors prevent contact with buried services or infrastructure, FRANZ will make the following changes in our procedures:

- Application of POST

    1. Subsurface clearance at operating gas stations must follow the POST Drilling / Borehole / Excavations Checklist (see attached). The checklist must be completed. This must be required by the FRANZ Health & Safety Plan.

- Work Plan Preparation and Layout of High Risk, Critical and Non-Critical Zones

    1. As part of the work plan preparation, the FRANZ project manager will establish zones on the investigation property that will require different clearance protocols: high risk zone, critical zone, and non-critical zone. A senior FRANZ professional must review and sign off on the layout of the zones.

    2. In the high risk zone, no drilling or excavation will be conducted.

    3. In the critical zone, all procedures discussed below for the whole property and the critical zone will be conducted. It is emphasized here that boreholes will be scanned with appropriate detection methods (private utility locator) AND all locations will be air- or hydro-vacuum excavated (in the following, this is often referred to as “daylighting”).

    4. In the non-critical zone, all procedures discussed below for the whole property and the non-critical zone will be conducted. It is emphasized here that boreholes will be scanned with appropriate detection methods (private utility locator), but it may not be necessary to conduct daylighting in all cases. Note that it is at the FRANZ project manager’s discretion to require daylighting of all boreholes in the non-critical zone.

    5. Upon a field visit, the FRANZ field supervisor must communicate with the FRANZ project manager to confirm the zones. The FRANZ project manager may adjust the zone boundaries to reflect site-specific conditions.

- What are High Risk, Critical and Non-Critical Zones?

1. The FRANZ project manager will lay out the high-risk, critical, and non-critical zones. Examples for the high risk zone are: the area between the tanks and pumps and the area between the pumps and kiosk. Examples for a non-critical zone are parking areas, areas beyond the pumps or tanks (i.e. the area on the opposite side of the pump island as seen from the kiosk, the area beyond the tanks as seen from the pump islands). All other areas are in the critical zone.

2. Boreholes located within 3 m of known subsurface infrastructure are in a critical zone (and must be daylighted).

- Procedures for the Whole Investigation Property

1. FRANZ must contact BC One Call, Ontario One Call or other similar appropriate public utility locator service to obtain public utility clearance and plans of public utility locations. Note that in some Canadian provinces and territories, this activity and obtaining such reports is required by law. When a request is made to a One Call center, the list of utility companies that will be notified should be obtained. Work cannot commence until all utilities on the One Call list have responded.

2. It is FRANZ's experience that the One Call contact does not always provide all public utilities. If utility information is not available through One Call or incomplete, the FRANZ field supervisor or project manager must make reasonable efforts to contact local utilities directly to identify their lines at the site or obtain maps from them if they will not provide the service. Examples are storm, sanitary and water line locations that may have to be obtained from the local municipality.

3. The FRANZ representative present during the utility stakeouts must be keep a written record (with dates and times) of which utility has been at the site.

4. FRANZ must make reasonable efforts to obtain site development plans and as-builts of the gas station (showing subsurface infrastructure) and other similar, relevant plans and documents. The plans should contain the location of "easements" where underground utilities are often located, which can be quite useful for subsurface clearance work. This document may not exist or may have limited use at large operating sites, but for smaller properties obtaining this or similar documents is recommended. The site development plan is typically filed at local governmental offices such as the municipal building department, the municipal engineer's office, or other governmental locations. Phase I ESA reports may also contain this information, and should be requested from FRANZ's client. Historical property title searches may include easement maps. Nevertheless, property development maps and plans should only be used as guidance. These are usually not 100% accurate and should therefore be verified in the field.

5. The FRANZ field supervisor must inspect the property and complete the POST Drilling and Excavation Clearance document (attached) **while on-site**.

6. The FRANZ field supervisor must make reasonable efforts to discuss site features / conditions with the property owner or responsible on-site personnel as they may be aware of utility locations (or former utility locations) that are not marked or easy to locate (for example, smaller conduits that may be missed via GPR – ground penetrating radar).

7. The FRANZ field supervisor who will be present during the drilling / excavation should be present at the site during the utility clearance process. For "One Call", often this is not practical since each utility may mark the site on different days and times, but for private locators, this is usually not a problem and is recommended. If the FRANZ field supervisor who will be present during the drilling / excavation is not available during the locating, there must be a discussion between the FRANZ representative who attended the locate process and the field supervisor to ensure that this critical information is transferred.

8. The FRANZ field supervisor must make field observations including asphalt patches, natural gas line tags or meters, catch basins, observed utility connections to buildings, etc., and sketch them on a scaled map relative to planned borehole locations. If boreholes are located in areas where there is evidence of anything suspicious, the location must be identified as a critical zone.

- <u>Procedures in the High-Risk Zone (the "No-Go Zone")</u>

1. In the high risk zone, no intrusive work will be conducted.

2. If work must occur at a location within the high risk zone, the boundary of the high risk zone can be adjusted to designate such a location as a critical zone, provided it is safe to do so. This can be done only if a field review by the field supervisor AND a review by the FRANZ project manager have been conducted and documented in writing (with appropriate sketches). The location must be daylighted.

- <u>Procedures in the Critical Zone</u>

1. All procedures discussed under "Procedures for the Whole Investigation Property" must be completed for borehole or excavation locations in the Critical Zone.

2. A private utility clearance subcontractor must be used to clear borehole and excavation locations. The locator must use a combination of methods. Electric methods MUST be used. GPR must NOT be the sole method of utility clearance used by the subcontractor.

3. The primary purpose of using the utility clearance subcontractor is to avoid too many "false starts", i.e. to avoid that we daylight (causing ground disturbance) in areas where subsurface utilities preclude drilling or excavation.

4. A written utility stakeout report MUST be obtained from the utility clearance subcontractor and MUST be kept on-site. Best practice is that the report consists

of a written documentation of the methods used (e.g. EM, GPR, passive and/or active inductive sweep, etc.) AND a site sketch with utilities marked.

5. If the utility clearance subcontractor conducted sweeps of the borehole location, the area investigated should be a minimum of 20 ft by 30 ft (6 m by 9 m) in order to give a better chance of crossing subsurface infrastructure multiple times for better detection. Usually a grid with 2-3 survey lines/paths is performed.

6. It is specifically stated here that interviews with knowledgeable personnel and review of plans are not sufficient to eliminate the need for daylighting, plan reviews and the use of other observations as described under "Procedures for the Whole Investigation Property" in the critical zone.

- Procedures in the Non-Critical Zone

1. All procedures discussed under "Procedures for the Whole Investigation Property" must be completed in the Non-Critical Zone.

2. A private utility clearance subcontractor must be used to clear borehole and excavation locations. The locator must use a combination of methods. Electric methods MUST be used. GPR must NOT be the sole method of utility clearance used by the subcontractor.

3. In the non-critical zone only, the primary purpose of using the utility clearance subcontractor is to clear drilling or excavation locations. However, the utility clearance subcontractor is not the sole method of clearing a location. "Procedures for the Whole Investigation Property" must also be used.

4. A written utility stakeout report MUST be obtained from the utility clearance subcontractor and MUST be kept on-site. Best practice is that the report consists of a written documentation of the methods used (e.g. EM, GPR, passive and/or active inductive sweep, etc.) AND a site sketch with utilities marked.

5. If the utility clearance subcontractor conducted sweeps of the borehole location, the area investigated should be a minimum of 20 ft by 30 ft (6 m by 9 m) in order to give a better chance of crossing subsurface infrastructure multiple times for better detection. Usually a grid with 2-3 survey lines/paths is performed.

6. When in doubt, daylight! Locations where there is any risk identified or where there is any suspicion of subsurface infrastructure, daylighting should be conducted.

7. Within 3 m of any identified subsurface infrastructure, daylighting must be used.

- General Procedures and Notes

1. FRANZ personnel involved in utilities clearance must have reviewed the ExxonMobil document "Subsurface Clearance Supplemental Guidance Document" (attached) and must have reviewed the best practices manual

available on the internet (http://www.commongroundalliance.com/) to educate themselves of method applications, limitations, and best practices.

2. The role of the utilities clearance subcontractor is not to be the sole method for "clearing" borehole locations. It is emphasized that the methods used by utilities clearance subcontractors cannot detect all subsurface infrastructure and too much faith put into such locates will lead to a FALSE SENSE OF SECURITY. Therefore, FRANZ's reliance on third party utilities clearance contractors for the identification of underground services will be reduced.

3. When in doubt, daylight! Locations where there is any risk identified or where there is any suspicion of subsurface infrastructure, daylighting should be conducted.

4. If underground services are uncovered during daylighting, FRANZ will re-locate the proposed borehole. The new borehole location must be cleared by daylighting, even in the non-critical zone.

5. FRANZ will take an active role working with utilities clearance contractors to ensure that both electrical methods and GPR are always used. It is specifically noted that GPR will not be acceptable as the sole method for subsurface clearance; while GPR is a useful method for the detection of certain subsurface structures, this method has sometimes been found to lack the required resolution. Oversight of the utilities contractor will be done by experienced FRANZ site personnel.

6. Any apparent oversights on the part of the utilities clearance contractor will be challenged by FRANZ. FRANZ personnel should discuss locate methods with the utilities clearance contractor. When in doubt of the capability or limitations of the equipment, FRANZ should request a scan of an area with known underground services to test the method used by the utilities clearance contractor, if this is practical.

7. Where air- or hydro-vacuum excavation is deemed necessary (according to the procedures stated above), air- or hydro-vacuum excavation will be conducted to a depth below the depth of any buried services. Note that the minimum depth is 1.2 m. In the critical zone, daylighting should be done to a depth of 2.4 m.

8. Delineate subsurface structures prior to ground disturbance activities to prevent potential injuries, equipment and property damage, and product releases. Watch for warning signs; e.g. encountering warning tape, or pea gravel or sand which may be indicate underground lines or structures. Consider exposing the location by vacuum digging or hand-digging (to a depth of 2.4m in critical zones and offsite private property, and 1.2m in non-critical areas).

Communications

- FRANZ field staff must communicate all incidents, including near-miss incidents, immediately (e.g. via telephone) to their designated senior FRANZ contact listed in the

Health and Safety Plan. FRANZ senior personnel must contact the client to provide information on the incident, as soon as practical. As a guide, this should happen within an hour of the incident.

- Health and Safety Plans
    - FRANZ we suggest to include personnel from our client in our project kick-off safety meeting via telephone.
- If a utilities contact occurs, the FRANZ field supervisor will:
    - Secure the work area to clear the work area or make it safe to site workers or the public from any on-going hazard.
    - Shut the job down immediately until further notice.
    - The FRANZ field supervisor must contact senior FRANZ personnel who will relay the incident to the client.
- Any variance from the work plan must be authorized by senior FRANZ personnel (FRANZ project manager) before being implemented by FRANZ field personnel.
- As part of our Health & Safety meetings, FRANZ will communicate our need for both our personnel and our drilling subcontractors to refuse to conduct any subsurface work if they feel that it would be unsafe to do so at a particular location for whatever reason. The situation and their reasons for the refusal should be communicated immediately to FRANZ senior personnel (e.g. via telephone).
- The FRANZ senior contact listed in the health and safety plan must commit to be available during the entire time field operations are underway or make arrangements for a suitable alternative to be available.

Management Responsibility

- FRANZ management will to conduct a search of available, suitably qualified, and safety-minded utilities clearance operators with whom we can develop an on-going relationship and a level of confidence for future work. These companies and operators will be used as often as possible.
- FRANZ management will approve FRANZ staff with suitable knowledge and training in monitoring subsurface utility clearance subcontractors.
- FRANZ will organize workshops with FRANZ staff and identified preferred clearance subcontractors and drillers to provide training and to establish safe work procedures for subsurface utility clearance.
- FRANZ will include CVs of our proposed field personnel with our scope of work and cost estimate proposal, and make adjustments as per client comments. No substitutions of personnel will be made without client approval of the change.

Subsurface Clearance

Supplemental Guidance Document

(December 1, 2006)

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Introduction

The purpose of this document is to provide guidance and preferred or best practices (BPs) for use with the existing OIMS System 3, Example Subsurface Clearance Procedure (OIMS Manual Section 2.4. in the US). It does not replace or modify the existing OIMS procedure, which is a Tier I BP mandatory to all regions. This guidance resides next to the SCP OIMS procedure on the Best Net Tier I for ease of use, but is not intended to be mandatory, as it should be used with and not in place of the procedure. Each region and function within Global Remediation (GR) can decide if specific elements within the guidance document should be mandatory.

The existing procedure provides a flexible framework for conducting subsurface clearance; however incidents continue to be encountered in this area. The intent of this guidance document is to provide an additional level of detail/ information for the OIMS user as well as attempt to standardize and clarify preferred approaches for subsurface clearance during specific activities (e.g. monitoring well installation, etc.) where the existing procedure allows the user to choose from a list of methods.

The existing OIMS procedure relies on a “level of knowledge” approach to achieve flawless operation. These are:

- Level I: Collect as much information about the site prior to work; e.g. maps, operator knowledge, field observations, etc.
- Level 2: Perform geophysical/ electronic surveys to identify known and unknown buried utilities.
- Level 3: Physically confirm the presence of known utilities and confirm no unknown utilities exist in the work area, e.g. hand augering, probing, vacuum digging, etc.

Level I is more established within OIMS and hence only minimal supplemental information is included in this guidance document. The primary focus of this document is elaboration of Level 2 and Level 3. Consistent with this, the Site Investigation and Assessment Network (SIAN) analyzed near loss/ loss incidents (circa 03-1H06) from the IMPACT database. From an LPS standpoint, “lack of knowledge” and “lack of procedures” were the most frequently cited causal factors at ~40%. Other general observations and findings from the analysis include:

- Large area excavations were involved in more than half the subsurface incidents; e.g. tank removal excavations, trenching, etc.
- It is estimated more than half of the incidents were in the upper ~3 feet (1 m) and a significant number occurred when removing surface covers.
- Incidents associated with electrical/electronic lines were highest comprising ~30%.
- There appears to be some level of uncertainty on when and how to effectively use electronic survey with a private utility locator.
- Air knife/ hydraulic digging/ vacuum digging can be used more frequently than is currently employed (associated safety risks and other issues such as equipment noise and liquid/ sediment disposal are factors to be considered).
- Hard media, e.g. rock, presents a challenge to conducting the clearance procedure.

This supplemental information provides focused guidance in these areas. **The structure of this document follows the same format as the OIMS procedure for reference.** Region-specific regulatory requirements are not captured here or in the existing OIMS procedure. When planning a subsurface clearance program, applicable regulatory requirements must be identified and incorporated as required. For example, government agencies/regulators may have different training requirements for operators and supervisors who manage these activities.

Section 1. Safety

The OIMS procedure is included as Attachment I to this guidance document for cross referencing. The following information is provided as a supplement to SCP Section 1.

All tasks associated with subsurface clearing are required to be performed under a JSA. Example JSAs for the following steps are included as Attachment II, but must be modified as needed for site-specific conditions. Each of these steps is independent of the other and requires a JSA review prior to execution.

- JSA for initial site visit and general line locator mark-out
- JSA for an electronic survey by private utility locator
- JSA for physical exploration; e.g. probing and hand augering

It is recommended that a near loss report be considered when any underground utility is encountered (but not damaged) while performing work (e.g. drilling, geo-probe, excavating, etc.) that was not identified by the clearance protocol prior to the start of the work. Per the protocol, the ExxonMobil PM should be notified, and together with the contractor, decide if a near loss is warranted. The intent for reporting of near losses is to help identify weaknesses/ strengths of the SCP and thus is encouraged by the SIAN network where the information can lead to enhancements in the procedure. For clarification, finding a utility while performing the subsurface clearance procedure, e.g. probing, hand augering, hand digging, vacuum digging, etc., is not considered a near loss/ loss unless some how the activity damages the utility.

As a service to the PM, the SIAN network can assist with the review of a SCP near loss/ loss if requested. Assistance can be requested by submitting the near loss/ loss report to the SIAN network mail box at DS-SHE-GR-COLLABORATION@XOM if inter company, or externally at DS-SHE-GR-COLLABORATION@exxonmobil.com, and placing the word "Investigation" in the subject line. Otherwise, near loss/ loss information will be captured in IMPACT and periodically reviewed to guide further enhancements of the procedure.

For ease of use, the following OIMS forms are included in a single, Microsoft Word file in Attachment III as a convenience for the PM. These are the OIMS documents needed to perform subsurface investigation work or excavations. Refer to the OIMS procedures before using to ensure subsequent updates to this document have not been made.

- Project Start Notification
- Project Orientation Meeting
- Daily Site Safety Meeting Checklist
- Traffic Control Plan & Traffic Control Process Flow Diagram
- Subsurface Clearance Procedure Checklist
- Example Utility Call Log (not part of OIMS but considered preferred approach)
- Drill Rig Pre-Mobilization Checklist (not part of OIMS but considered preferred approach)
- Daily Drill Rig Inspection Checklist (not part of OIMS but considered preferred approach)
- Waste Shipment Documentation Form
- Post-Construction/Excavation Inspection Checklist

Section 2. Preparation Tasks

The following information is provided as a supplement to OIMS SCP Section 2.

A. Obtain Permits and Site Access

No supplemental guidance to the existing procedure is provided for this section.

B. Obtain Historic Site Information

Property development maps and plans, historically called “plats” in the US (may have another name in other countries), are not specifically mentioned in the OIMS procedure. A property “development plan” is used to describe property features added during its development process. The plan should contain the location of “easements” where underground utilities are located, which can be quite useful for subsurface clearance work. This document may not exist or may have limited use at large operating sites, but for smaller properties obtaining this or similar documents is recommended. The site development plan is typically filed at local governmental offices such as a court house, City Engineer’s office, or other governmental locations. Also in the US, historical property title searches may include easement maps. Nevertheless property development maps and plans should only be used as guidance. These are usually not 100% accurate and should therefore be verified in the field.

For property sales and purchases a Phase I assessment is always performed. If possible, the property plan or plat should be obtained during this step or prior to the first application of the SCP protocol. If a Phase II assessment is required, the plat listing easements will then already be available for use when subsurface work is performed.

In addition, be sure to discuss site features/ conditions with the property owner or responsible on-site personnel as they may be aware of utility locations (or former utility locations) that are not marked or easy to locate (for example, smaller conduits that may be missed via GPR – ground penetrating radar).

Section 3. Mark-Outs

The following information is provided as a supplement to OIMS SCP Section 3.

A. Use of “One-Call” and Utility Company Notifications:

Some countries use centralized utility mark-out services to manage risks associated with subsurface digging. Mark-out by these services is required by the OIMS procedure and by law in most of the US where the service is available. Where not available, to the extent possible, local utilities should be contacted directly to identify their lines at the site or obtain maps from them if they will not provide the service (all utilities should be contacted when performing work on public property). In the United States and Canada this is commonly referred to as the “one-call” system, which is managed by each State and Province. A list of one-call centers in the US can be found at: www.constructionweblinks.com/Resources/Industry_Reports__Newsletters/Jun_12_2006/comp.html. Note that US laws vary from State to State and some are very specific regarding who should contact the one-call. In some States, the company that will actually perform the excavation (e.g. driller, contractor, etc.) is required to make the call; failure to comply with these regulations may void the protections granted by using the one-call system.

Of particular interest to US PMs, note that while it is required by law for the excavator to notify the one-call system prior to the work, it is not mandatory for all utilities in all States to be members of the one-call network. Simply put, check your State laws to determine if one-call is mandatory for all utilities. If not mandatory, local utilities will need to be contacted individually. Project managers should be aware of over reliance on these systems, as the following problems can be encountered:

- As stated above, not all utilities are participants in all one-call systems.
- Utility companies usually do not come on the site, thus utility lines are only marked up to the property boundary or service meter, necessitating private surveys for the interior of the site.
- One-call systems will only identify utilities and make notice to each company that lists a utility in the potential work area. One-call does not check that the mark-out was actually performed. Prior to subsurface work this must be verified.
- Depth information is generally not provided by companies when marking utilities.
- Even when the one-call system is used, utilities can be inaccurately marked.
- Where plans are provided, they may not present a complete listing of the utility’s assets in that area.
- Utility companies may have gone out of business and abandoned their lines in place.
- Lastly, of note, in 1995 in the US, 56% of damage to gas pipelines occurred, even though one-call was used; 25% of these hits were due to miss-locates.

When a request is made to a one-call center, the list of utility companies that will be notified should be obtained. This should be logged as part of the subsurface clearance procedure. The example log included as Attachment IV can be used for one-call mark-outs and can also be used to document utility company requests where one-call is not available. The utilities that respond should be recorded on the log. The consultant/ contractor performing the work should confirm that all utility companies notified came to the site and marked out their utilities or responded that none were present (direct follow-up with one-call utility companies may be required if they do not respond in the requested time period). Work should not commence until all utilities on the one-call list have responded.

If possible, the person who will be present when field work is performed (e.g. consultant PM), should be present when these mark-outs are made whether it be one-call, a utility company, or private locator firm. For one-call, often this is not practical since each utility may mark the site on different days and times. However, if a private locator is scheduled, this should not present a problem and is recommended. This provides a central point of communication for all activities. It is recognized that this step will marginally increase the job cost (potentially 3 or more mobilizations to the site). When the consultant PM who was present while the mark-outs were performed is not undertaking the field work, appropriate Management of Change must occur between the PM and the site supervisor. This is to ensure awareness of all relevant issues relating to SCP for that site.

Regulatory “tolerance” zones need to be considered when conducting subsurface work. For example, in the US, several States require a distance of the utility width plus 18 inches (~0.5m). If in the tolerance zone, the utility is physically identified and only hand digging/ vacuum digging allowed. PMs/ Consulting Contractors should verify State laws when working near utilities.

Since electrical and gas lines represent a higher risk, physical verification of their exact location is especially important before beginning work. Recall from earlier that, in the past, more than half of all pipeline incidents in the US occurred even though the lines were marked out prior to beginning work. In particular, the direction of marked utilities should be confirmed to ensure they do not travel across the work area. Vacuum digging or hand tools, discussed later, should be used to confirm the direction or location of the utility if there is any uncertainty. Critical services such as power mains (distribution lines that supply power to the site), gas mains, etc, should be positively identified for all sites via one-call or utility operators (entry point to the site) and verified for on-site orientation and location.

It is a good practice (and sometimes required by one-call services in the US) to mark the proposed work area with white paint or stakes prior to arrival of the mark-out crews so that they can focus their work. This notwithstanding, if the possibility exists to expand the work from the initial focus area, the PM should consider marking out the entire site to ensure the protocol has been applied to all potential work areas. Note that the use of white paint may be required by the local one-call laws (each utility may be assigned a different color – with white being used to indicate “excavation”).

The consultant must consider the potential for paint markings to be lost such as in unpaved areas or during rain events, and plan accordingly. Flags are also often used as an alternative to paint. Some countries may not allow paint due to environmental considerations.

Another effective "mark-out method" is to take pictures of the work area showing the exact drill/ excavation location (e.g. by use of a cone, etc.) relative to and along with the mark outs for utilities. This provides a permanent record for reference prior to actual work. This method is a learning and highlight of the last internal OIMS assessment in Europe.

B. Use of Private Locator Firms (Electronic Survey Requirements):

The existing OIMS procedure indicates an electronic survey is required “if warranted”. For clarification, an electronic site survey is required by the OIMS procedure where electrical utilities, fuel lines, gas lines, or other high risk subsurface structures may be present in the vicinity of subsurface work. If the PM either concludes the survey is not warranted or electronic survey equipment is not available, endorsement by the Area Manager (AM) at a minimum is recommended. This could be accomplished by a single communication if the problem is encountered at multiple sites or universally throughout the region. **The area manager and PM should have this discussion on how this will be handled - blanket approval, individual approval, country approval, etc - as soon as possible.** It is recommended that the discussion and basis for not performing the survey (if chosen) be documented and placed in the OIMS files for the project. The electronic survey which follows is recommended.

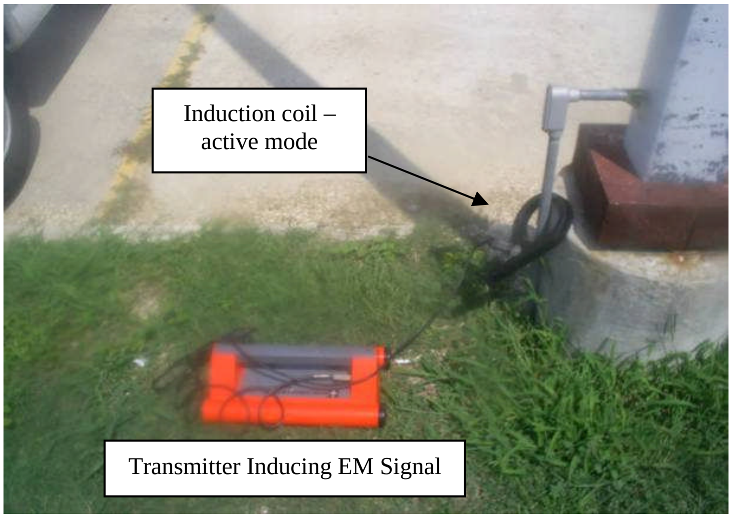
Also, the SIAN Network Team recognizes that use of a private locator is an increased cost and the technology deployed is not guaranteed to identify all utilities due to their inherent limitations. However, the GR OIMS procedure is based on the collection of individual pieces of data, not one of which by itself ensures an area is cleared, but collectively lowers the risk of the work. The SIAN network believes the use of locator services/technology is an important component of the OIMS procedure and endorses its use to the extent possible.

Primary Equipment – Best Practice Includes Performance of an Electromagnetic Survey with a Pipe and Cable Locator

The survey will be more effective if a drawing showing all “known” utilities is brought to the site to be used to bench mark the locator’s efforts and help select areas to be cleared for subsurface work. The work area should be marked with white paint prior to arrival of the locator.

- An electromagnetic (EM) survey using an EM locator device, commonly referred to as a pipe and cable locator, is an industry standard. This device may be used either in an active or passive mode. Several companies make EM locators, as the technology is in common practice. The EM locator is fairly simple to use and should be available in most regions. A typical pipe and cable locator is shown below (receiver on the left and transmitter on the right).

- In active mode a transmitter induces an EM signal directly into a line which radiates and can be traced with a receiver unit. If the utility line is accessible, the needed signal may be created through a physical connection to the utility or it may be created by induction through a clamp or coil on the line (see below). Active mode is used for accessible, known lines, since some type of attachment is needed. "Tracer wires" are sometimes buried with utilities. As part of this protocol, the PM and locator service should always confirm if they exist through evaluation of site maps and direct questioning of the site operator. If so, a direct hookup can be made and a more accurate locate performed. When looking for lines that are unknown, an alternative "passive" method is needed.



- Passive mode operates in a similar fashion, except that it detects the 50 Hz or 60 Hz typical of AC power lines. A direct connection to the line is not made; this mode is useful in detecting unknown electrical lines where current is flowing. Where practical, all lines at the site should be energized (e.g. turn lights on, etc.) when performing this method. If energized, this approach may be useful for locating electrical lines below concrete with rebar.

- For electrical lines that are not energized or for other conductive utilities, a transmitter can be carried in parallel to the detector (e.g. 15 feet/ 5 m apart) in a grid pattern to search for unknown utilities as shown in the picture below. This is sometimes referred to as "blind locating". Although not as accurate as direct locates, this method should be deployed for purposes of identifying unknown utilities at all sites. Conductive materials such as rebar will interfere with this method. Also, note that the locators in the picture below are not wearing high visibility clothing as this is not an ExxonMobil job site. For clarification, high visibility clothing is required when performing locating procedures on ExxonMobil projects.

- Generally, for a point area, i.e. drilling location, an area 20-30 feet/ 6-9 m should be surveyed around the proposed location. Surveying a larger area allows the equipment to cross potential utilities multiple times and thereby increases the probability of detection. Usually a grid with 2-3 survey lines/paths is performed. For large area surveys, a similar methodology is deployed, with the survey extending out 20-30 feet/ 6-9 m beyond the area of excavation.

- The use of EM inductive locators usually allows for very accurate horizontal locations, but less reliable depths. Other limitations of this method include the fact that the utility must be conductive and, for active tracing, the utility must be accessible at some point for either direct or inductive coupling. In passive mode, the detector cannot locate electrical lines where current is not flowing. However, the blind locate method may detect the electrical line even without current.

- Pipe and cable locators are relatively easy to use; however there is no technician certification process. For reference, in the US the National Utility Locators Contractor Association (NULCA) has prepared minimum knowledge requirements, which can be found at requhttp://nulca.org/content/CompetencyStandards.pdf. The questions below can be used to help determine if a locator company and their technicians are qualified to perform the survey.
  1. What does your training program for your line locate technicians entail?
  2. If one exists, are you using a governmental or national standard; e.g. NULCA?
  3. Are they re-certified annually?
  4. Do you have a quality assurance program?
  5. Do you have a full-time position devoted to quality assurance?
  6. What is the average workload for your technicians?
  7. How often are pieces of detection equipment calibrated?
  8. What procedures and steps does your firm take in the event an object is impacted at a site where your firm performed the mark-outs?

- For a quality assurance check, it is recommended that the survey results be reviewed by a second person knowledgeable with the EM method/ equipment and a report prepared. While ideally the reviewer has seen the site with mark-outs present, it may not be cost effective or practical to do so. Often locate companies have small staffs and the person performing the survey is also the most knowledgeable, thus a quality control review by a second person may not occur. This should be discussed with the locate firm prior to the work as it might be possible to have a second office in the same firm provide a QC check. Pictures of the mark-outs should be included in the report. The report will be useful for future work if needed. In addition, the information collected should be provided to the site owner/operator to provide them the opportunity to check and correct site plot maps. Preferably work should not begin until the report has been completed and reviewed by the site PM/contractor responsible for field execution work. The EM PM may delegate these responsibilities to the consulting contractor. The report should be brought to the site when field work begins and reviewed with the personnel performing the subsurface work. An example report is included as Attachment V.

- It is recommended that a limited number of locator service providers be identified in each GR region/country to provide services. This should assist with controlling training of locators as well as help control quality standards. In addition, incident management and follow-up controls would be enhanced.

Secondary Equipment – Best Practice Includes a Ground Penetrating Radar Survey (GPR) Where Available

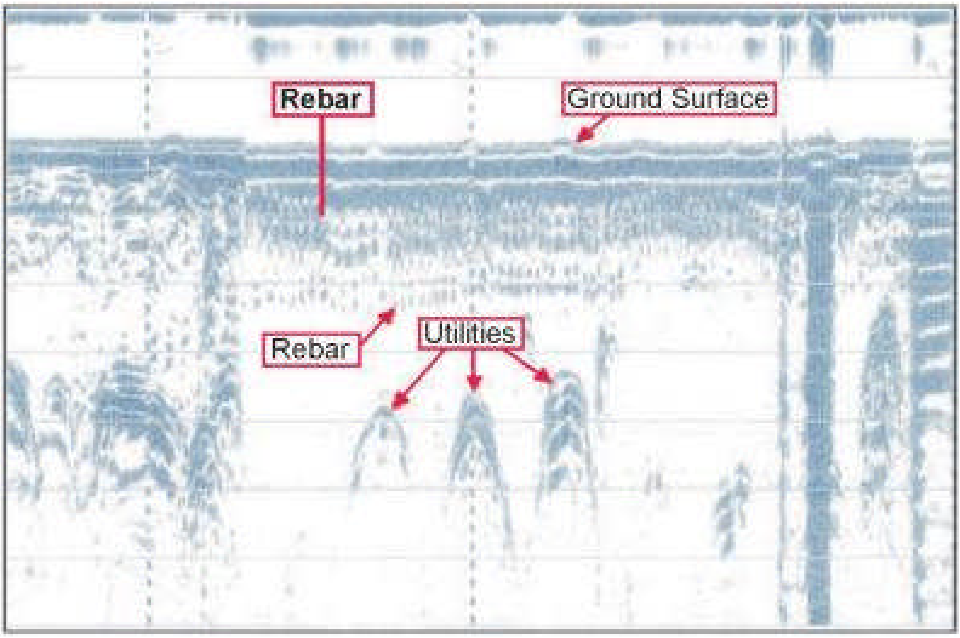
- Experiences with GPR have been mixed across the different GR regions. As stated above, the OIMS procedures effectiveness is dependent upon the collection of multiple pieces of data to lower risks associated with subsurface work. With this in mind, the SIAN endorses and encourages the use of GPR in tandem with EM as an additional line of information where equipment and experienced GPR operators are available. As indicated above, at a minimum, the site PM should discuss applicability with the AM if a decision is made not to deploy the technology.

- GPR should be used in conjunction with a pipe and cable locator as an additional line of knowledge. GPR operates by transmitting an electromagnetic wave into the ground and detecting energy reflected back from objects with different electrical properties compared to the surrounding soil. GPR can detect both conductive and nonconductive utilities. Under appropriate operating conditions, GPR can provide a very accurate and rapid measurement of utility location and depth. GPR complements pipe and cable locator technology, especially where utilities are unknown (“blind” surveys). A typical deployment is shown below. Again, note that in the picture below the locator is not wearing high visibility clothing since this is not an ExxonMobil site. For clarification, high visibility clothing is always required when performing a survey at all ExxonMobil sites.

- Certain conditions can limit the usefulness of GPR data. The more conductive the ground, the less the GPR signal can penetrate before it is distorted to the point where no return signal can be detected. Void spaces, such as ground separation beneath concrete, can cause the loss of the GPR signal and rebar can dissipate the signal. Also, sites constructed with large amounts of ‘fill material’ can make interpretation of GPR results difficult. Brine-saturated soils, clays, and other conductive materials can inhibit the use of GPR to any useful depth. However, GPR has been used in the gulf coast of the US in high water table/clay conditions to identify shallow utilities. Since GR incidents typically involve a depth shallower than 3 feet, GPR surveys should not be eliminated based on this factor alone.

- Generally, for a point area, i.e. drilling location, an area 20-30 feet/ 6-9 meters should be surveyed around the point. Usually a grid with 2-3 survey lines/paths is performed, but a “tighter” grid with more survey lines can be requested. Surveying a larger area allows the equipment to cross the utility multiple times and thereby increase the probability of detection. For large area surveys, a similar methodology is deployed, with the survey extending out 20-30 feet/ 6-9 meters beyond the area of excavation.

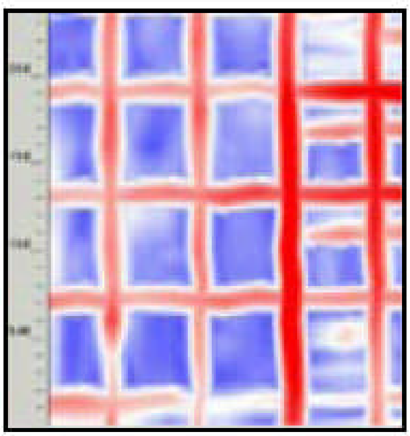
- A certain level of interpretive skill (see below) is required to discriminate between utilities and geologic “clutter” (noise). Industry or regulatory certification and training standards have not been established. Again, the number of qualified contractors utilized should be minimized to ensure quality work products. The questions cited above for EM surveys can also be used to screen GPR companies in your region.



Similar to the EM survey above, for a quality assurance check it is recommended that the survey results be reviewed by a second person knowledgeable with the GPR method/equipment and a report prepared. While ideally the reviewer has seen the site with mark-outs present, it may not be cost effective or practical to do so. Often private locator companies have small staffs and the person performing the survey is also the most knowledgeable, thus a quality control review by a second person may not occur. This should be discussed with the locator firm prior to the work as it might be possible to have a second office in the same firm to provide a QC check. Pictures of the mark-outs should be included in the report. The report will be useful for future work if needed. In addition, the information collected should be provided to the site owner/operator to provide them the opportunity to check and correct site plot maps. Preferably work should not begin until the report has been completed and reviewed by the site PM/contractor responsible for field execution work. The EM PM may delegate these responsibilities to the consulting contractor. The report should be brought to the site when field work begins and reviewed with the personnel performing the subsurface work. An example report is included as Attachment V.

- GPR typically becomes a marginal/incremental cost when deploying a pipe and cable survey at the same time. Costs on the order of $500/half day or $200/hour are typical. A small site can be surveyed in half a day or less, although it is not unusual for companies to charge half day minimum fees. Mobilization charges can be significant if the site is remote to the locator office. Usually 1-2 weeks is needed to produce a final report.

- If work is to be done in concrete, and the “non-presence” of utilities cannot be confirmed via pipe and cable survey or conventional GPR, it may be necessary to evaluate use of higher frequency GPR. Use of a higher resolution antenna (1.6GHz as opposed to 400 MHz “conventional GPR”) and typically a handheld device can be used to inspect concrete structures to locate rebar and conduit that is located within the concrete.



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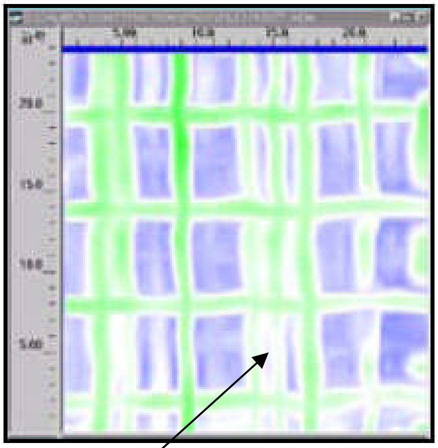

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1. Overlapping rebar within concrete
2. Water line visible within surface cover

Section 4. Initial Site Visit

No supplemental guidance to the existing procedure is provided for this section.

Section 5. Selection of Ground Disturbance Locations

The following information is provided as a supplement to OIMS SCP Section 5.

A. Define Critical Zones

No supplemental guidance to the existing procedure is provided for this section.

B. Select Ground Disturbance Locations

Although working within a critical zone is discouraged by the OIMS procedure, often it is necessary and commonly done (sometimes required by a governmental agency), especially at retail stations. The key to managing this elevated risk is communication between the consulting contractor and the ExxonMobil PM, who must approve all subsurface disturbance locations. However, under certain circumstances the work to be done may be at a level of risk whereby the AM should be consulted to provide them with an opportunity to contribute and explore additional risk management options as appropriate. For example, in regions where GPR is not used, the AM/PM may conclude the risk level is high enough to deploy a GPR to the region. The OIMS subsurface procedure does not require this step, however, the OIMS Risk Management Guide should be consulted. This guide will help determine if the work is considered routine and has previously been risk assessed or if the proposed work is outside what is considered normal and a job specific risk assessment needed. Each region should decide when this might be needed. Some examples might include:

- Work within 10 feet (3 m) of major gas or electrical transmission lines
- Work within 10 feet (3 m) of lines critical to the operation of major facilities
- Work in areas where utilities are known to be deeper than 8 feet (2.4 m) (typically major utilities that might occur at railroad crossings or major highways)
- Use of equipment beyond the scope of the OIMS procedure (e.g. horizontal drilling)
- Projects where unexploded ordnance may be present, which requires specialty contractors and procedures outside the scope of the SCP to clear

This type of risk management approach is not uncommon; i.e. higher levels of management endorsement. For example, in operating facilities in the US cranes cannot operate with booms fully extended within 10 feet (3 m) of live overhead utilities without the equivalent of an AM's approval. The PM should determine if the subsurface work to be performed is normal and routine or whether it might represent an elevated level of risk beyond what has been contemplated by the existing OIMS risk management procedures. This might also occur when a management of change (MOC) procedure is needed.

C. Review Selected Locations with the PM

The protocol requires that "THE CONSULTANT/CONTRACTOR MUST NOT PROCEED WITH THE SUBSURFACE ACTIVITIES UNTIL THE PLAN HAS BEEN DISCUSSED WITH THE EXXONMOBIL PM." Performing mark-outs and clearing protocols (i.e. probing, augering, etc.) should generally not be performed on the same day in order to allow the ExxonMobil PM time to review and approve the subsurface work plans prior to beginning the work. In addition, where mark-outs are performed by a private locate firm, generally 1-2 weeks is required to prepare a report and, as mentioned in earlier sections, work should not begin until the PM has had a chance to review the findings.

Section 6. Subsurface Structure Delineation Activities

The following information is provided as a supplement to OIMS SCP Section 6.

A. Supervision

"Appropriate training" for site clearance personnel is referenced in this section. For clarification, this refers to LPS training, Health and Safety Plans (HASP), and JSA review. As mentioned in the SCP, in the US, ExxonMobil UST system training must also be completed for Retail Sites. The training is presented on a DVD provided to each consultant. If a copy is needed, submit a request with a mailing address to the SIAN network mail box at DS-SHE-GR-COLLABORATION@XOM if inter company, or externally at DS-SHE-GR-COLLABORATION@exxonmobil.com, and placing the word "Investigation" in the subject line.

If at an operating site such as a refinery, training will also include the specific facility training requirements. Note that subcontractors cannot enter an operating plant, even if the primary contractor is approved by Global Remediation, without having the specific site contract administration approval and training required. Incidents have occurred where subcontractors provided the primary's name, received training, and then entered the plant without this specific approval. This can be a problem for locate firms and other infrequently used subcontractors. A waiver by the facility can usually be obtained under certain circumstances for infrequent work.

B. Ground Disturbance Activities Sequence

No supplemental guidance to the existing procedure is provided for this section.

C. Warning Signs

Also look for these additional indicators:

- Seams and patches in concrete cover, pavement, or any repaving activities completed on site.

D. Surface Removal for Paved Areas

Paving Removal

Removing paving as part of the SCP adds an additional level of risk to subsurface work. It is important to note that incidents have occurred due to utilities that were located either within or just beneath the surface cover. This section provides additional guidance for surface removal.

General guidelines:

- Energize utilities where possible when an electronic survey is performed using a pipe and cable locator in passive mode (i.e. detects 60 Hz frequency but only if current is flowing). This may identify electrical lines below the cover. The SIAN recommends an electronic survey be performed as described in the guidance document where available; in particular for large surface cover area removals.
- Obtain applicable permits/ensure the site's hot work permit is followed. Note that cutting may generate sparks (wet cutting is recommended at all times).

- PPE should include non-conductive gloves for saw operators.
- If possible, request that the facility operator lock out/tag out (LOTO) known utilities in the work area during the cutting operations.

Surface Removal Technique

For Small Areas (e.g. wells, geoprobe areas) with Concrete or Asphalt Cover:

1. To facilitate removal of concrete for small areas, some type of cutting via coring equipment or concrete saw is required.
2. Where concrete saws are used, the smallest diameter blade should be used to minimize ground disturbance below the cover. A saw blade with a diameter no larger than 2x the concrete thickness (where the thickness is known) should be used.
3. Where previous work has occurred, bore logs should be reviewed for concrete thickness. If unavailable, EM engineering specifications (applicable to that area) for concrete pavement should be used as a guide to establish the likely thickness. A pilot hole with a small diameter drill bit can also be used to estimate thickness.
4. Where the thickness is unknown, default to the engineering standard and use a smaller diameter blade than the anticipated thickness. Where the smaller diameter does not penetrate, a large diameter is subsequently used.
5. Where a coring device is to be used, the same information as noted above should be considered, and core depth should be measured continuously.
6. Do not go deeper than necessary to facilitate cover removal.
7. On completion of concrete cutting, appropriate tools should be utilized to remove the concrete, without causing significant disturbance to the underlying material and potential services.
8. If during drilling the rebar in the concrete is cut, the integrity of the concrete may be compromised. Consider repairing the rebar in addition to surface replacement when work is completed.

Large Area (trenches, USTs, etc.) Surface Cover Removal of Concrete or Asphalt:

1. Large area surface cover removal should begin at the perimeter of the removal area. This is to first identify utilities at the perimeter passing through the work zone.
2. Considering the elevated risk, SIAN recommends an electronic survey be performed as described in this guidance document.
3. Follow the steps 3 and 4 above to determine concrete thickness.
4. For a large area, a concrete saw may not be practical. Heavy equipment is often used in conjunction with a hammering device to open and pull back the cover guided by an electronic survey or site knowledge. Hammering should not occur above known or marked-out utilities.
5. A spotter should also be used during this process.
6. Heavy equipment should not have “teeth”; a flat blade should be used.
7. Once the cover has been removed around the perimeter, vacuum or hand dig to 4 feet (1.2 m) around the perimeter. While this is optional, where the perimeter is located in a critical zone SIAN strongly recommends this approach. This should reveal utilities running through the area.
8. Next remove the cover along the utility lines, probing the utilities along the length to check their depth.

9. Once the cover has been removed at the perimeter and along utility lines, remove the remaining cover, while minimizing ground disturbance.
10. Sometimes cables and lines may be imbedded in the cover material. If this is encountered, the site manager should stop work and contact the ExxonMobil PM to determine how to proceed.

E. Subsurface Delineation

All possible situations and site conditions encountered cannot be evaluated within the scope of this document. This guidance is offered as preferred approaches and is not required. However, if the SCP Tier I OIMS procedure cannot be followed, the PM and consulting contractor should discuss the situation with their AM to determine the proper course of action before proceeding.

The following supplemental guidance is provided for subsurface delineation. Note that the OIMS procedure allows flexibility in choosing an approach; however this section provides what the SIAN believes is the preferred method where it can be deployed. This includes a recommendation to clear to 8-10 feet (2.4-3 m) regardless of whether or not the work is being performed in a critical zone, as most work is conducted in commercial/ industrial settings where utilities can be found deeper than 4 feet (1.2 m). Two topic areas are discussed, the first “Point Activities” followed by “Large Area Excavations”.

Point Activities

In clearing for “Point Activities” (drilling, direct push, etc.) the procedures below are considered the lowest risk approaches for the specific activities listed.

- Well Installation: Vacuum dig over an area 2 feet (0.6 m) in diameter to 8-10 feet (2.4-3 m) deep, depending on location (note that in some regions it may not be uncommon for utilities to be encountered at these depths e.g. cold regions). A bigger diameter opening may be needed for larger augers; this should be verified by the PM/consulting contractor. A demonstration of this technology can be seen at http://www.vacmasters.com/airdemo.htm as an example. A face shield with safety glasses should be worn when operating the equipment (both air/water lance and vacuum hose) or personnel standing in the vicinity to prevent eye injury from soil particles. Whip checks should be installed on all connections for both air and water knife operations. Establish an exclusion zone to prevent other site personnel from entering the area when operating digging equipment. Hearing protection should also be worn around this equipment. For some equipment, such as hydrovac units, double hearing protection may be required. Also, to prevent pipe erosion, the air or hydraulic tool/lance should be continuously moved and should not be placed upon any utilities. In all cases the operator should have the appropriate JSA to complete the task which covers some of the items above (i.e. PPE).

  If this technology is not available in the region, hand dig to 4 feet (1.2 m), then use a hand auger or probe to clear to 8-10 feet (2.4-3 m). Concern has been expressed about the use of probing rods. Electrical shock incidents have occurred in the past with steel probing rods. Fiberglass or other non-conductive material is preferred, but at a minimum, if a steel rod is used the handles should be coated or wrapped with non-conductive material (if practical, rubber boots or standing on an insulated pad would also add another level of protection). The rods are still capable of damaging utilities but they will not conduct current. Also, note that fiberglass rods can snap if too much force is applied. Probing may not be possible in hard soils and too much force will damage utilities. Also, in hard soils it is difficult to determine if utilities are present. If this occurs, and the work is taking place in a critical zone, the PM should be consulted with and a decision made on how to proceed.

- Soil Sampling/Direct-Push Geo-Probe: Hand auger to 8-10 feet (2.4-3 m) if the ground is not too hard. Alternatively, hand auger and collect a soil sample to 4 feet (1.2 m) followed by probing to 8-10 feet (2.4-3 m) with a non-conductive rod. Geo-probe rods can then be inserted into the hand-cleared opening to proceed to depth.

  If regulations permit, a vacuum digging technique can also be used; e.g. dig to interval then sample, repeat to depth. Always ensure that this sample collection methodology is acceptable to local regulators.

- "Rock" Materials: This type of material typically cannot be hand augered or probed. If available, we suggest using an air knife/vacuum digging technique to 8-10 feet (2.4-3 m), sample the aggregate recovered if needed, followed by drilling. The consultant should confirm that the rock materials encountered represent local geology and, where uncertain, should cease operations and obtain confirmation from appropriate internal experts. Also, the status of the rock material should be confirmed (where possible); i.e. re-worked material, artificial fill, native material, floaters, etc. Lastly, it simply may not be possible to delineate through a rock media and a digging bar deployed. Since the existing OIMS procedure does not specifically address this, it is assumed this would be done under the MOC process.

- Other considerations: Other factors which may affect delineation selection include: the work is on a previously delineated site where utilities have already been exposed; operating versus non-operating sites; the proximity to the critical zone; risk associated with the utility; e.g. gas and electrical are higher risk than water or sewer.

Clearing for Large Area Activities (trenching, excavation, etc.):

- Worth stating again, large area excavations present a greater challenge to identifying utilities prior to work. Performance of due diligence in searching historical records and use of electronic surveys is especially important to reducing site risks.

- Confirm location and orientation of all utility mark-outs proximal to work area prior to digging using vacuum dig or hand dig method; i.e. physically expose all known or suspected utilities.

- Mark-outs can be lost over time. The mark-out procedure should be repeated as necessary as a project progresses. This is especially important for projects of extended duration.

- Establish tolerance zones for all known utilities; this may be set by governmental regulations. Often this will require physical identification of the utility and hand digging within the zone. SIAN recommends this zone be set at the width of the utility plus 2 feet (0.6 m) unless otherwise required by law.

- Use vacuum digging or hand dig soils within 2 feet (0.6 m) of all utilities 360 degrees around pipe (and within the path of the excavation). Note it is not unusual for utilities to be under and beside other utilities in the same corridor. GR incidents have occurred because this was not recognized.

- Trenching/Shoring/UST Excavations/Soil Excavations: The existing OIMS procedure requires “the first 4 feet (1.2 m) should be delineated by hand digging to remove the soil unless an alternative delineation method has been reviewed with the PM prior to start of ground disturbance activities.” Use of vacuum digging/hand dig to cut a minimum 4 feet (1.2 m) exploratory trench around the perimeter of the work area is preferred. Some construction sites at operating plants have encircled the area with vacuum digging techniques to expose all utilities that transverse the construction area. This is a preferred approach for large area excavations.

- Mark-outs for large projects can deteriorate with time. Maintain the mark-out throughout life of work, i.e. use painted poles, etc., if needed to ensure the mark-out is maintained. Similarly once a utility is encountered/ uncovered, a permanent mark-out will be needed as well to guide the excavator.

- Always use a spotter when using heavy equipment to dig.

- Only use experienced heavy equipment operators to perform excavations or trenching.

- Do not use “teeth” on heavy equipment; flat blades should be used.

- Use the smallest piece of equipment necessary to excavate.

F. Alternative Subsurface Clearance Methods

The SIAN network can assist with review of alternative methods. Submit support requests to SIAN network mail box at DS-SHE-GR-COLLABORATION@XOM if inter company, or externally at DS-SHE-GR-COLLABORATION@exxonmobil.com, and placing the word “Investigation” in the subject line. A substantial change or less restrictive approach would require a MOC and risk assessment before use.

G. Incident Notification

It is recommended that a near loss report be considered when any underground utility is encountered (but not damaged) while performing work (e.g. drilling, geo-probe, excavating, etc.) that was not identified by the clearance protocol prior to the start of the work. Per the protocol, the ExxonMobil PM should be notified, and together with the contractor, decide if a near loss is warranted. The intent for reporting of near losses is to help identify weaknesses/strengths of the SCP and thus is encouraged by the SIAN network where the information can lead to enhancements in the procedure. For clarification, finding a utility while performing the subsurface clearance procedure, e.g. probing, hand augering, hand digging, vacuum digging, etc., is not considered a near loss/ loss unless some how the activity damages the utility.

As a service to the PM, the SIAN network can assist with the review of a SCP near loss/ loss if requested. Assistance can be requested by submitting the near loss/ loss report to the SIAN network mail box at DS-SHE-GR-COLLABORATION@XOM if inter company, or externally at DS-SHE-GR-COLLABORATION@exxonmobil.com, and placing the word “Investigation” in the subject line. Otherwise, near loss/ loss information will be captured in IMPACT and periodically reviewed to guide further enhancements of the procedure.

H. Scheduling

At times there can be significant time gaps between mark-out, clearing, and drilling. The mark-out procedure (one-call and/or private) should be repeated if work has not begun within 30 days or sooner if required by local laws. If field work is to begin within 30 days this obviously would require the clearing (i.e. hand augering, probing, etc.) to take place within this same time period.

The longer the time gap, the more likely personnel changes could occur. If field personnel for marking and clearing are different from field personnel managing the subsurface work, it is recommended a formal personnel Management of Change take place that would include communication in the field of prior activities (i.e. locations, depths, and what was encountered).

I. Waste Disposal

No supplemental guidance to the existing procedure is provided for this section.

APPENDIX C-3

Field Logs

BOREHOLE FIELD LOG

Page: ______ of ________

Borehole #: ______________ Location: ______________
Date: ______________ Weather ______________ Auger Diameter: ______________
Project Number: ______________ Time: ______________ OVM Instrument: ______________
Project Name: ______________ Drilling Co.: ______________ Split Spoon Diameter ______________
Representative ______________ Drill Rig: ______________ Split Spoon Length ______________

SS#___
Depth: ____________ Upper: ____________
Blowcount: ____________ Lower: ____________
OVM: ____________ ppm
____________ %LEL

- ☐ dry
- ☐ dry to moist
- ☐ moist
- ☐ moist to wet
- ☐ wet
- ☐ very wet

- ☐ dark
- ☐ light
- ☐ brown
- ☐ grey
- ☐ black
- ☐ red
- ☐ green

- ☐ very loose (4)/soft(4)
- ☐ loose(10)/firm(8)
- ☐ compact(30)/stiff(15)
- ☐ dense(50)/very stiff(30)
- ☐ very dense(>50)/hard(>30)
- ☐ Stratified

- ☐ well sorted
- ☐ poorly sorted
- ☐ fractured
- ☐ irregular
- ☐ horizontal
- ☐ vertical

- ☐ trace
- ☐ gravel
- ☐ sand
- ☐ silty
- ☐ clay
- ☐ petroleum staining
- ☐ petroleum sheen

- ☐ gravelly
- ☐ sandy
- ☐ silty
- ☐ clayey

- ☐ GRAVEL
- ☐ SAND
- ☐ SILT
- ☐ CLAY
- ☐ TOPSOIL
- ☐ PEAT
- ☐ TILL
- ☐ FILL

in._ Top
24
18_
12_
6_
0_
Bottom

Comments: ____

Lab Sample: ____

SS#___
Depth: ____________ Upper: ____________
Blowcount: ____________ Lower: ____________
OVM: ____________ ppm
____________ %LEL

- ☐ dry
- ☐ dry to moist
- ☐ moist
- ☐ moist to wet
- ☐ wet
- ☐ very wet

- ☐ dark
- ☐ light
- ☐ brown
- ☐ grey
- ☐ black
- ☐ red
- ☐ green
- ☐ olive

- ☐ very loose (4)/soft(4)
- ☐ loose(10)/firm(8)
- ☐ compact(30)/stiff(15)
- ☐ dense(50)/very stiff(30)
- ☐ very dense(>50)/hard(>30)
- ☐ Stratified

- ☐ well sorted
- ☐ poorly sorted
- ☐ fractured
- ☐ irregular
- ☐ horizontal
- ☐ vertical

- ☐ trace
- ☐ gravel
- ☐ sand
- ☐ silty
- ☐ clay
- ☐ petroleum staining
- ☐ petroleum sheen

- ☐ gravelly
- ☐ sandy
- ☐ silty
- ☐ clayey

- ☐ GRAVEL
- ☐ SAND
- ☐ SILT
- ☐ CLAY
- ☐ TOPSOIL
- ☐ PEAT
- ☐ TILL
- ☐ FILL

in._ Top
24
18_
12_
6_
0_
Bottom

Comments: ____

Lab Sample: ____

SS#___
Depth: ____________ Upper: ____________
Blowcount: ____________ Lower: ____________
OVM: ____________ ppm
____________ %LEL

- ☐ dry
- ☐ dry to moist
- ☐ moist
- ☐ moist to wet
- ☐ wet
- ☐ very wet

- ☐ dark
- ☐ light
- ☐ brown
- ☐ grey
- ☐ black
- ☐ red
- ☐ green
- ☐ olive

- ☐ very loose (4)/soft(4)
- ☐ loose(10)/firm(8)
- ☐ compact(30)/stiff(15)
- ☐ dense(50)/very stiff(30)
- ☐ very dense(>50)/hard(>30)
- ☐ Stratified

- ☐ well sorted
- ☐ poorly sorted
- ☐ fractured
- ☐ irregular
- ☐ horizontal
- ☐ vertical

- ☐ trace
- ☐ gravel
- ☐ sand
- ☐ silty
- ☐ clay
- ☐ petroleum staining
- ☐ petroleum sheen

- ☐ gravelly
- ☐ sandy
- ☐ silty
- ☐ clayey

- ☐ GRAVEL
- ☐ SAND
- ☐ SILT
- ☐ CLAY
- ☐ TOPSOIL
- ☐ PEAT
- ☐ TILL
- ☐ FILL

in._ Top
24
18_
12_
6_
0_
Bottom

Comments: ____

Lab Sample: ____

FLUID LEVEL MONITORING DATA SHEET

Project:

Monitoring Date:

Monitored By:

Well ID	Fuel Level (m)	Water Level (m)	OVM (ppmv)	Fuel Colour	Comments/Notes

GROUNDWATER SAMPLING DATA SHEET

Well ID:

Project Number

Project Name:

Weather:

Date:

Time:

Sampler:

(A) Depth to Bottom of Well (BTOC):

(B) Depth to Water (BTOC):

(A-B) Meters of water in well:

Casing Diameter:

(C) Water volume per metre of water in well (0.051 m ID casing = 2.0 L/m)

(D) Volume of Water in Well: **(A-B) x C** **L**

Estimated Purge Volume (3 x Well Volume[D]) **L**

Pumping/Purging Method:

Time	Volume Removed (L)	Temp (°C)	pH	Conductivity (uS/cm)	ORP (mV)	DO (mg/L)

Instrument Used:

Odor Yes / No (circle) Type:

Sheen Yes / No (circle) Type:

Turbidity Clear I I I I I I I I I I I I I Very Turbid

Colour/Type

Comments:

HYDRAULIC CONDUCTIVITY TEST DATA SHEET

Well ID:

Project Number:

Date:

Project Name:

Time:

Weather:

Tester:

Depth to Water (BTOC): (Static)

Depth to Bottom of Well (BTOC):

Casing Diameter:

Pumping Method:

Time	Water Level	Time	Water Level	Time	Water Level
0:00					

Comments:

APPENDIX E

Site Photographs

Phase Two ESA **University of Ottawa (200 Lees Avenue, Ontario)**	**1329-1102**
Photo ID 1 **Date** 10/08/11 **Direction** SE **Description** Drilling FZ-BH11-1D.	

Phase Two ESA **University of Ottawa (200 Lees Avenue, Ontario)**	**1329-1102**
Photo ID 2 **Date** 10/08/11 **Direction** N **Description** Soil cores collected from FZ-BH11-6D.	

<table>
<tr><td>Phase Two ESA
University of Ottawa (200 Lees Avenue, Ontario)</td><td>1329-1102</td></tr>
<tr><td>Photo ID 3</td><td rowspan="4"></td></tr>
<tr><td>Date 11/08/11</td></tr>
<tr><td>Direction E</td></tr>
<tr><td>Description
Drilling FZ-MW11-2.</td></tr>
</table>

<table>
<tr><td>Phase Two ESA
University of Ottawa (200 Lees Avenue, Ontario)</td><td>1329-1102</td></tr>
<tr><td>Photo ID 4</td><td rowspan="4"></td></tr>
<tr><td>Date 10/08/11</td></tr>
<tr><td>Direction E</td></tr>
<tr><td>Description
Soil cores collected from FZ-MW11-2.</td></tr>
</table>

Phase Two ESA **University of Ottawa (200 Lees Avenue, Ontario)**	**1329-1102**
Photo ID 5	
Date 11/08/11	
Direction E	
Description Soil cores collected from FZ-MW11-2 (Cinder & Ash FILL).	

Phase Two ESA **University of Ottawa (200 Lees Avenue, Ontario)**	**1329-1102**
Photo ID 6	
Date 11/08/11	
Direction N	
Description Soil cores from FZ-BH11-6D.	

Phase Two ESA **University of Ottawa (200 Lees Avenue, Ontario)**	**1329-1102**
Photo ID 7	
Date 12/08/11	
Direction W	
Description Installing monitoring well FZ-MW11-3.	

Phase Two ESA **University of Ottawa (200 Lees Avenue, Ontario)**	**1329-1102**
Photo ID 8	
Date 12/08/11	
Direction N	
Description Soil cores from BH11-7D (GLACIAL TILL).	

Phase Two ESA **University of Ottawa (200 Lees Avenue, Ontario)**	**1329-1102**
Photo ID 9	
Date 12/08/11	
Direction N	
Description Soil cores from FZ-BH11-1S (Cinder & Ash FILL).	

Phase Two ESA **University of Ottawa (200 Lees Avenue, Ontario)**	**1329-1102**
Photo ID 10	
Date 12/08/11	
Direction N	
Description Soil cores from BH11-3S (Cinder & Ash FILL).	

Phase Two ESA **University of Ottawa (200 Lees Avenue, Ontario)**	**1329-1102**
Photo ID 11 **Date** 23/08/11 **Direction** NE Parking lot. **Description** Soil vapour reading from FZ-VP11-1.	

Phase Two ESA **University of Ottawa (200 Lees Avenue, Ontario)**	**1329-1102**
Photo ID 12 **Date** 23/08/11 **Direction** NE of building **Description** Summa Canister at NECRAWL (crawl space).	

Z:\Projects\2011\1329-1102 University of Ottawa 200 Lees Phase II ESA\Reporting\Photologs\Appendix D - Photo Log.docx

APPENDIX F

Borehole, Monitoring Well, and Vapour Probe Logs

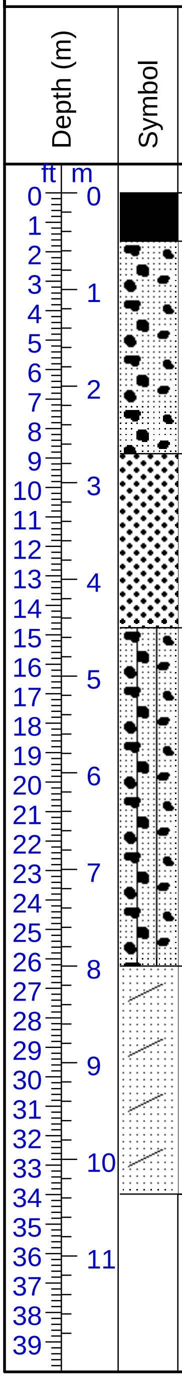
Borehole Log: FZ-BH11-1D

Project: Phase Two ESA — **Project No: 1329-1102**

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON



SUBSURFACE PROFILE	SAMPLE			Analysis	Well Installation Details
Description	Core Run Number	Type	Recovery		
Ground Surface					No Monitoring Well Installed
Asphalt ***Sand and Gravel FILL*** Sand and gravel fill material.			37%		
Cinder and Ash FILL Gray silty sand and gravel fill.			20%		
Dark sand and gravel with red spots and ash apparent.			20%	FZ-BH11-1D *(1)	
GLACIAL TILL Gray silty sand and gravel. Getting dark.			7%	Organic Vapour: 0 ppm	
			60%	FZ-BH11-1D *(2)	
GLACIAL TILL Gray clayey sand and trace gravel.			67%		
			52%		
End of Borehole Refusal Encountered					

Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 10, 2011

Borehole Depth: 34 ft (~10.4m)
Hole Diameter: 50 mm

Sheet: 1 of 1

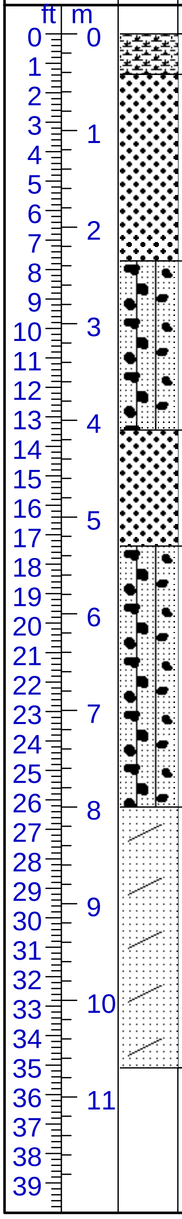
*(1)(2) Grab samples collected for different analyses. See Table 4-4.

Borehole Log: FZ-BH11-2D

Project: Phase Two ESA ***Project No: 1329-1102***

Client: University of Ottawa ***Logged By: MM/CA***

Location: 200 Lees Avenue, Ottawa, ON



SUBSURFACE PROFILE	SAMPLE			Analysis	Well Installation Details
Description	Core Run Number	Type	Recovery		
Ground Surface					No Monitoring Well Installed
Top Soil					
Cinder and Ash FILL Brown sand and gravel. Black spots and pieces of glass apparent. White and red spots in soil. Red sand with black/white spots.			72% 47%	FZ-BH11-2D *(1) Organic Vapour: 0 ppm	
Silty Sand and Gravel FILL Gray sand and gravel.			71%	FZ-BH11-2D *(2) FZ-BH11-2D *(3) FZ-BH11-2D *(4)	
Cinder and Ash FILL Red sand becoming black with debris present in soil (i.e., glass).				FZ-BH11-2D *(5)	
GLACIAL TILL Greenish brown silty sand and gravel. Cobbles present. Brownish gray sand and gravel with cobble apparent.			60% 55%		
GLACIAL TILL Brownish gray clayey sand with gravel apparent.			100% 7%		
End of Borehole Refusal Encountered					

Drilled By: Strata Soil Sampling Inc. Borehole Depth: 35 ft (~10.7 m)

Drill Method: Geoprobe Hole Diameter: 50 mm

Drill Date: August 10, 2011

Sheet: 1 of 1

*(1)(2)(3)(4)(5) Grab samples collected for different analyses. See Table 4-4.

Borehole Log: FZ-BH11-3D

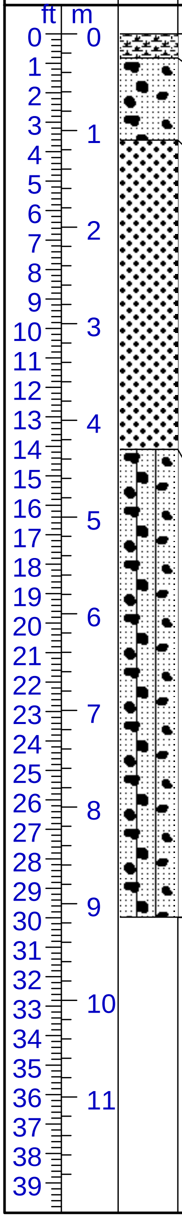
Project: Phase Two ESA

Project No: 1329-1102

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON



SUBSURFACE PROFILE	SAMPLE			Analysis	Well Installation Details
Description	Core Run Number	Type	Recovery		
Ground Surface					No Monitoring Well Installed
Top Soil					
Sand and Gravel FILL Brownish gray sand and gravel. Cobble apparent.			87%		
Cinder and Ash FILL Dark sand and gravel. Debris (i.e., cinder) was apparent. Black spots apparent.			27%	FZ-BH11-3D *(1)	
Brown/green sand and gravel. Trace silt and cobble. Debris (i.e., brick) was evident. Turning brown.			43%		
Turning green.					
GLACIAL TILL Gray silty sand and gravel. Some cobble apparent.			84%		
			100%		
			32%		
End of Borehole					

Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 10, 2011

Borehole Depth: 30 ft (~9.14 m)
Hole Diameter: 50 mm

Sheet: 1 of 1

*(1) Grab samples collected for different analyses. See Table 4-4.

Borehole Log: FZ-BH11-4D

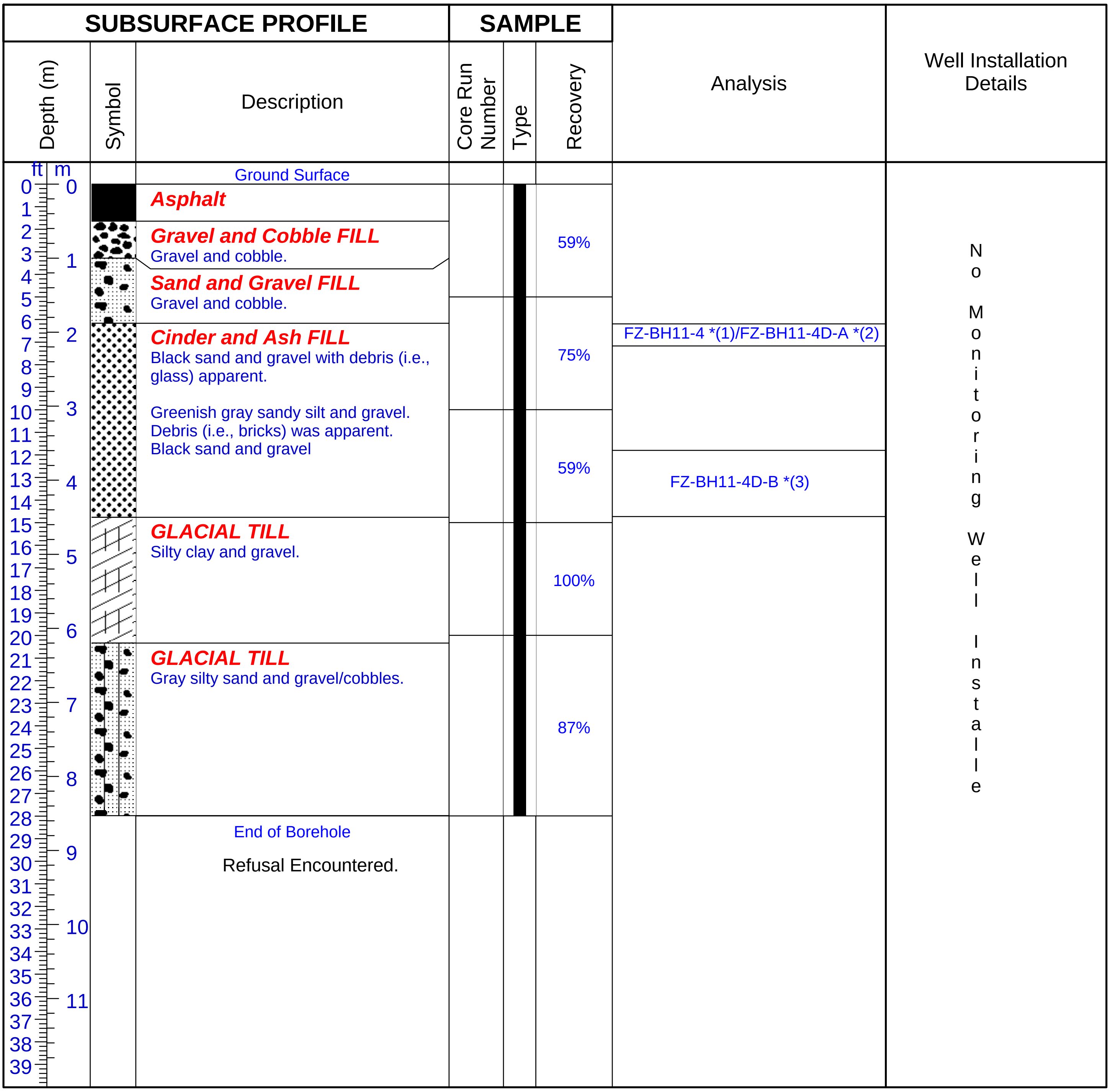
Project: Phase Two ESA

Project No: 1329-1102

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON



Ground Surface

Asphalt

Gravel and Cobble FILL
Gravel and cobble.

Sand and Gravel FILL
Gravel and cobble.

Cinder and Ash FILL
Black sand and gravel with debris (i.e., glass) apparent.

Greenish gray sandy silt and gravel.
Debris (i.e., bricks) was apparent.
Black sand and gravel

GLACIAL TILL
Silty clay and gravel.

GLACIAL TILL
Gray silty sand and gravel/cobbles.

End of Borehole

Refusal Encountered.

Recovery: 59%, 75%, 59%, 100%, 87%

Analysis:
FZ-BH11-4 *(1)/FZ-BH11-4D-A *(2)
FZ-BH11-4D-B *(3)

Well Installation Details: No Monitoring Well Installe

Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 11, 2011

Borehole Depth: 28 ft (~8.5 m)
Hole Diameter: 50 mm

Sheet: 1 of 1

*(1)(2)(3) Grab samples collected for different analyses. See Table 4-4.

Borehole Log: FZ-BH11-5D

Project: Phase Two ESA

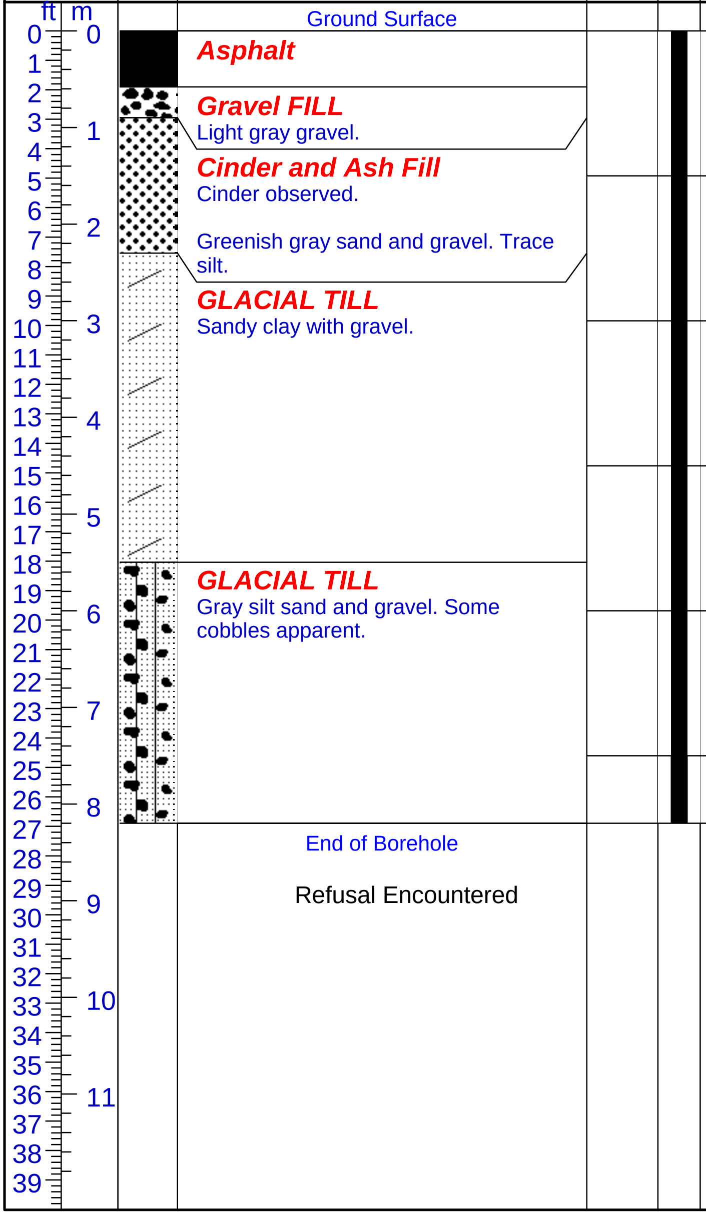
Project No: 1329-1102

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE



Description

Ground Surface

Asphalt

Gravel FILL
Light gray gravel.

Cinder and Ash Fill
Cinder observed.

Greenish gray sand and gravel. Trace silt.

GLACIAL TILL
Sandy clay with gravel.

GLACIAL TILL
Gray silt sand and gravel. Some cobbles apparent.

End of Borehole

Refusal Encountered

SAMPLE

Core Run Number	Type	Recovery
		61%
		60%
		100%
		93%
		100%
		48%

Analysis

FZ-BH11-5D-A

FZ-BH11-5D-A

Well Installation Details

No Monitoring Well Installed

Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 11, 2011

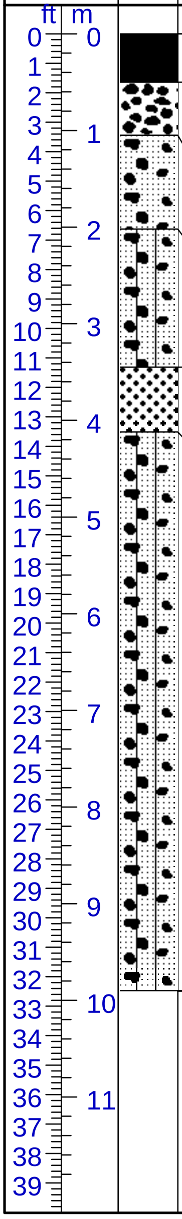
Borehole Depth: 27 ft (~8.2 m)
Hole Diameter: 50 mm

Sheet: 1 of 1

Borehole Log: FZ-BH11-6D

Project: Phase Two ESA
Project No: 1329-1102
Client: University of Ottawa
Logged By: MM/CA
Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE



Description
Ground Surface
Asphalt
Gravel and Cobble FILL White to light gray gravel and cobble fill.
Sand and Gravel FILL Brown sand and gravel with areas of black spots.
Sand and Gravel FILL Greenish gray sand and gravel. Trace silt.
Cinder and Ash FILL Black sand and gravel. Debris (i.e., wood) was evident.
GLACIAL TILL Gray silty sand and gravel. Some cobbles evident.
End of Borehole Refusal Encountered.

SAMPLE

Core Run Number	Type	Recovery	Analysis	Well Installation Details
		70%		No Monitoring Well Installed
		87%		
		90%	FZ-BH11-6D-A	
		41%		
		37%		
		100%		
		80%	FZ-BH11-6D-B	

Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 11, 2011

Borehole Depth: 32.5 ft (~9.91 m)
Hole Diameter: 50 mm

Sheet: 1 of 1

Borehole Log: FZ-BH11-7D

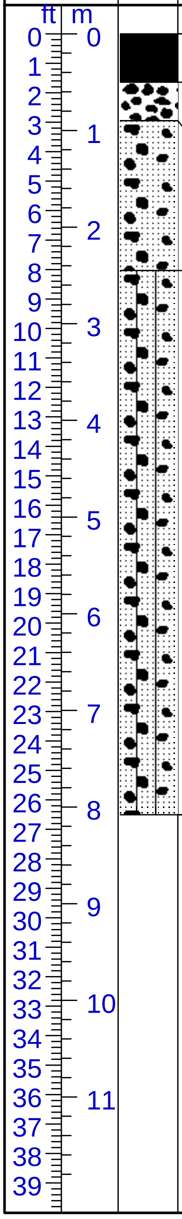
Project: Phase Two ESA ***Project No: 1329-1102***

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE | SAMPLE



Description	Core Run Number	Type	Recovery	Analysis	Well Installation Details
Ground Surface					No Monitoring Well Installed
Asphalt			64%		
Gravel FILL Gravel fill.					
Sand and Gravel FILL Brown sand and gravel fill.				FZ-BH11-7D-A	
			73%		
GLACIAL TILL Brown silty sand and gravel.				FZ-BH11-7D-B	
			69%		
Becoming gray.					
Cobbles evident.			64%		
			82%	FZ-BH11-7D-C	
			43%		
End of Borehole Refusal Encountered					

Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 12, 2011

Borehole Depth: 26.5 ft (~8.08 m)
Hole Diameter: 50 mm

Sheet: 1 of 1

Borehole Log: FZ-BH11-8D

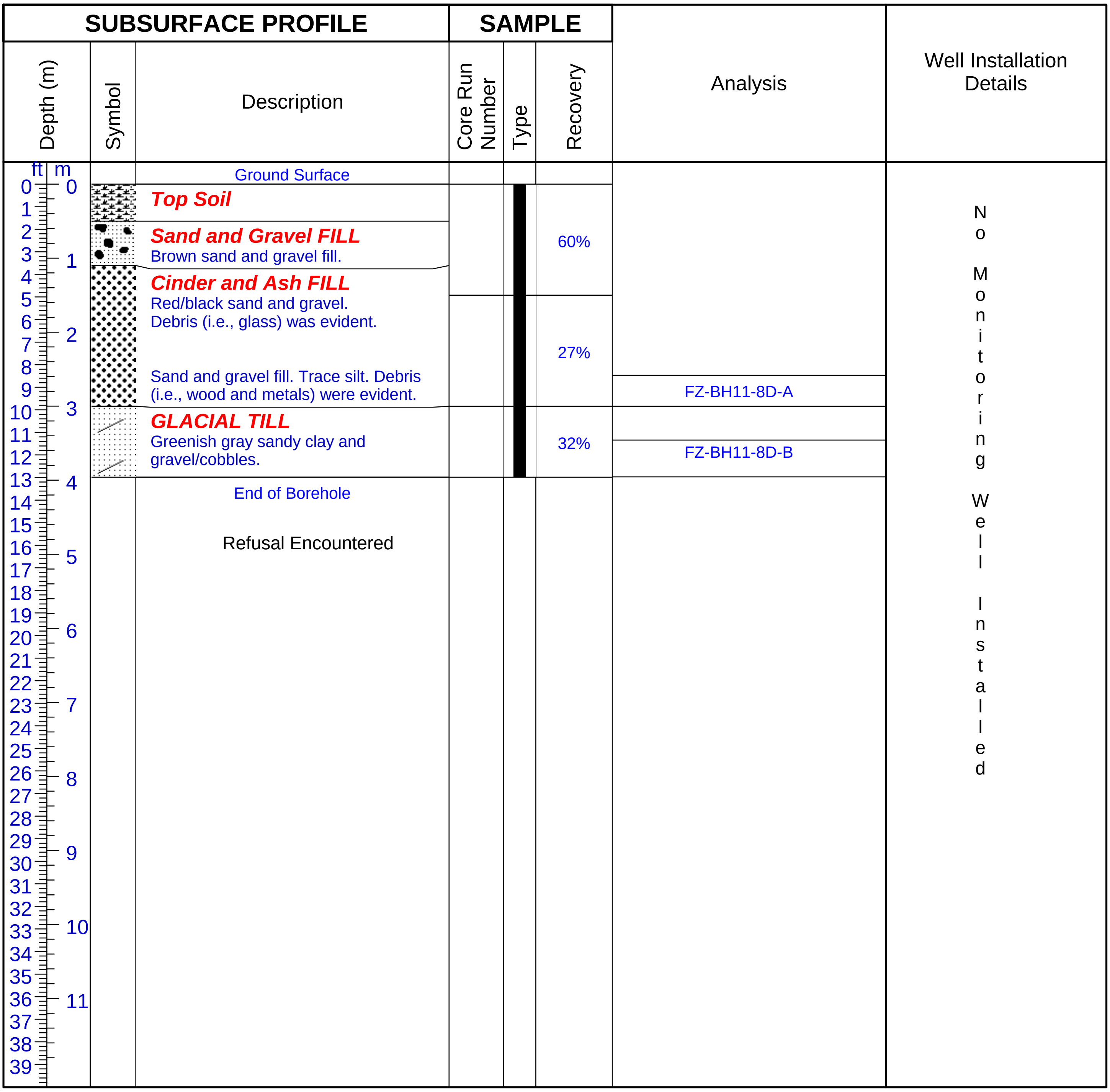
Project: Phase Two ESA

Project No: 1329-1102

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON



SUBSURFACE PROFILE			SAMPLE				
Depth (m)	Symbol	Description	Core Run Number	Type	Recovery	Analysis	Well Installation Details
		Ground Surface					No Monitoring Well Installed
		Top Soil			60%		
		Sand and Gravel FILL Brown sand and gravel fill.					
		Cinder and Ash FILL Red/black sand and gravel. Debris (i.e., glass) was evident.			27%		
		Sand and gravel fill. Trace silt. Debris (i.e., wood and metals) were evident.				FZ-BH11-8D-A	
		GLACIAL TILL Greenish gray sandy clay and gravel/cobbles.			32%	FZ-BH11-8D-B	
		End of Borehole Refusal Encountered					

Drilled By: Strata Soil Sampling Inc.

Drill Method: Geoprobe

Drill Date: August 11, 2011

Borehole Depth: 13 ft (~3.96 m)

Hole Diameter: 50 mm

Sheet: 1 of 1

Borehole Log: *FZ-BH11-9D*

Project: Phase Two ESA

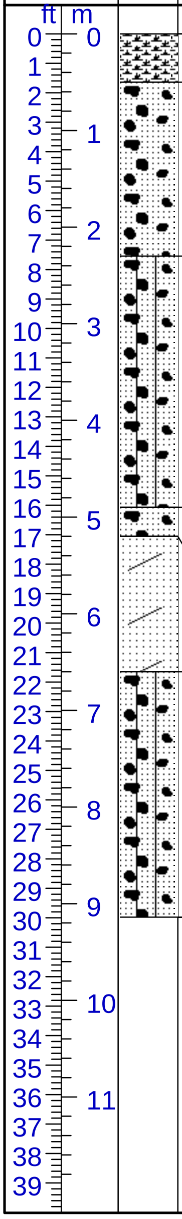
Project No: 1329-1102

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE			SAMPLE				
Depth (m)	Symbol	Description	Core Run Number	Type	Recovery	Analysis	Well Installation Details
		Ground Surface					
		Top Soil			67%	FZ-BH11-9D *(1) FZ-BH11-9D *(2) Organic Vapour: 0 ppm FZ-BH11-9D *(3)	No Monitoring Well Installed
		Cinder and Ash FILL Loose sand and gravel fill. Turning black in colour. Turning red in colour. Cobble apparent.			69%		
		Silty Sand and Gravel FILL Gray silty sand and gravel.			100%		
		Sand and Gravel FILL Light colour sand and gravel.			73%		
		GLACIAL TILL Brownish sandy clay with gravel.					
		GLACIAL TILL Gray silty sand and gravel.			90% 100%		
		End of Borehole Refusal Encountered					



Drilled By: Strata Soil Sampling Inc.

Drill Method: Geoprobe

Drill Date: August 10, 2011

Borehole Depth: 30 ft (~9.14 m)

Hole Diameter: 50 mm

Sheet: 1 of 1

*(1)(2)(3) Grab samples collected for different analyses. See Table 4-4.

Borehole Log: FZ-BH11-10D

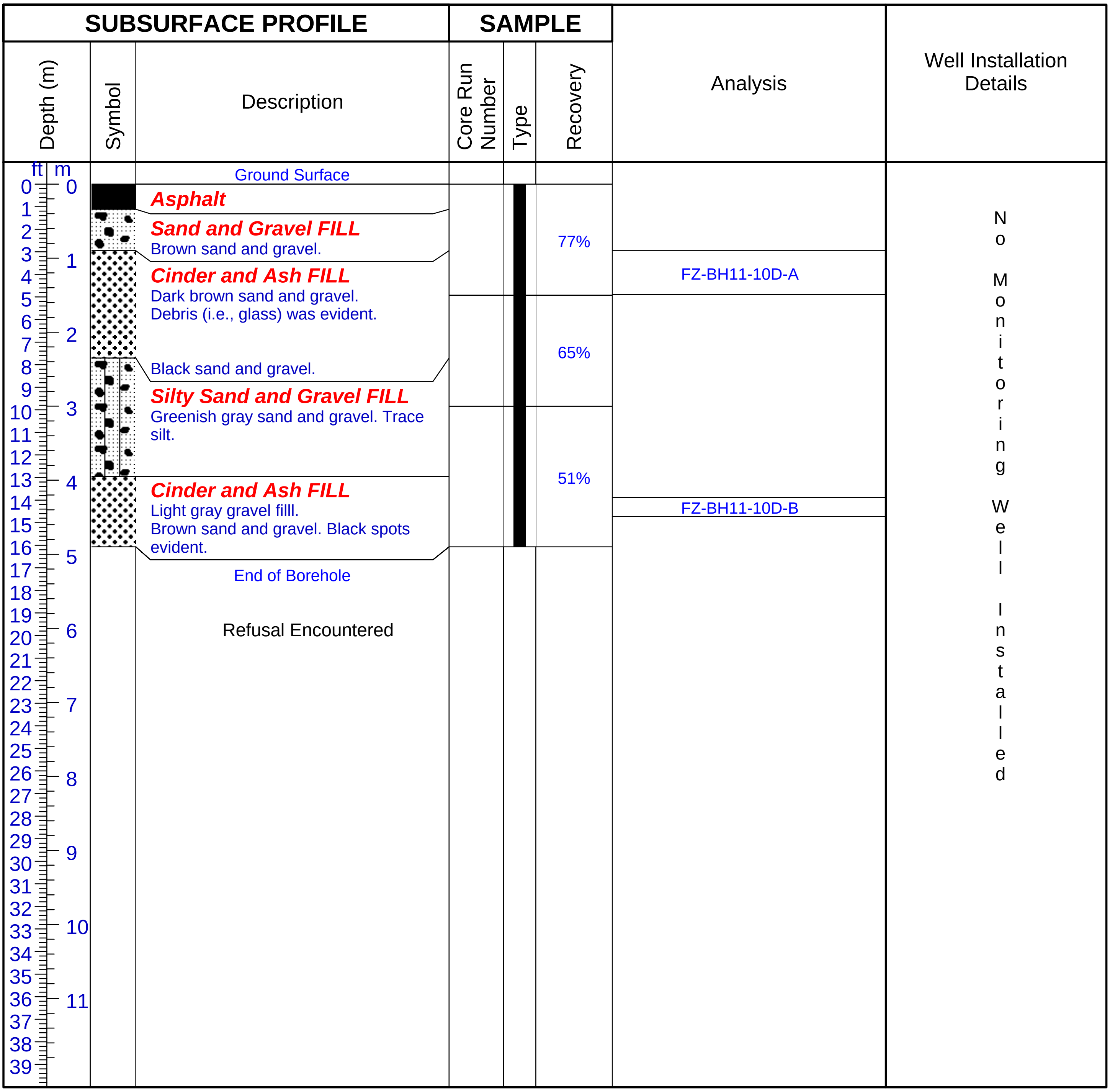
Project: Phase Two ESA

Project No: 1329-1102

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON



Ground Surface

Asphalt

Sand and Gravel FILL
Brown sand and gravel.

Cinder and Ash FILL
Dark brown sand and gravel.
Debris (i.e., glass) was evident.

Black sand and gravel.

Silty Sand and Gravel FILL
Greenish gray sand and gravel. Trace silt.

Cinder and Ash FILL
Light gray gravel filll.
Brown sand and gravel. Black spots evident.

End of Borehole

Refusal Encountered

Recovery: 77%, 65%, 51%

FZ-BH11-10D-A

FZ-BH11-10D-B

No Monitoring Well Installed

Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 11, 2011

Borehole Depth: 16 ft (~4.9 m)
Hole Diameter: 50 mm

Sheet: 1 of 1

Borehole Log: FZ-BH11-1S

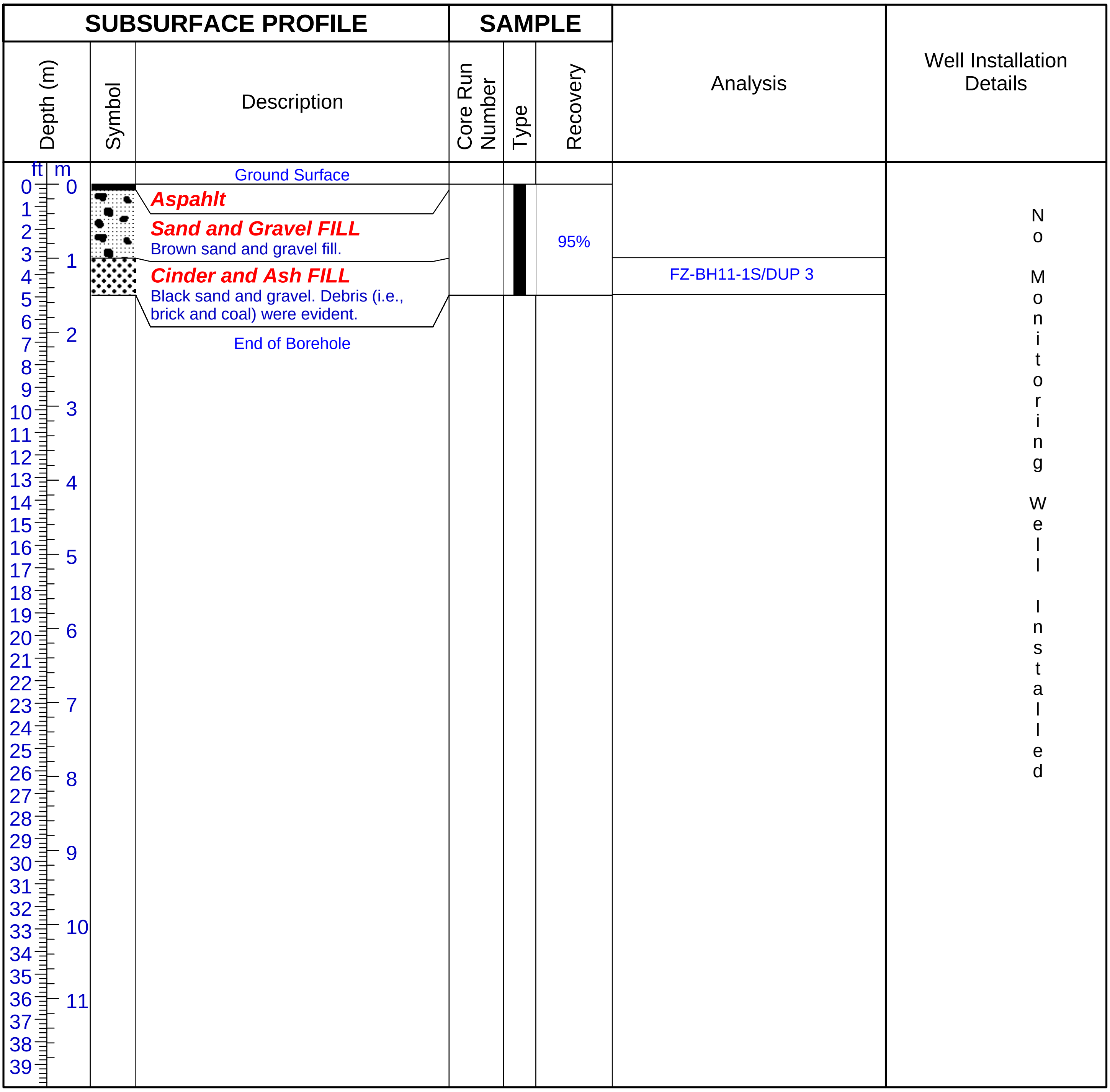
Project: Phase Two ESA

Project No: 1329-1102

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON



SUBSURFACE PROFILE			SAMPLE			Analysis	Well Installation Details
Depth (m)	Symbol	Description	Core Run Number	Type	Recovery		
0		Ground Surface					No Monitoring Well Installed
		Aspahlt			95%		
		Sand and Gravel FILL Brown sand and gravel fill.					
		Cinder and Ash FILL Black sand and gravel. Debris (i.e., brick and coal) were evident.				FZ-BH11-1S/DUP 3	
		End of Borehole					

Drilled By: Strata Soil Sampling Inc.

Drill Method: Geoprobe

Drill Date: August 12, 2011

Borehole Depth: 5 ft (1.5 m)

Hole Diameter: 50 mm

Sheet: 1 of 1

Borehole Log: FZ-BH11-3S

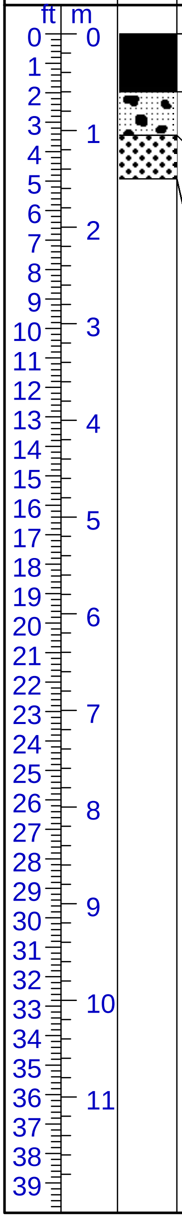
Project: Phase Two ESA

Project No: 1329-1102

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON



SUBSURFACE PROFILE			SAMPLE			Analysis	Well Installation Details
Depth (m)	Symbol	Description	Core Run Number	Type	Recovery		
		Ground Surface					
		Asphalt			80%		No Monitoring Well Installe
		Sand and Gravel FILL Brown sand and gravel.					
		Cinder and Ash FILL Turning black. Debris (i.e., glass and ceramic) were evident.				FZ-BH11-3S/Dup 4.	
		End of Borehole					

Drilled By: Strata Soil Sampling Inc.

Drill Method: Geoprobe

Drill Date: August 12, 2011

Borehole Depth: 5 ft (~1.5m)

Hole Diameter: 50 mm

Sheet: 1 of 1

Borehole Log: FZ-BH11-4S

Project: Phase Two ESA **Project No: 1329-1102**

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE			SAMPLE			Analysis	Well Installation Details
Depth (m)	Symbol	Description	Core Run Number	Type	Recovery		
ft: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 m: 0 1 2 3 4 5 6 7 8 9 10 11		Ground Surface					No Monitoring Well Installed
	■	***Asphalt***		■	83%	FZ-BH11-4S	
	▨	***Sand and Gravel FILL*** Brown sand and gravel fill.					
	▨	***Cinder and Ash FILL*** Black sand and gravel. Debris (i.e., glass) was evident.					
		End of Borehole					

Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 12, 2011

Borehole Depth: 5 ft (~1.5 m)
Hole Diameter: 50 mm

Sheet: 1 of 1

Borehole Log: FZ-MW11-1

Project: Phase Two ESA

Project No: 1329-1102

Client: University of Ottawa

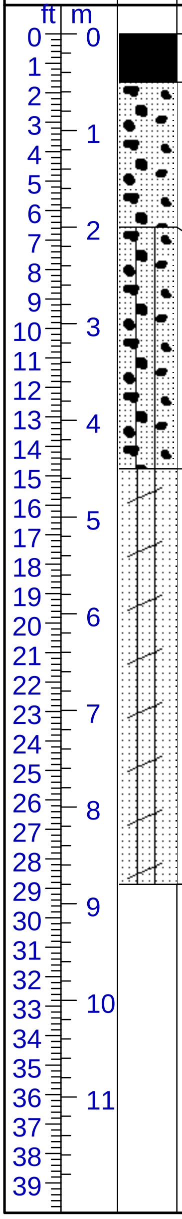
Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE

Depth (m)

Symbol



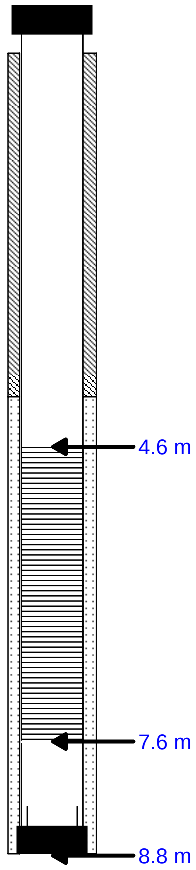
Description
Ground Surface
Asphalt
Sand and Gravel FILL Brown sand and gravel fill. Some cobbles apparent. White and black spots noted. Turning black.
Sand and Gravel FILL Greenish gray sand and gravel. Trace silt. Turning black.
GLACIAL TILL Gray silty sand and gravel. Some cobbles and more clayey.
End of Borehole Refusal Encountered

SAMPLE

Core Run Number	Type	Recovery
		57%
		72%
		100%
		100%
		67%
		73%

Analysis
FZ-MW11-1A
FZ-MW11-1B

Well Installation Details



Drilled By: Strata Soil Sampling Inc.

Drill Method: Geoprobe

Drill Date: August 11, 2011

Borehole Depth: 29 ft (~8.8 m)

Hole Diameter: 50 mm

Sheet: 1 of 1

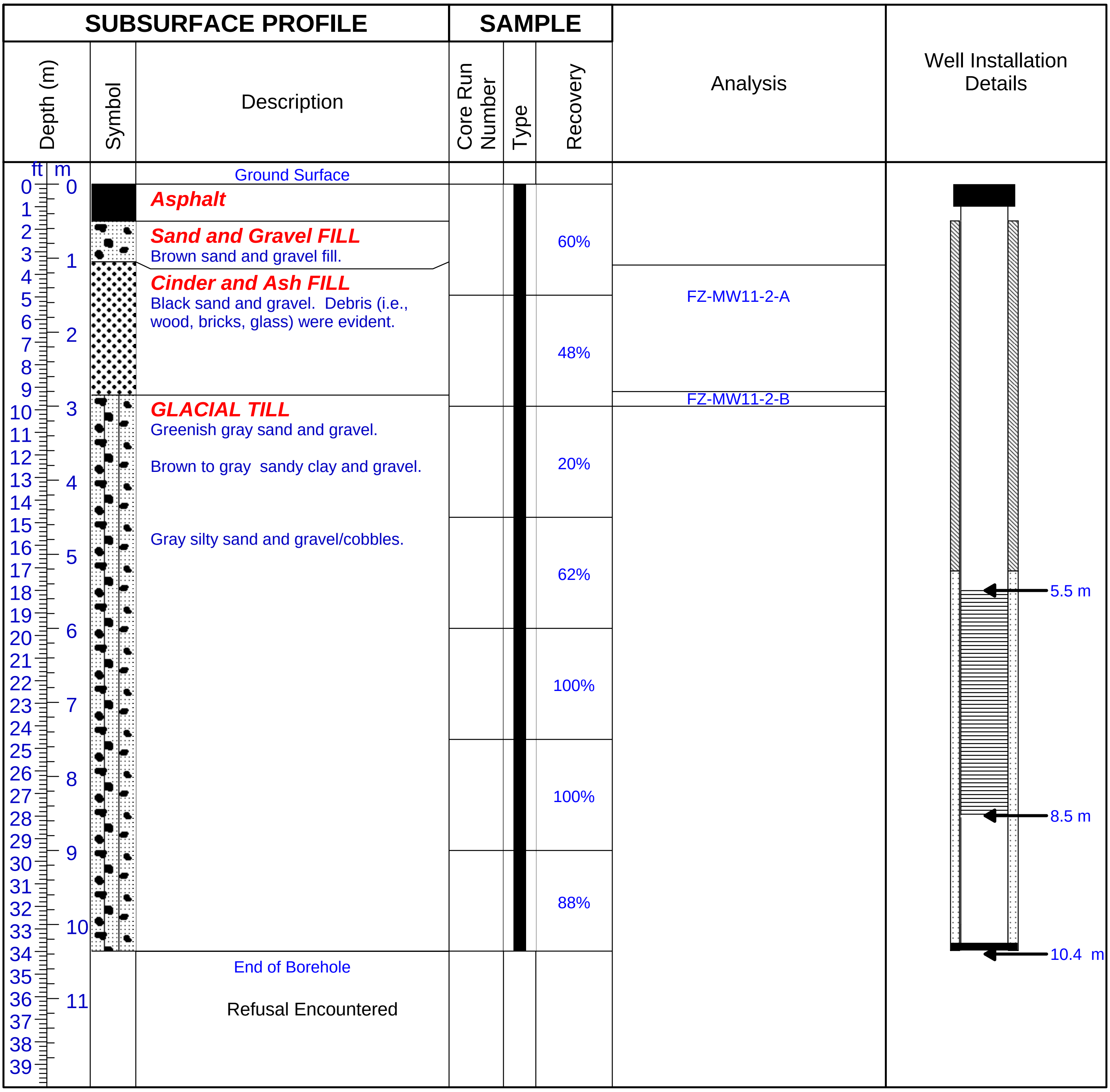
Borehole Log: FZ-MW11-2

Project: Phase Two ESA **Project No: 1329-1102**

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON



Description
Ground Surface
Asphalt
Sand and Gravel FILL Brown sand and gravel fill.
Cinder and Ash FILL Black sand and gravel. Debris (i.e., wood, bricks, glass) were evident.
GLACIAL TILL Greenish gray sand and gravel. Brown to gray sandy clay and gravel. Gray silty sand and gravel/cobbles.
End of Borehole Refusal Encountered

Recovery	Analysis
60%	
48%	FZ-MW11-2-A FZ-MW11-2-B
20%	
62%	
100%	
100%	
88%	

Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 11, 2011

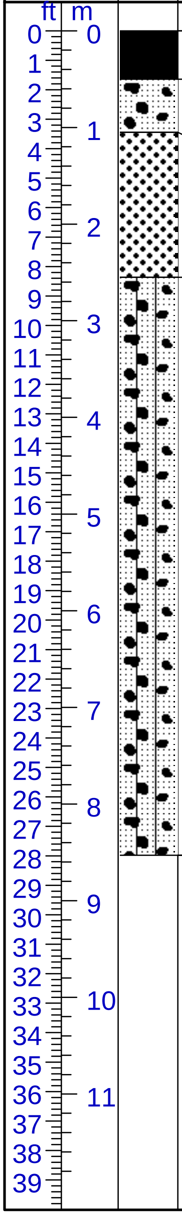
Borehole Depth: 34 ft (~10.4 m)
Hole Diameter: 50 mm

Sheet: 1 of 1

Borehole Log: FZ-MW11-3/BH11-2S

Project: Phase Two ESA	***Project No: 1329-1102***
Client: University of Ottawa	***Logged By: MM/CA***
Location: 200 Lees Avenue, Ottawa, ON	

SUBSURFACE PROFILE



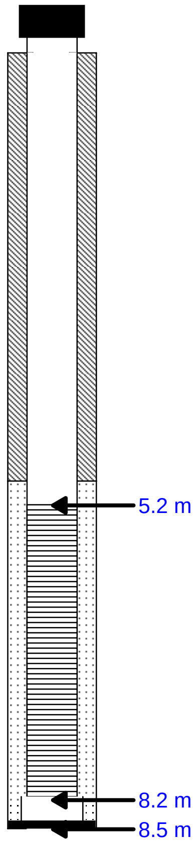
Description
Ground Surface
Asphalt
Sand and Gravel FILL Sand and gravel fill.
Cinder and Ash FILL Turning black. Debris (i.e., brick) was evident.
GLACIAL TILL Greenish gray sand and gravel. Trace silt. Gray sand and gravel. Trace silt. Cobbles evident.
End of Borehole Refusal Encountered

SAMPLE

Core Run Number	Type	Recovery
		70%
		53%
		90%
		97%
		100%
		97%

Analysis
FZ-MW11-3/DUP 5

Well Installation Details



Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 12, 2011

Borehole Depth: 28 ft (~8.5 m)
Hole Diameter: 50 mm

Sheet: 1 of 1

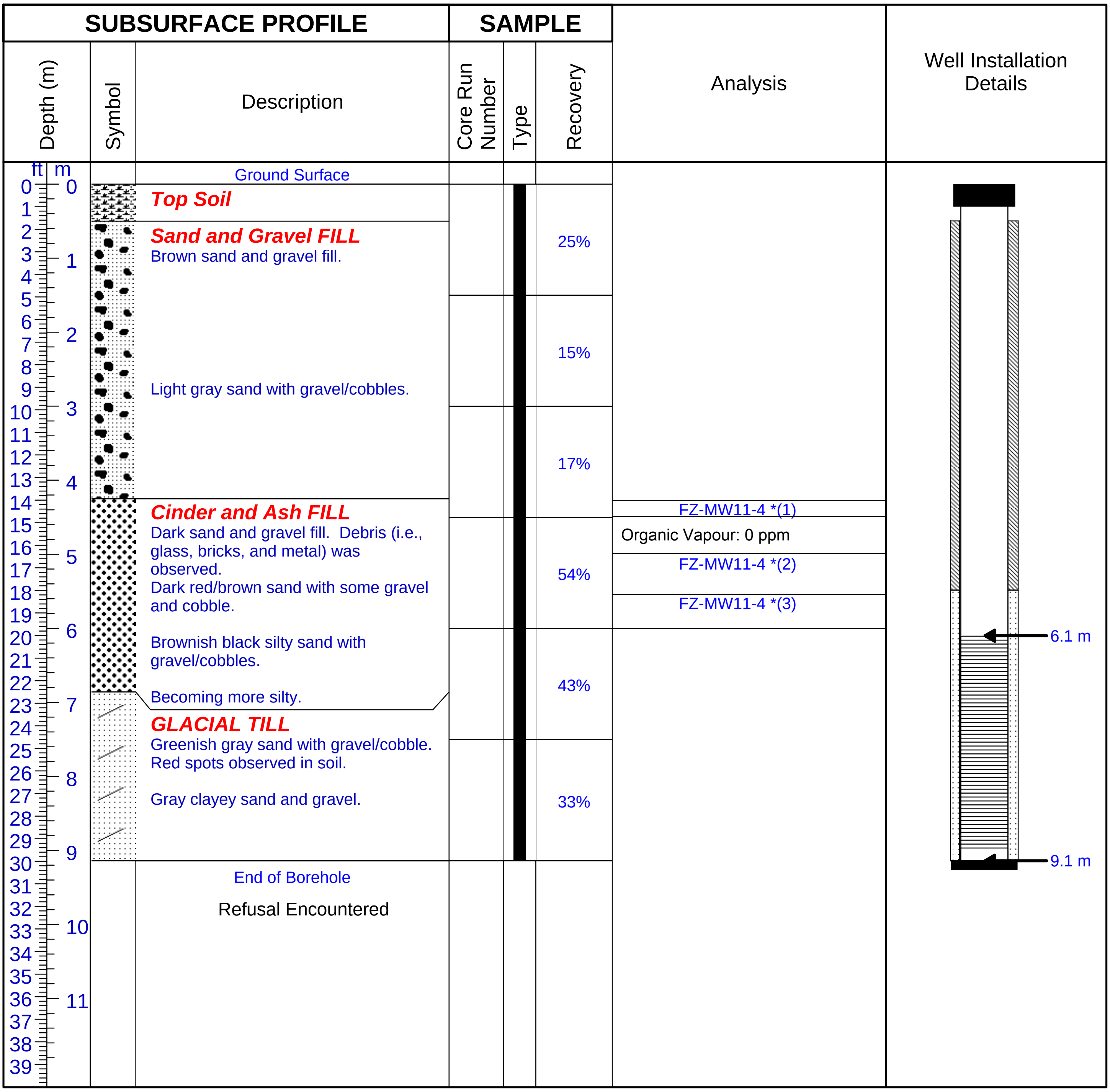
Borehole Log: FZ-MW11-4

Project: Phase Two ESA — ***Project No: 1329-1102***

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON



Depth (m)	Description	Recovery	Analysis
0 ft / 0 m	Ground Surface		
0–1 ft	**Top Soil**	25%	
1–14 ft	**Sand and Gravel FILL** Brown sand and gravel fill. Light gray sand with gravel/cobbles.	25% 15% 17%	
14–22.5 ft	**Cinder and Ash FILL** Dark sand and gravel fill. Debris (i.e., glass, bricks, and metal) was observed. Dark red/brown sand with some gravel and cobble. Brownish black silty sand with gravel/cobbles. Becoming more silty.	54% 43%	FZ-MW11-4 *(1) Organic Vapour: 0 ppm FZ-MW11-4 *(2) FZ-MW11-4 *(3)
22.5–30 ft	**GLACIAL TILL** Greenish gray sand with gravel/cobble. Red spots observed in soil. Gray clayey sand and gravel.	43% 33%	
30 ft	End of Borehole Refusal Encountered		

Drilled By: Strata Soil Sampling Inc. — Borehole Depth: 30 ft (~9.14 m)

Drill Method: Geoprobe — Hole Diameter: 50 mm

Drill Date: August 10, 2011

Sheet: 1 of 1

*(1)(2)(3) Grab samples collected for different analyses. See Table 4-4.

Borehole Log: FZ-MW11-5

Project: Phase Two ESA

Project No: 1329-1102

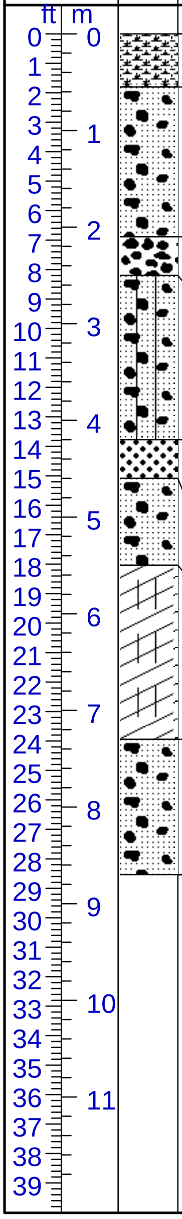
Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE

Depth (m) | Symbol | Description



Ground Surface

Top Soil

Sand and Gravel FILL
Brown sand and gravel.

Gravel FILL
Gravel fill.

Sand and Gravel FILL
Greenish gray sand and gravel. Traces of silt.

Cinder and Ash FILL
Dark silt and gravel. Debris (i.e., wood) was evident.

GLACIAL TILL
Brown sand and gravel.

GLACIAL TILL
Clayey silt material.

GLACIAL TILL
Brown sand and gravel.

End of Borehole

Refusal Encountered

SAMPLE

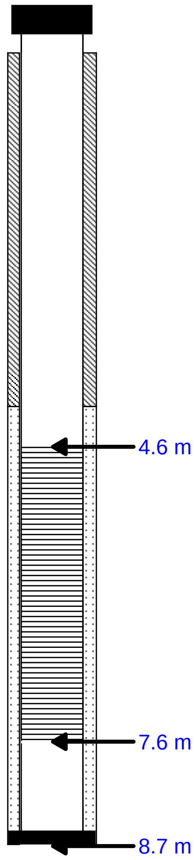
Core Run Number	Type	Recovery
		63%
		85%
		33%
		100%
		13%

Analysis

FZ-MW11-5-A

FZ-MW11-5-B

Well Installation Details



Drilled By: Strata Soil Sampling Inc.

Drill Method: Geoprobe

Drill Date: August 11, 2011

Borehole Depth: 28.5 ft (~8.7 m)

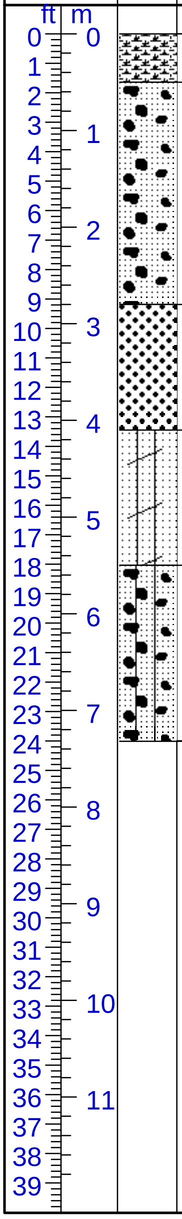
Hole Diameter: 50 mm

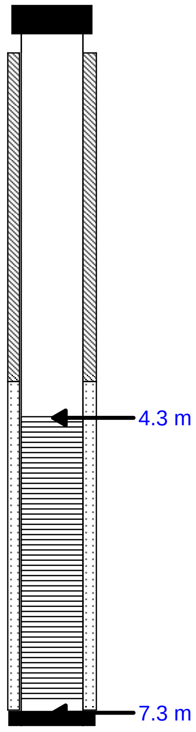
Sheet: 1 of 1

Borehole Log: FZ-MW11-6

Project: Phase Two ESA
Project No: 1329-1102
Client: University of Ottawa
Logged By: MM/CA
Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE			SAMPLE				
Depth (m)	Symbol	Description	Core Run Number	Type	Recovery	Analysis	Well Installation Details
		Ground Surface					
		Top Soil			51%		
		Sand and Gravel FILL Sand and gravel fill.			60%	FZ-MW11-6 *(1)	
		Cinder and Ash FILL Black sand and gravel fill.			57%	FZ-MW11-6/DUP 1 *(2)	
		GLACIAL TILL Silty sand and gravel. Trace clay.			100%		
		GLACIAL TILL Gray silty sand and gravel fill.			100%		
		End of Borehole Refusal Encountered					





Drilled By: Strata Soil Sampling Inc.
Drill Method: Geoprobe
Drill Date: August 11, 2011

Borehole Depth: 24 ft(~7.3 m)
Hole Diameter: 50 mm

Sheet: 1 of 1

*(1)(2) Grab samples collected for different analyses. See Table 4-4.

Ontario

Ministry of
the Environment

Well Tag No. for Master Well *(Place Sticker and/or Print Below)*

A 094096

A094096

MW11-4

Master Well Record for Cluster Well Construction

Regulation 903 Ontario Water Resources Act

8921

Page 1 of 2

Master Well Owner's and Land Owner's Information

First Name	Last Name	E-mail Address
Renee	Grandbois	

Mailing Address (Street Number/Name, RR)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
1 Nicholas St- Suite 840	Ottawa	ON	K1N7M7	6135625800

Location and Construction of the Master Well in the Cluster

Address of Well Location (Street Number/Name, RR)	Township	Lot	Concession
200 Lees Avenue			

County/District/Municipality	City/Town/Village	Province	Postal Code
	OTTAWA	Ontario	

UTM Coordinates	Zone	Easting	Northing	GPS Unit Make	Model
NAD 83	18	448027	5029421	Garmin	E trex

Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Overburden and Bedrock Materials *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth *(Metres)* From	To
B/K	Topsoil			0	.61
Brn.	Fill			.61	2.44
Gry	Clay	Silt		2.44	4.57
Gry	Clay	Fine Sand.		4.57	9.14

Hole Details

Depth *(Metres)* From	To	Diameter *(Centimetres)*
0	9.14	8.25

Water Use

☐ Public ☐ Domestic ☐ Livestock ☐ Irrigation ☐ Industrial ☐ Commercial ☐ Municipal ☒ Test Hole ☐ Not used ☐ Dewatering ☒ Monitoring ☐ Cooling & Air Conditioning ☐ Other, *specify*

Method of Construction

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Rotary (Air) ☐ Air Percussion ☐ Diamond ☐ Jetting ☐ Driving ☐ Digging ☐ Boring ☒ Other, *specify* Direct push

Status of Well

☒ Test Hole ☐ Replacement Well ☐ Dewatering Well ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Other, *specify* ☐ Abandoned, other, *specify*

Construction Details

Inside Diameter *(Centimetres)*	Material *(steel, plastic, fibreglass, concrete, galvanized)*	Wall Thickness	Depth *(Metres)* From	To
4.03	PVC RISER.	.368	0	6.1
4.03	PVC Screen.	.368	6.1	9.14

No Casing and Screen Used

Open Hole ☐ Yes ☒ No

Static Water Level Test

Metres

Screen

☐ Galvanized ☐ Steel ☐ Fibreglass ☐ Concrete ☒ Plastic

Outside Diameter *(Centimetres)* 4.32

Slot No. 10

Water Details

Water found at Depth Metres ☐ Gas — Kind of Water ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals

Water found at Depth Metres ☐ Gas — Kind of Water ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals

Water found at Depth Metres ☐ Gas — Kind of Water ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals

Annular Space/Abandonment Sealing Record

Depth Set at *(Metres)* From	To	Type of Sealant Used *(Material and Type)*	Volume Used *(Cubic Metres)*
0	.31	Flushmount.	
.31	5.79	Benseal	
5.79	9.14	Sand.	

Disinfected ☐ Yes ☒ No If no, provide reason: Test Hole/observation well

Date Master Well Completed *(yyyy/mm/dd)*

Cluster Information *(Please also fill out the additional Cluster Well Information for Well Construction for each parcel of land and cluster.)*

Total Wells in Cluster: 6

Total Wells on this Property: 6

Please indicate Number of Cluster Well Information Log Sheets Submitted: 1

Location of Well Cluster

Detailed Map must be provided as an attachment no larger than legal size (8.5" x 14"). Sketches are not allowed.

☒ Check box to confirm detailed map is provided as per Section 11.1 (3)

Consent to release additional information concerning the cluster to the Director upon request

Signature of Technician/Contractor

Date *(yyyy/mm/dd)* 2011/08/14

Master Well Owner's/Land Owner's consent to use Cluster Form

Signature

Date *(yyyy/mm/dd)* Aug 12, 2011

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Strata Soil Sampling	7241

Business Address (Street No./Name, number, RR)	Municipality
147-2 west Beaver creek Rd	Richmond Hill

Province	Postal Code	Business E-mail Address
ON	L4B1C6	wrecords@stratasoil.com

Bus.Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
9057649364	Beatty Brian

Well Technician's Licence No.	Signature of Technician	Date Submitted *(yyyy/mm/dd)*
3616		2011/08/14

Ministry Use Only

Audit No. M 10149

Well Contractor No.

Date Received *(yyyy/mm/dd)*

Date of Inspection *(yyyy/mm/dd)*

Remarks

1992 (11/2006)

Ministry's Copy

Ontario Ministry of the Environment

Well Tag No. for Master Well *(Print Well Tag No.)*

A 094096 A094096

Cluster Well Information for Cluster Well Construction

Regulation 903 Ontario Water Resources Act

8921 Page 2 of 3

Property Owner's Information

First Name Renee	Last Name Grandbois	Mailing Address (Street No./Name, RR) 1 Nicholas st. Suite 840	Municipality Ottawa
Province Ontario	Postal Code K1N7N7	E-mail Address	Telephone No. (inc. area code) 6135625800

Cluster Well Information

Address of Well Location (Street Number/Name, RR) 200 Lees Avenue	Lot	Concession	Township	County/District/Municipality Ottawa - Carleton.	
City/Town/Village OTTAWA	Province Ontario	Postal Code	GPS Unit Make Garmin	Model E trex	Unit Mode of Operation ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify:

Consent

Property Owner's Consent to use cluster form

Signature	Date *(yyyy/mm/dd)* AUG, 12 2011

Consent to release additional information to the Director upon request

Signature of Technician/Contractor	Date *(yyyy/mm/dd)* Aug 14/11

Well # on Sketch	UTM Coordinates Zone	Easting	Northing	Full Depth of Hole (metres)	Hole Diameter (cm)	Method of Construction	Casing Material	Casing Length (metres)	Screen Interval (metres) From	To	Annular Space Sealant Used	Static Water Level (metres)	Abandonment Sealant Used	Comments	Date of Completion *(yyyy/mm/dd)*
MW11-5	18	448005	5029362	7.62	8.25	Direct Push	PVC plastic	4.57	4.57	7.62	Benseal Granular Betonite				2011/08/11
W11-6	18	448036	5029410	7.32	8.25	Direct push	PVC plastic	4.27	4.27	7.32	Benseal.				2011/08/11
W11-1	18	447941	5029422	7.62	8.25	Direct push	PVC plastic	4.57	4.57	7.62	Benseal.				2011/08/11
W11-2	18	447950	5029347	8.53	8.25	Direct push	PVC plastic	5.49	5.49	8.53	Benseal				2011/08/1
W11-3	18	447884	5029411	8.23	8.25	Direct Push	PVC plastic	5.18	5.18	8.23	Benseal				2011/08/12

Well Contractor and Well Technician Information

Business Name of Well Contractor Strata Soil Sampling	Business Address (Street Number/Name, RR) 147-2 West Beaver creek Rd	Municipality Richmond Hill	Province ON
Postal Code L4B1C6	Business Telephone No. *(inc. area code)* 9057648304	Well Contractor's Licence No. 7241	Business E-mail Address wrecords@stratasoil.com
Name of Well Technician (First Name, Last Name) Brian Beatty	Well Technician's Licence No. 36116	Date Submitted *(yyyy/mm/dd)* 2011/08/14	Signature of Technician

Date 1st Well in Cluster Constructed *(yyyy/mm/dd)* 2011/08/10	Date Last Well in Cluster Constructed *(yyyy/mm/dd)* 2011/08/

Ministry Use Only

Date Received *(yyyy/mm/dd)*	Date Inspected *(yyyy/mm/dd)*
Audit No. C 14179	Remarks

1991 (11/2006)

Ministry's Copy

Soil Vapour Probe: FZ-VP11-1

Project: Phase Two ESA

Project No: 1329-1102

Client: University of Ottawa

Logged By: MM/CA

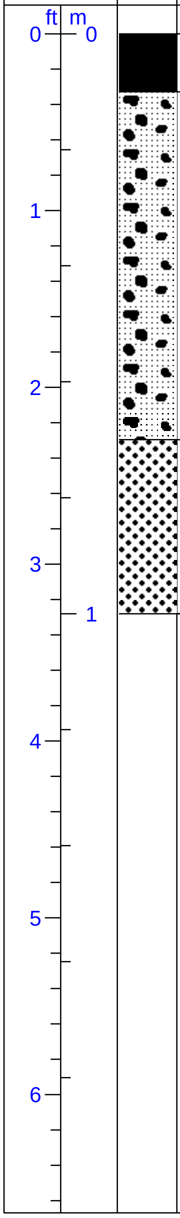
Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE

Depth (m)

Symbol

Description



Ground Surface

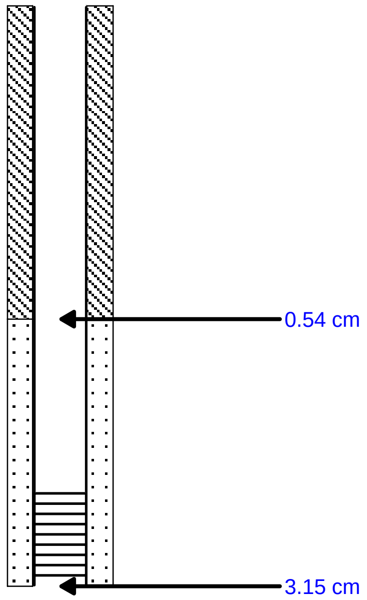
Asphalt

Sand and Gravel FILL
Brown sand and gravel fill.

Cinder and Ash FILL
Black sand and gravel. Debris (i.e., glass) was evident.

End of Borehole

SVP Completion Details



Diameter of Borehole: 3.15 cm

Diameter of Vapour Prope: 0.63 cm

Sheet: 1 of 1

Soil Vapour Probe: FZ-VP11-2

Project: Phase Two ESA

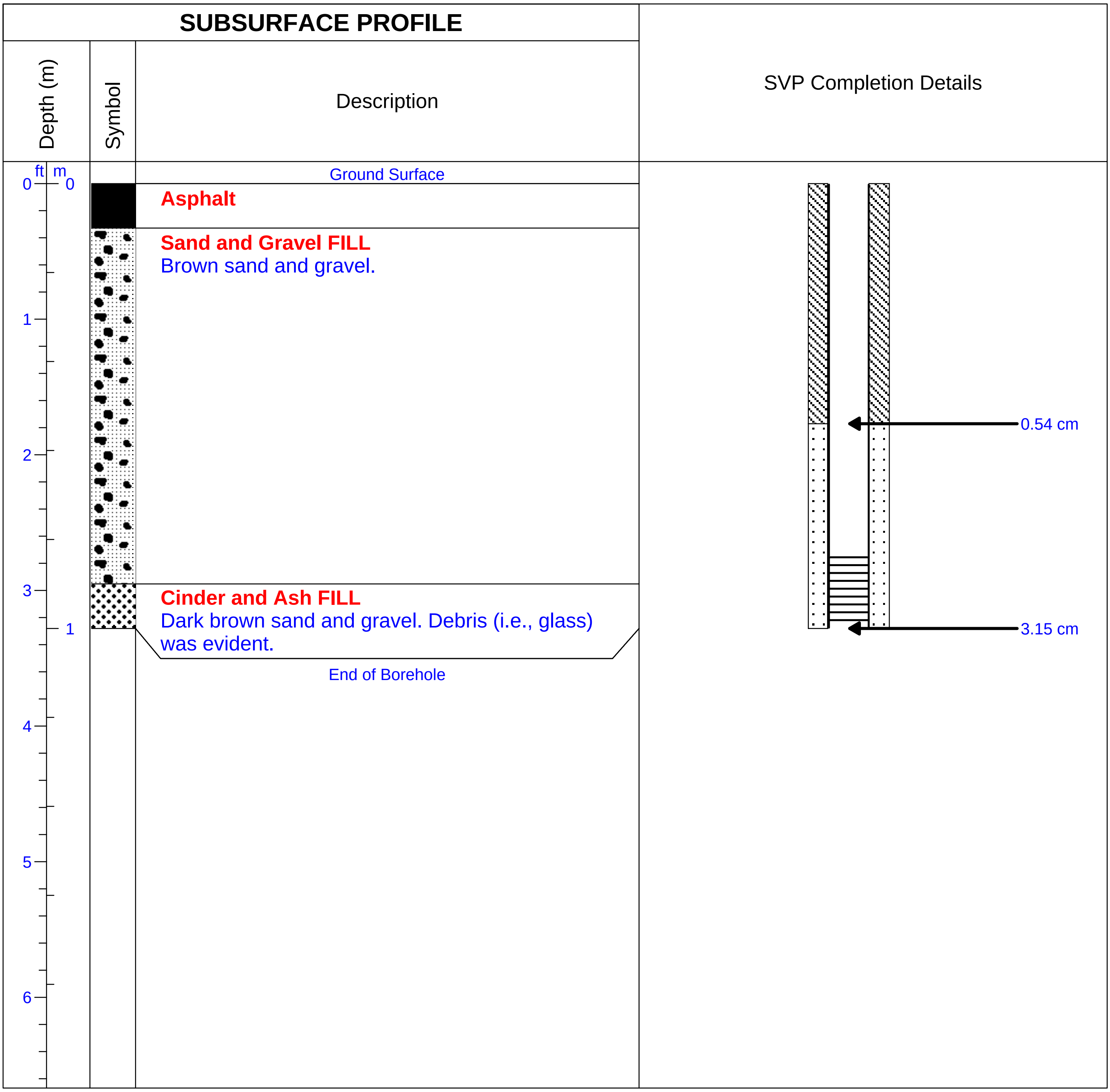
Project No: 1329-1102

Client: University of Ottawa

Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE



Asphalt

Sand and Gravel FILL
Brown sand and gravel.

Cinder and Ash FILL
Dark brown sand and gravel. Debris (i.e., glass) was evident.

End of Borehole

Diameter of Borehole: 3.15 cm

Diameter of Vapour Prope: 0.63 cm

Sheet: 1 of 1

Soil Vapour Probe: FZ-VP11-3

Project: Phase Two ESA — ***Project No: 1329-1102***

Client: University of Ottawa

Logged By: MM/CA

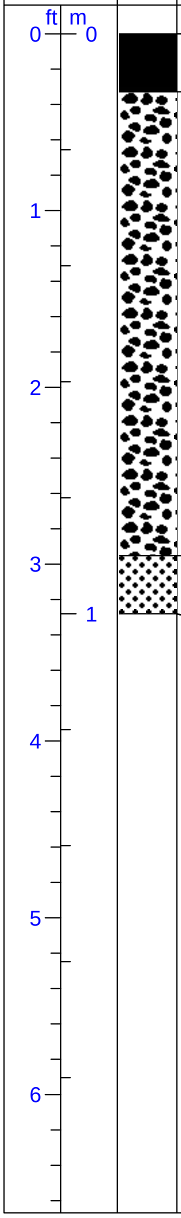
Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE

Depth (m) | Symbol | Description

SVP Completion Details

Ground Surface

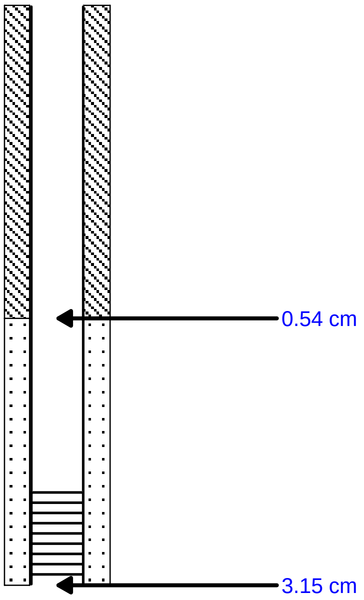


Asphalt

Gravel FILL
Light gray gravel.

Cinder and Ash FILL
Cinder observed.

End of Borehole



Diameter of Borehole: 3.15 cm

Diameter of Vapour Prope: 0.63 cm

Sheet: 1 of 1

Soil Vapour Probe: FZ-VP11-4

Project: Phase Two ESA

Project No: 1329-1102

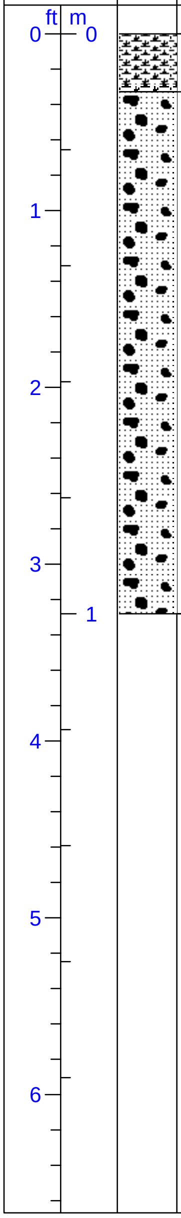
Client: University of Ottawa

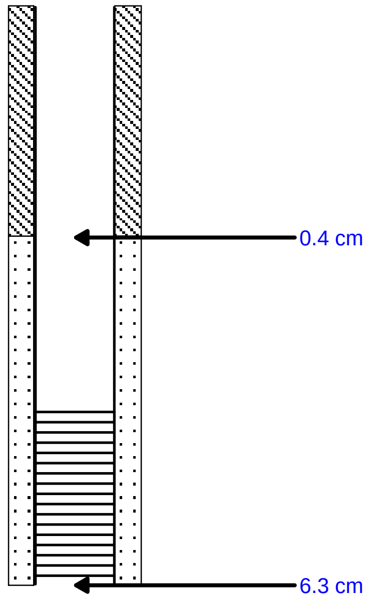
Logged By: MM/CA

Location: 200 Lees Avenue, Ottawa, ON

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	SVP Completion Details
		Ground Surface	
0		**Top Soil**	
		Sand and Gravel FILL Brown sand and gravel.	
1		End of Borehole	





Diameter of Borehole: 6.3 cm

Diameter of Vapour Prope: 1.9 cm

Sheet: 1 of 1

APPENDIX G

Residue Management

LACOMBE WASTE SERVICES

A division of 349977 Ontario Ltd.

5555 POWER ROAD
OTTAWA, ONTARIO K1G 3N4
PHONE (613) 822-2700 / FAX (613) 822-6183 / WATTS 1- 800-263-5048
MOE C OF A #A860156 / MOE-QUE FILE # 7610-07-01-0468
GST # 106173776

Straight Bill of Lading
Original - Not Negotiable

Vehicle Number	**Sequence Number** № 24808
Reference Number D17263	**Date** 30 SEP 2011

LACOMBE WASTE SERVICES
Name of Carrier

Consignee: LACOMBE WASTE SERVICES	**Consignor:** UNIVERSITY OF OTTAWA - LEES CAMPUS
5555 POWER ROAD	200 LEES AVE
OTTAWA ON K1G 3N4	OTTAWA ON K1S 5S9

Payment Options Cash Cheque Visa Charge

GENERATOR NAME & NUMBER

Type and number of containers	DG	DESCRIPTION/ PROPER SHIPPING NAME	UN HAZARD CLASS(ES)	UN/NA NUMBER	PG	TOTAL QUANTITY kilograms/litres	WEIGHT in kilos	W. O. Number
2 DM		1) NON REGULATED SOLID WASTE, NR (SOIL), NR,NR RQ	NR	NR	NR		122kg	24001
2DM		Non Regulated Oil Rags	NR	NR	NR	205L		24022
1DM		Waste Aerosols Flammable	2,1	1950	NR	50kg		24022

Comments

24- Hour Emergency Phone Number: 1(613) 996-6666, CANUTEC.
Emergency Response Assistance Plan and Phone Number: __________
Type and Number of Placards Required: __________
Special Safety or Handling Instructions: __________

Shipper UNIVERSITY OF OTTAWA - LEES CAMPUS	Carrier LACOMBE WASTE SERVICES	Consignee LACOMBE WASTE SERVICES
Per	Per	Per
Date 30 SEP 2011	Date 30 SEP 2011	Date 30 SEP 2011
Company UNIVERSITY OF OTTAWA - LEES CAMPUS	Company LACOMBE WASTE SERVICES	Company LACOMBE WASTE SERVICES

Lacombe Waste Services

INVOICE

5555 Power Road.
Ottawa, Ontario KIG3N4
Canada
Ph:(613) 822-2700/Fax:(613) 822-6183
MOE C OF A #A860156
MOE-QUE FILE #7610-07-01-0468
Email mail@lacombewaste.ca

Invoice No: 24001
Date: September 30, 2011
Page: 1 of 1

Invoice To:

FRANZ ENVIRONMENTAL INC.
329 CHURCHILL AVE NORTH
SUITE 200
OTTAWA, ON K1Z 5B8
613-721-0555 ext.225

Generator site address:

UNIVERSITY OF OTTAWA - LEES CAMPUS
200 LEES AVE

OTTAWA, ON K1S 5S9
Sales Order: 24001
PO: 2464
Manifest: 24808

GST Reg No.: 10617 3776

QST Reg No.: 1008762151

Quantity	Container Type	Billing Unit	Description	Unit Price	Amount
1	DM	EA	Non Regulated Solid Waste, Nr (Soil), Nr,Nr Rq	100.00	100.00
1			Transportation	90.00	90.00
190		%	Environmental Surcharge	7.50	14.25

SUBTOTAL	**$204.25**
GST	
PST	
HST	**$26.55**
TOTAL	**$230.80**

Payable upon receipt. 2% interest charged after 30 days.
DISCREPANCIES ON INVOICES MUST BE REPORTED WITHIN 30 CALENDAR DAYS!

APPENDIX H

Survey of Site

LEGEND

■	SURVEY MONUMENT FOUND
SIB	STANDARD IRON BAR
IB	IRON BAR
ø	ROUND
CC	CUT CROSS
CP	CONCRETE PIN
WIT	WITNESS
x —x —x	FENCE
1287, FSM	FARLEY, SMITH & MURRAY SURVEYING LTD. AUG.28, 1989, NOV.21, 1989
AOG	ANNIS,O'SULLIVAN, VOLLEBEKK LTD.
CB	CATCH BASIN
FH	FIRE HYDRANT
MH	MANHOLE
LS	LIGHT STANDARD
FL	FLOOD LIGHT
▨	GRASS AND VEGETATION
P1	PLAN R.D.1
P2	PLAN 5R-5422
P3	PLAN 4R-299
P3	PLAN 5R-5009
GV	GAS VALVE
PM	PARKING METER
TC	TOP OF CURB
F.F.	FINISHED FLOOR
ELEV.	ELEVATION
MW	MONITORING WELL
Conc.	CONCRETE
VB	VALVE BOX
StMH	STORM MANHOLE
SanMH	SANITARY MANHOLE
WVC	WATER VALVE & CHAMBER
GM	GAS METER
CLS	CENTRELINE OF SWALE
INV	INVERT
C/L	CENTRELINE

THIS PLAN MUST BE READ IN CONJUNCTION WITH SURVEY REPORT – PART 2, DATED ....SEPTEMBER 19,.......2002

SURVEYOR'S REAL PROPERTY REPORT – PART 1 AND TOPOGRAPHIC PLAN OF SURVEY OF

PART OF LOT "G"
CONCESSION "D" (Rideau Front)
Geographic TOWNSHIP OF NEPEAN
CITY OF OTTAWA

FARLEY SMITH & DENIS SURVEYING LTD

2002

SCALE 1:500

0 5 10 15 20 25 30 35 40 45 50 metres

METRIC NOTE

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO A PORTION OF THE SOUTHERLY LIMIT OF PART 4, PLAN 5R-5422, COURSE N79°09'40"W.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT,AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.

2. THE SURVEY WAS COMPLETED ON THE ...11th...DAY OF .....SEPTEMBER,.....2002

DATE .....SEPTEMBER 19,.......2002

SEE ORIGINAL MYLAR
....
PETER G. SMITH
ONTARIO LAND SURVEYOR

THIS REPORT WAS PREPARED FOR THE BOARD OF GOVERNORS OF UNIVERSITY OF OTTAWA . . . . "the Client", the Client's solicitors, mortgagees and other related parties. The undersigned accepts no responsibility for use by other parties. See Part 2 of this Report.

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
1422176
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR in accordance with Regulations 1026, Section 29(3)

WARNING NO PERSON MAY COPY, REPRODUCE, DISTRIBUTE OR ALTER THIS PLAN IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF FARLEY, SMITH & DENIS SURVEYING LTD .

REVISED: – TO SHOW ELEVATIONS,WATER'S EDGE, TOP OF BANK, EDGE OF BUSH AREA, ETC.

ELEVATION NOTE

1. ELEVATIONS ARE GEODETIC AND ARE REFERRED TO N.C.C. MONUMENT No.019680250, A PLUG IN CONCRETE ON THE SIDEWALK, 28.29metres SOUTH OF THE BRIDGE OVER QUEENSWAY ON ALTA VISTA DRIVE, HAVING AN ELEVATION OF 66.295 metres.

2. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE SITE BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON THIS DRAWING.

DATED: DECEMBER 21, 2007

....
RONALD A. DENIS
ONTARIO LAND SURVEYOR

REVISED: – TO SHOW : NEW FENCE, SWALE, CB/MH INVERTS AND ADDITIONAL ELEVATIONS SHOWN THUS: 60.95 +

DATED: JUNE 21, 2011

....
RONALD A. DENIS
ONTARIO LAND SURVEYOR

REVISED: – TO SHOW : TOP OF BANK PER GEOTECHNICAL ENGINEER AND ADDITIONAL ELEVATIONS SHOWN THUS: + 60.54

DATED: AUGUST 8, 2011

....
RONALD A. DENIS
ONTARIO LAND SURVEYOR

REVISED: – TO SHOW : CULVERT, RIP-RAP CHANEL AND ADDITIONAL ELEVATIONS SHOWN THUS: +61.92

DATED: AUGUST 11, 2011

....
RONALD A. DENIS
ONTARIO LAND SURVEYOR

REVISED: – TO SHOW : BOREHOLES AND MONITORING WELLS

DATED: AUGUST 25, 2011

....
RONALD A. DENIS
ONTARIO LAND SURVEYOR

REVISED: – TO SHOW : ENVIRONMENTAL BOUNDARY

DATED: SEPTEMBER 1, 2011

....
RONALD A. DENIS
ONTARIO LAND SURVEYOR

FILE No. : 258-02

FARLEY, SMITH & DENIS SURVEYING LTD.
ONTARIO LAND SURVEYORS
CANADA LANDS SURVEYORS
190 COLONNADE ROAD, OTTAWA, ONTARIO K2E 7J5
(613) 727-8226 FAX (613) 727-1823

J201-11(175-07)LEES.DWG

F:\My_Files\go_out\LEES-ENVIRONMENTAL LINE-010911.dwg, 9/1/2011 4:15:04 PM

APPENDIX I

Laboratory Certificates of Analysis

Your Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Your C.O.C. #: 27513511, 275135-11-01

Attention: Andrew Henderson
Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2011/08/23

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1C2151
Received: 2011/08/12, 09:30

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
ABN Compounds in soil by GC/MS (1)	1	2011/08/15	2011/08/15	CAM SOP-00301	EPA 8270 (modified)
ABN Compounds in soil by GC/MS (1)	3	2011/08/15	2011/08/16	CAM SOP-00301	EPA 8270 (modified)
Hot Water Extractable Boron (1)	4	2011/08/19	2011/08/19	CAM SOP-00408	R153 Ana. Prot. 2004
Hot Water Extractable Boron (1)	1	2011/08/19	2011/08/22	CAM SOP-00408	R153 Ana. Prot. 2004
Hexavalent Chromium in Soil by IC (1, 3)	2	N/A	2011/08/21	CAM SOP-00436	EPA SW846-3060/7199
Hexavalent Chromium in Soil by IC (1, 3)	3	N/A	2011/08/22	CAM SOP-00436	EPA SW846-3060/7199
Petroleum Hydro. CCME F1 & BTEX in Soil	3	2011/08/15	2011/08/15	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	1	2011/08/15	2011/08/15	OTT SOP-00001	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	2	2011/08/15	2011/08/16	OTT SOP-00001	CCME CWS
F4G (CCME Hydrocarbons Gravimetric)	2	2011/08/17	2011/08/22	OTT SOP-00001	CCME CWS
Acid Extr. Metals (aqua regia) by ICPMS (1)	5	2011/08/18	2011/08/18	CAM SOP-00447	EPA 6020
MOISTURE	3	N/A	2011/08/22	CAM SOP-00445	MOE HANDBOOK(1983)
Moisture (1)	2	N/A	2011/08/19	CAM SOP-00445	McKeague 2nd ed 1978
PAH in sediment by GC/MS (Low Level) (2)	2	2011/08/18	2011/08/22	ATL SOP 00102 R4	based on EPA8270C
PAH in sediment by GC/MS (Low Level) (2)	3	2011/08/18	2011/08/23	ATL SOP 00102 R4	based on EPA8270C
pH CaCl2 EXTRACT (1)	1	2011/08/22	2011/08/22	CAM SOP-00413	SM 4500 H
Phenols (4AAP) (1)	4	N/A	2011/08/18	CAM SOP-00444	MOE ROPHEN-E3179
Sieve, 75um (1, 4)	2	N/A	2011/08/22	CAM SOP-00467	
Volatile Organic Compounds in Soil (1)	1	2011/08/15	2011/08/22	CAM SOP-00226	EPA 8260 modified

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) This test was performed by Maxxam Analytics Mississauga
(2) This test was performed by Bedford
(3) Soils are reported on a dry weight basis unless otherwise specified.
(4) The Sieve test has been validated in accordance with ISO Guide 17025 requirements. SCC accreditation pending.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JULIE CLEMENT, Ottawa Customer Service
Email: JClement@maxxam.ca
Phone# (613) 274-3549

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Job #: B1C2151
Report Date: 2011/08/23

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MM

O'REG 153 METALS PACKAGE (SOIL)

Maxxam ID		KN1509		KN1510			KN1511	KN1512	KN1513		
Sampling Date		2011/08/10 10:00		2011/08/10 14:30			2011/08/10 18:00	2011/08/10 16:30	2011/08/10 12:00		
	Units	**FZ-BH11-1D**	**RDL**	**FZ-BH11-2D**	**RDL**	**QC Batch**	**FZ-BH11-3D**	**FZ-BH11-9D**	**FZ-MW11-4**	**RDL**	**QC Batch**
Inorganics											
Chromium (VI)	ug/g	<0.2	0.2	<0.4(1)	0.4	2586366	<0.2	<0.2	<0.2	0.2	2586993
Moisture	%						15		19	1	2588421
Metals											
Hot Water Ext. Boron (B)	ug/g	0.41	0.05	1.1	0.5	2588284	1.4	0.54	1.1	0.05	2588284
Acid Extractable Antimony (Sb)	ug/g	0.6	0.2	83	0.2	2586822	4.3	11	0.3	0.2	2586822
Acid Extractable Arsenic (As)	ug/g	3	1	26	1	2586822	13	7	2	1	2586822
Acid Extractable Barium (Ba)	ug/g	92	0.5	220	0.5	2586822	250	110	120	0.5	2586822
Acid Extractable Beryllium (Be)	ug/g	<0.2	0.2	<0.2	0.2	2586822	0.5	<0.2	0.4	0.2	2586822
Acid Extractable Boron (B)	ug/g	<5	5	7	5	2586822	9	5	<5	5	2586822
Acid Extractable Cadmium (Cd)	ug/g	0.2	0.1	5.4	0.1	2586822	1.3	0.7	0.3	0.1	2586822
Acid Extractable Chromium (Cr)	ug/g	10	1	35	1	2586822	24	18	23	1	2586822
Acid Extractable Cobalt (Co)	ug/g	3.9	0.1	13	0.1	2586822	6.7	5.6	8.0	0.1	2586822
Acid Extractable Copper (Cu)	ug/g	13	0.5	440	0.5	2586822	170	120	11	0.5	2586822
Acid Extractable Lead (Pb)	ug/g	39	1	900	1	2586822	710	150	14	1	2586822
Acid Extractable Molybdenum (Mo)	ug/g	0.9	0.5	2.8	0.5	2586822	2.9	0.7	2.3	0.5	2586822
Acid Extractable Nickel (Ni)	ug/g	7.6	0.5	53	0.5	2586822	22	21	13	0.5	2586822
Acid Extractable Selenium (Se)	ug/g	<0.5	0.5	0.9	0.5	2586822	1.5	<0.5	<0.5	0.5	2586822
Acid Extractable Silver (Ag)	ug/g	<0.2	0.2	0.3	0.2	2586822	1.0	0.3	<0.2	0.2	2586822
Acid Extractable Thallium (Tl)	ug/g	0.07	0.05	0.10	0.05	2586822	0.16	0.15	0.08	0.05	2586822
Acid Extractable Uranium (U)	ug/g	0.60	0.05	0.52	0.05	2586822	0.75	0.41	0.80	0.05	2586822
Acid Extractable Vanadium (V)	ug/g	15	5	14	5	2586822	25	21	34	5	2586822
Acid Extractable Zinc (Zn)	ug/g	88	5	2600	50	2586822	640	260	55	5	2586822
Acid Extractable Mercury (Hg)	ug/g	<0.05	0.05	0.29	0.05	2586822	0.76	0.45	0.05	0.05	2586822

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.

O'REG 153 PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		KN1509	KN1510	KN1512		
Sampling Date		2011/08/10 10:00	2011/08/10 14:30	2011/08/10 16:30		
	Units	**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-9D**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons						
Benzene	ug/g	<0.02	<0.02		0.02	2582030
Toluene	ug/g	<0.02	<0.02		0.02	2582030
Ethylbenzene	ug/g	<0.02	<0.02		0.02	2582030
o-Xylene	ug/g	<0.02	<0.02		0.02	2582030
p+m-Xylene	ug/g	<0.04	<0.04		0.04	2582030
Total Xylenes	ug/g	<0.04	<0.04		0.04	2582030
F1 (C6-C10)	ug/g	<10	<10	<10	10	2582030
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	10	2582030
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	10	2582201
F3 (C16-C34 Hydrocarbons)	ug/g	490	110	77	10	2582201
F4 (C34-C50 Hydrocarbons)	ug/g	1100	29	140	10	2582201
Reached Baseline at C50	ug/g	NO	YES	NO		2582201
Surrogate Recovery (%)						
1,4-Difluorobenzene	%	99	110	96		2582030
4-Bromofluorobenzene	%	111	94	100		2582030
D10-Ethylbenzene	%	77	77	82		2582030
D4-1,2-Dichloroethane	%	86	94	81		2582030
o-Terphenyl	%	78	74	74		2582201

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (SOIL)

Maxxam ID		KN1509		KN1510		KN1511	KN1512		
Sampling Date		2011/08/10 10:00		2011/08/10 14:30		2011/08/10 18:00	2011/08/10 16:30		
	Units	**FZ-BH11-1D**	**RDL**	**FZ-BH11-2D**	**RDL**	**FZ-BH11-3D**	**FZ-BH11-9D**	**RDL**	**QC Batch**
Semivolatile Organics									
1,2,4-Trichlorobenzene	ug/g	<0.5	0.5	<0.3	0.3	<1	<1	1	2582785
1-Methylnaphthalene	ug/g	<0.3	0.3	<0.2	0.2	<0.6	<0.6	0.6	2582785
2,4,5-Trichlorophenol	ug/g	<0.8	0.8	<0.4	0.4	<2	<2	2	2582785
2,4,6-Trichlorophenol	ug/g	<1	1	<0.5	0.5	<2	<2	2	2582785
2,4-Dichlorophenol	ug/g	<1	1	<0.5	0.5	<2	<2	2	2582785
2,4-Dimethylphenol	ug/g	<2	2	<1	1	<4	<4	4	2582785
2,4-Dinitrophenol	ug/g	<2	2	<0.8	0.8	<3	<3	3	2582785
2,4-Dinitrotoluene	ug/g	<1	1	<0.5	0.5	<2	<2	2	2582785
2,6-Dinitrotoluene	ug/g	<1	1	<0.5	0.5	<2	<2	2	2582785
2-Chlorophenol	ug/g	<0.8	0.8	<0.4	0.4	<2	<2	2	2582785
2-Methylnaphthalene	ug/g	<0.3	0.3	<0.2	0.2	<0.6	<0.6	0.6	2582785
3,3'-Dichlorobenzidine	ug/g	<5	5	<3	3	<10	<10	10	2582785
Acenaphthene	ug/g	<0.3	0.3	<0.2	0.2	<0.6	<0.6	0.6	2582785
Acenaphthylene	ug/g	<0.5	0.5	<0.3	0.3	<1	<1	1	2582785
Anthracene	ug/g	0.6	0.3	<0.2	0.2	1.5	<0.6	0.6	2582785
Benzo(a)anthracene	ug/g	1.0	0.5	<0.3	0.3	3	1	1	2582785
Benzo(a)pyrene	ug/g	0.7	0.5	<0.3	0.3	3	<1	1	2582785
Benzo(b/j)fluoranthene	ug/g	<1	1	<0.5	0.5	3	<2	2	2582785
Benzo(g,h,i)perylene	ug/g	<1	1	<0.5	0.5	<2	<2	2	2582785
Benzo(k)fluoranthene	ug/g	0.4	0.3	<0.2	0.2	1.6	<0.6	0.6	2582785
Biphenyl	ug/g	<0.5	0.5	<0.3	0.3	<1	<1	1	2582785
Bis(2-chloroethyl)ether	ug/g	<2	2	<1	1	<4	<4	4	2582785
Bis(2-chloroisopropyl)ether	ug/g	<1	1	<0.5	0.5	<2	<2	2	2582785
Bis(2-ethylhexyl)phthalate	ug/g	<10	10	<5	5	<20	<20	20	2582785
Chrysene	ug/g	1.0	0.5	<0.3	0.3	3	1	1	2582785
Dibenz(a,h)anthracene	ug/g	<0.5	0.5	<0.3	0.3	<1	<1	1	2582785
Diethyl phthalate	ug/g	<2	2	<1	1	<4	<4	4	2582785
Dimethyl phthalate	ug/g	<2	2	<1	1	<4	<4	4	2582785
Fluoranthene	ug/g	2.2	0.5	<0.3	0.3	8	2	1	2582785
Fluorene	ug/g	0.3	0.3	<0.2	0.2	<0.6	<0.6	0.6	2582785
Indeno(1,2,3-cd)pyrene	ug/g	<0.8	0.8	<0.4	0.4	<2	<2	2	2582785
Naphthalene	ug/g	0.5	0.3	<0.2	0.2	<0.6	<0.6	0.6	2582785
p-Chloroaniline	ug/g	<2	2	<1	1	<4	<4	4	2582785
Pentachlorophenol	ug/g	<1	1	<0.5	0.5	<2	<2	2	2582785

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (SOIL)

Maxxam ID		KN1509		KN1510		KN1511	KN1512		
Sampling Date		2011/08/10 10:00		2011/08/10 14:30		2011/08/10 18:00	2011/08/10 16:30		
	Units	**FZ-BH11-1D**	**RDL**	**FZ-BH11-2D**	**RDL**	**FZ-BH11-3D**	**FZ-BH11-9D**	**RDL**	**QC Batch**
Phenanthrene	ug/g	2.7	0.5	<0.3	0.3	6	1	1	2582785
Phenol	ug/g	<0.9	0.9	<0.5	0.5	<2	<2	2	2582785
Pyrene	ug/g	1.8	0.5	<0.3	0.3	7	2	1	2582785
Surrogate Recovery (%)									
2,4,6-Tribromophenol	%	44		45		52	32		2582785
2-Fluorobiphenyl	%	66		67		64	60		2582785
2-Fluorophenol	%	54		50		52	40		2582785
D14-Terphenyl (FS)	%	74		71		76	64		2582785
D5-Nitrobenzene	%	24(1)		47		44	40		2582785
D5-Phenol	%	48		48		44	32		2582785

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Surrogate recovery was below the lower control limit due to matrix interference. This may represent a low bias in some results.

Maxxam Job #: B1C2151
Report Date: 2011/08/23

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MM

O'REG 153 VOLATILE ORGANICS (SOIL)

Maxxam ID		KN1512		
Sampling Date		2011/08/10 16:30		
	Units	**FZ-BH11-9D**	**RDL**	**QC Batch**
Volatile Organics				
Acetone (2-Propanone)	ug/g	<0.5	0.5	2582533
Benzene	ug/g	<0.02	0.02	2582533
Bromodichloromethane	ug/g	<0.05	0.05	2582533
Bromoform	ug/g	<0.05	0.05	2582533
Bromomethane	ug/g	<0.05	0.05	2582533
Carbon Tetrachloride	ug/g	<0.05	0.05	2582533
Chlorobenzene	ug/g	<0.05	0.05	2582533
Chloroform	ug/g	<0.05	0.05	2582533
Dibromochloromethane	ug/g	<0.05	0.05	2582533
1,2-Dichlorobenzene	ug/g	<0.05	0.05	2582533
1,3-Dichlorobenzene	ug/g	<0.05	0.05	2582533
1,4-Dichlorobenzene	ug/g	<0.05	0.05	2582533
Dichlorodifluoromethane (FREON 12)	ug/g	<0.05	0.05	2582533
1,1-Dichloroethane	ug/g	<0.05	0.05	2582533
1,2-Dichloroethane	ug/g	<0.05	0.05	2582533
1,1-Dichloroethylene	ug/g	<0.05	0.05	2582533
cis-1,2-Dichloroethylene	ug/g	<0.05	0.05	2582533
trans-1,2-Dichloroethylene	ug/g	<0.05	0.05	2582533
1,2-Dichloropropane	ug/g	<0.05	0.05	2582533
cis-1,3-Dichloropropene	ug/g	<0.03	0.03	2582533
trans-1,3-Dichloropropene	ug/g	<0.04	0.04	2582533
Ethylbenzene	ug/g	<0.02	0.02	2582533
Ethylene Dibromide	ug/g	<0.05	0.05	2582533
Hexane	ug/g	<0.05	0.05	2582533
Methylene Chloride(Dichloromethane)	ug/g	<0.05	0.05	2582533
Methyl Isobutyl Ketone	ug/g	<0.5	0.5	2582533
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.5	0.5	2582533
Methyl t-butyl ether (MTBE)	ug/g	<0.05	0.05	2582533
Styrene	ug/g	<0.05	0.05	2582533
1,1,1,2-Tetrachloroethane	ug/g	<0.05	0.05	2582533
1,1,2,2-Tetrachloroethane	ug/g	<0.05	0.05	2582533
Tetrachloroethylene	ug/g	<0.05	0.05	2582533
Toluene	ug/g	0.04	0.02	2582533
1,1,1-Trichloroethane	ug/g	<0.05	0.05	2582533
1,1,2-Trichloroethane	ug/g	<0.05	0.05	2582533

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 VOLATILE ORGANICS (SOIL)

Maxxam ID		KN1512		
Sampling Date		2011/08/10 16:30		
	Units	**FZ-BH11-9D**	**RDL**	**QC Batch**
Trichloroethylene	ug/g	<0.05	0.05	2582533
Vinyl Chloride	ug/g	<0.02	0.02	2582533
p+m-Xylene	ug/g	0.03	0.02	2582533
o-Xylene	ug/g	0.03	0.02	2582533
Xylene (Total)	ug/g	0.05	0.02	2582533
Trichlorofluoromethane (FREON 11)	ug/g	<0.05	0.05	2582533
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	90		2582533
D10-o-Xylene	%	99		2582533
D4-1,2-Dichloroethane	%	99		2582533
D8-Toluene	%	107		2582533

RESULTS OF ANALYSES OF SOIL

Maxxam ID		KN1509	KN1510	KN1512	KN1513		
Sampling Date		2011/08/10 10:00	2011/08/10 14:30	2011/08/10 16:30	2011/08/10 12:00		
	Units	**FZ-BH11-1D**	**FZ-BH11-2D**	**FZ-BH11-9D**	**FZ-MW11-4**	**RDL**	**QC Batch**
Inorganics							
Moisture	%	20	16	16		0.2	2589295
Available (CaCl2) pH	pH		7.25				2589443
Phenols-4AAP	ug/g	<0.04	<0.04	<0.04	<0.04	0.04	2585302
Miscellaneous Parameters							
Grain Size	%	FINE	COARSE			N/A	2589204
Sieve - #200 (<0.075mm)	%	55	21			N/A	2589204
Sieve - #200 (>0.075mm)	%	45	79			N/A	2589204

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		KN1509		KN1510		KN1511		KN1512		KN1513		
Sampling Date		2011/08/10 10:00		2011/08/10 14:30		2011/08/10 18:00		2011/08/10 16:30		2011/08/10 12:00		
	Units	**FZ-BH11-1D**	**RDL**	**FZ-BH11-2D**	**RDL**	**FZ-BH11-3D**	**RDL**	**FZ-BH11-9D**	**RDL**	**FZ-MW11-4**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons												
1-Methylnaphthalene	mg/kg	0.064	0.005	0.11	0.005	0.060	0.005	0.16	0.005	0.30	0.005	2586080
2-Methylnaphthalene	mg/kg	0.084	0.005	0.14	0.005	0.068	0.005	0.19	0.005	0.51	0.005	2586080
Acenaphthene	mg/kg	0.20	0.005	0.49	0.005	0.36	0.005	0.38	0.005	1.1	0.005	2586080
Acenaphthylene	mg/kg	0.076	0.005	0.92	0.005	0.22	0.005	1.2	0.005	2.2	0.005	2586080
Anthracene	mg/kg	0.63	0.005	3.1	0.005	1.4	0.005	3.4	0.005	8.7(1)	0.1	2586080
Benzo(a)anthracene	mg/kg	0.66	0.005	8.9(1)	0.05	3.6	0.005	11(1)	0.05	28(1)	0.1	2586080
Benzo(a)pyrene	mg/kg	0.44	0.005	7.4	0.005	2.9	0.005	7.6(1)	0.05	20(1)	0.1	2586080
Benzo(b)fluoranthene	mg/kg	0.31	0.005	6.8(1)	0.05	2.8	0.005	6.3(1)	0.05	17(1)	0.1	2586080
Benzo(g,h,i)perylene	mg/kg	0.25	0.005	4.3	0.005	1.8	0.005	3.6	0.005	11(1)	0.1	2586080
Benzo(j)fluoranthene	mg/kg	0.22	0.005	3.6	0.005	1.5	0.005	3.6	0.005	10(1)	0.1	2586080
Benzo(k)fluoranthene	mg/kg	0.22	0.005	3.8	0.005	1.5	0.005	3.7	0.005	11(1)	0.1	2586080
Chrysene	mg/kg	0.64	0.005	8.0(1)	0.05	3.4	0.005	11(1)	0.05	27(1)	0.1	2586080
Dibenz(a,h)anthracene	mg/kg	0.068	0.005	1.2	0.005	0.47	0.005	1.1	0.005	2.9	0.005	2586080
Fluoranthene	mg/kg	1.5	0.005	19(1)	0.05	11(1)	0.05	26(1)	0.05	45(1)	0.1	2586080
Fluorene	mg/kg	0.24	0.005	0.74	0.005	0.44	0.005	0.95	0.005	1.9	0.005	2586080
Indeno(1,2,3-cd)pyrene	mg/kg	0.22	0.005	4.0	0.005	1.6	0.005	3.5	0.005	11(1)	0.1	2586080
Naphthalene	mg/kg	0.38	0.005	0.23	0.005	0.10	0.005	0.27	0.005	1.4	0.005	2586080
Perylene	mg/kg	0.12	0.005	1.9	0.005	0.71	0.005	1.6	0.005	4.1	0.005	2586080
Phenanthrene	mg/kg	1.4	0.005	11(1)	0.05	5.8	0.005	17(1)	0.05	21(1)	0.1	2586080
Pyrene	mg/kg	1.2	0.005	15(1)	0.05	9.0(1)	0.05	21(1)	0.05	43(1)	0.1	2586080
Surrogate Recovery (%)												
D10-Anthracene	%	55		51		51		52		68		2586080
D14-Terphenyl	%	70		63		52		68		75		2586080
D8-Acenaphthylene	%	90		93		96		106		93		2586080

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Elevated PAH RDL(s) due to sample dilution.

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KN1509	KN1512		
Sampling Date		2011/08/10 10:00	2011/08/10 16:30		
	Units	**FZ-BH11-1D**	**FZ-BH11-9D**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons					
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	3200	1700	100	2584928

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Test Summary

Maxxam ID KN1509
Sample ID FZ-BH11-1D
Matrix Soil

Collected 2011/08/10
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/15	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2588284	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586366	N/A	2011/08/21	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2582030	2011/08/15	2011/08/15	PAUL RUBINATO
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2582201	2011/08/15	2011/08/16	LYNDSEY HART
F4G (CCME Hydrocarbons Gravimetric)	BAL	2584928	2011/08/17	2011/08/22	LYNDSEY HART
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2586822	2011/08/18	2011/08/18	VIVIANA CANZONIERI
MOISTURE	BAL	2589295	N/A	2011/08/22	LYNDSEY HART
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/23	GINA THOMPSON
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM
Sieve, 75um	PSIV	2589204	N/A	2011/08/22	LAKHVIR KALER

Maxxam ID KN1509 Dup
Sample ID FZ-BH11-1D
Matrix Soil

Collected 2011/08/10
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hexavalent Chromium in Soil by IC	IC/SPEC	2586366	N/A	2011/08/21	LUSINE KHACHATRYAN

Maxxam ID KN1510
Sample ID FZ-BH11-2D
Matrix Soil

Collected 2011/08/10
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/16	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2588284	2011/08/19	2011/08/22	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586366	N/A	2011/08/21	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2582030	2011/08/15	2011/08/15	PAUL RUBINATO
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2582201	2011/08/15	2011/08/15	LYNDSEY HART
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2586822	2011/08/18	2011/08/18	VIVIANA CANZONIERI
MOISTURE	BAL	2589295	N/A	2011/08/22	LYNDSEY HART
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/22	GINA THOMPSON

Test Summary

pH CaCl2 EXTRACT		2589443	2011/08/22	2011/08/22	XUANHONG QIU
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM
Sieve, 75um	PSIV	2589204	N/A	2011/08/22	LAKHVIR KALER

Maxxam ID KN1510 Dup
Sample ID FZ-BH11-2D
Matrix Soil

Collected 2011/08/10
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2582201	2011/08/15	2011/08/16	LYNDSEY HART
MOISTURE	BAL	2589295	N/A	2011/08/22	LYNDSEY HART

Maxxam ID KN1511
Sample ID FZ-BH11-3D
Matrix Soil

Collected 2011/08/10
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/16	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2588284	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2586822	2011/08/18	2011/08/18	VIVIANA CANZONIERI
Moisture	BAL	2588421	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/23	GINA THOMPSON

Maxxam ID KN1512
Sample ID FZ-BH11-9D
Matrix Soil

Collected 2011/08/10
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/16	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2588284	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2582030	2011/08/15	2011/08/15	PAUL RUBINATO
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2582201	2011/08/15	2011/08/16	LYNDSEY HART
F4G (CCME Hydrocarbons Gravimetric)	BAL	2584928	2011/08/17	2011/08/22	LYNDSEY HART
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2586822	2011/08/18	2011/08/18	VIVIANA CANZONIERI

Test Summary

MOISTURE	BAL	2589295	N/A	2011/08/22	LYNDSEY HART
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/22	GINA THOMPSON
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM
Volatile Organic Compounds in Soil	P&T/MS	2582533	2011/08/15	2011/08/22	DINESH RANGARAJAN

Maxxam ID KN1513
Sample ID FZ-MW11-4
Matrix Soil

Collected 2011/08/10
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2588284	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2586822	2011/08/18	2011/08/18	VIVIANA CANZONIERI
Moisture	BAL	2588421	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/23	GINA THOMPSON
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM

Maxxam ID KN1513 Dup
Sample ID FZ-MW11-4
Matrix Soil

Collected 2011/08/10
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/23	GINA THOMPSON

Package 1	8.3°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Custody seal was not present on the cooler.

ABN Analysis: Due to the sample matrix, some of the samples required dilutions. Detection limits were adjusted accordingly.

Sample KN1510-01: Soluble Boron Analysis: Due to high concentrations of the non target analytes, sample required dilution. Detection limit was adjusted accordingly.

Maxxam Job #: B1C2151
Report Date: 2011/08/23

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
2582030	1,4-Difluorobenzene	2011/08/15			103	60 - 140	94	%				
2582030	4-Bromofluorobenzene	2011/08/15			122	60 - 140	102	%				
2582030	D10-Ethylbenzene	2011/08/15			105	30 - 130	100	%				
2582030	D4-1,2-Dichloroethane	2011/08/15			89	60 - 140	79	%				
2582030	Benzene	2011/08/15			91	60 - 140	<0.02	ug/g	13.6	50		
2582030	Toluene	2011/08/15			114	60 - 140	<0.02	ug/g	8.3	50		
2582030	Ethylbenzene	2011/08/15			104	60 - 140	<0.02	ug/g	0.5	50		
2582030	o-Xylene	2011/08/15			104	60 - 140	<0.02	ug/g	4.3	50		
2582030	p+m-Xylene	2011/08/15			103	60 - 140	<0.04	ug/g	3.6	50		
2582030	F1 (C6-C10)	2011/08/15			113	60 - 140	<10	ug/g	17.3	50		
2582030	Total Xylenes	2011/08/15					<0.04	ug/g				
2582030	F1 (C6-C10) - BTEX	2011/08/15					<10	ug/g				
2582201	o-Terphenyl	2011/08/15	69	30 - 130	74	30 - 130	68	%				
2582201	F2 (C10-C16 Hydrocarbons)	2011/08/16	118	60 - 130	127	60 - 130	<10	ug/g	NC	50		
2582201	F3 (C16-C34 Hydrocarbons)	2011/08/16	118	60 - 130	127	60 - 130	<10	ug/g	1.8	50		
2582201	F4 (C34-C50 Hydrocarbons)	2011/08/16	118	60 - 130	127	60 - 130	<10	ug/g	NC	50		
2582533	4-Bromofluorobenzene	2011/08/21	92	60 - 140	93	60 - 140	91	%				
2582533	D10-o-Xylene	2011/08/21	104	50 - 130	95	50 - 130	98	%				
2582533	D4-1,2-Dichloroethane	2011/08/21	98	60 - 140	98	60 - 140	99	%				
2582533	D8-Toluene	2011/08/21	107	60 - 140	109	60 - 140	105	%				
2582533	Acetone (2-Propanone)	2011/08/21	91	60 - 140	49 (1, 2)	60 - 140	<0.5	ug/g				
2582533	Benzene	2011/08/21	99	60 - 140	95	60 - 140	<0.02	ug/g				
2582533	Bromodichloromethane	2011/08/21	93	60 - 140	87	60 - 140	<0.05	ug/g				
2582533	Bromoform	2011/08/21	94	60 - 140	89	60 - 140	<0.05	ug/g				
2582533	Bromomethane	2011/08/21	81	60 - 140	76	60 - 140	<0.05	ug/g				
2582533	Carbon Tetrachloride	2011/08/21	102	60 - 140	97	60 - 140	<0.05	ug/g				
2582533	Chlorobenzene	2011/08/21	100	60 - 140	97	60 - 140	<0.05	ug/g				
2582533	Chloroform	2011/08/21	97	60 - 140	93	60 - 140	<0.05	ug/g				
2582533	Dibromochloromethane	2011/08/21	96	60 - 140	92	60 - 140	<0.05	ug/g				
2582533	1,2-Dichlorobenzene	2011/08/21	104	60 - 140	96	60 - 140	<0.05	ug/g				
2582533	1,3-Dichlorobenzene	2011/08/21	106	60 - 140	98	60 - 140	<0.05	ug/g				
2582533	1,4-Dichlorobenzene	2011/08/21	106	60 - 140	98	60 - 140	<0.05	ug/g				
2582533	Dichlorodifluoromethane (FREON 12)	2011/08/21	90	60 - 140	90	60 - 140	<0.05	ug/g				
2582533	1,1-Dichloroethane	2011/08/21	101	60 - 140	98	60 - 140	<0.05	ug/g				
2582533	1,2-Dichloroethane	2011/08/22	97	60 - 140	94	60 - 140	<0.05	ug/g	NC	50		
2582533	1,1-Dichloroethylene	2011/08/21	107	60 - 140	104	60 - 140	<0.05	ug/g				
2582533	cis-1,2-Dichloroethylene	2011/08/21	92	60 - 140	88	60 - 140	<0.05	ug/g				
2582533	trans-1,2-Dichloroethylene	2011/08/21	95	60 - 140	93	60 - 140	<0.05	ug/g				
2582533	1,2-Dichloropropane	2011/08/21	100	60 - 140	95	60 - 140	<0.05	ug/g				
2582533	cis-1,3-Dichloropropene	2011/08/21	92	60 - 140	87	60 - 140	<0.03	ug/g				

Maxxam Job #: B1C2151
Report Date: 2011/08/23

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2582533	trans-1,3-Dichloropropene	2011/08/21	96	60 - 140	92	60 - 140	<0.04	ug/g				
2582533	Ethylbenzene	2011/08/21	109	60 - 140	103	60 - 140	<0.02	ug/g				
2582533	Ethylene Dibromide	2011/08/22	99	60 - 140	95	60 - 140	<0.05	ug/g	NC	50		
2582533	Hexane	2011/08/22	98	60 - 140	92	60 - 140	<0.05	ug/g	24.7	50		
2582533	Methylene Chloride(Dichloromethane)	2011/08/21	85	60 - 140	83	60 - 140	<0.05	ug/g				
2582533	Methyl Isobutyl Ketone	2011/08/21	109	60 - 140	96	60 - 140	<0.5	ug/g				
2582533	Methyl Ethyl Ketone (2-Butanone)	2011/08/21	104	60 - 140	73	60 - 140	<0.5	ug/g				
2582533	Methyl t-butyl ether (MTBE)	2011/08/22	86	60 - 140	82	60 - 140	<0.05	ug/g	NC	50		
2582533	Styrene	2011/08/21	105	60 - 140	99	60 - 140	<0.05	ug/g				
2582533	1,1,1,2-Tetrachloroethane	2011/08/21	100	60 - 140	95	60 - 140	<0.05	ug/g				
2582533	1,1,2,2-Tetrachloroethane	2011/08/21	97	60 - 140	95	60 - 140	<0.05	ug/g				
2582533	Tetrachloroethylene	2011/08/21	96	60 - 140	92	60 - 140	<0.05	ug/g				
2582533	Toluene	2011/08/21	102	60 - 140	101	60 - 140	<0.02	ug/g				
2582533	1,1,1-Trichloroethane	2011/08/21	102	60 - 140	96	60 - 140	<0.05	ug/g				
2582533	1,1,2-Trichloroethane	2011/08/21	97	60 - 140	93	60 - 140	<0.05	ug/g				
2582533	Trichloroethylene	2011/08/21	101	60 - 140	92	60 - 140	<0.05	ug/g				
2582533	Vinyl Chloride	2011/08/21	102	60 - 140	99	60 - 140	<0.02	ug/g				
2582533	p+m-Xylene	2011/08/21	108	60 - 140	101	60 - 140	<0.02	ug/g				
2582533	o-Xylene	2011/08/21	102	60 - 140	96	60 - 140	<0.02	ug/g				
2582533	Trichlorofluoromethane (FREON 11)	2011/08/21	101	60 - 140	98	60 - 140	<0.05	ug/g				
2582533	Xylene (Total)	2011/08/21					<0.02	ug/g				
2582785	2,4,6-Tribromophenol	2011/08/15	31	10 - 130	74	10 - 130	37	%				
2582785	2-Fluorobiphenyl	2011/08/15	84	30 - 130	95	30 - 130	87	%				
2582785	2-Fluorophenol	2011/08/15	22	10 - 130	74	10 - 130	75	%				
2582785	D14-Terphenyl (FS)	2011/08/15	82	30 - 130	87	30 - 130	85	%				
2582785	D5-Nitrobenzene	2011/08/15	58	30 - 130	74	30 - 130	71	%				
2582785	D5-Phenol	2011/08/15	49	10 - 130	79	10 - 130	75	%				
2582785	1,2,4-Trichlorobenzene	2011/08/16	87	30 - 130	114	30 - 130	<0.05	ug/g	NC	50		
2582785	1-Methylnaphthalene	2011/08/16	91	30 - 130	99	30 - 130	<0.03	ug/g	NC	50		
2582785	2,4,5-Trichlorophenol	2011/08/16	24	10 - 130	90	10 - 130	<0.08	ug/g	NC	50		
2582785	2,4,6-Trichlorophenol	2011/08/16	31	10 - 130	94	10 - 130	<0.1	ug/g	NC	50		
2582785	2,4-Dichlorophenol	2011/08/16	9.4 (1, 2)	10 - 130	86	10 - 130	<0.1	ug/g	NC	50		
2582785	2,4-Dimethylphenol	2011/08/16	77	10 - 130	94	10 - 130	<0.2	ug/g	NC	50		
2582785	2,4-Dinitrophenol	2011/08/16	5.5 (1, 2)	10 - 130	3.0 (1, 2)	10 - 130	<0.2	ug/g	NC	50		
2582785	2,4-Dinitrotoluene	2011/08/16	59	30 - 130	82	30 - 130	<0.1	ug/g	NC	50		
2582785	2,6-Dinitrotoluene	2011/08/16	62	30 - 130	87	30 - 130	<0.1	ug/g	NC	50		
2582785	2-Chlorophenol	2011/08/16	28	10 - 130	95	10 - 130	<0.08	ug/g	NC	50		
2582785	2-Methylnaphthalene	2011/08/16	87	30 - 130	100	30 - 130	<0.03	ug/g	NC	50		
2582785	3,3'-Dichlorobenzidine	2011/08/16	108	30 - 130	107	30 - 130	<0.5	ug/g	NC	50		
2582785	Acenaphthene	2011/08/16	95	30 - 130	94	30 - 130	<0.03	ug/g	NC	50		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2582785	Acenaphthylene	2011/08/16	86	30 - 130	93	30 - 130	<0.05	ug/g	NC	50		
2582785	Anthracene	2011/08/16	102	30 - 130	97	30 - 130	<0.03	ug/g	NC	50		
2582785	Benzo(a)anthracene	2011/08/16	84	30 - 130	89	30 - 130	<0.05	ug/g	NC	50		
2582785	Benzo(a)pyrene	2011/08/16	95	30 - 130	94	30 - 130	<0.05	ug/g	NC	50		
2582785	Benzo(b/j)fluoranthene	2011/08/16	86	30 - 130	94	30 - 130	<0.1	ug/g	NC	50		
2582785	Benzo(g,h,i)perylene	2011/08/16	63	30 - 130	82	30 - 130	<0.1	ug/g	NC	50		
2582785	Benzo(k)fluoranthene	2011/08/16	106	30 - 130	100	30 - 130	<0.03	ug/g	NC	50		
2582785	Biphenyl	2011/08/16	102	30 - 130	106	30 - 130	<0.05	ug/g	NC	50		
2582785	Bis(2-chloroethyl)ether	2011/08/16	65	30 - 130	90	30 - 130	<0.2	ug/g	NC	50		
2582785	Bis(2-chloroisopropyl)ether	2011/08/16	74	30 - 130	90	30 - 130	<0.1	ug/g	NC	50		
2582785	Bis(2-ethylhexyl)phthalate	2011/08/16	99	30 - 130	92	30 - 130	<1	ug/g	NC	50		
2582785	Chrysene	2011/08/16	102	30 - 130	96	30 - 130	<0.05	ug/g	NC	50		
2582785	Dibenz(a,h)anthracene	2011/08/16	62	30 - 130	80	30 - 130	<0.05	ug/g	NC	50		
2582785	Diethyl phthalate	2011/08/16	89	30 - 130	91	30 - 130	<0.2	ug/g	NC	50		
2582785	Dimethyl phthalate	2011/08/16	92	30 - 130	105	30 - 130	<0.2	ug/g	NC	50		
2582785	Fluoranthene	2011/08/16	88	30 - 130	94	30 - 130	<0.05	ug/g	NC	50		
2582785	Fluorene	2011/08/16	98	30 - 130	101	30 - 130	<0.03	ug/g	NC	50		
2582785	Indeno(1,2,3-cd)pyrene	2011/08/16	54	30 - 130	75	30 - 130	<0.08	ug/g	NC	50		
2582785	Naphthalene	2011/08/16	90	30 - 130	97	30 - 130	<0.03	ug/g	NC	50		
2582785	p-Chloroaniline	2011/08/16	106	30 - 130	111	30 - 130	<0.2	ug/g	NC	50		
2582785	Pentachlorophenol	2011/08/16	21	10 - 130	16	10 - 130	<0.1	ug/g	NC	50		
2582785	Phenanthrene	2011/08/16	93	30 - 130	93	30 - 130	<0.05	ug/g	NC	50		
2582785	Phenol	2011/08/16	68	10 - 130	103	10 - 130	<0.09	ug/g	NC	50		
2582785	Pyrene	2011/08/16	99	30 - 130	97	30 - 130	<0.05	ug/g	NC	50		
2584928	F4G-sg (Grav. Heavy Hydrocarbons)	2011/08/22			95	65 - 135	<100	ug/g	0.6	50		
2585302	Phenols-4AAP	2011/08/18	107	75 - 125	101	75 - 125	<0.04	ug/g	NC	35		
2586080	D10-Anthracene	2011/08/19	53	30 - 130	52	30 - 130	82	%				
2586080	D14-Terphenyl	2011/08/19	69	30 - 130	59	30 - 130	85	%				
2586080	D8-Acenaphthylene	2011/08/19	105	30 - 130	92	30 - 130	91	%				
2586080	1-Methylnaphthalene	2011/08/23	NC	30 - 130	80	30 - 130	<0.005	mg/kg	50.2(1, 3)	50		
2586080	2-Methylnaphthalene	2011/08/23	NC	30 - 130	89	30 - 130	<0.005	mg/kg	54.6(1, 3)	50		
2586080	Acenaphthene	2011/08/23	NC	30 - 130	96	30 - 130	<0.005	mg/kg	61.6(1, 3)	50		
2586080	Acenaphthylene	2011/08/23	NC	30 - 130	88	30 - 130	<0.005	mg/kg	10.6	50		
2586080	Anthracene	2011/08/23	NC	30 - 130	114	30 - 130	<0.005	mg/kg	34.5(4)	50		
2586080	Benzo(a)anthracene	2011/08/23	NC	30 - 130	97	30 - 130	<0.005	mg/kg	2.9(4)	50		
2586080	Benzo(a)pyrene	2011/08/23	NC	30 - 130	97	30 - 130	<0.005	mg/kg	8.1(4)	50		
2586080	Benzo(b)fluoranthene	2011/08/23	NC	30 - 130	92	30 - 130	<0.005	mg/kg	10.5(4)	50		
2586080	Benzo(g,h,i)perylene	2011/08/23	NC	30 - 130	86	30 - 130	<0.005	mg/kg	12.8(4)	50		
2586080	Benzo(j)fluoranthene	2011/08/23	NC	30 - 130	112	30 - 130	<0.005	mg/kg	1.1(4)	50		
2586080	Benzo(k)fluoranthene	2011/08/23	NC	30 - 130	99	30 - 130	<0.005	mg/kg	11.7(4)	50		

Maxxam Job #: B1C2151
Report Date: 2011/08/23

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2586080	Chrysene	2011/08/23	NC	30 - 130	99	30 - 130	<0.005	mg/kg	3.1(4)	50		
2586080	Dibenz(a,h)anthracene	2011/08/23	NC	30 - 130	75	30 - 130	<0.005	mg/kg	19.9	50		
2586080	Fluoranthene	2011/08/23	NC	30 - 130	102	30 - 130	<0.005	mg/kg	14.5(4)	50		
2586080	Fluorene	2011/08/23	NC	30 - 130	89	30 - 130	<0.005	mg/kg	68.8(1, 3)	50		
2586080	Indeno(1,2,3-cd)pyrene	2011/08/23	NC	30 - 130	69	30 - 130	<0.005	mg/kg	7.8(4)	50		
2586080	Naphthalene	2011/08/23	NC	30 - 130	105	30 - 130	<0.005	mg/kg	22.7	50		
2586080	Perylene	2011/08/23	NC	30 - 130	95	30 - 130	<0.005	mg/kg	4.7	50		
2586080	Phenanthrene	2011/08/23	NC	30 - 130	98	30 - 130	<0.005	mg/kg	50.3(1, 5)	50		
2586080	Pyrene	2011/08/23	NC	30 - 130	101	30 - 130	<0.005	mg/kg	7.4(4)	50		
2586366	Chromium (VI)	2011/08/21	47(1, 6)	75 - 125	88	80 - 120	<0.2	ug/g	NC	25	94	75 - 125
2586822	Acid Extractable Antimony (Sb)	2011/08/18	101	75 - 125			<0.2	ug/g	NC	35	104	75 - 125
2586822	Acid Extractable Arsenic (As)	2011/08/18	96	75 - 125			<1	ug/g	NC	35	96	75 - 125
2586822	Acid Extractable Barium (Ba)	2011/08/18	NC(7)	75 - 125			<0.5	ug/g	7.8	35	91	75 - 125
2586822	Acid Extractable Beryllium (Be)	2011/08/18	95	75 - 125			<0.2	ug/g	NC	35	94	75 - 125
2586822	Acid Extractable Boron (B)	2011/08/18	88	75 - 125			<5	ug/g	NC	35	98	75 - 125
2586822	Acid Extractable Cadmium (Cd)	2011/08/18	103	75 - 125			<0.1	ug/g	NC	35	102	75 - 125
2586822	Acid Extractable Chromium (Cr)	2011/08/18	103	75 - 125			<1	ug/g	7.3	35	99	75 - 125
2586822	Acid Extractable Cobalt (Co)	2011/08/18	95	75 - 125			<0.1	ug/g	9.4	35	96	75 - 125
2586822	Acid Extractable Copper (Cu)	2011/08/18	NC(7)	75 - 125			<0.5	ug/g	5.0	35	100	75 - 125
2586822	Acid Extractable Lead (Pb)	2011/08/18	101	75 - 125			<1	ug/g	6.7	35	100	75 - 125
2586822	Acid Extractable Molybdenum (Mo)	2011/08/18	100	75 - 125			<0.5	ug/g	NC	35	100	75 - 125
2586822	Acid Extractable Nickel (Ni)	2011/08/18	98	75 - 125			<0.5	ug/g	4.1	35	96	75 - 125
2586822	Acid Extractable Selenium (Se)	2011/08/18	101	75 - 125			<0.5	ug/g	NC	35	103	75 - 125
2586822	Acid Extractable Silver (Ag)	2011/08/18	100	75 - 125			<0.2	ug/g	NC	35	100	75 - 125
2586822	Acid Extractable Thallium (Tl)	2011/08/18	100	75 - 125			<0.05	ug/g	NC	35	98	75 - 125
2586822	Acid Extractable Uranium (U)	2011/08/18	110	75 - 125			<0.05	ug/g	1.5	25	108	75 - 125
2586822	Acid Extractable Vanadium (V)	2011/08/18	102	75 - 125			<5	ug/g	NC	35	102	75 - 125
2586822	Acid Extractable Zinc (Zn)	2011/08/18	NC(7)	75 - 125			<5	ug/g	10.5	35	103	75 - 125
2586822	Acid Extractable Mercury (Hg)	2011/08/18	111	75 - 125			<0.05	ug/g			107	75 - 125
2586993	Chromium (VI)	2011/08/22	47(1, 6)	75 - 125	107	80 - 120	<0.2	ug/g	NC	25	109	75 - 125
2588284	Hot Water Ext. Boron (B)	2011/08/19					<0.05	ug/g			101	85 - 115
2588421	Moisture	2011/08/19							5.7	20		
2589204	Sieve - #200 (<0.075mm)	2011/08/22							0.3	20	88	86 - 91

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2589204	Sieve - #200 (>0.075mm)	2011/08/22							0.4	20	12	9 - 14
2589295	Moisture	2011/08/22							3.9	50		

N/A = Not Applicable

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) - The recovery was below the lower control limit. This may represent a low bias in some results for this specific analyte.

(3) - Duplicate: results are outside acceptance limit. Analysis was repeated with similar results.

(4) - Elevated PAH RDL(s) due to sample dilution.

(5) - Duplicate: results are outside acceptance limit. Analysis was repeated with similar results. Elevated PAH RDL(s) due to sample dilution.

(6) - The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample.

(7) - The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

Validation Signature Page

Maxxam Job #: B1C2151

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

ALAN STEWART, Scientific Specialist (Organics)

CHARTERED
Eva Pranjic
CHEMIST

EWA PRANJIC, M.Sc., C.Chem, Scientific Specialist

FLOYD MAYEDE, Senior Analyst

PAUL RUBINATO, Analyst, Maxxam Analytics

Validation Signature Page

Maxxam Job #: B1C2151

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

STEVE ROBERTS, Lab Supervisor, Ottawa

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION:

Company Name: #10988 Franz Environmental Inc
Contact Name: Invoices, Lillian & Andrew
Address: 329 Churchill Ave N Suite 200
Ottawa ON K1Z 5B8
Phone: (613)721-0555 Fax: (613)721-0029
Email: ahenderson@franzenvironmental.com;lellis@franze

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name: Andrew Henderson
Address:
Phone: (613)721-0555 x226 Fax:
Email: ahenderson@franzenvironmental.com

PROJECT INFORMATION:

Quotation #: B14374
P.O. #:
Project #: 1329-1102
Project Name: 260 Lees Phase 2.
Site #:
Sampled By: Miguel Madrid

Laboratory Use Only:

MAXXAM JOB #:
BOTTLE ORDER #: 275135
CHAIN OF CUSTODY #: C#275135-11-01
PROJECT MANAGER: JULIE CLEMENT

Regulation 153 (2011)

☐ Table 1
☐ Table 2
☒ Table 3
☑ Table G
☐ Res/Park
☐ Ind/Comm
☐ Agri/Other
☐ Medium/Fine
☐ Coarse
☒ For RSC

Other Regulations

☐ CCME
☐ Reg. 558
☐ MISA
☐ PWQO
☐ Other ______
☐ Sanitary Sewer Bylaw
☐ Storm Sewer Bylaw
Municipality ______

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ____

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10ºC) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ______ Time Required: ______ ☐
Rush Confirmation Number: ______ *(call lab for #)*

ANALYSIS REQUESTED (Please be specific):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	O'Reg 153 Volatile Organics	O'Reg 153 Semivolatile Organics Package	O'Reg 153 PAHs	O'Reg 153 Metals Package	Phenols (4AAP)	O'Reg 153 Petroleum Hydrocarbons	Sieve, 75um	pH CaCl2 EXTRACT	O'Reg 558 TCLP Metals & BTEX	Grain Size	# of Bottles	Comments
1	FZ-BH11-1D		AUG 10, 2011	10:00	SOIL				✓	✓	✓	✓	✓	✓			✓	9	LIMITED SOIL FOR METALS
2	FZ-BH11-2D		11	14:30	SOIL				✓	✓	✓	✓	✓	✓	✓			10	LIMITED SOIL FOR METALS
3	FZ-BH11-3D		11	18:00	SOIL				✓	✓	✓							3	LIMITED SOIL FOR METALS
4	FZ-BH11-9D		11	16:30	SOIL			✓	✓	✓	✓	✓	✓					10	LIMITED SOIL FOR METALS
5	FZ-MW11-4		11	12:00	SOIL			H	H	✓	✓	✓	H	H	H	H		14	LIMITED SOIL FOR METALS H = HOLD
6					SOIL														
7					SOIL														
8					SOIL														
9					SOIL														
10					SOIL														

12-Aug-11 09:30
JULIE CLEMENT
B1C2151
JOF OTT-011

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
/ Andrew Henderson	11/08/12	0900	/ Habiba Gasek	11/08/12	9:30	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	8/8/8	Present		✓
		Intact		✓

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

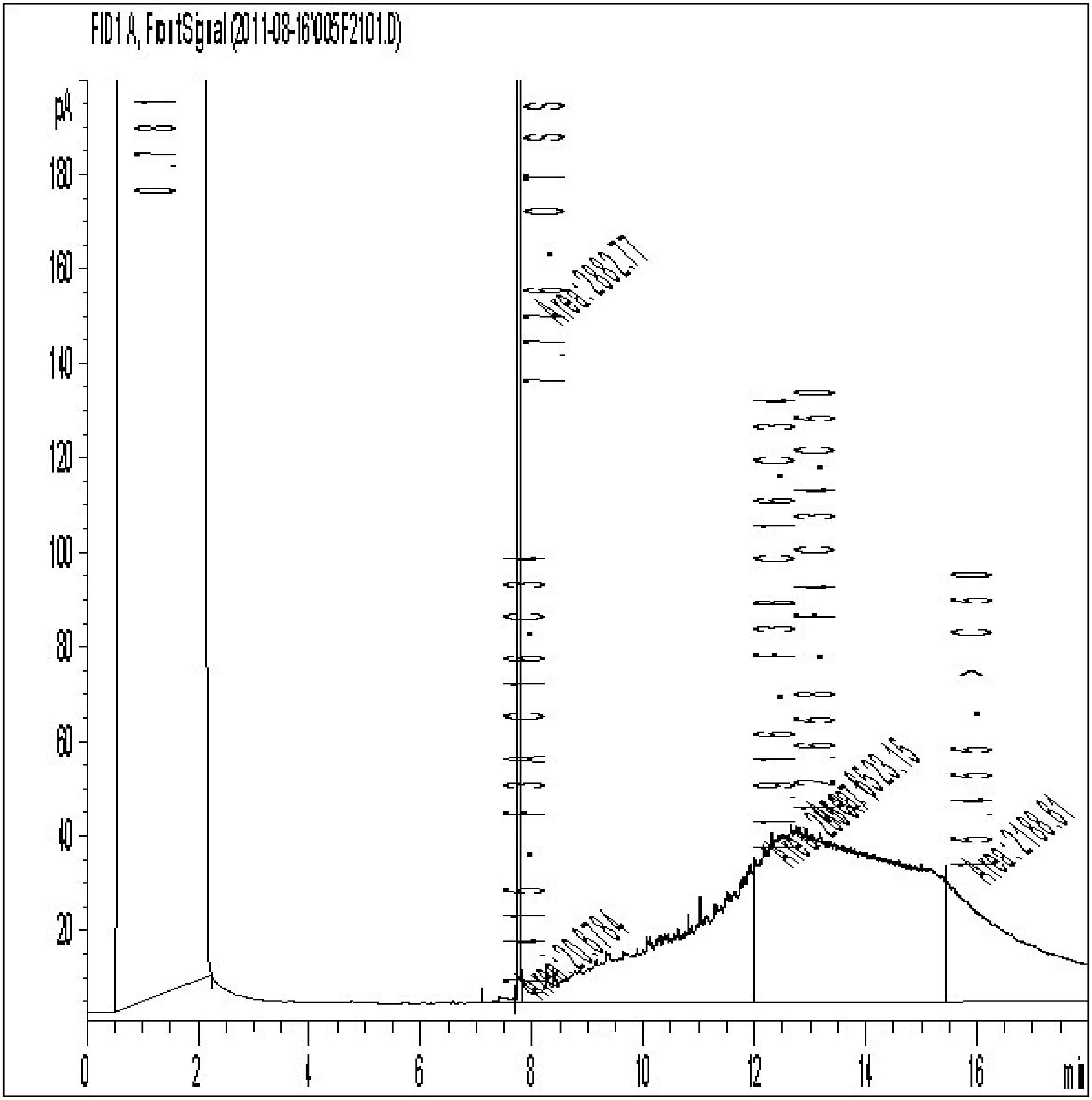
Maxxam Analytics International Corporation o/a Maxxam Analytics

10/8/6

6/9/11 ~~[illegible]~~ JF

Franz Environmental Inc
Report Date: 2011/08/23 Client Project #: 1329-1102
Maxxam Job #: B1C2151 Project name: 200 Lees Avenue, Phase II ESA
Maxxam Sample: KN1509 Client ID: FZ-BH11-1D

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

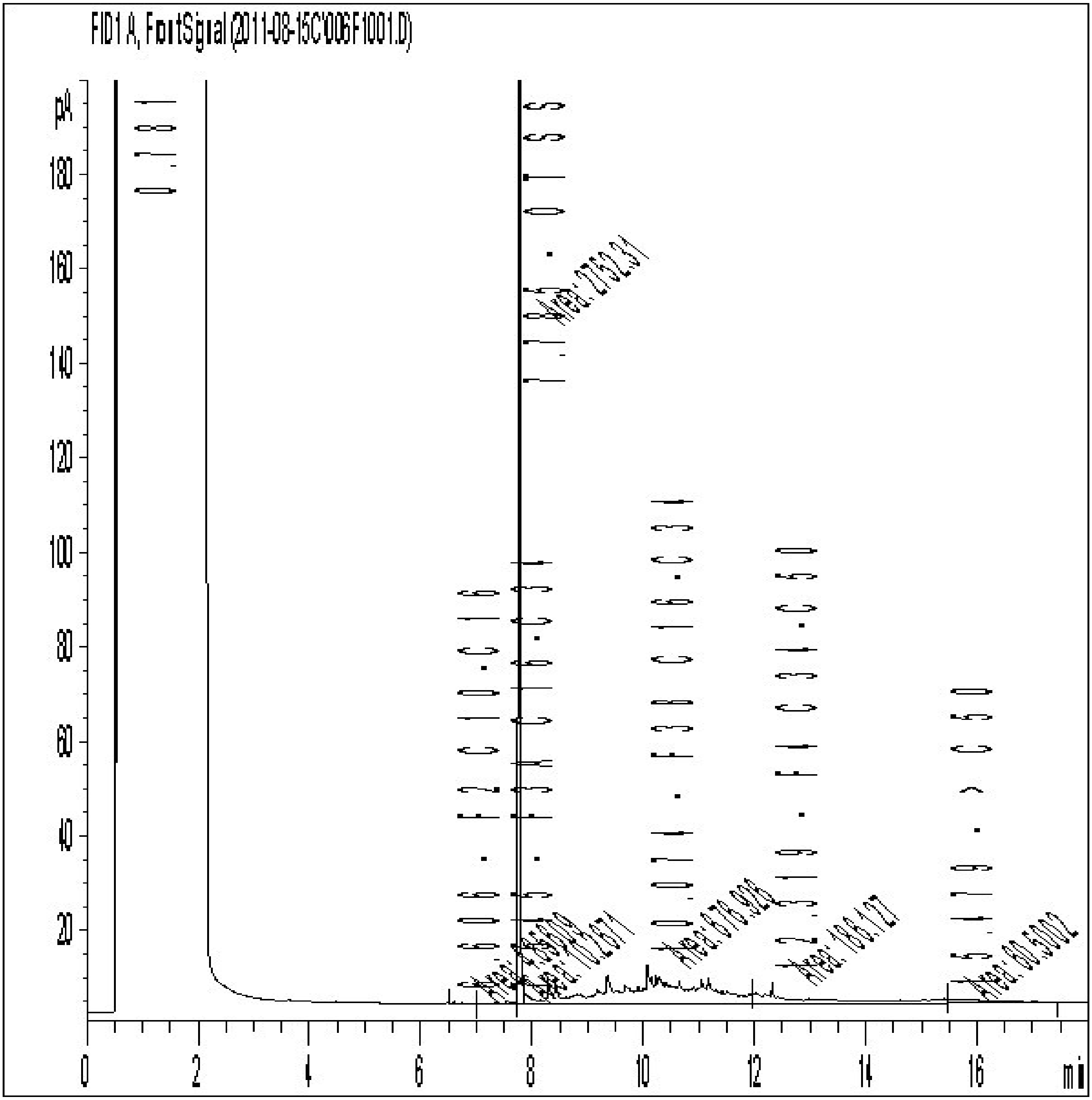
Maxxam

Success Through Science®

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FZ-BH11-2D

Report Date: 2011/08/23
Maxxam Job #: B1C2151
Maxxam Sample: KN1510

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



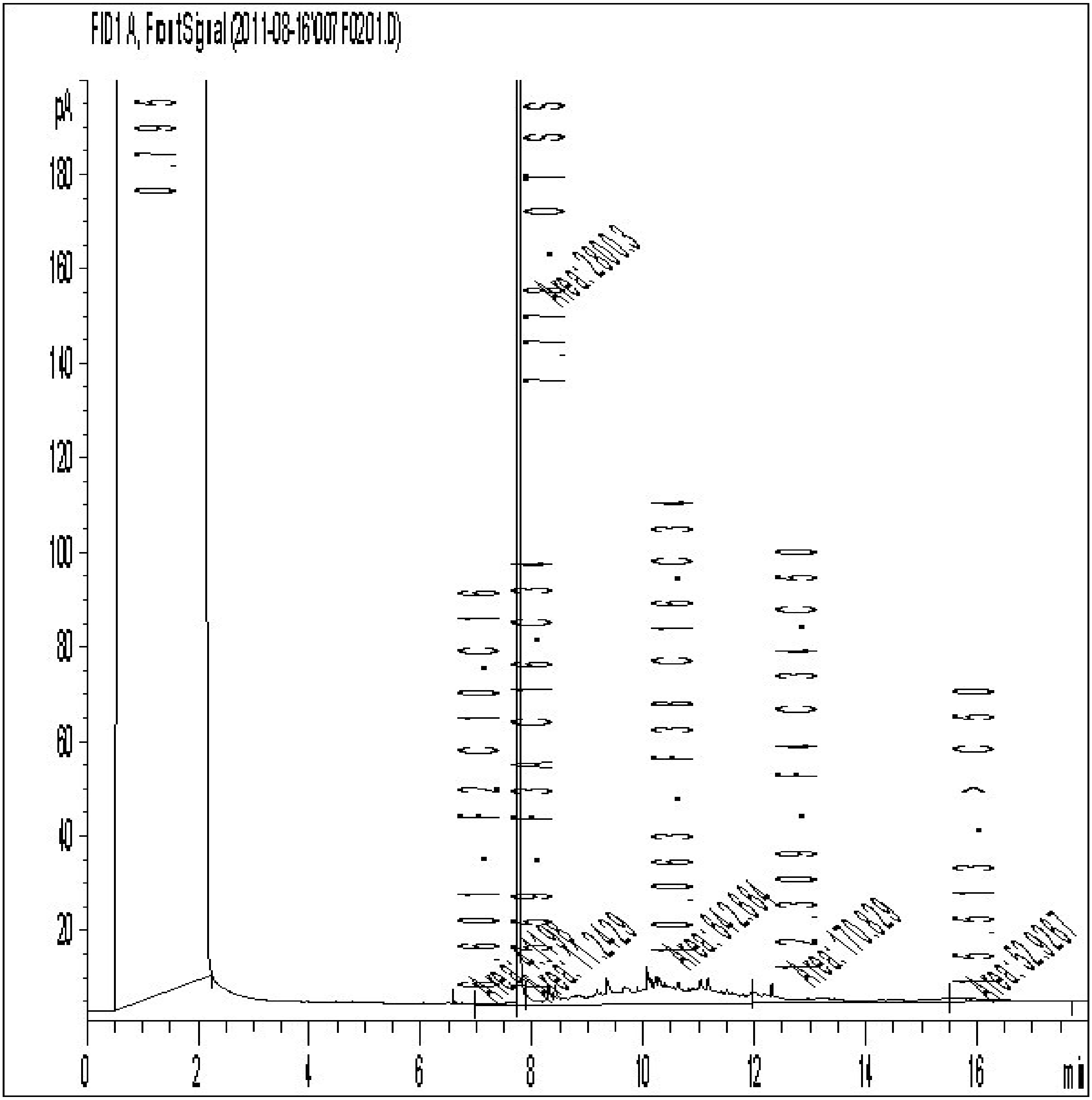
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

Report Date: 2011/08/23
Maxxam Job #: B1C2151
Maxxam Sample: KN1510 Lab-Dup

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FZ-BH11-2D

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

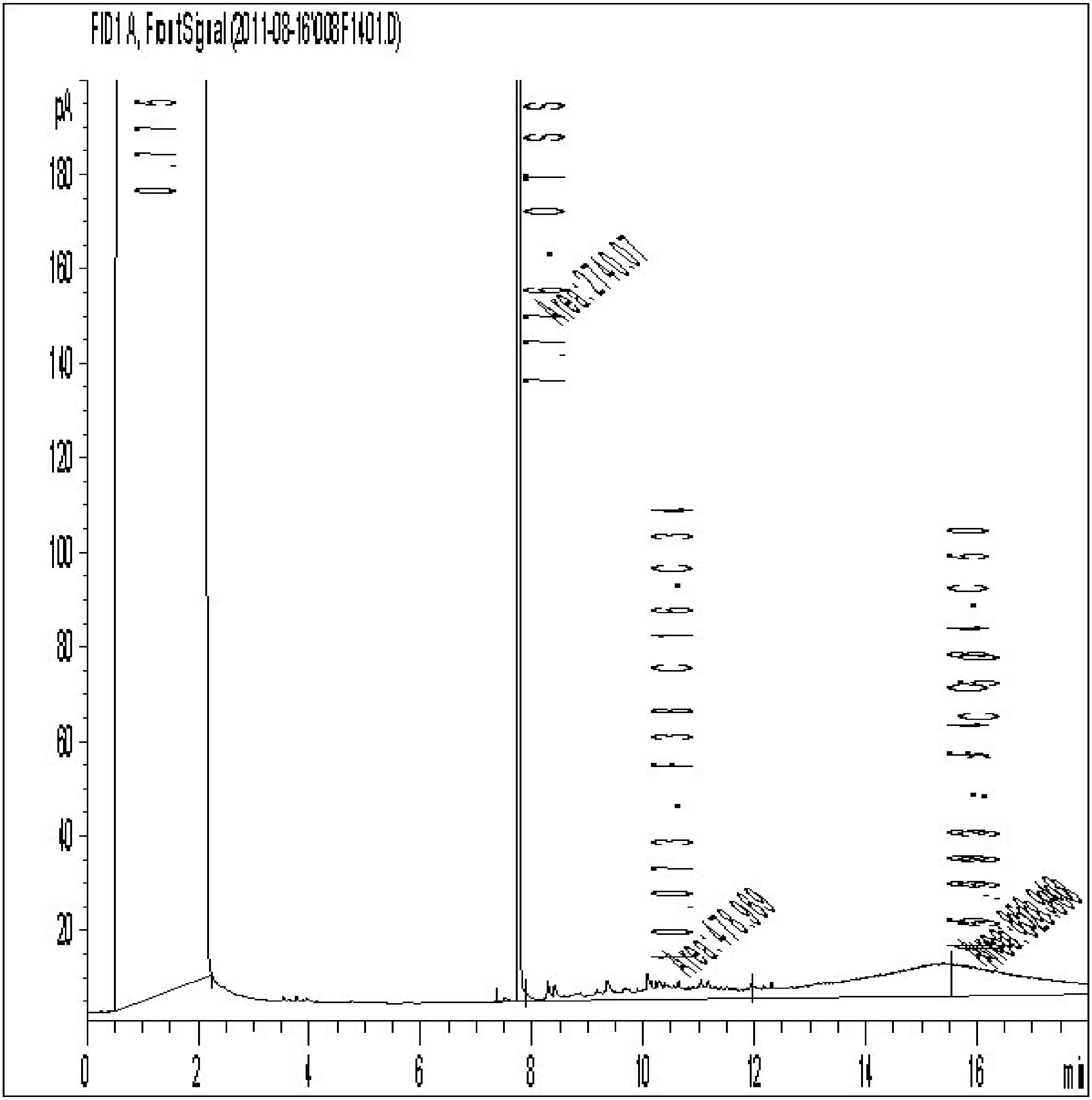


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Report Date: 2011/08/23
Maxxam Job #: B1C2151
Maxxam Sample: KN1512

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FZ-BH11-9D

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Your C.O.C. #: 27513513, 275135-13-01, 275135-14-01

Attention: Andrew Henderson
Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2011/08/31

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1C2240
Received: 2011/08/12, 09:30

Sample Matrix: Soil
Samples Received: 20

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
ABN Compounds in soil by GC/MS (1)	7	2011/08/15	2011/08/16	CAM SOP-00301	EPA 8270 (modified)
Hot Water Extractable Boron (1)	15	2011/08/19	2011/08/19	CAM SOP-00408	R153 Ana. Prot. 2004
Hot Water Extractable Boron (1)	1	2011/08/19	2011/08/20	CAM SOP-00408	R153 Ana. Prot. 2004
Hexavalent Chromium in Soil by IC (1,3)	1	N/A	2011/08/21	CAM SOP-00436	EPA SW846-3060/7199
Hexavalent Chromium in Soil by IC (1,3)	15	N/A	2011/08/22	CAM SOP-00436	EPA SW846-3060/7199
TEH in Soil (AA PIRI) (2)	1	2011/08/16	2011/08/26	ATL SOP 00116 R3	Based on Atl. PIRI
CCME F1 Hydrocarbons/BTEX in Leachate (1)	2	2011/08/18	2011/08/19	CAM SOP-00315	CCME CWS
Petroleum Hydro. CCME F1 & BTEX in Soil	3	2011/08/18	2011/08/18	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil (1)	1	2011/08/27	2011/08/30	CAM SOP-00316	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	4	2011/08/15	2011/08/16	OTT SOP-00001	CCME CWS
Fraction Organic Carbon in Triplicate (1)	2	N/A	2011/08/19	15840_1_4	LECO 203-601-224
Mercury (TCLP Leachable) (mg/L) (1)	2	N/A	2011/08/18	CAM SOP-00453	EPA 7470
Acid Extr. Metals (aqua regia) by ICPMS (1)	1	2011/08/18	2011/08/18	CAM SOP-00447	EPA 6020
Acid Extr. Metals (aqua regia) by ICPMS (1)	14	2011/08/19	2011/08/19	CAM SOP-00447	EPA 6020
Acid Extr. Metals (aqua regia) by ICPMS (1)	1	2011/08/19	2011/08/22	CAM SOP-00447	EPA 6020
Total Metals in TCLP Leachate by ICPMS (1)	2	2011/08/17	2011/08/18	CAM SOP-00447	EPA 6020
Moisture (2)	1	N/A	2011/08/16	ATL SOP 00001 R3	MOE Handbook 1983
MOISTURE	1	N/A	2011/08/18	CAM SOP-00445	MOE HANDBOOK(1983)
Moisture (1)	18	N/A	2011/08/19	CAM SOP-00445	McKeague 2nd ed 1978
PAH in sediment by GC/MS (Low Level) (2)	2	2011/08/18	2011/08/20	ATL SOP 00102 R4	based on EPA8270C
PAH in sediment by GC/MS (Low Level) (2)	7	2011/08/18	2011/08/22	ATL SOP 00102 R4	based on EPA8270C
PAH in sediment by GC/MS (Low Level) (2)	1	2011/08/18	2011/08/23	ATL SOP 00102 R4	based on EPA8270C
pH CaCl2 EXTRACT (1)	5	2011/08/16	2011/08/16	CAM SOP-00413	SM 4500 H
Phenols (4AAP) (1)	7	N/A	2011/08/18	CAM SOP-00444	MOE ROPHEN-E3179
VPH in Soil (PIRI2) (2)	1	2011/08/16	2011/08/17	ATL SOP 00120 R5	Based on Atl. PIRI
Sieve, 75um (1,4)	3	N/A	2011/08/22	CAM SOP-00467	
TCLP - % Solids (1)	2	2011/08/16	2011/08/17	CAM SOP-00401	EPA 1311 modified
TCLP - Extraction Fluid (1)	2	N/A	2011/08/17	CAM SOP-00401	EPA 1311 modified
TCLP - Initial and final pH (1)	2	N/A	2011/08/17	CAM SOP-00401	EPA 1311 modified
Total Organic Carbon in Triplicate (1)	2	N/A	2011/08/19	CAM SOP-00468	LECO Combustion
ModTPH (T2) Calc. for Soil (2)	1	N/A	2011/08/26	n/a	Based on Atl. PIRI
TCLP Zero Headspace Extraction (1)	2	2011/08/17	2011/08/17	CAM SOP-00430	EPA 1311 modified
Volatile Organic Compounds in Soil (1)	1	2011/08/16	2011/08/18	CAM SOP-00226	EPA 8260 modified
Volatile Organic Compounds in Soil (1)	1	2011/08/16	2011/08/19	CAM SOP-00226	EPA 8260 modified

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) This test was performed by Maxxam Analytics Mississauga
(2) This test was performed by Bedford
(3) Soils are reported on a dry weight basis unless otherwise specified.
(4) The Sieve test has been validated in accordance with ISO Guide 17025 requirements. SCC accreditation pending.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JULIE CLEMENT, Ottawa Customer Service
Email: JClement@maxxam.ca
Phone# (613) 274-3549

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B1C2240
Report Date: 2011/08/31

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MM

ATLANTIC FRACTIONATION (PIRIT2) IN SOIL

Maxxam ID		KN2074		
Sampling Date		2011/08/11 19:00		
	Units	**FZ-MW11-2-A**	**RDL**	**QC Batch**
Petroleum Hydrocarbons				
Benzene	mg/kg	<0.03	0.03	2584644
Toluene	mg/kg	<0.03	0.03	2584644
Ethylbenzene	mg/kg	<0.03	0.03	2584644
Xylene (Total)	mg/kg	<0.05	0.05	2584644
Aliphatic >C6-C8	mg/kg	<0.1	0.1	2584644
Aliphatic >C8-C10	mg/kg	1.0	0.4	2584644
>C8-C10 Aromatics (-EX)	mg/kg	0.2	0.1	2584644
Aliphatic >C10-C12	mg/kg	<8.0	8.0	2592460
Aliphatic >C12-C16	mg/kg	<15	15	2592460
Aliphatic >C16-C21	mg/kg	100	15	2592460
Aliphatic >C21-<C32	mg/kg	600	15	2592460
Aromatic >C10-C12	mg/kg	8.6	4.0	2592460
Aromatic >C12-C16	mg/kg	30	15	2592460
Aromatic >C16-C21	mg/kg	160	15	2592460
Aromatic >C21-<C32	mg/kg	720	15	2592460
Modified TPH (Tier 2)	mg/kg	1600	20	2582227
Reached Baseline at C32	mg/kg	YES	N/A	2592460
Hydrocarbon Resemblance	mg/kg	COMMENT(1)	N/A	2592460
Surrogate Recovery (%)				
Isobutylbenzene - Extractable	%	90		2592460
Isobutylbenzene - Volatile	%	87		2584644
n-Dotriacontane - Extractable	%	94(2)		2592460

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Lube oil fraction; interference from possible PAHs.
(2) - TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

O'REG 153 METALS PACKAGE (SOIL)

Maxxam ID		KN1996		KN1997			KN1999			KN2000	KN2001		
Sampling Date		2011/08/11 09:30		2011/08/11 09:30			2011/08/11 11:00			2011/08/11 11:00	2011/08/11 11:00		
	Units	**FZ-BH11-4D-A**	**RDL**	**FZ-BH11-4D-B**	**RDL**	**QC Batch**	**FZ-MW-5-A**	**RDL**	**QC Batch**	**FZ-MW-5-B**	**FZ-BH11-5D-A**	**RDL**	**QC Batch**
Inorganics													
Chromium (VI)	ug/g	<0.2	0.2	<1	1	2586993	<0.4	0.4	2586993	<1	<1	1	2586993
Moisture	%	10	1	37	1	2588384	10	1	2588384	20	14	1	2588384
Metals													
Hot Water Ext. Boron (B)	ug/g	0.87	0.05	0.65	0.05	2588284	0.33	0.05	2587618	0.49	0.81	0.05	2587618
Acid Extractable Antimony (Sb)	ug/g	3.6	0.2	33	0.2	2588279	2.2	0.2	2586822	9.0	2.4	0.2	2588279
Acid Extractable Arsenic (As)	ug/g	12	1	27	1	2588279	6	1	2586822	17	21	1	2588279
Acid Extractable Barium (Ba)	ug/g	220	0.5	110	0.5	2588279	130	0.5	2586822	240	160	0.5	2588279
Acid Extractable Beryllium (Be)	ug/g	0.5	0.2	0.6	0.2	2588279	0.4	0.2	2586822	0.5	0.7	0.2	2588279
Acid Extractable Boron (B)	ug/g	6	5	<5	5	2588279	<5	5	2586822	<5	<5	5	2588279
Acid Extractable Cadmium (Cd)	ug/g	6.6	0.1	0.5	0.1	2588279	0.6	0.1	2586822	25	16	0.1	2588279
Acid Extractable Chromium (Cr)	ug/g	24	1	31	1	2588279	19	1	2586822	25	18	1	2588279
Acid Extractable Cobalt (Co)	ug/g	8.6	0.1	11	0.1	2588279	6.5	0.1	2586822	11	14	0.1	2588279
Acid Extractable Copper (Cu)	ug/g	180	0.5	57	0.5	2588279	56	0.5	2586822	350	180	0.5	2588279
Acid Extractable Lead (Pb)	ug/g	510	1	510	1	2588279	170	1	2586822	450	260	1	2588279
Acid Extractable Molybdenum (Mo)	ug/g	3.0	0.5	4.7	0.5	2588279	2.0	0.5	2586822	3.4	2.8	0.5	2588279
Acid Extractable Nickel (Ni)	ug/g	24	0.5	30	0.5	2588279	19	0.5	2586822	26	22	0.5	2588279
Acid Extractable Selenium (Se)	ug/g	1.1	0.5	4.0	0.5	2588279	0.7	0.5	2586822	1.0	1.4	0.5	2588279
Acid Extractable Silver (Ag)	ug/g	0.7	0.2	<0.2	0.2	2588279	0.4	0.2	2586822	<0.2	0.4	0.2	2588279
Acid Extractable Thallium (Tl)	ug/g	0.27	0.05	0.63	0.05	2588279	0.14	0.05	2586822	0.27	0.16	0.05	2588279
Acid Extractable Uranium (U)	ug/g	0.60	0.05	1.0	0.05	2588279	0.70	0.05	2586822	0.98	0.89	0.05	2588279
Acid Extractable Vanadium (V)	ug/g	22	5	28	5	2588279	24	5	2586822	28	22	5	2588279
Acid Extractable Zinc (Zn)	ug/g	480	5	210	5	2588279	200	5	2586822	190	220	5	2588279
Acid Extractable Mercury (Hg)	ug/g	0.64	0.05	0.13	0.05	2588279	1.1	0.05	2586822	0.21	0.70	0.05	2588279

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B1C2240
Report Date: 2011/08/31

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MM

O'REG 153 METALS PACKAGE (SOIL)

Maxxam ID		KN2002		KN2003		KN2004		KN2067		
Sampling Date		2011/08/11 11:00		2011/08/11 11:00		2011/08/11 11:00		2011/08/11 15:00		
	Units	**FZ-BH11-5D-B**	**RDL**	**FZ-MW11-6**	**RDL**	**FZ-BH11-6D-A**	**RDL**	**FZ-BH11-6D-B**	**RDL**	**QC Batch**
Inorganics										
Chromium (VI)	ug/g	<0.2	0.2	<1	1	<0.4	0.4	<0.2	0.2	2586993
Moisture	%	25	1	26	1	17	1	8	1	2588384
Metals										
Hot Water Ext. Boron (B)	ug/g	0.30	0.05	0.60	0.05	1.1	0.05	0.15	0.05	2587618
Acid Extractable Antimony (Sb)	ug/g	0.2	0.2	6.7	0.2	0.9	0.2	<0.2	0.2	2588279
Acid Extractable Arsenic (As)	ug/g	2	1	38	1	6	1	4	1	2588279
Acid Extractable Barium (Ba)	ug/g	260	0.5	100	0.5	56	0.5	37	0.5	2588279
Acid Extractable Beryllium (Be)	ug/g	0.6	0.2	1.0	0.2	0.4	0.2	0.3	0.2	2588279
Acid Extractable Boron (B)	ug/g	<5	5	<5	5	<5	5	<5	5	2588279
Acid Extractable Cadmium (Cd)	ug/g	8.8	0.1	0.3	0.1	0.5	0.1	8.0	0.1	2588279
Acid Extractable Chromium (Cr)	ug/g	65	1	12	1	10	1	14	1	2588279
Acid Extractable Cobalt (Co)	ug/g	15	0.1	6.4	0.1	4.2	0.1	9.4	0.1	2588279
Acid Extractable Copper (Cu)	ug/g	86	0.5	170	0.5	42	0.5	60	0.5	2588279
Acid Extractable Lead (Pb)	ug/g	24	1	470	1	49	1	21	1	2588279
Acid Extractable Molybdenum (Mo)	ug/g	<0.5	0.5	4.5	0.5	1.5	0.5	1.5	0.5	2588279
Acid Extractable Nickel (Ni)	ug/g	37	0.5	16	0.5	17	0.5	24	0.5	2588279
Acid Extractable Selenium (Se)	ug/g	<0.5	0.5	2.1	0.5	0.6	0.5	0.6	0.5	2588279
Acid Extractable Silver (Ag)	ug/g	<0.2	0.2	0.2	0.2	<0.2	0.2	<0.2	0.2	2588279
Acid Extractable Thallium (Tl)	ug/g	0.29	0.05	0.34	0.05	0.17	0.05	0.11	0.05	2588279
Acid Extractable Uranium (U)	ug/g	0.73	0.05	0.49	0.05	0.52	0.05	0.71	0.05	2588279
Acid Extractable Vanadium (V)	ug/g	66	5	20	5	18	5	17	5	2588279
Acid Extractable Zinc (Zn)	ug/g	100	5	85	5	70	5	46	5	2588279
Acid Extractable Mercury (Hg)	ug/g	<0.05	0.05	0.34	0.05	0.07	0.05	<0.05	0.05	2588279

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B1C2240
Report Date: 2011/08/31

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MM

O'REG 153 METALS PACKAGE (SOIL)

Maxxam ID		KN2069			KN2070		KN2071		KN2072		
Sampling Date		2011/08/11 16:30			2011/08/11 16:30		2011/08/11 16:30		2011/08/11 18:30		
	Units	**FZ-MW11-1-B**	**RDL**	**QC Batch**	**FZ-BH11-10D-A**	**RDL**	**FZ-BH11-10D-B**	**RDL**	**FZ-BH11-8D-A**	**RDL**	**QC Batch**
Inorganics											
Chromium (VI)	ug/g	<2(1)	2	2586366	<2	2	<0.4	0.4	<1	1	2586993
Moisture	%	19	1	2588384	28	1	14	1	15	1	2588384
Metals											
Hot Water Ext. Boron (B)	ug/g	0.87	0.05	2587618	0.59	0.05	1.0	0.05	0.86	0.05	2587618
Acid Extractable Antimony (Sb)	ug/g	<0.2	0.2	2588279	11	0.2	9.5	0.2	25	0.2	2588279
Acid Extractable Arsenic (As)	ug/g	3	1	2588279	29	1	17	1	41	1	2588279
Acid Extractable Barium (Ba)	ug/g	67	0.5	2588279	380	0.5	450	0.5	780	0.5	2588279
Acid Extractable Beryllium (Be)	ug/g	0.4	0.2	2588279	0.6	0.2	0.3	0.2	0.7	0.2	2588279
Acid Extractable Boron (B)	ug/g	<5	5	2588279	9	5	6	5	9	5	2588279
Acid Extractable Cadmium (Cd)	ug/g	0.3	0.1	2588279	1.9	0.1	14	0.1	13	0.1	2588279
Acid Extractable Chromium (Cr)	ug/g	17	1	2588279	44	1	24	1	59	1	2588279
Acid Extractable Cobalt (Co)	ug/g	6.5	0.1	2588279	10	0.1	11	0.1	16	0.1	2588279
Acid Extractable Copper (Cu)	ug/g	15	0.5	2588279	450	0.5	130	0.5	580	0.5	2588279
Acid Extractable Lead (Pb)	ug/g	10	1	2588279	1300	1	1200	1	2800	10	2588279
Acid Extractable Molybdenum (Mo)	ug/g	1.2	0.5	2588279	6.2	0.5	1.3	0.5	4.5	0.5	2588279
Acid Extractable Nickel (Ni)	ug/g	16	0.5	2588279	650	5	26	0.5	100	0.5	2588279
Acid Extractable Selenium (Se)	ug/g	<0.5	0.5	2588279	3.9	0.5	2.4	0.5	2.9	0.5	2588279
Acid Extractable Silver (Ag)	ug/g	<0.2	0.2	2588279	2.5	0.2	0.7	0.2	1.8	0.2	2588279
Acid Extractable Thallium (Tl)	ug/g	0.15	0.05	2588279	0.24	0.05	0.33	0.05	0.31	0.05	2588279
Acid Extractable Uranium (U)	ug/g	0.79	0.05	2588279	0.57	0.05	0.81	0.05	0.54	0.05	2588279
Acid Extractable Vanadium (V)	ug/g	26	5	2588279	25	5	24	5	28	5	2588279
Acid Extractable Zinc (Zn)	ug/g	33	5	2588279	990	5	1200	5	4500	50	2588279
Acid Extractable Mercury (Hg)	ug/g	<0.05	0.05	2588279	0.95	0.05	0.21	0.05	0.46	0.05	2588279

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.

O'REG 153 METALS PACKAGE (SOIL)

Maxxam ID		KN2073		KN2074			KN2076		
Sampling Date		2011/08/11 18:30		2011/08/11 19:00			2011/08/11 19:00		
	Units	**FZ-BH11-8D-B**	**RDL**	**FZ-MW11-2-A**	**RDL**	**QC Batch**	**DUP-1**	**RDL**	**QC Batch**
Inorganics									
Chromium (VI)	ug/g	<0.2	0.2	<2	2	2586993	<1	1	2586993
Moisture	%	15	1	32	1	2588384	26	1	2588384
Metals									
Hot Water Ext. Boron (B)	ug/g	0.18	0.05	3.5	0.05	2587618	0.63	0.05	2588284
Acid Extractable Antimony (Sb)	ug/g	0.2	0.2	24	0.2	2588279	11	0.2	2588279
Acid Extractable Arsenic (As)	ug/g	2	1	20	1	2588279	42	1	2588279
Acid Extractable Barium (Ba)	ug/g	43	0.5	270	0.5	2588279	120	0.5	2588279
Acid Extractable Beryllium (Be)	ug/g	0.3	0.2	0.3	0.2	2588279	<2(1)	2	2588279
Acid Extractable Boron (B)	ug/g	<5	5	6	5	2588279	<5	5	2588279
Acid Extractable Cadmium (Cd)	ug/g	<0.1	0.1	1.7	0.1	2588279	0.9	0.1	2588279
Acid Extractable Chromium (Cr)	ug/g	11	1	19	1	2588279	14	1	2588279
Acid Extractable Cobalt (Co)	ug/g	4.2	0.1	6.5	0.1	2588279	7.0	0.1	2588279
Acid Extractable Copper (Cu)	ug/g	15	0.5	430	0.5	2588279	220	0.5	2588279
Acid Extractable Lead (Pb)	ug/g	10	1	2400	10	2588279	520	1	2588279
Acid Extractable Molybdenum (Mo)	ug/g	0.9	0.5	3.6	0.5	2588279	5.2	0.5	2588279
Acid Extractable Nickel (Ni)	ug/g	12	0.5	27	0.5	2588279	17	0.5	2588279
Acid Extractable Selenium (Se)	ug/g	<0.5	0.5	1.2	0.5	2588279	2.6	0.5	2588279
Acid Extractable Silver (Ag)	ug/g	<0.2	0.2	0.5	0.2	2588279	0.3	0.2	2588279
Acid Extractable Thallium (Tl)	ug/g	0.09	0.05	0.19	0.05	2588279	0.38	0.05	2588279
Acid Extractable Uranium (U)	ug/g	0.48	0.05	0.31	0.05	2588279	0.64	0.05	2588279
Acid Extractable Vanadium (V)	ug/g	15	5	13	5	2588279	24	5	2588279
Acid Extractable Zinc (Zn)	ug/g	38	5	800	5	2588279	92	5	2588279
Acid Extractable Mercury (Hg)	ug/g	<0.05	0.05	19	0.5	2588279	0.41	0.05	2588279

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Detection Limit was raised due to matrix interferences.

Maxxam Job #: B1C2240
Report Date: 2011/08/31

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MM

O'REG 153 PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		KN2004	KN2068	KN2070	KN2073		
Sampling Date		2011/08/11 11:00	2011/08/11 16:30	2011/08/11 16:30	2011/08/11 18:30		
	Units	**FZ-BH11-6D-A**	**FZ-MW11-1-A**	**FZ-BH11-10D-A**	**FZ-BH11-8D-B**	**RDL**	**QC Batch**
Inorganics							
Moisture	%		10			0.2	2582245
BTEX & F1 Hydrocarbons							
Benzene	ug/g	0.03				0.02	2586347
Toluene	ug/g	0.13				0.02	2586347
Ethylbenzene	ug/g	0.13				0.02	2586347
o-Xylene	ug/g	0.15				0.02	2586347
p+m-Xylene	ug/g	0.33				0.04	2586347
Total Xylenes	ug/g	0.48				0.04	2586347
F1 (C6-C10)	ug/g	<10				10	2586347
F1 (C6-C10) - BTEX	ug/g	<10				10	2586347
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	160	<10	<10	<10	10	2582201
F3 (C16-C34 Hydrocarbons)	ug/g	300	54	530	<10	10	2582201
F4 (C34-C50 Hydrocarbons)	ug/g	67	14	200	<10	10	2582201
Reached Baseline at C50	ug/g	YES	YES	YES	YES		2582201
Surrogate Recovery (%)							
1,4-Difluorobenzene	%	88					2586347
4-Bromofluorobenzene	%	125					2586347
D10-Ethylbenzene	%	87					2586347
D4-1,2-Dichloroethane	%	82					2586347
o-Terphenyl	%	76	73	76	75		2582201

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (SOIL)

Maxxam ID		KN1995		KN2001	KN2004		
Sampling Date		2011/08/11 09:30		2011/08/11 11:00	2011/08/11 11:00		
	Units	**FZ-BH11-4D**	**RDL**	**FZ-BH11-5D-A**	**FZ-BH11-6D-A**	**RDL**	**QC Batch**
Inorganics							
Moisture	%	28	1				2588384
Semivolatile Organics							
1,2,4-Trichlorobenzene	ug/g	<1	1	<0.5	<0.5	0.5	2582785
1-Methylnaphthalene	ug/g	<0.6	0.6	<0.3	8.1	0.3	2582785
2,4,5-Trichlorophenol	ug/g	<2	2	<0.8	<0.8	0.8	2582785
2,4,6-Trichlorophenol	ug/g	<2	2	<1	<1	1	2582785
2,4-Dichlorophenol	ug/g	<2	2	<1	<1	1	2582785
2,4-Dimethylphenol	ug/g	<4	4	<2	<2	2	2582785
2,4-Dinitrophenol	ug/g	<3	3	<2	<2	2	2582785
2,4-Dinitrotoluene	ug/g	<2	2	<1	<1	1	2582785
2,6-Dinitrotoluene	ug/g	<2	2	<1	<1	1	2582785
2-Chlorophenol	ug/g	<2	2	<0.8	<0.8	0.8	2582785
2-Methylnaphthalene	ug/g	<0.6	0.6	<0.3	15	0.3	2582785
3,3'-Dichlorobenzidine	ug/g	<10	10	<5	<5	5	2582785
Acenaphthene	ug/g	1.0	0.6	<0.3	19	0.3	2582785
Acenaphthylene	ug/g	<1	1	<0.5	<0.5	0.5	2582785
Anthracene	ug/g	<0.6	0.6	0.5	7.1	0.3	2582785
Benzo(a)anthracene	ug/g	<1	1	0.9	3.6	0.5	2582785
Benzo(a)pyrene	ug/g	<1	1	0.7	1.2	0.5	2582785
Benzo(b/j)fluoranthene	ug/g	<2	2	<1	2	1	2582785
Benzo(g,h,i)perylene	ug/g	<2	2	<1	<1	1	2582785
Benzo(k)fluoranthene	ug/g	<0.6	0.6	0.4	0.9	0.3	2582785
Biphenyl	ug/g	<1	1	<0.5	4.9	0.5	2582785
Bis(2-chloroethyl)ether	ug/g	<4	4	<2	<2	2	2582785
Bis(2-chloroisopropyl)ether	ug/g	<2	2	<1	<1	1	2582785
Bis(2-ethylhexyl)phthalate	ug/g	<20	20	<10	<10	10	2582785
Chrysene	ug/g	<1	1	0.9	2.8	0.5	2582785
Dibenz(a,h)anthracene	ug/g	<1	1	<0.5	<0.5	0.5	2582785
Diethyl phthalate	ug/g	<4	4	<2	<2	2	2582785
Dimethyl phthalate	ug/g	<4	4	<2	<2	2	2582785
Fluoranthene	ug/g	<1	1	1.8	24	0.5	2582785
Fluorene	ug/g	<0.6	0.6	<0.3	23	0.3	2582785
Indeno(1,2,3-cd)pyrene	ug/g	<2	2	<0.8	<0.8	0.8	2582785
Naphthalene	ug/g	<0.6	0.6	<0.3	42	0.3	2582785

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (SOIL)

Maxxam ID		KN1995		KN2001	KN2004		
Sampling Date		2011/08/11 09:30		2011/08/11 11:00	2011/08/11 11:00		
	Units	**FZ-BH11-4D**	**RDL**	**FZ-BH11-5D-A**	**FZ-BH11-6D-A**	**RDL**	**QC Batch**
p-Chloroaniline	ug/g	<4	4	<2	<2	2	2582785
Pentachlorophenol	ug/g	<2	2	<1	<1	1	2582785
Phenanthrene	ug/g	<1	1	1.9	43	0.5	2582785
Phenol	ug/g	<2	2	<0.9	<0.9	0.9	2582785
Pyrene	ug/g	<1	1	1.6	16	0.5	2582785
Surrogate Recovery (%)							
2,4,6-Tribromophenol	%	44		48	72		2582785
2-Fluorobiphenyl	%	64		66	84		2582785
2-Fluorophenol	%	48		50	54		2582785
D14-Terphenyl (FS)	%	60		74	84		2582785
D5-Nitrobenzene	%	40		46	48		2582785
D5-Phenol	%	40		48	48		2582785

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (SOIL)

Maxxam ID		KN2069		KN2070		KN2073		KN2074		
Sampling Date		2011/08/11 16:30		2011/08/11 16:30		2011/08/11 18:30		2011/08/11 19:00		
	Units	**FZ-MW11-1-B**	**RDL**	**FZ-BH11-10D-A**	**RDL**	**FZ-BH11-8D-B**	**RDL**	**FZ-MW11-2-A**	**RDL**	**QC Batch**
Semivolatile Organics										
1,2,4-Trichlorobenzene	ug/g	<0.05	0.05	<3	3	<0.05	0.05	<5	5	2582785
1-Methylnaphthalene	ug/g	<0.03	0.03	<2	2	<0.03	0.03	<3	3	2582785
2,4,5-Trichlorophenol	ug/g	<0.08	0.08	<4	4	<0.08	0.08	<8	8	2582785
2,4,6-Trichlorophenol	ug/g	<0.1	0.1	<5	5	<0.1	0.1	<10	10	2582785
2,4-Dichlorophenol	ug/g	<0.1	0.1	<5	5	<0.1	0.1	<10	10	2582785
2,4-Dimethylphenol	ug/g	<0.2	0.2	<10	10	<0.2	0.2	<20	20	2582785
2,4-Dinitrophenol	ug/g	<0.2	0.2	<8	8	<0.2	0.2	<20	20	2582785
2,4-Dinitrotoluene	ug/g	<0.1	0.1	<5	5	<0.1	0.1	<10	10	2582785
2,6-Dinitrotoluene	ug/g	<0.1	0.1	<5	5	<0.1	0.1	<10	10	2582785
2-Chlorophenol	ug/g	<0.08	0.08	<4	4	<0.08	0.08	<8	8	2582785
2-Methylnaphthalene	ug/g	0.04	0.03	<2	2	<0.03	0.03	<3	3	2582785
3,3'-Dichlorobenzidine	ug/g	<0.5	0.5	<30	30	<0.5	0.5	<50	50	2582785
Acenaphthene	ug/g	0.09	0.03	<2	2	0.04	0.03	<3	3	2582785
Acenaphthylene	ug/g	<0.05	0.05	<3	3	<0.05	0.05	<5	5	2582785
Anthracene	ug/g	0.07	0.03	5	2	0.10	0.03	4	3	2582785
Benzo(a)anthracene	ug/g	<0.05	0.05	7	3	0.18	0.05	6	5	2582785
Benzo(a)pyrene	ug/g	<0.05	0.05	5	3	0.14	0.05	6	5	2582785
Benzo(b/j)fluoranthene	ug/g	<0.1	0.1	7	5	0.2	0.1	<10	10	2582785
Benzo(g,h,i)perylene	ug/g	<0.1	0.1	<5	5	<0.1	0.1	<10	10	2582785
Benzo(k)fluoranthene	ug/g	<0.03	0.03	3	2	0.08	0.03	4	3	2582785
Biphenyl	ug/g	<0.05	0.05	<3	3	<0.05	0.05	<5	5	2582785
Bis(2-chloroethyl)ether	ug/g	<0.2	0.2	<10	10	<0.2	0.2	<20	20	2582785
Bis(2-chloroisopropyl)ether	ug/g	<0.1	0.1	<5	5	<0.1	0.1	<10	10	2582785
Bis(2-ethylhexyl)phthalate	ug/g	<1	1	<50	50	<1	1	<100	100	2582785
Chrysene	ug/g	<0.05	0.05	7	3	0.18	0.05	7	5	2582785
Dibenz(a,h)anthracene	ug/g	<0.05	0.05	<3	3	<0.05	0.05	<5	5	2582785
Diethyl phthalate	ug/g	<0.2	0.2	<10	10	<0.2	0.2	<20	20	2582785
Dimethyl phthalate	ug/g	<0.2	0.2	<10	10	<0.2	0.2	<20	20	2582785
Fluoranthene	ug/g	0.16	0.05	16	3	0.49	0.05	19	5	2582785
Fluorene	ug/g	0.10	0.03	<2	2	0.04	0.03	6	3	2582785
Indeno(1,2,3-cd)pyrene	ug/g	<0.08	0.08	<4	4	<0.08	0.08	<8	8	2582785
Naphthalene	ug/g	0.11	0.03	<2	2	0.03	0.03	<3	3	2582785
p-Chloroaniline	ug/g	<0.2	0.2	<10	10	<0.2	0.2	<20	20	2582785
Pentachlorophenol	ug/g	<0.1	0.1	<5	5	<0.1	0.1	<10	10	2582785

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (SOIL)

Maxxam ID		KN2069		KN2070		KN2073		KN2074		
Sampling Date		2011/08/11 16:30		2011/08/11 16:30		2011/08/11 18:30		2011/08/11 19:00		
	Units	**FZ-MW11-1-B**	**RDL**	**FZ-BH11-10D-A**	**RDL**	**FZ-BH11-8D-B**	**RDL**	**FZ-MW11-2-A**	**RDL**	**QC Batch**
Phenanthrene	ug/g	0.38	0.05	17	3	0.46	0.05	23	5	2582785
Phenol	ug/g	<0.09	0.09	<5	5	<0.09	0.09	<9	9	2582785
Pyrene	ug/g	0.11	0.05	13	3	0.38	0.05	15	5	2582785
Surrogate Recovery (%)										
2,4,6-Tribromophenol	%	72		40		60		50		2582785
2-Fluorobiphenyl	%	81		80		80		80		2582785
2-Fluorophenol	%	70		60		72		60		2582785
D14-Terphenyl (FS)	%	94		70		91		70		2582785
D5-Nitrobenzene	%	61		50		66		50		2582785
D5-Phenol	%	70		40		71		40		2582785

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B1C2240
Report Date: 2011/08/31

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MM

O'REG 153 VOLATILE ORGANICS (SOIL)

Maxxam ID		KN1995		KN2075		
Sampling Date		2011/08/11 09:30		2011/08/11 19:00		
	Units	**FZ-BH11-4D**	**RDL**	**FZ-MW11-2-B**	**RDL**	**QC Batch**
Inorganics						
Moisture	%			30	1	2588384
Volatile Organics						
Acetone (2-Propanone)	ug/g	<2	2	<0.5	0.5	2583292
Benzene	ug/g	0.12	0.06	<0.02	0.02	2583292
Bromodichloromethane	ug/g	<0.2	0.2	<0.05	0.05	2583292
Bromoform	ug/g	<0.2	0.2	<0.05	0.05	2583292
Bromomethane	ug/g	<0.2	0.2	<0.05	0.05	2583292
Carbon Tetrachloride	ug/g	<0.2	0.2	<0.05	0.05	2583292
Chlorobenzene	ug/g	<0.2	0.2	<0.05	0.05	2583292
Chloroform	ug/g	<0.2	0.2	<0.05	0.05	2583292
Dibromochloromethane	ug/g	<0.2	0.2	<0.05	0.05	2583292
1,2-Dichlorobenzene	ug/g	<0.2	0.2	<0.05	0.05	2583292
1,3-Dichlorobenzene	ug/g	<0.2	0.2	<0.05	0.05	2583292
1,4-Dichlorobenzene	ug/g	<0.2	0.2	<0.05	0.05	2583292
Dichlorodifluoromethane (FREON 12)	ug/g	<0.2	0.2	<0.05	0.05	2583292
1,1-Dichloroethane	ug/g	<0.2	0.2	<0.05	0.05	2583292
1,2-Dichloroethane	ug/g	<0.2	0.2	<0.05	0.05	2583292
1,1-Dichloroethylene	ug/g	<0.2	0.2	<0.05	0.05	2583292
cis-1,2-Dichloroethylene	ug/g	<0.2	0.2	<0.05	0.05	2583292
trans-1,2-Dichloroethylene	ug/g	<0.2	0.2	<0.05	0.05	2583292
1,2-Dichloropropane	ug/g	<0.2	0.2	<0.05	0.05	2583292
cis-1,3-Dichloropropene	ug/g	<0.09	0.09	<0.03	0.03	2583292
trans-1,3-Dichloropropene	ug/g	<0.1	0.1	<0.04	0.04	2583292
Ethylbenzene	ug/g	0.16	0.06	<0.02	0.02	2583292
Ethylene Dibromide	ug/g	<0.2	0.2	<0.05	0.05	2583292
Hexane	ug/g	0.4	0.2	<0.05	0.05	2583292
Methylene Chloride(Dichloromethane)	ug/g	<0.2	0.2	<0.05	0.05	2583292
Methyl Isobutyl Ketone	ug/g	<2	2	<0.5	0.5	2583292
Methyl Ethyl Ketone (2-Butanone)	ug/g	<2	2	<0.5	0.5	2583292
Methyl t-butyl ether (MTBE)	ug/g	<0.2	0.2	<0.05	0.05	2583292
Styrene	ug/g	<0.2	0.2	<0.05	0.05	2583292
1,1,1,2-Tetrachloroethane	ug/g	<0.2	0.2	<0.05	0.05	2583292
1,1,2,2-Tetrachloroethane	ug/g	<0.2	0.2	<0.05	0.05	2583292
Tetrachloroethylene	ug/g	<0.2	0.2	<0.05	0.05	2583292
Toluene	ug/g	0.40	0.06	<0.02	0.02	2583292

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 VOLATILE ORGANICS (SOIL)

Maxxam ID		KN1995		KN2075		
Sampling Date		2011/08/11 09:30		2011/08/11 19:00		
	Units	**FZ-BH11-4D**	**RDL**	**FZ-MW11-2-B**	**RDL**	**QC Batch**
1,1,1-Trichloroethane	ug/g	<0.2	0.2	<0.05	0.05	2583292
1,1,2-Trichloroethane	ug/g	<0.2	0.2	<0.05	0.05	2583292
Trichloroethylene	ug/g	<0.2	0.2	<0.05	0.05	2583292
Vinyl Chloride	ug/g	<0.06	0.06	<0.02	0.02	2583292
p+m-Xylene	ug/g	0.49	0.06	<0.02	0.02	2583292
o-Xylene	ug/g	0.30	0.06	<0.02	0.02	2583292
Xylene (Total)	ug/g	0.79	0.06	<0.02	0.02	2583292
Trichlorofluoromethane (FREON 11)	ug/g	<0.2	0.2	<0.05	0.05	2583292
Surrogate Recovery (%)						
4-Bromofluorobenzene	%	95		94		2583292
D10-o-Xylene	%	111		114		2583292
D4-1,2-Dichloroethane	%	103		103		2583292
D8-Toluene	%	105		106		2583292

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 558 TCLP BTEX (SOIL)

Maxxam ID		KN1995	KN2068		
Sampling Date		2011/08/11 09:30	2011/08/11 16:30		
	Units	**FZ-BH11-4D**	**FZ-MW11-1-A**	**RDL**	**QC Batch**
Charge/Prep Analysis					
Amount Extracted (Wet Weight) (g)	N/A	25	25	N/A	2584880
BTEX & F1 Hydrocarbons					
Leachable (ZHE) Benzene	ug/L	<0.8	<0.8	0.8	2586131
Leachable (ZHE) Toluene	ug/L	<0.8	<0.8	0.8	2586131
Leachable (ZHE) Ethylbenzene	ug/L	<0.8	<0.8	0.8	2586131
Leachable (ZHE) o-Xylene	ug/L	<0.8	<0.8	0.8	2586131
Leachable (ZHE) p+m-Xylene	ug/L	<2	<2	2	2586131
Leachable (ZHE) Total Xylenes	ug/L	<2	<2	2	2586131
Surrogate Recovery (%)					
Leachable (ZHE) 1,4-Difluorobenzene	%	103	103		2586131
Leachable (ZHE) 4-Bromofluorobenzene	%	113	111		2586131
Leachable (ZHE) D10-Ethylbenzene	%	101	107		2586131
Leachable (ZHE) D4-1,2-Dichloroethane	%	102	103		2586131

O'REG 558 TCLP LEACHATE PREPARATION (SOIL)

Maxxam ID		KN1995	KN2068		
Sampling Date		2011/08/11 09:30	2011/08/11 16:30		
	Units	**FZ-BH11-4D**	**FZ-MW11-1-A**	**RDL**	**QC Batch**
Inorganics					
Final pH	pH	6.18	6.10		2584719
Initial pH	pH	9.03	9.20		2584719
TCLP - % Solids	%	100	100	0.2	2584709
TCLP Extraction Fluid	N/A	FLUID 1	FLUID 1		2584716

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 558 TCLP METALS (SOIL)

Maxxam ID		KN1995	KN2068		
Sampling Date		2011/08/11 09:30	2011/08/11 16:30		
	Units	**FZ-BH11-4D**	**FZ-MW11-1-A**	**RDL**	**QC Batch**
Metals					
Leachable Mercury (Hg)	mg/L	<0.001	<0.001	0.001	2585421
Leachable Arsenic (As)	mg/L	<0.2	<0.2	0.2	2585413
Leachable Barium (Ba)	mg/L	0.9	0.4	0.2	2585413
Leachable Boron (B)	mg/L	0.2	0.2	0.1	2585413
Leachable Cadmium (Cd)	mg/L	<0.05	<0.05	0.05	2585413
Leachable Chromium (Cr)	mg/L	<0.1	<0.1	0.1	2585413
Leachable Lead (Pb)	mg/L	<0.1	<0.1	0.1	2585413
Leachable Selenium (Se)	mg/L	<0.1	<0.1	0.1	2585413
Leachable Silver (Ag)	mg/L	<0.01	<0.01	0.01	2585413
Leachable Uranium (U)	mg/L	<0.01	<0.01	0.01	2585413

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF SOIL

Maxxam ID		KN1995	KN1998	KN2001	KN2003	KN2004		
Sampling Date		2011/08/11 09:30	2011/08/11 11:00	2011/08/11 11:00	2011/08/11 11:00	2011/08/11 11:00		
	Units	**FZ-BH11-4D**	**FZ-MW-5**	**FZ-BH11-5D-A**	**FZ-MW11-6**	**FZ-BH11-6D-A**	**RDL**	**QC Batch**
Calculated Parameters								
Fraction of Organic Carbon	g/g		0.026		0.12		0.0005	2582229
Fraction of Organic Carbon (rep.#1)	g/g		0.026		0.13		0.0005	2582229
Fraction of Organic Carbon (rep.#2)	g/g		0.027		0.13		0.0005	2582229
Average FOC Result	g/g		0.026		0.13		0.0005	2582229
Inorganics								
Moisture	%		11				1	2583355
Available (CaCl2) pH	pH	7.11		7.37		7.16		2583268
Phenols-4AAP	ug/g		<0.04	<0.04	<0.04	0.05	0.04	2585302
Total Organic Carbon	mg/kg		26000		120000		500	2585776
Total Organic Carbon (repeat #1)	mg/kg		26000		130000		500	2585776
Total Organic Carbon (repeat #2)	mg/kg		27000		130000		500	2585776
Miscellaneous Parameters								
Grain Size	%			COARSE			N/A	2589204
Sieve - #200 (<0.075mm)	%			38			N/A	2589204
Sieve - #200 (>0.075mm)	%			62			N/A	2589204

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF SOIL

Maxxam ID		KN2069	KN2070	KN2074	KN2075	KN2076		
Sampling Date		2011/08/11 16:30	2011/08/11 16:30	2011/08/11 19:00	2011/08/11 19:00	2011/08/11 19:00		
	Units	**FZ-MW11-1-B**	**FZ-BH11-10D-A**	**FZ-MW11-2-A**	**FZ-MW11-2-B**	**DUP-1**	**RDL**	**QC Batch**
Inorganics								
Available (CaCl2) pH	pH	7.19		7.19				2583268
Phenols-4AAP	ug/g	<0.04	<0.04			<0.04	0.04	2585302
Miscellaneous Parameters								
Grain Size	%			COARSE	FINE		N/A	2589204
Sieve - #200 (<0.075mm)	%			35	62		N/A	2589204
Sieve - #200 (>0.075mm)	%			65	38		N/A	2589204

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		KN1995		KN1998	KN2001		KN2003		KN2004		KN2069		
Sampling Date		2011/08/11 09:30		2011/08/11 11:00	2011/08/11 11:00		2011/08/11 11:00		2011/08/11 11:00		2011/08/11 16:30		
	Units	**FZ-BH11-4D**	**RDL**	**FZ-MW-5**	**FZ-BH11-5D-A**	**RDL**	**FZ-MW11-6**	**RDL**	**FZ-BH11-6D-A**	**RDL**	**FZ-MW11-1-B**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons													
1-Methylnaphthalene	mg/kg	0.42	0.005	0.13	0.037	0.005	0.99	0.005	6.6(1)	0.3	0.014	0.005	2586080
2-Methylnaphthalene	mg/kg	0.46	0.005	0.042	0.034	0.005	1.8	0.005	13(1)	0.3	0.026	0.005	2586080
Acenaphthene	mg/kg	1.9	0.005	0.053	0.034	0.005	7.4(1)	0.05	21(1)	0.3	0.052	0.005	2586080
Acenaphthylene	mg/kg	0.36	0.005	0.22	0.072	0.005	0.49	0.005	0.30	0.005	<0.005	0.005	2586080
Anthracene	mg/kg	5.2	0.005	0.32	0.19	0.005	16(1)	0.05	16(1)	0.3	0.068	0.005	2586080
Benzo(a)anthracene	mg/kg	7.7(1)	0.05	0.91	0.62	0.005	22(1)	0.05	3.7	0.005	0.021	0.005	2586080
Benzo(a)pyrene	mg/kg	5.1	0.005	0.97	0.52	0.005	15(1)	0.05	1.3	0.005	0.006	0.005	2586080
Benzo(b)fluoranthene	mg/kg	4.9	0.005	0.74	0.50	0.005	13(1)	0.05	1.5	0.005	0.005	0.005	2586080
Benzo(g,h,i)perylene	mg/kg	2.7	0.005	0.63	0.32	0.005	8.0(1)	0.05	0.45	0.005	<0.005	0.005	2586080
Benzo(j)fluoranthene	mg/kg	2.6	0.005	0.41	0.29	0.005	6.6	0.005	0.83	0.005	<0.005	0.005	2586080
Benzo(k)fluoranthene	mg/kg	2.7	0.005	0.40	0.28	0.005	7.6(1)	0.05	0.84	0.005	<0.005	0.005	2586080
Chrysene	mg/kg	6.7	0.005	0.94	0.65	0.005	20(1)	0.05	3.1	0.005	0.022	0.005	2586080
Dibenz(a,h)anthracene	mg/kg	0.91	0.005	0.16	0.089	0.005	2.3	0.005	0.16	0.005	<0.005	0.005	2586080
Fluoranthene	mg/kg	19(1)	0.05	1.5	1.3	0.005	53(1)	0.05	26(1)	0.3	0.14	0.005	2586080
Fluorene	mg/kg	2.4	0.005	0.11	0.050	0.005	8.3(1)	0.05	24(1)	0.3	0.059	0.005	2586080
Indeno(1,2,3-cd)pyrene	mg/kg	2.6	0.005	0.52	0.29	0.005	6.7	0.005	0.44	0.005	<0.005	0.005	2586080
Naphthalene	mg/kg	0.54	0.005	0.11	0.031	0.005	4.9	0.005	47(1)	0.3	0.075	0.005	2586080
Perylene	mg/kg	1.3	0.005	0.25	0.13	0.005	3.3	0.005	0.35	0.005	0.008	0.005	2586080
Phenanthrene	mg/kg	19(1)	0.05	1.1	0.68	0.005	55(1)	0.05	51(1)	0.3	0.28	0.005	2586080
Pyrene	mg/kg	14(1)	0.05	1.5	1.1	0.005	41(1)	0.05	16(1)	0.3	0.086	0.005	2586080
Surrogate Recovery (%)													
D10-Anthracene	%	54		52	52		53		51		59		2586080
D14-Terphenyl	%	59		64	65		70		60		83		2586080
D8-Acenaphthylene	%	103		96	102		89		103		90		2586080

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Elevated PAH RDL(s) due to sample dilution.

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		KN2070		KN2073		KN2074		KN2076		
Sampling Date		2011/08/11 16:30		2011/08/11 18:30		2011/08/11 19:00		2011/08/11 19:00		
	Units	**FZ-BH11-10D-A**	**RDL**	**FZ-BH11-8D-B**	**RDL**	**FZ-MW11-2-A**	**RDL**	**DUP-1**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons										
1-Methylnaphthalene	mg/kg	0.21	0.005	0.009	0.005	2.5	0.005	1.2	0.005	2586080
2-Methylnaphthalene	mg/kg	0.34	0.005	0.013	0.005	2.4	0.005	1.9	0.005	2586080
Acenaphthene	mg/kg	2.0	0.005	0.039	0.005	3.0	0.005	2.6	0.005	2586080
Acenaphthylene	mg/kg	0.38	0.005	<0.005	0.005	1.1	0.005	0.87	0.005	2586080
Anthracene	mg/kg	5.5	0.005	0.14	0.005	4.4	0.005	12 (1)	0.05	2586080
Benzo(a)anthracene	mg/kg	10 (1)	0.05	0.21	0.005	7.3	0.005	17 (1)	0.05	2586080
Benzo(a)pyrene	mg/kg	6.4	0.005	0.15	0.005	6.5	0.005	10 (1)	0.05	2586080
Benzo(b)fluoranthene	mg/kg	5.9	0.005	0.15	0.005	5.8	0.005	8.7 (1)	0.05	2586080
Benzo(g,h,i)perylene	mg/kg	3.1	0.005	0.092	0.005	3.8	0.005	4.3	0.005	2586080
Benzo(j)fluoranthene	mg/kg	3.2	0.005	0.089	0.005	3.4	0.005	4.1	0.005	2586080
Benzo(k)fluoranthene	mg/kg	3.3	0.005	0.087	0.005	3.5	0.005	4.2	0.005	2586080
Chrysene	mg/kg	9.9 (1)	0.05	0.22	0.005	7.8 (1)	0.05	16 (1)	0.05	2586080
Dibenz(a,h)anthracene	mg/kg	1.1	0.005	0.023	0.005	1.1	0.005	1.4	0.005	2586080
Fluoranthene	mg/kg	24 (1)	0.05	0.52	0.005	19 (1)	0.05	41 (1)	0.05	2586080
Fluorene	mg/kg	2.6	0.005	0.047	0.005	7.2	0.005	3.8	0.005	2586080
Indeno(1,2,3-cd)pyrene	mg/kg	3.0	0.005	0.080	0.005	3.5	0.005	4.1	0.005	2586080
Naphthalene	mg/kg	0.73	0.005	0.029	0.005	2.0	0.005	3.2	0.005	2586080
Perylene	mg/kg	1.6	0.005	0.043	0.005	1.3	0.005	2.0	0.005	2586080
Phenanthrene	mg/kg	23 (1)	0.05	0.44	0.005	19 (1)	0.05	45 (1)	0.05	2586080
Pyrene	mg/kg	18 (1)	0.05	0.39	0.005	15 (1)	0.05	32 (1)	0.05	2586080
Surrogate Recovery (%)										
D10-Anthracene	%	64		52		56		55		2586080
D14-Terphenyl	%	78		62		65		64		2586080
D8-Acenaphthylene	%	106		92		105		104		2586080

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Elevated PAH RDL(s) due to sample dilution.

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KN1995	KN2075		
Sampling Date		2011/08/11 09:30	2011/08/11 19:00		
	Units	**FZ-BH11-4D**	**FZ-MW11-2-B**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons					
F1 (C6-C10)	ug/g	<10	<10	10	2586347
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	2586347
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/g		<10	10	2596630
F3 (C16-C34 Hydrocarbons)	ug/g		<10	10	2596630
F4 (C34-C50 Hydrocarbons)	ug/g		<10	10	2596630
Reached Baseline at C50	ug/g		YES		2596630
Surrogate Recovery (%)					
1,4-Difluorobenzene	%	115	91		2586347
4-Bromofluorobenzene	%	104	83		2586347
D10-Ethylbenzene	%	86	104		2586347
D4-1,2-Dichloroethane	%	118	77		2586347
o-Terphenyl	%		113		2596630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Test Summary

Maxxam ID KN1995
Sample ID FZ-BH11-4D
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/16	NATALIYA GNIDASH
CCME F1 Hydrocarbons/BTEX in Leachate	HSGC/MSFD	2586131	2011/08/18	2011/08/19	GALINA BAGLAY
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2586347	2011/08/18	2011/08/18	PAUL RUBINATO
Mercury (TCLP Leachable) (mg/L)	CVAA	2585421	N/A	2011/08/18	LAWRENCE CHEUNG
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	2585413	2011/08/17	2011/08/18	AREFA DABHAD
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/22	GINA THOMPSON
pH CaCl2 EXTRACT		2583268	2011/08/16	2011/08/16	XUANHONG QIU
TCLP - % Solids	BAL	2584709	2011/08/16	2011/08/17	JIAN (KEN) WANG
TCLP - Extraction Fluid		2584716	N/A	2011/08/17	JIAN (KEN) WANG
TCLP - Initial and final pH	PH	2584719	N/A	2011/08/17	JIAN (KEN) WANG
TCLP Zero Headspace Extraction		2584880	2011/08/17	2011/08/17	FOZIA TABASUM
Volatile Organic Compounds in Soil	P&T/MS	2583292	2011/08/16	2011/08/18	AMPOMAH ADUTWUM

Maxxam ID KN1995 Dup
Sample ID FZ-BH11-4D
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
CCME F1 Hydrocarbons/BTEX in Leachate	HSGC/MSFD	2586131	2011/08/18	2011/08/19	GALINA BAGLAY
TCLP Zero Headspace Extraction		2584880	2011/08/17	2011/08/17	FOZIA TABASUM

Maxxam ID KN1996
Sample ID FZ-BH11-4D-A
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2588284	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER

Test Summary

Maxxam ID KN1997 **Collected** 2011/08/11
Sample ID FZ-BH11-4D-B **Shipped**
Matrix Soil **Received** 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2588284	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER

Maxxam ID KN1998 **Collected** 2011/08/11
Sample ID FZ-MW-5 **Shipped**
Matrix Soil **Received** 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Fraction Organic Carbon in Triplicate		2582229	N/A	2011/08/19	EWA PRANJIC
Moisture	BAL	2583355	N/A	2011/08/16	TONY WEINGARTSHOFER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/20	GINA THOMPSON
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM
Total Organic Carbon in Triplicate	LECO	2585776	N/A	2011/08/19	GODWIN OKEREKE

Maxxam ID KN1999 **Collected** 2011/08/11
Sample ID FZ-MW-5-A **Shipped**
Matrix Soil **Received** 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2586822	2011/08/18	2011/08/18	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER

Test Summary

Maxxam ID KN1999 Dup
Sample ID FZ-MW-5-A
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER

Maxxam ID KN2000
Sample ID FZ-MW-5-B
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER

Maxxam ID KN2001
Sample ID FZ-BH11-5D-A
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/16	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/20	GINA THOMPSON
pH CaCl2 EXTRACT		2583268	2011/08/16	2011/08/16	XUANHONG QIU
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM
Sieve, 75um	PSIV	2589204	N/A	2011/08/22	LAKHVIR KALER

Test Summary

Maxxam ID KN2001 Dup
Sample ID FZ-BH11-5D-A
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN

Maxxam ID KN2002
Sample ID FZ-BH11-5D-B
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/22	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER

Maxxam ID KN2003
Sample ID FZ-MW11-6
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Fraction Organic Carbon in Triplicate		2582229	N/A	2011/08/19	AUTOMATED STATCHK
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/23	GINA THOMPSON
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM
Total Organic Carbon in Triplicate	LECO	2585776	N/A	2011/08/19	GODWIN OKEREKE

Test Summary

Maxxam ID KN2004
Sample ID FZ-BH11-6D-A
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/16	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2586347	2011/08/18	2011/08/18	PAUL RUBINATO
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2582201	2011/08/15	2011/08/16	LYNDSEY HART
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/22	GINA THOMPSON
pH CaCl2 EXTRACT		2583268	2011/08/16	2011/08/16	XUANHONG QIU
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM

Maxxam ID KN2067
Sample ID FZ-BH11-6D-B
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER

Maxxam ID KN2068
Sample ID FZ-MW11-1-A
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
CCME F1 Hydrocarbons/BTEX in Leachate	HSGC/MSFD	2586131	2011/08/18	2011/08/19	GALINA BAGLAY
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2582201	2011/08/15	2011/08/16	LYNDSEY HART
Mercury (TCLP Leachable) (mg/L)	CVAA	2585421	N/A	2011/08/18	LAWRENCE CHEUNG
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	2585413	2011/08/17	2011/08/18	AREFA DABHAD
MOISTURE	BAL	2582245	N/A	2011/08/18	LYNDSEY HART
TCLP - % Solids	BAL	2584709	2011/08/16	2011/08/17	JIAN (KEN) WANG

Test Summary

TCLP - Extraction Fluid		2584716	N/A	2011/08/17	JIAN (KEN) WANG
TCLP - Initial and final pH	PH	2584719	N/A	2011/08/17	JIAN (KEN) WANG
TCLP Zero Headspace Extraction		2584880	2011/08/17	2011/08/17	FOZIA TABASUM

Maxxam ID KN2069
Sample ID FZ-MW11-1-B
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/16	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586366	N/A	2011/08/21	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/22	GINA THOMPSON
pH CaCl2 EXTRACT		2583268	2011/08/16	2011/08/16	XUANHONG QIU
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM

Maxxam ID KN2070
Sample ID FZ-BH11-10D-A
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/16	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2582201	2011/08/15	2011/08/16	LYNDSEY HART
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/22	GINA THOMPSON
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM

Test Summary

Maxxam ID KN2071
Sample ID FZ-BH11-10D-B
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER

Maxxam ID KN2072
Sample ID FZ-BH11-8D-A
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER

Maxxam ID KN2073
Sample ID FZ-BH11-8D-B
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/16	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2582201	2011/08/15	2011/08/16	LYNDSEY HART
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/22	GINA THOMPSON

Test Summary

Maxxam ID KN2074
Sample ID FZ-MW11-2-A
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2582785	2011/08/15	2011/08/16	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2587618	2011/08/19	2011/08/20	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
TEH in Soil (AA PIRI)	GC/FID	2592460	2011/08/16	2011/08/26	KELLY KEEPING
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/22	GINA THOMPSON
pH CaCl2 EXTRACT		2583268	2011/08/16	2011/08/16	XUANHONG QIU
VPH in Soil (PIRI2)	PTGC/MS	2584644	2011/08/16	2011/08/17	SHAWN HELMKAY
Sieve, 75um	PSIV	2589204	N/A	2011/08/22	LAKHVIR KALER
ModTPH (T2) Calc. for Soil	CALC	2582227	N/A	2011/08/26	AUTOMATED STATCHK

Maxxam ID KN2075
Sample ID FZ-MW11-2-B
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2586347	2011/08/18	2011/08/18	PAUL RUBINATO
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2596630	2011/08/27	2011/08/30	ZHIYUE (FRANK) ZHU
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER
Sieve, 75um	PSIV	2589204	N/A	2011/08/22	LAKHVIR KALER
Volatile Organic Compounds in Soil	P&T/MS	2583292	2011/08/16	2011/08/19	AMPOMAH ADUTWUM

Test Summary

Maxxam ID KN2076
Sample ID DUP-1
Matrix Soil

Collected 2011/08/11
Shipped
Received 2011/08/12

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2588284	2011/08/19	2011/08/19	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2586993	N/A	2011/08/22	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2588279	2011/08/19	2011/08/19	VIVIANA CANZONIERI
Moisture	BAL	2588384	N/A	2011/08/19	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2586080	2011/08/18	2011/08/22	GINA THOMPSON
Phenols (4AAP)	TECH	2585302	N/A	2011/08/18	BRAMDEO MOTIRAM

Package 1	8.3°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

ABN Analysis: Due to the sample matrix, some of the samples required dilutions. Detection limits were adjusted accordingly.

Hexavalent Chromium
Due to colour interferences, some samples required dilution. Detection limits were adjusted accordingly.

Sample KN1995-01: VOC Analysis: Detection limits were adjusted for low sample weight.

Sample KN2068-01: VOC Analysis (ZHE Leachates): Sample jar had headspace before leaching was performed on this sample. Please view results with discretion.

Sample KN2074-01: ABN Analysis: Detection limits were adjusted for high moisture content.

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
2582201	o-Terphenyl	2011/08/15	69	30 - 130	74	30 - 130	68	%				
2582201	F2 (C10-C16 Hydrocarbons)	2011/08/16	118	60 - 130	127	60 - 130	<10	ug/g	NC	50		
2582201	F3 (C16-C34 Hydrocarbons)	2011/08/16	118	60 - 130	127	60 - 130	<10	ug/g	1.8	50		
2582201	F4 (C34-C50 Hydrocarbons)	2011/08/16	118	60 - 130	127	60 - 130	<10	ug/g	NC	50		
2582245	Moisture	2011/08/18							11.3	50		
2582785	2,4,6-Tribromophenol	2011/08/15	31	10 - 130	74	10 - 130	37	%				
2582785	2-Fluorobiphenyl	2011/08/15	84	30 - 130	95	30 - 130	87	%				
2582785	2-Fluorophenol	2011/08/15	22	10 - 130	74	10 - 130	75	%				
2582785	D14-Terphenyl (FS)	2011/08/15	82	30 - 130	87	30 - 130	85	%				
2582785	D5-Nitrobenzene	2011/08/15	58	30 - 130	74	30 - 130	71	%				
2582785	D5-Phenol	2011/08/15	49	10 - 130	79	10 - 130	75	%				
2582785	1,2,4-Trichlorobenzene	2011/08/16	87	30 - 130	114	30 - 130	<0.05	ug/g	NC	50		
2582785	1-Methylnaphthalene	2011/08/16	91	30 - 130	99	30 - 130	<0.03	ug/g	NC	50		
2582785	2,4,5-Trichlorophenol	2011/08/16	24	10 - 130	90	10 - 130	<0.08	ug/g	NC	50		
2582785	2,4,6-Trichlorophenol	2011/08/16	31	10 - 130	94	10 - 130	<0.1	ug/g	NC	50		
2582785	2,4-Dichlorophenol	2011/08/16	9.4 (1, 2)	10 - 130	86	10 - 130	<0.1	ug/g	NC	50		
2582785	2,4-Dimethylphenol	2011/08/16	77	10 - 130	94	10 - 130	<0.2	ug/g	NC	50		
2582785	2,4-Dinitrophenol	2011/08/16	5.5 (1, 2)	10 - 130	3.0 (1, 2)	10 - 130	<0.2	ug/g	NC	50		
2582785	2,4-Dinitrotoluene	2011/08/16	59	30 - 130	82	30 - 130	<0.1	ug/g	NC	50		
2582785	2,6-Dinitrotoluene	2011/08/16	62	30 - 130	87	30 - 130	<0.1	ug/g	NC	50		
2582785	2-Chlorophenol	2011/08/16	28	10 - 130	95	10 - 130	<0.08	ug/g	NC	50		
2582785	2-Methylnaphthalene	2011/08/16	87	30 - 130	100	30 - 130	<0.03	ug/g	NC	50		
2582785	3,3'-Dichlorobenzidine	2011/08/16	108	30 - 130	107	30 - 130	<0.5	ug/g	NC	50		
2582785	Acenaphthene	2011/08/16	95	30 - 130	94	30 - 130	<0.03	ug/g	NC	50		
2582785	Acenaphthylene	2011/08/16	86	30 - 130	93	30 - 130	<0.05	ug/g	NC	50		
2582785	Anthracene	2011/08/16	102	30 - 130	97	30 - 130	<0.03	ug/g	NC	50		
2582785	Benzo(a)anthracene	2011/08/16	84	30 - 130	89	30 - 130	<0.05	ug/g	NC	50		
2582785	Benzo(a)pyrene	2011/08/16	95	30 - 130	94	30 - 130	<0.05	ug/g	NC	50		
2582785	Benzo(b/j)fluoranthene	2011/08/16	86	30 - 130	94	30 - 130	<0.1	ug/g	NC	50		
2582785	Benzo(g,h,i)perylene	2011/08/16	63	30 - 130	82	30 - 130	<0.1	ug/g	NC	50		
2582785	Benzo(k)fluoranthene	2011/08/16	106	30 - 130	100	30 - 130	<0.03	ug/g	NC	50		
2582785	Biphenyl	2011/08/16	102	30 - 130	106	30 - 130	<0.05	ug/g	NC	50		
2582785	Bis(2-chloroethyl)ether	2011/08/16	65	30 - 130	90	30 - 130	<0.2	ug/g	NC	50		
2582785	Bis(2-chloroisopropyl)ether	2011/08/16	74	30 - 130	90	30 - 130	<0.1	ug/g	NC	50		
2582785	Bis(2-ethylhexyl)phthalate	2011/08/16	99	30 - 130	92	30 - 130	<1	ug/g	NC	50		
2582785	Chrysene	2011/08/16	102	30 - 130	96	30 - 130	<0.05	ug/g	NC	50		
2582785	Dibenz(a,h)anthracene	2011/08/16	62	30 - 130	80	30 - 130	<0.05	ug/g	NC	50		
2582785	Diethyl phthalate	2011/08/16	89	30 - 130	91	30 - 130	<0.2	ug/g	NC	50		
2582785	Dimethyl phthalate	2011/08/16	92	30 - 130	105	30 - 130	<0.2	ug/g	NC	50		
2582785	Fluoranthene	2011/08/16	88	30 - 130	94	30 - 130	<0.05	ug/g	NC	50		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2582785	Fluorene	2011/08/16	98	30 - 130	101	30 - 130	<0.03	ug/g	NC	50		
2582785	Indeno(1,2,3-cd)pyrene	2011/08/16	54	30 - 130	75	30 - 130	<0.08	ug/g	NC	50		
2582785	Naphthalene	2011/08/16	90	30 - 130	97	30 - 130	<0.03	ug/g	NC	50		
2582785	p-Chloroaniline	2011/08/16	106	30 - 130	111	30 - 130	<0.2	ug/g	NC	50		
2582785	Pentachlorophenol	2011/08/16	21	10 - 130	16	10 - 130	<0.1	ug/g	NC	50		
2582785	Phenanthrene	2011/08/16	93	30 - 130	93	30 - 130	<0.05	ug/g	NC	50		
2582785	Phenol	2011/08/16	68	10 - 130	103	10 - 130	<0.09	ug/g	NC	50		
2582785	Pyrene	2011/08/16	99	30 - 130	97	30 - 130	<0.05	ug/g	NC	50		
2583292	4-Bromofluorobenzene	2011/08/18	96	60 - 140	94	60 - 140	94	%				
2583292	D10-o-Xylene	2011/08/18	111	50 - 130	103	50 - 130	105	%				
2583292	D4-1,2-Dichloroethane	2011/08/18	106	60 - 140	101	60 - 140	103	%				
2583292	D8-Toluene	2011/08/18	102	60 - 140	103	60 - 140	104	%				
2583292	Acetone (2-Propanone)	2011/08/18	77	60 - 140	48(1, 2)	60 - 140	<0.5	ug/g				
2583292	Benzene	2011/08/18	99	60 - 140	100	60 - 140	<0.02	ug/g				
2583292	Bromodichloromethane	2011/08/18	101	60 - 140	100	60 - 140	<0.05	ug/g				
2583292	Bromoform	2011/08/18	109	60 - 140	107	60 - 140	<0.05	ug/g				
2583292	Bromomethane	2011/08/18	86	60 - 140	92	60 - 140	<0.05	ug/g				
2583292	Carbon Tetrachloride	2011/08/18	99	60 - 140	103	60 - 140	<0.05	ug/g				
2583292	Chlorobenzene	2011/08/18	106	60 - 140	105	60 - 140	<0.05	ug/g				
2583292	Chloroform	2011/08/18	104	60 - 140	102	60 - 140	<0.05	ug/g				
2583292	Dibromochloromethane	2011/08/18	108	60 - 140	105	60 - 140	<0.05	ug/g				
2583292	1,2-Dichlorobenzene	2011/08/18	106	60 - 140	109	60 - 140	<0.05	ug/g				
2583292	1,3-Dichlorobenzene	2011/08/18	106	60 - 140	109	60 - 140	<0.05	ug/g				
2583292	1,4-Dichlorobenzene	2011/08/18	104	60 - 140	106	60 - 140	<0.05	ug/g				
2583292	Dichlorodifluoromethane (FREON 12)	2011/08/18	70	60 - 140	80	60 - 140	<0.05	ug/g				
2583292	1,1-Dichloroethane	2011/08/18	99	60 - 140	101	60 - 140	<0.05	ug/g				
2583292	1,2-Dichloroethane	2011/08/18	106	60 - 140	102	60 - 140	<0.05	ug/g	NC	50		
2583292	1,1-Dichloroethylene	2011/08/18	98	60 - 140	103	60 - 140	<0.05	ug/g				
2583292	cis-1,2-Dichloroethylene	2011/08/18	97	60 - 140	96	60 - 140	<0.05	ug/g				
2583292	trans-1,2-Dichloroethylene	2011/08/18	96	60 - 140	98	60 - 140	<0.05	ug/g				
2583292	1,2-Dichloropropane	2011/08/18	104	60 - 140	101	60 - 140	<0.05	ug/g				
2583292	cis-1,3-Dichloropropene	2011/08/18	102	60 - 140	97	60 - 140	<0.03	ug/g				
2583292	trans-1,3-Dichloropropene	2011/08/18	103	60 - 140	98	60 - 140	<0.04	ug/g				
2583292	Ethylbenzene	2011/08/18	104	60 - 140	106	60 - 140	<0.02	ug/g				
2583292	Ethylene Dibromide	2011/08/18	109	60 - 140	106	60 - 140	<0.05	ug/g	NC	50		
2583292	Hexane	2011/08/18	92	60 - 140	90	60 - 140	<0.05	ug/g	NC	50		
2583292	Methylene Chloride(Dichloromethane)	2011/08/18	89	60 - 140	88	60 - 140	<0.05	ug/g				
2583292	Methyl Isobutyl Ketone	2011/08/18	112	60 - 140	105	60 - 140	<0.5	ug/g				
2583292	Methyl Ethyl Ketone (2-Butanone)	2011/08/18	99	60 - 140	77	60 - 140	<0.5	ug/g				
2583292	Methyl t-butyl ether (MTBE)	2011/08/18	97	60 - 140	93	60 - 140	<0.05	ug/g	NC	50		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2583292	Styrene	2011/08/18	108	60 - 140	106	60 - 140	<0.05	ug/g				
2583292	1,1,1,2-Tetrachloroethane	2011/08/18	109	60 - 140	108	60 - 140	<0.05	ug/g				
2583292	1,1,2,2-Tetrachloroethane	2011/08/18	108	60 - 140	101	60 - 140	<0.05	ug/g				
2583292	Tetrachloroethylene	2011/08/18	94	60 - 140	97	60 - 140	<0.05	ug/g				
2583292	Toluene	2011/08/18	103	60 - 140	104	60 - 140	<0.02	ug/g				
2583292	1,1,1-Trichloroethane	2011/08/18	99	60 - 140	102	60 - 140	<0.05	ug/g				
2583292	1,1,2-Trichloroethane	2011/08/18	107	60 - 140	103	60 - 140	<0.05	ug/g				
2583292	Trichloroethylene	2011/08/18	101	60 - 140	102	60 - 140	<0.05	ug/g				
2583292	Vinyl Chloride	2011/08/18	89	60 - 140	95	60 - 140	<0.02	ug/g				
2583292	p+m-Xylene	2011/08/18	103	60 - 140	104	60 - 140	<0.02	ug/g				
2583292	o-Xylene	2011/08/18	102	60 - 140	101	60 - 140	<0.02	ug/g				
2583292	Trichlorofluoromethane (FREON 11)	2011/08/18	90	60 - 140	105	60 - 140	<0.05	ug/g				
2583292	Xylene (Total)	2011/08/18					<0.02	ug/g				
2584644	Isobutylbenzene - Volatile	2011/08/17	110	60 - 140	95	60 - 140	95	%				
2584644	Benzene	2011/08/18	81	60 - 140	89	60 - 140	<0.03	mg/kg	NC	50		
2584644	Toluene	2011/08/18	119	60 - 140	96	60 - 140	<0.03	mg/kg	NC	50		
2584644	Ethylbenzene	2011/08/18	93	60 - 140	92	60 - 140	<0.03	mg/kg	NC	50		
2584644	Xylene (Total)	2011/08/18	112	60 - 140	97	60 - 140	<0.05	mg/kg	NC	50		
2584644	Aliphatic >C6-C8	2011/08/18					<0.1	mg/kg	6.6	50		
2584644	Aliphatic >C8-C10	2011/08/18					<0.4	mg/kg	6.8	50		
2584644	>C8-C10 Aromatics (-EX)	2011/08/18					<0.1	mg/kg	38.6	50		
2585302	Phenols-4AAP	2011/08/18	107	75 - 125	101	75 - 125	<0.04	ug/g	NC	35		
2585413	Leachable Arsenic (As)	2011/08/18	100	75 - 125	96	85 - 115	<0.2	mg/L	NC	25		
2585413	Leachable Barium (Ba)	2011/08/18	NC(3)	75 - 125	98	85 - 115	<0.2	mg/L	NC	25		
2585413	Leachable Boron (B)	2011/08/18	100	75 - 125	100	85 - 115	<0.1	mg/L	NC	25		
2585413	Leachable Cadmium (Cd)	2011/08/18	104	75 - 125	100	85 - 115	<0.05	mg/L	NC	25		
2585413	Leachable Chromium (Cr)	2011/08/18	106	75 - 125	101	85 - 115	<0.1	mg/L	NC	25		
2585413	Leachable Lead (Pb)	2011/08/18	102	75 - 125	100	85 - 115	<0.1	mg/L	NC	25		
2585413	Leachable Selenium (Se)	2011/08/18	102	75 - 125	99	85 - 115	<0.1	mg/L	NC	25		
2585413	Leachable Silver (Ag)	2011/08/18	103	75 - 125	96	85 - 115	<0.01	mg/L	NC	25		
2585413	Leachable Uranium (U)	2011/08/18	102	75 - 125	99	85 - 115	<0.01	mg/L	NC	25		
2585421	Leachable Mercury (Hg)	2011/08/18	92	75 - 125	95	80 - 120	<0.001	mg/L	NC	25		
2585776	Total Organic Carbon	2011/08/19					<500	mg/kg			94	80 - 120
2585776	Total Organic Carbon (repeat #1)	2011/08/19					<500	mg/kg				
2585776	Total Organic Carbon (repeat #2)	2011/08/19					<500	mg/kg				
2586080	D10-Anthracene	2011/08/19	53	30 - 130	52	30 - 130	82	%				
2586080	D14-Terphenyl	2011/08/19	69	30 - 130	59	30 - 130	85	%				
2586080	D8-Acenaphthylene	2011/08/19	105	30 - 130	92	30 - 130	91	%				
2586080	1-Methylnaphthalene	2011/08/23	NC	30 - 130	80	30 - 130	<0.005	mg/kg	50.2(1, 4)	50		
2586080	2-Methylnaphthalene	2011/08/23	NC	30 - 130	89	30 - 130	<0.005	mg/kg	54.6(1, 4)	50		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2586080	Acenaphthene	2011/08/23	NC	30 - 130	96	30 - 130	<0.005	mg/kg	61.6(1, 4)	50		
2586080	Acenaphthylene	2011/08/23	NC	30 - 130	88	30 - 130	<0.005	mg/kg	10.6	50		
2586080	Anthracene	2011/08/23	NC	30 - 130	114	30 - 130	<0.005	mg/kg	34.5(5)	50		
2586080	Benzo(a)anthracene	2011/08/23	NC	30 - 130	97	30 - 130	<0.005	mg/kg	2.9(5)	50		
2586080	Benzo(a)pyrene	2011/08/23	NC	30 - 130	97	30 - 130	<0.005	mg/kg	8.1(5)	50		
2586080	Benzo(b)fluoranthene	2011/08/23	NC	30 - 130	92	30 - 130	<0.005	mg/kg	10.5(5)	50		
2586080	Benzo(g,h,i)perylene	2011/08/23	NC	30 - 130	86	30 - 130	<0.005	mg/kg	12.8(5)	50		
2586080	Benzo(j)fluoranthene	2011/08/23	NC	30 - 130	112	30 - 130	<0.005	mg/kg	1.1(5)	50		
2586080	Benzo(k)fluoranthene	2011/08/23	NC	30 - 130	99	30 - 130	<0.005	mg/kg	11.7(5)	50		
2586080	Chrysene	2011/08/23	NC	30 - 130	99	30 - 130	<0.005	mg/kg	3.1(5)	50		
2586080	Dibenz(a,h)anthracene	2011/08/23	NC	30 - 130	75	30 - 130	<0.005	mg/kg	19.9	50		
2586080	Fluoranthene	2011/08/23	NC	30 - 130	102	30 - 130	<0.005	mg/kg	14.5(5)	50		
2586080	Fluorene	2011/08/23	NC	30 - 130	89	30 - 130	<0.005	mg/kg	68.8(1, 4)	50		
2586080	Indeno(1,2,3-cd)pyrene	2011/08/23	NC	30 - 130	69	30 - 130	<0.005	mg/kg	7.8(5)	50		
2586080	Naphthalene	2011/08/23	NC	30 - 130	105	30 - 130	<0.005	mg/kg	22.7	50		
2586080	Perylene	2011/08/23	NC	30 - 130	95	30 - 130	<0.005	mg/kg	4.7	50		
2586080	Phenanthrene	2011/08/23	NC	30 - 130	98	30 - 130	<0.005	mg/kg	50.3(1, 6)	50		
2586080	Pyrene	2011/08/23	NC	30 - 130	101	30 - 130	<0.005	mg/kg	7.4(5)	50		
2586131	Leachable (ZHE) 1,4-Difluorobenzene	2011/08/19	102	60 - 140	101	60 - 140	102	%				
2586131	Leachable (ZHE) 4-Bromofluorobenzene	2011/08/19	114	60 - 140	113	60 - 140	110	%				
2586131	Leachable (ZHE) D10-Ethylbenzene	2011/08/19	100	30 - 130	101	30 - 130	101	%				
2586131	Leachable (ZHE) D4-1,2-Dichloroethane	2011/08/19	103	60 - 140	104	60 - 140	105	%				
2586131	Leachable (ZHE) Benzene	2011/08/19	70	70 - 130	70	70 - 130	<0.8	ug/L	NC	40		
2586131	Leachable (ZHE) Toluene	2011/08/19	79	70 - 130	80	70 - 130	<0.8	ug/L	NC	40		
2586131	Leachable (ZHE) Ethylbenzene	2011/08/19	88	70 - 130	88	70 - 130	<0.8	ug/L	NC	40		
2586131	Leachable (ZHE) o-Xylene	2011/08/19	91	70 - 130	92	70 - 130	<0.8	ug/L	NC	40		
2586131	Leachable (ZHE) p+m-Xylene	2011/08/19	90	70 - 130	91	70 - 130	<2	ug/L	NC	40		
2586131	Leachable (ZHE) Total Xylenes	2011/08/19					<2	ug/L	NC	40		
2586347	1,4-Difluorobenzene	2011/08/18			91	60 - 140	89	%				
2586347	4-Bromofluorobenzene	2011/08/18			110	60 - 140	99	%				
2586347	D10-Ethylbenzene	2011/08/18			99	30 - 130	111	%				
2586347	D4-1,2-Dichloroethane	2011/08/18			88	60 - 140	82	%				
2586347	Benzene	2011/08/18			88	60 - 140	<0.02	ug/g	3.9	50		
2586347	Toluene	2011/08/18			102	60 - 140	<0.02	ug/g	5.9	50		
2586347	Ethylbenzene	2011/08/18			108	60 - 140	<0.02	ug/g	4.6	50		
2586347	o-Xylene	2011/08/18			104	60 - 140	<0.02	ug/g	1.1	50		
2586347	p+m-Xylene	2011/08/18			108	60 - 140	<0.04	ug/g	4.5	50		
2586347	F1 (C6-C10)	2011/08/18			76	60 - 140	<10	ug/g	2.2	50		
2586347	Total Xylenes	2011/08/18					<0.04	ug/g				
2586347	F1 (C6-C10) - BTEX	2011/08/18					<10	ug/g				

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
2586366	Chromium (VI)	2011/08/21	47(1, 7)	75 - 125	88	80 - 120	<0.2	ug/g	NC	25	94	75 - 125
2586822	Acid Extractable Antimony (Sb)	2011/08/18	101	75 - 125			<0.2	ug/g	NC	35	104	75 - 125
2586822	Acid Extractable Arsenic (As)	2011/08/18	96	75 - 125			<1	ug/g	NC	35	96	75 - 125
2586822	Acid Extractable Barium (Ba)	2011/08/18	NC(3)	75 - 125			<0.5	ug/g	7.8	35	91	75 - 125
2586822	Acid Extractable Beryllium (Be)	2011/08/18	95	75 - 125			<0.2	ug/g	NC	35	94	75 - 125
2586822	Acid Extractable Boron (B)	2011/08/18	88	75 - 125			<5	ug/g	NC	35	98	75 - 125
2586822	Acid Extractable Cadmium (Cd)	2011/08/18	103	75 - 125			<0.1	ug/g	NC	35	102	75 - 125
2586822	Acid Extractable Chromium (Cr)	2011/08/18	103	75 - 125			<1	ug/g	7.3	35	99	75 - 125
2586822	Acid Extractable Cobalt (Co)	2011/08/18	95	75 - 125			<0.1	ug/g	9.4	35	96	75 - 125
2586822	Acid Extractable Copper (Cu)	2011/08/18	NC(3)	75 - 125			<0.5	ug/g	5.0	35	100	75 - 125
2586822	Acid Extractable Lead (Pb)	2011/08/18	101	75 - 125			<1	ug/g	6.7	35	100	75 - 125
2586822	Acid Extractable Molybdenum (Mo)	2011/08/18	100	75 - 125			<0.5	ug/g	NC	35	100	75 - 125
2586822	Acid Extractable Nickel (Ni)	2011/08/18	98	75 - 125			<0.5	ug/g	4.1	35	96	75 - 125
2586822	Acid Extractable Selenium (Se)	2011/08/18	101	75 - 125			<0.5	ug/g	NC	35	103	75 - 125
2586822	Acid Extractable Silver (Ag)	2011/08/18	100	75 - 125			<0.2	ug/g	NC	35	100	75 - 125
2586822	Acid Extractable Thallium (Tl)	2011/08/18	100	75 - 125			<0.05	ug/g	NC	35	98	75 - 125
2586822	Acid Extractable Uranium (U)	2011/08/18	110	75 - 125			<0.05	ug/g	1.5	25	108	75 - 125
2586822	Acid Extractable Vanadium (V)	2011/08/18	102	75 - 125			<5	ug/g	NC	35	102	75 - 125
2586822	Acid Extractable Zinc (Zn)	2011/08/18	NC(3)	75 - 125			<5	ug/g	10.5	35	103	75 - 125
2586822	Acid Extractable Mercury (Hg)	2011/08/18	111	75 - 125			<0.05	ug/g			107	75 - 125
2586993	Chromium (VI)	2011/08/22	47(1, 7)	75 - 125	107	80 - 120	<0.2	ug/g	NC	25	109	75 - 125
2587618	Hot Water Ext. Boron (B)	2011/08/19					<0.05	ug/g			97	85 - 115
2588279	Acid Extractable Antimony (Sb)	2011/08/19	81	75 - 125			<0.2	ug/g			102	75 - 125
2588279	Acid Extractable Arsenic (As)	2011/08/19	93	75 - 125			<1	ug/g			100	75 - 125
2588279	Acid Extractable Barium (Ba)	2011/08/19	NC	75 - 125			<0.5	ug/g			97	75 - 125
2588279	Acid Extractable Beryllium (Be)	2011/08/19	90	75 - 125			<0.2	ug/g			94	75 - 125
2588279	Acid Extractable Boron (B)	2011/08/22	95	75 - 125			<5	ug/g	NC	35	93	75 - 125
2588279	Acid Extractable Cadmium (Cd)	2011/08/19	95	75 - 125			<0.1	ug/g			98	75 - 125
2588279	Acid Extractable Chromium (Cr)	2011/08/19	NC	75 - 125			<1	ug/g			101	75 - 125
2588279	Acid Extractable Cobalt (Co)	2011/08/19	91	75 - 125			<0.1	ug/g			100	75 - 125
2588279	Acid Extractable Copper (Cu)	2011/08/19	NC	75 - 125			<0.5	ug/g			102	75 - 125
2588279	Acid Extractable Lead (Pb)	2011/08/19	NC	75 - 125			<1	ug/g			101	75 - 125
2588279	Acid Extractable Molybdenum (Mo)	2011/08/19	98	75 - 125			<0.5	ug/g			100	75 - 125
2588279	Acid Extractable Nickel (Ni)	2011/08/19	93	75 - 125			<0.5	ug/g			100	75 - 125
2588279	Acid Extractable Selenium (Se)	2011/08/19	93	75 - 125			<0.5	ug/g			99	75 - 125
2588279	Acid Extractable Silver (Ag)	2011/08/19	94	75 - 125			<0.2	ug/g			98	75 - 125
2588279	Acid Extractable Thallium (Tl)	2011/08/19	84	75 - 125			<0.05	ug/g			100	75 - 125
2588279	Acid Extractable Uranium (U)	2011/08/19	100	75 - 125			<0.05	ug/g			106	75 - 125
2588279	Acid Extractable Vanadium (V)	2011/08/19	94	75 - 125			<5	ug/g			101	75 - 125
2588279	Acid Extractable Zinc (Zn)	2011/08/19	NC	75 - 125			<5	ug/g			104	75 - 125

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
2588279	Acid Extractable Mercury (Hg)	2011/08/19	95	75 - 125			<0.05	ug/g			105	75 - 125
2588284	Hot Water Ext. Boron (B)	2011/08/19					<0.05	ug/g			101	85 - 115
2588384	Moisture	2011/08/19							4.0	20		
2589204	Sieve - #200 (<0.075mm)	2011/08/22							0.3	20	88	86 - 91
2589204	Sieve - #200 (>0.075mm)	2011/08/22							0.4	20	12	9 - 14
2592460	Aliphatic >C10-C12	2011/08/25			80	30 - 130	<8.0	mg/kg	0.009	50		
2592460	Aliphatic >C12-C16	2011/08/25			91	30 - 130	<15	mg/kg	NC	50		
2592460	Aliphatic >C16-C21	2011/08/25			98	30 - 130	<15	mg/kg	NC	50		
2592460	Aliphatic >C21-<C32	2011/08/25			96	30 - 130	<15	mg/kg	NC	50		
2592460	Aromatic >C10-C12	2011/08/25			120	30 - 130	<4.0	mg/kg	4.2	50		
2592460	Aromatic >C12-C16	2011/08/25			122	30 - 130	<15	mg/kg	NC	50		
2592460	Aromatic >C16-C21	2011/08/25			129	30 - 130	<15	mg/kg	NC	50		
2592460	Aromatic >C21-<C32	2011/08/25			104	30 - 130	<15	mg/kg	10.7	50		
2592460	Isobutylbenzene - Extractable	2011/08/25					114	%				
2592460	n-Dotriacontane - Extractable	2011/08/25					76	%				
2596630	o-Terphenyl	2011/08/30	105	30 - 130	105	30 - 130	108	%				
2596630	F2 (C10-C16 Hydrocarbons)	2011/08/30	97	60 - 130	93	60 - 130	<10	ug/g	NC	50		
2596630	F3 (C16-C34 Hydrocarbons)	2011/08/30	91	60 - 130	87	60 - 130	<10	ug/g	13.3	50		
2596630	F4 (C34-C50 Hydrocarbons)	2011/08/30	93	60 - 130	91	60 - 130	<10	ug/g	NC	50		

QUALITY ASSURANCE REPORT

			Leachate Blank	
QC Batch	**Parameter**	**Date**	**Value**	**Units**
2585413	Leachable Arsenic (As)	2011/08/18	<0.2	mg/L
2585413	Leachable Barium (Ba)	2011/08/18	<0.2	mg/L
2585413	Leachable Boron (B)	2011/08/18	<0.1	mg/L
2585413	Leachable Cadmium (Cd)	2011/08/18	<0.05	mg/L
2585413	Leachable Chromium (Cr)	2011/08/18	<0.1	mg/L
2585413	Leachable Lead (Pb)	2011/08/18	<0.1	mg/L
2585413	Leachable Selenium (Se)	2011/08/18	<0.1	mg/L
2585413	Leachable Silver (Ag)	2011/08/18	<0.01	mg/L
2585413	Leachable Uranium (U)	2011/08/18	<0.01	mg/L
2585421	Leachable Mercury (Hg)	2011/08/18	<0.001	mg/L
2586131	Leachable (ZHE) 1,4-Difluorobenzene	2011/08/19	100	%
2586131	Leachable (ZHE) 4-Bromofluorobenzene	2011/08/19	111	%
2586131	Leachable (ZHE) D10-Ethylbenzene	2011/08/19	103	%
2586131	Leachable (ZHE) D4-1,2-Dichloroethane	2011/08/19	103	%
2586131	Leachable (ZHE) Benzene	2011/08/19	<0.8	ug/L
2586131	Leachable (ZHE) Toluene	2011/08/19	<0.8	ug/L
2586131	Leachable (ZHE) Ethylbenzene	2011/08/19	<0.8	ug/L
2586131	Leachable (ZHE) o-Xylene	2011/08/19	<0.8	ug/L
2586131	Leachable (ZHE) p+m-Xylene	2011/08/19	<2	ug/L
2586131	Leachable (ZHE) Total Xylenes	2011/08/19	<2	ug/L

N/A = Not Applicable

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Leachate Blank: A blank matrix containing all reagents used in the leaching procedure. Used to determine any process contamination.

QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) - The recovery was below the lower control limit. This may represent a low bias in some results for this specific analyte.

(3) - The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

(4) - Duplicate: results are outside acceptance limit. Analysis was repeated with similar results.

(5) - Elevated PAH RDL(s) due to sample dilution.

(6) - Duplicate: results are outside acceptance limit. Analysis was repeated with similar results. Elevated PAH RDL(s) due to sample dilution.

(7) - The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample.

Validation Signature Page

Maxxam Job #: B1C2240

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eva

CHARTERED
Eva Pranjic
CHEMIST

EWA PRANJIC, M.Sc., C.Chem, Scientific Specialist

Paul

PAUL RUBINATO, Analyst, Maxxam Analytics

Suzana Popović

SUZANA POPOVIC, Supervisor, Hydrocarbons

STEVE ROBERTS, Lab Supervisor, Ottawa

Validation Signature Page

Maxxam Job #: B1C2240

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

FLOYD MAYEDE, Senior Analyst

ROSE MACDONALD, Scientific Specialist (Organics)

ALAN STEWART, Scientific Specialist (Organics)

MEDHAT RISKALLAH, Manager, Hydrocarbon Department

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 2

INVOICE INFORMATION:

Company Name: #10988 Franz Environmental Inc
Contact Name: Invoices, Lillian & Andrew
Address: 329 Churchill Ave N Suite 200
Ottawa ON K1Z 5B8
Phone: (613)721-0555 Fax: (613)721-0029
Email: ahenderson@franzenvironmental.com;lellis@franze

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name: Andrew Henderson
Address:
Phone: (613)721-0555 x226 Fax:
Email: ahenderson@franzenvironmental.com

PROJECT INFORMATION:

Quotation #: B14374
P.O. #:
Project #: 1329-1102
Project Name: 200 Lees Phase 2 ESA
Site #: 1329
Sampled By: Miguel Moreno

Laboratory Use Only:

MAXXAM JOB #:
BOTTLE ORDER #: 275135
CHAIN OF CUSTODY #: C#275135-13-01
PROJECT MANAGER: JULIE CLEMENT

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☒ Table 3 ☐ Agri/Other
☒ Table 9 ☒ For RSC

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg. 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ______
☐ PWQO
☐ Other ______

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ____

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ______ Time Required: ______ ☐
Rush Confirmation Number: ______ *(call lab for #)*

SAMPLES MUST BE KEPT COOL (< 10ºC) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	O'Reg 153 Volatile Organics	O'Reg 153 Semivolatile Organics Package	O'Reg 153 PAHs	O'Reg 153 Metals Package	Phenols (4AAP)	O'Reg 153 Petroleum Hydrocarbons	Sieve, 75um	pH CaCl2 EXTRACT	O'Reg 558 TCLP Metals & BTEX	FOC	# of Bottles	Comments
1	FZ-BH11-4D		Aug 11, 2011	09:30	SOIL			✓	✓	✓			✓		✓	✓		11	NO PHC F2-F4 LIMITED SOIL SAMPLE
2	FZ-BH11-4D-A		〃	〃	SOIL						✓							1	LIMITED SOIL
3	FZ-BH11-4D-B		〃	〃	SOIL						✓							1	LIMITED SOIL
4	FZ-MW-5		〃	11:00	SOIL					✓		✓					✓	3	LIMITED SOIL
5	FZ-MW-5-A		〃	〃	SOIL						✓							1	LIMITED SOIL
6	FZ-MW-5-B		〃	〃	SOIL						✓							1	LIMITED SOIL
7	FZ-BH11-5D-A		〃		SOIL				✓	✓	✓	✓		✓	✓			6	〃
8	FZ-BH11-5D-B		〃		SOIL						✓							1	12-Aug-11 09:30 JULIE CLEMENT B1C2240 JOF OTT-011
9	FZ-MW11-6		〃		SOIL					✓	✓	✓					✓	4	
10	FZ-BH11-6D-A		〃		SOIL				✓	✓	✓	✓	✓		✓			9	

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
/ Andrew Henderson	11/08/12	0900	/ Habiba Essak	11/08/12	9:30	

Laboratory Use Only

Time Sensitive	Temperature (ºC) on Receipt	Custody Seal	Yes	No
	8/8/8 10/8/6	Present		✓
		Intact		✓

White: Maxxam Yellow: Client

JF

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam

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6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 2 of 2

INVOICE INFORMATION:

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Ottawa ON K1Z 5B8
Phone: (613)721-0555 Fax: (613)721-0029
Email: ahenderson@franzenvironmental.com;lellis@franze

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name: Andrew Henderson
Address:
Phone: (613)721-0555 x226 Fax:
Email: ahenderson@franzenvironmental.com

PROJECT INFORMATION:

Quotation #: B14374
P.O. #:
Project #: 1329-1102
Project Name: 200 Lees Phase 2 ESA
Site #:
Sampled By: MIGUEL MADRID

Laboratory Use Only:

MAXXAM JOB #:
BOTTLE ORDER #: 275135
CHAIN OF CUSTODY #: C#275135-14-01
PROJECT MANAGER: JULIE CLEMENT

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☒ Table 3 ☐ Agri/Other
☒ Table 9 ☒ For RSC

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg. 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ____________
☐ PWQO
☐ Other ____________

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ____

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10ºC) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	O'Reg 153 Volatile Organics	GRAIN SIZE	O'Reg 153 Semivolatile Organics Package	O'Reg 153 PAHs	O'Reg 153 Metals Package	Phenols (4AAP)	O'Reg 153 Petroleum Hydrocarbons	Sieve, 75um	pH CaCl2 EXTRACT	O'Reg 558 TCLP Metals & BTEX	PHC FRACTIONATION	# of Bottles	Comments
1	FZ-BH11-6D-B		AUG 11, 2011	15:00	SOIL							✓							1	
2	FZ-MW11-1-A		〃	16:30	SOIL									✓			✓		2	NO BTEX/F1 NO TCLP BTEX/VOCs
3	FZ-MW11-1-B		〃	〃	SOIL					✓	✓	✓	✓			✓			5	LIMITED SOIL
4	FZ-BH11-10D-A		〃		SOIL					✓	✓	✓	✓	✓					5	NO BTEX/F1 LIMITED SOIL
5	FZ-BH11-10D-B		〃		SOIL							✓							6	LIMITED SOIL
6	FZ-BH11-8D-A		〃	18:30	SOIL							✓							14	~~NO BTEX/F1~~ LIMITED SOIL
7	FZ-BH11-8D-B		〃		SOIL					✓	✓	✓		✓					4	NO BTEX/F1 LIMITED SOIL
8	FZ-MW11-2-A		〃	19:00	SOIL					✓	✓	✓			✓	✓		✓	7	LIMITED SOIL
9	FZ-MW11-2-B		〃		SOIL			✓	✓					✓					5	NO PHC F2-F4.
10	DUP-1		〃		SOIL						✓	✓	✓						3	LIMITED SOIL

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

☒ **Regular (Standard) TAT:**
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

☐ **Job Specific Rush TAT (if applies to entire submission)**
Date Required: ____________ Time Required: ________
Rush Confirmation Number: ____________ *(call lab for #)*

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
/ Andrew Henderson	11/08/12	0900	/ Habiba Fosah	11/08/12	9:30	

Laboratory Use Only

Time Sensitive	Temperature (ºC) on Receipt	Custody Seal	Yes	No
	8/8/8	Present		✓
		Intact		✓

10/8/6

JF

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

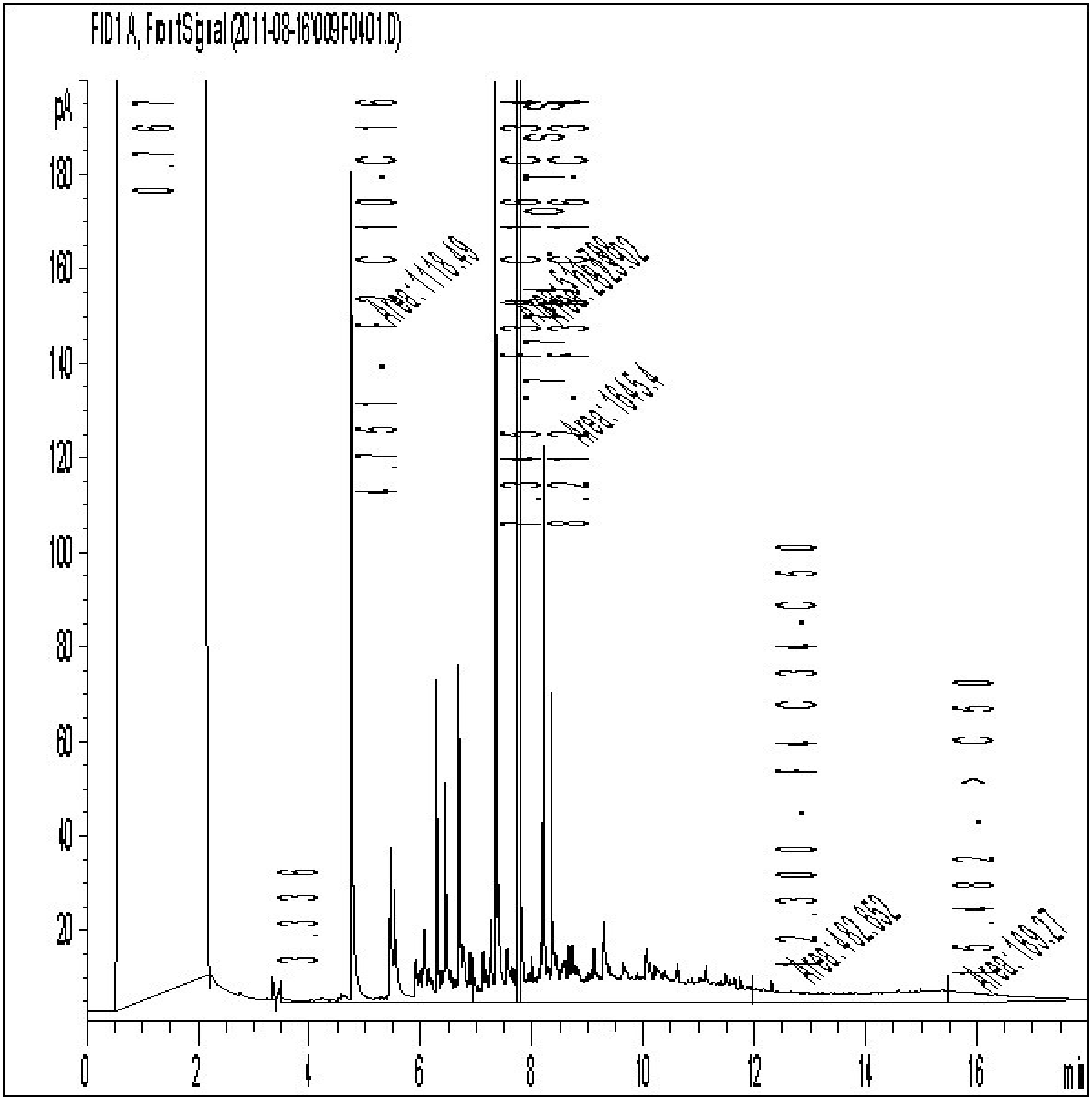
White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Success Through Science®

Franz Environmental Inc
Report Date: 2011/08/31
Client Project #: 1329-1102
Maxxam Job #: B1C2240
Project name: 200 Lees Avenue, Phase II ESA
Maxxam Sample: KN2004
Client ID: FZ-BH11-6D-A

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



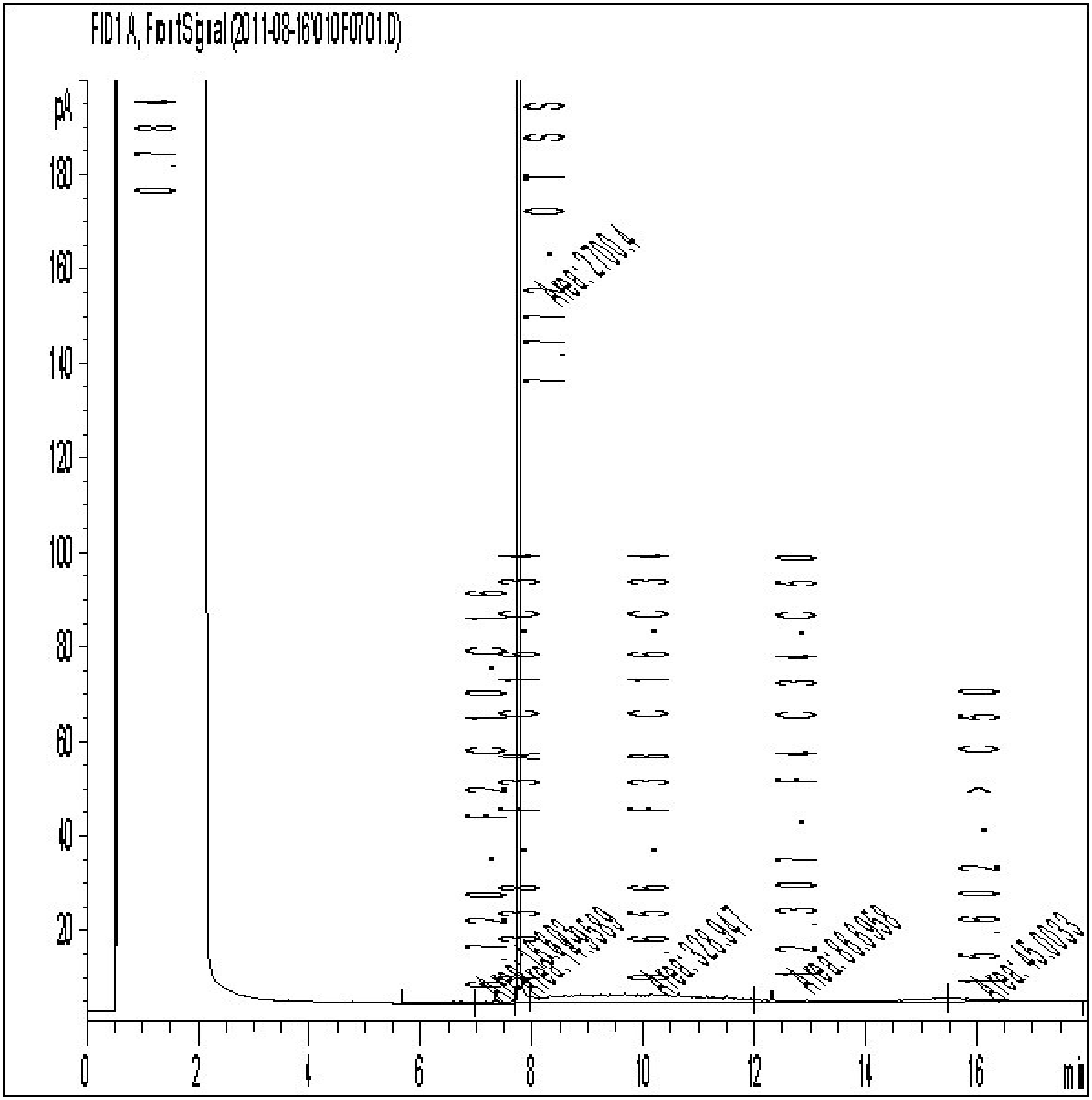
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

Report Date: 2011/08/31
Maxxam Job #: B1C2240
Maxxam Sample: KN2068

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FZ-MW11-1-A

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

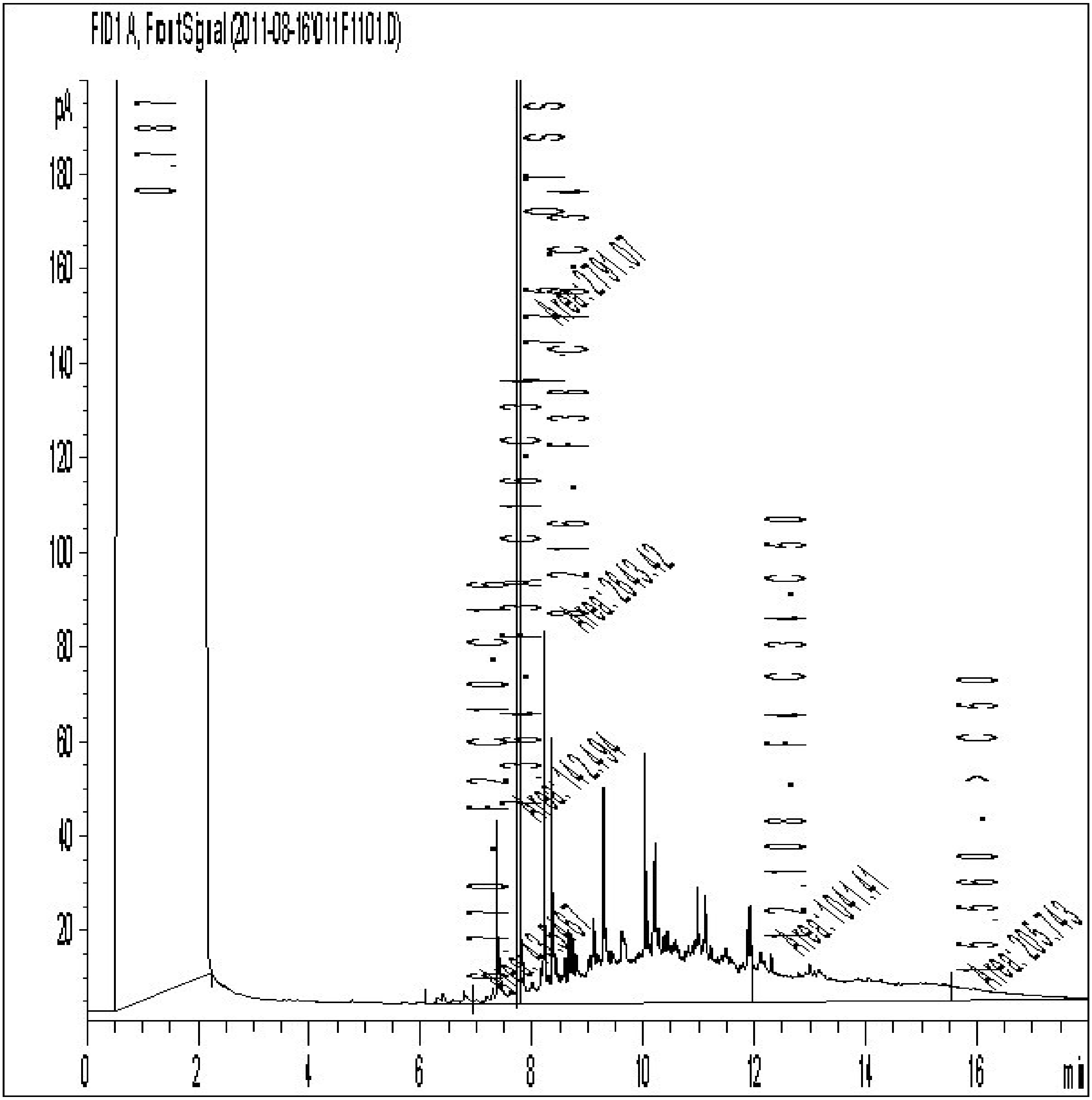


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Report Date: 2011/08/31
Maxxam Job #: B1C2240
Maxxam Sample: KN2070

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FZ-BH11-10D-A

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

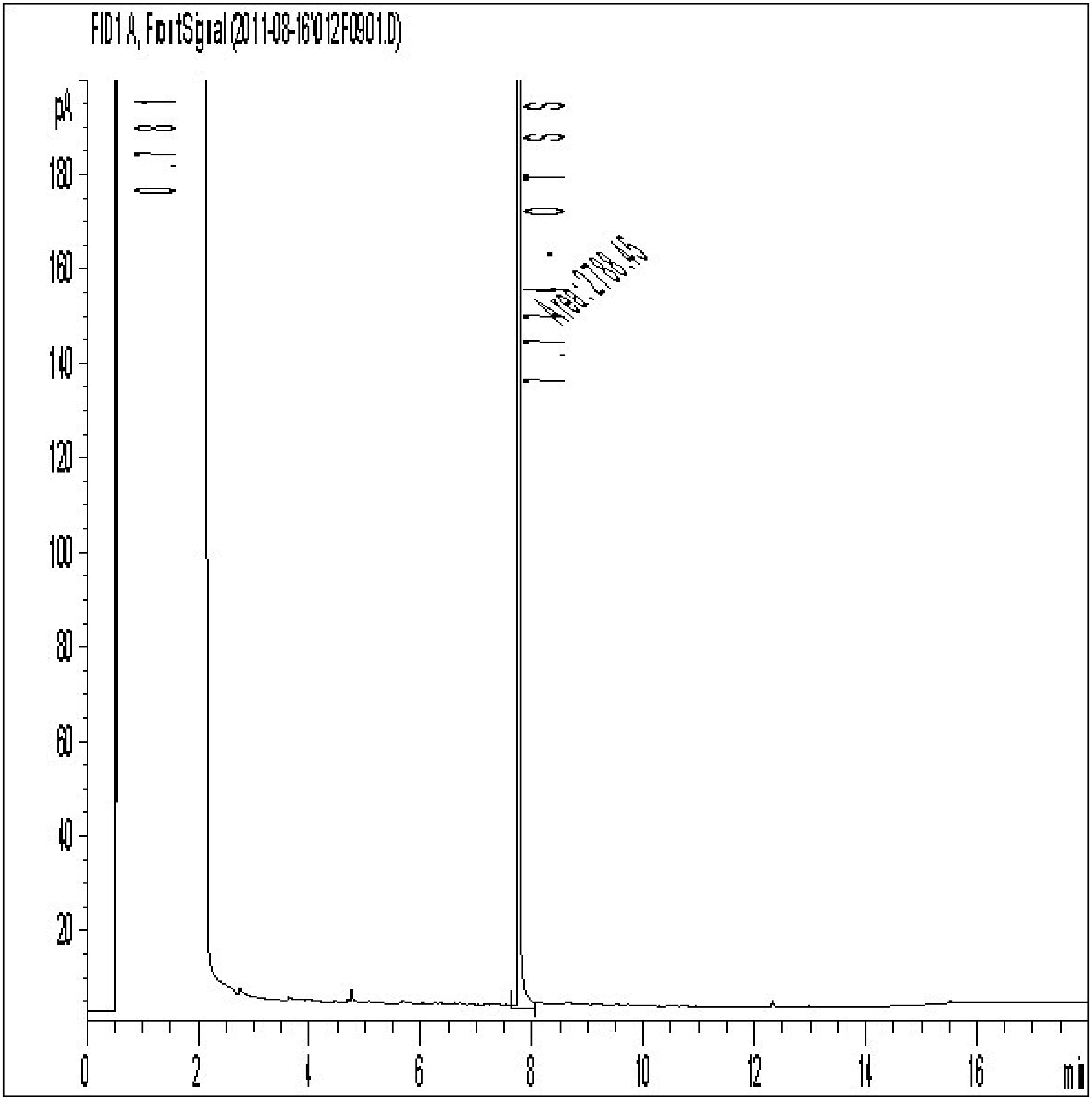


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FZ-BH11-8D-B

Report Date: 2011/08/31
Maxxam Job #: B1C2240
Maxxam Sample: KN2073

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

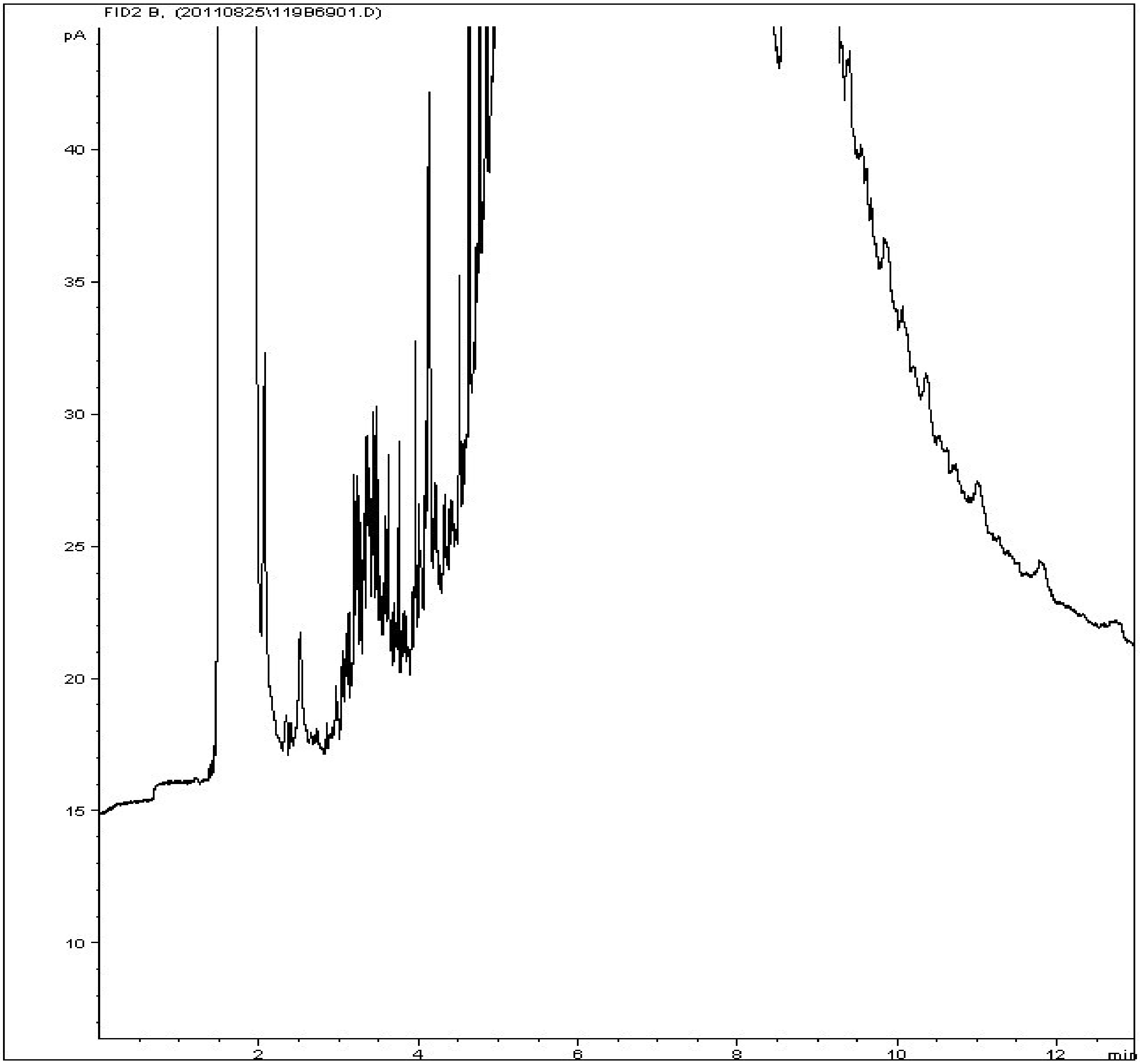


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FZ-MW11-2-A

Report Date: 2011/08/31
Maxxam Job #: B1C2240
Maxxam Sample: KN2074

TEH in Soil (AA PIRI) Chromatogram



Page 1 of 1

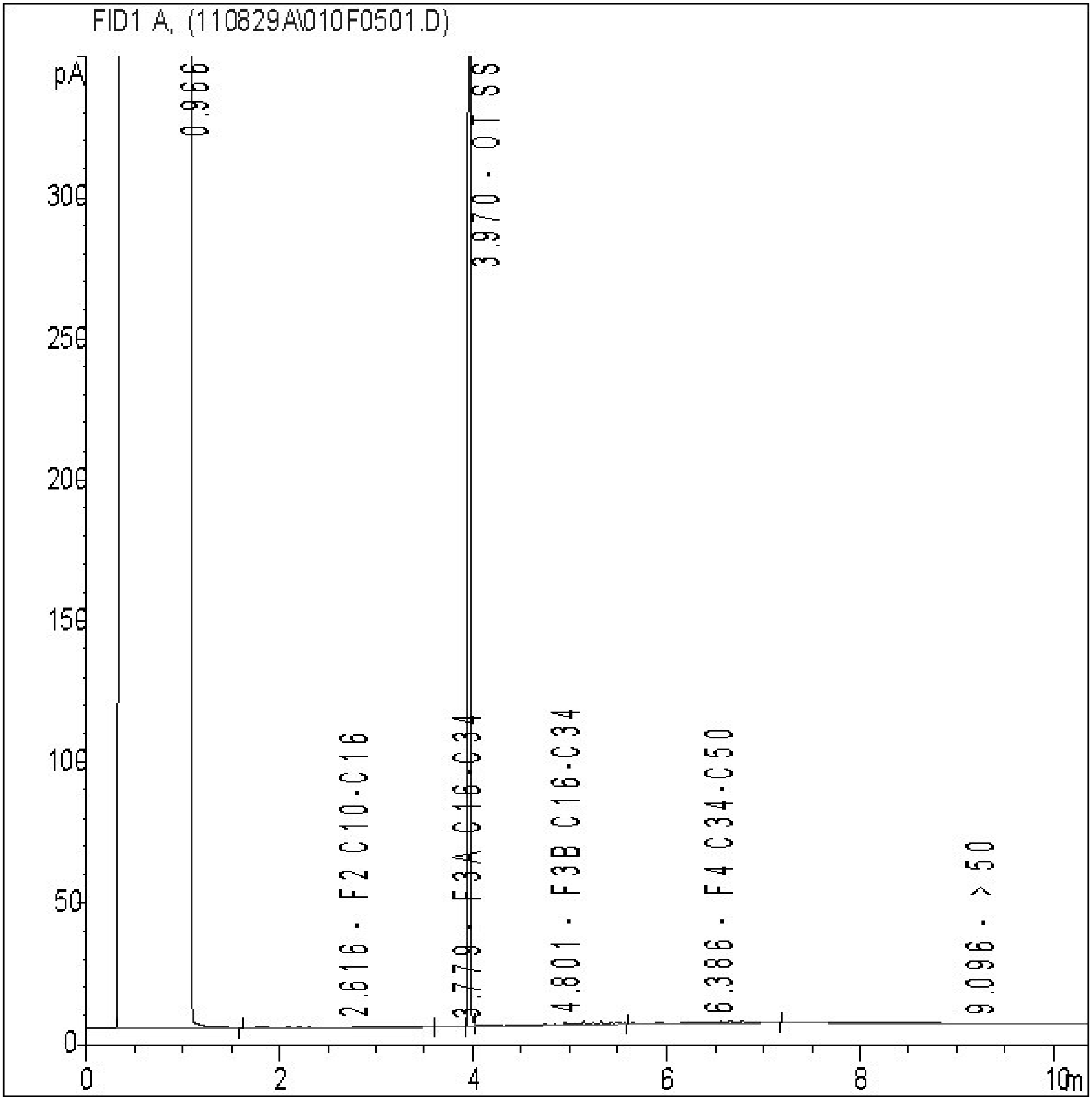
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FZ-MW11-2-B

Report Date: 2011/08/31
Maxxam Job #: B1C2240
Maxxam Sample: KN2075

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Your C.O.C. #: 27513516, 275135-16-01, 275135-10-01

Attention: Andrew Henderson
Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2011/09/06

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1C3566
Received: 2011/08/15, 17:00

Sample Matrix: Soil
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
ABN Compounds in soil by GC/MS (1)	3	2011/08/18	2011/08/19	CAM SOP-00301	EPA 8270 (modified)
Hot Water Extractable Boron (1)	7	2011/08/24	2011/08/24	CAM SOP-00408	R153 Ana. Prot. 2004
Hexavalent Chromium in Soil by IC (1,3)	7	N/A	2011/08/25	CAM SOP-00436	EPA SW846-3060/7199
TEH in Soil (AA PIRI) (2)	1	2011/08/19	2011/08/26	ATL SOP 00116 R3	Based on Atl. PIRI
CCME F1 Hydrocarbons/BTEX in Leachate (1)	1	2011/08/23	2011/08/24	CAM SOP-00315	CCME CWS
Petroleum Hydro. CCME F1 & BTEX in Soil	2	2011/08/18	2011/08/19	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	3	2011/08/16	2011/08/18	OTT SOP-00001	CCME CWS
F4G (CCME Hydrocarbons Gravimetric)	1	2011/08/22	2011/08/23	OTT SOP-00001	CCME CWS
Mercury (TCLP Leachable) (mg/L) (1)	1	N/A	2011/08/23	CAM SOP-00453	EPA 7470
Acid Extr. Metals (aqua regia) by ICPMS (1)	7	2011/08/23	2011/08/23	CAM SOP-00447	EPA 6020
Total Metals in TCLP Leachate by ICPMS (1)	1	2011/08/23	2011/08/23	CAM SOP-00447	EPA 6020
MOISTURE	3	N/A	2011/08/18	CAM SOP-00445	MOE HANDBOOK(1983)
MOISTURE	1	N/A	2011/08/22	CAM SOP-00445	MOE HANDBOOK(1983)
Moisture (1)	7	N/A	2011/08/23	CAM SOP-00445	McKeague 2nd ed 1978
PAH in sediment by GC/MS (Low Level) (2)	1	2011/08/19	2011/08/24	ATL SOP 00102 R4	based on EPA8270C
PAH in sediment by GC/MS (Low Level) (2)	6	2011/08/19	2011/08/25	ATL SOP 00102 R4	based on EPA8270C
Phenols (4AAP) (1)	1	N/A	2011/08/23	CAM SOP-00444	MOE ROPHEN-E3179
VPH in Soil (PIRI2) (2)	1	2011/08/19	2011/08/31	ATL SOP 00120 R5	Based on Atl. PIRI
Sieve, 75um (1,4)	4	N/A	2011/08/24	CAM SOP-00467	
TCLP - % Solids (1)	1	2011/08/22	2011/08/23	CAM SOP-00401	EPA 1311 modified
TCLP - Extraction Fluid (1)	1	N/A	2011/08/23	CAM SOP-00401	EPA 1311 modified
TCLP - Initial and final pH (1)	1	N/A	2011/08/23	CAM SOP-00401	EPA 1311 modified
ModTPH (T2) Calc. for Soil (2)	1	N/A	2011/09/01	n/a	Based on Atl. PIRI
TCLP Zero Headspace Extraction (1)	1	2011/08/22	2011/08/22	CAM SOP-00430	EPA 1311 modified
Volatile Organic Compounds in Soil (1)	1	2011/08/18	2011/08/19	CAM SOP-00226	EPA 8260 modified

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) This test was performed by Maxxam Analytics Mississauga
(2) This test was performed by Bedford
(3) Soils are reported on a dry weight basis unless otherwise specified.
(4) The Sieve test has been validated in accordance with ISO Guide 17025 requirements. SCC accreditation pending.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JULIE CLEMENT, Ottawa Customer Service
Email: JClement@maxxam.ca
Phone# (613) 274-3549

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

ATLANTIC FRACTIONATION (PIRIT2) IN SOIL

Maxxam ID		KN9316		
Sampling Date		2011/08/12 11:30		
	Units	**FZ-MW11-3**	**RDL**	**QC Batch**
Petroleum Hydrocarbons				
Benzene	mg/kg	<0.03	0.03	2600237
Toluene	mg/kg	0.06	0.03	2600237
Ethylbenzene	mg/kg	<0.03	0.03	2600237
Xylene (Total)	mg/kg	0.11	0.05	2600237
Aliphatic >C6-C8	mg/kg	0.5	0.1	2600237
Aliphatic >C8-C10	mg/kg	0.9	0.4	2600237
>C8-C10 Aromatics (-EX)	mg/kg	<0.1	0.1	2600237
Aliphatic >C10-C12	mg/kg	<8.0	8.0	2592460
Aliphatic >C12-C16	mg/kg	<15	15	2592460
Aliphatic >C16-C21	mg/kg	<15	15	2592460
Aliphatic >C21-<C32	mg/kg	61	15	2592460
Aromatic >C10-C12	mg/kg	6.3	4.0	2592460
Aromatic >C12-C16	mg/kg	<15	15	2592460
Aromatic >C16-C21	mg/kg	78	15	2592460
Aromatic >C21-<C32	mg/kg	200	15	2592460
Modified TPH (Tier 2)	mg/kg	350	20	2583749
Reached Baseline at C32	mg/kg	YES	N/A	2592460
Hydrocarbon Resemblance	mg/kg	COMMENT(1)	N/A	2592460
Surrogate Recovery (%)				
Isobutylbenzene - Extractable	%	110		2592460
Isobutylbenzene - Volatile	%	103		2600237
n-Dotriacontane - Extractable	%	82(2)		2592460

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Lube oil fraction; interference from possible PAHs.
(2) - TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

Maxxam Job #: B1C3566
Report Date: 2011/09/06

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MN

O'REG 153 METALS PACKAGE (SOIL)

Maxxam ID		KN9313		KN9316			KN9317		
Sampling Date		2011/08/12 07:45		2011/08/12 11:30			2011/08/12 10:15		
	Units	**FZ-BH11-7D-A**	**RDL**	**FZ-MW11-3**	**RDL**	**QC Batch**	**FZ-BH11-1S**	**RDL**	**QC Batch**
Inorganics									
Chromium (VI)	ug/g	<0.2	0.2	<1	1	2591003	<2	2	2591003
Moisture	%	4	1			2591219	21	1	2591444
Metals									
Hot Water Ext. Boron (B)	ug/g	0.10	0.05	1.4	0.05	2592364	2.9	0.05	2592364
Acid Extractable Antimony (Sb)	ug/g	5.1	0.2	8.6	0.2	2591177	16	0.2	2591177
Acid Extractable Arsenic (As)	ug/g	2	1	15	1	2591177	8	1	2591177
Acid Extractable Barium (Ba)	ug/g	24	0.5	510	0.5	2591177	630	0.5	2591177
Acid Extractable Beryllium (Be)	ug/g	0.2	0.2	0.4	0.2	2591177	0.4	0.2	2591177
Acid Extractable Boron (B)	ug/g	<5	5	12	5	2591177	9	5	2591177
Acid Extractable Cadmium (Cd)	ug/g	<0.1	0.1	1.4	0.1	2591177	2.7	0.1	2591177
Acid Extractable Chromium (Cr)	ug/g	8	1	33	1	2591177	26	1	2591177
Acid Extractable Cobalt (Co)	ug/g	4.2	0.1	7.0	0.1	2591177	6.9	0.1	2591177
Acid Extractable Copper (Cu)	ug/g	13	0.5	410	0.5	2591177	250	0.5	2591177
Acid Extractable Lead (Pb)	ug/g	48	1	1100	1	2591177	650	1	2591177
Acid Extractable Molybdenum (Mo)	ug/g	<0.5	0.5	2.9	0.5	2591177	1.5	0.5	2591177
Acid Extractable Nickel (Ni)	ug/g	6.5	0.5	32	0.5	2591177	21	0.5	2591177
Acid Extractable Selenium (Se)	ug/g	<0.5	0.5	1.5	0.5	2591177	0.8	0.5	2591177
Acid Extractable Silver (Ag)	ug/g	<0.2	0.2	0.7	0.2	2591177	0.5	0.2	2591177
Acid Extractable Thallium (Tl)	ug/g	0.08	0.05	0.18	0.05	2591177	0.12	0.05	2591177
Acid Extractable Uranium (U)	ug/g	0.45	0.05	0.45	0.05	2591177	0.38	0.05	2591177
Acid Extractable Vanadium (V)	ug/g	20	5	26	5	2591177	24	5	2591177
Acid Extractable Zinc (Zn)	ug/g	22	5	1000	5	2591177	2400	50	2591177
Acid Extractable Mercury (Hg)	ug/g	<0.05	0.05	2.1	0.05	2591177	0.37	0.05	2591177

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 METALS PACKAGE (SOIL)

Maxxam ID		KN9318	KN9319		KN9321		KN9328		
Sampling Date		2011/08/12 10:30	2011/08/12 10:45		2011/08/12		2011/08/12		
	Units	**FZ-BH11-3S**	**FZ-BH11-4S**	**RDL**	**DUP 3**	**RDL**	**DUP 4**	**RDL**	**QC Batch**
Inorganics									
Chromium (VI)	ug/g	<1	<1	1	<1	1	<1	1	2591003
Moisture	%	19	15	1	20	1	19	1	2591444
Metals									
Hot Water Ext. Boron (B)	ug/g	0.48	0.53	0.05	2.8	0.05	0.46	0.05	2592364
Acid Extractable Antimony (Sb)	ug/g	8.0	24	0.2	17	0.2	7.7	0.2	2591177
Acid Extractable Arsenic (As)	ug/g	19	22	1	9	1	20	1	2591177
Acid Extractable Barium (Ba)	ug/g	350	450	0.5	640	0.5	390	0.5	2591177
Acid Extractable Beryllium (Be)	ug/g	0.8	0.7	0.2	0.3	0.2	0.9	0.2	2591177
Acid Extractable Boron (B)	ug/g	8	7	5	11	5	7	5	2591177
Acid Extractable Cadmium (Cd)	ug/g	1.0	1.6	0.1	3.3	0.1	1.3	0.1	2591177
Acid Extractable Chromium (Cr)	ug/g	23	33	1	30	1	25	1	2591177
Acid Extractable Cobalt (Co)	ug/g	7.1	8.7	0.1	7.4	0.1	8.1	0.1	2591177
Acid Extractable Copper (Cu)	ug/g	140	210	0.5	200	0.5	140	0.5	2591177
Acid Extractable Lead (Pb)	ug/g	700	1600	1	710	1	760	1	2591177
Acid Extractable Molybdenum (Mo)	ug/g	5.3	4.8	0.5	1.8	0.5	5.6	0.5	2591177
Acid Extractable Nickel (Ni)	ug/g	33	30	0.5	23	0.5	34	0.5	2591177
Acid Extractable Selenium (Se)	ug/g	2.8	2.4	0.5	0.9	0.5	2.0	0.5	2591177
Acid Extractable Silver (Ag)	ug/g	1.8	2.0	0.2	0.6	0.2	1.4	0.2	2591177
Acid Extractable Thallium (Tl)	ug/g	0.15	0.21	0.05	0.14	0.05	0.17	0.05	2591177
Acid Extractable Uranium (U)	ug/g	1.1	0.63	0.05	0.44	0.05	2.6	0.05	2591177
Acid Extractable Vanadium (V)	ug/g	24	25	5	27	5	27	5	2591177
Acid Extractable Zinc (Zn)	ug/g	360	650	5	2400	50	390	5	2591177
Acid Extractable Mercury (Hg)	ug/g	0.62	1.7	0.05	0.43	0.05	0.59	0.05	2591177

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B1C3566
Report Date: 2011/09/06

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MN

O'REG 153 PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		KN9314	KN9315	KN9316	KN9320		
Sampling Date		2011/08/12 07:45	2011/08/12 07:45	2011/08/12 11:30	2011/08/12		
	Units	**FZ-BH11-7D-B**	**FZ-BH11-7D-C**	**FZ-MW11-3**	**DUP 2**	**RDL**	**QC Batch**
Inorganics							
Moisture	%	9.3	7.3		7.5	0.2	2582245
BTEX & F1 Hydrocarbons							
Benzene	ug/g			0.22		0.02	2586347
Toluene	ug/g			0.25		0.02	2586347
Ethylbenzene	ug/g			0.06		0.02	2586347
o-Xylene	ug/g			0.11		0.02	2586347
p+m-Xylene	ug/g			0.19		0.04	2586347
Total Xylenes	ug/g			0.30		0.04	2586347
F1 (C6-C10)	ug/g	<10		18		10	2586347
F1 (C6-C10) - BTEX	ug/g	<10		17		10	2586347
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g		<10	26	<10	10	2583985
F3 (C16-C34 Hydrocarbons)	ug/g		<10	560	<10	10	2583985
F4 (C34-C50 Hydrocarbons)	ug/g		<10	250	<10	10	2583985
Reached Baseline at C50	ug/g		YES	NO	YES		2583985
Surrogate Recovery (%)							
1,4-Difluorobenzene	%	89		89			2586347
4-Bromofluorobenzene	%	105		111			2586347
D10-Ethylbenzene	%	96		114			2586347
D4-1,2-Dichloroethane	%	85		84			2586347
o-Terphenyl	%		72	69	70		2583985

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B1C3566
Report Date: 2011/09/06

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MN

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (SOIL)

Maxxam ID		KN9313		KN9316	KN9329		
Sampling Date		2011/08/12 07:45		2011/08/12 11:30	2011/08/12		
	Units	**FZ-BH11-7D-A**	**RDL**	**FZ-MW11-3**	**DUP 5**	**RDL**	**QC Batch**
Inorganics							
Moisture	%				18	1	2591444
Semivolatile Organics							
1,2,4-Trichlorobenzene	ug/g	<0.05	0.05	<5	<5	5	2586902
1-Methylnaphthalene	ug/g	<0.03	0.03	<3	<3	3	2586902
2,4,5-Trichlorophenol	ug/g	<0.08	0.08	<8	<8	8	2586902
2,4,6-Trichlorophenol	ug/g	<0.1	0.1	<10	<10	10	2586902
2,4-Dichlorophenol	ug/g	<0.1	0.1	<10	<10	10	2586902
2,4-Dimethylphenol	ug/g	<0.2	0.2	<20	<20	20	2586902
2,4-Dinitrophenol	ug/g	<0.2	0.2	<20	<20	20	2586902
2,4-Dinitrotoluene	ug/g	<0.1	0.1	<10	<10	10	2586902
2,6-Dinitrotoluene	ug/g	<0.1	0.1	<10	<10	10	2586902
2-Chlorophenol	ug/g	<0.08	0.08	<8	<8	8	2586902
2-Methylnaphthalene	ug/g	<0.03	0.03	<3	<3	3	2586902
3,3'-Dichlorobenzidine	ug/g	<0.5	0.5	<50	<50	50	2586902
Acenaphthene	ug/g	<0.03	0.03	<3	<3	3	2586902
Acenaphthylene	ug/g	<0.05	0.05	<5	<5	5	2586902
Anthracene	ug/g	<0.03	0.03	15	6	3	2586902
Benzo(a)anthracene	ug/g	<0.05	0.05	25	10	5	2586902
Benzo(a)pyrene	ug/g	<0.05	0.05	19	6	5	2586902
Benzo(b/j)fluoranthene	ug/g	<0.1	0.1	22	<10	10	2586902
Benzo(g,h,i)perylene	ug/g	<0.1	0.1	<10	<10	10	2586902
Benzo(k)fluoranthene	ug/g	<0.03	0.03	10	4	3	2586902
Biphenyl	ug/g	<0.05	0.05	<5	<5	5	2586902
Bis(2-chloroethyl)ether	ug/g	<0.2	0.2	<20	<20	20	2586902
Bis(2-chloroisopropyl)ether	ug/g	<0.1	0.1	<10	<10	10	2586902
Bis(2-ethylhexyl)phthalate	ug/g	<1	1	<100	<100	100	2586902
Chrysene	ug/g	<0.05	0.05	24	10	5	2586902
Dibenz(a,h)anthracene	ug/g	<0.05	0.05	<5	<5	5	2586902
Diethyl phthalate	ug/g	<0.2	0.2	<20	<20	20	2586902
Dimethyl phthalate	ug/g	<0.2	0.2	<20	<20	20	2586902
Fluoranthene	ug/g	<0.05	0.05	75	25	5	2586902
Fluorene	ug/g	<0.03	0.03	4	4	3	2586902
Indeno(1,2,3-cd)pyrene	ug/g	<0.08	0.08	<8	<8	8	2586902
Naphthalene	ug/g	<0.03	0.03	<3	<3	3	2586902

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (SOIL)

Maxxam ID		KN9313		KN9316	KN9329		
Sampling Date		2011/08/12 07:45		2011/08/12 11:30	2011/08/12		
	Units	**FZ-BH11-7D-A**	**RDL**	**FZ-MW11-3**	**DUP 5**	**RDL**	**QC Batch**
p-Chloroaniline	ug/g	<0.2	0.2	<20	<20	20	2586902
Pentachlorophenol	ug/g	<0.1	0.1	<10	<10	10	2586902
Phenanthrene	ug/g	<0.05	0.05	58	28	5	2586902
Phenol	ug/g	<0.09	0.09	<9	<9	9	2586902
Pyrene	ug/g	<0.05	0.05	60	20	5	2586902
Surrogate Recovery (%)							
2,4,6-Tribromophenol	%	50		40	20		2586902
2-Fluorobiphenyl	%	93		80	80		2586902
2-Fluorophenol	%	75		60	60		2586902
D14-Terphenyl (FS)	%	99		80	60		2586902
D5-Nitrobenzene	%	75		40	40		2586902
D5-Phenol	%	76		20	20		2586902

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 VOLATILE ORGANICS (SOIL)

Maxxam ID		KN9314		
Sampling Date		2011/08/12 07:45		
	Units	**FZ-BH11-7D-B**	**RDL**	**QC Batch**
Volatile Organics				
Acetone (2-Propanone)	ug/g	<0.5	0.5	2586149
Benzene	ug/g	<0.02	0.02	2586149
Bromodichloromethane	ug/g	<0.05	0.05	2586149
Bromoform	ug/g	<0.05	0.05	2586149
Bromomethane	ug/g	<0.05	0.05	2586149
Carbon Tetrachloride	ug/g	<0.05	0.05	2586149
Chlorobenzene	ug/g	<0.05	0.05	2586149
Chloroform	ug/g	<0.05	0.05	2586149
Dibromochloromethane	ug/g	<0.05	0.05	2586149
1,2-Dichlorobenzene	ug/g	<0.05	0.05	2586149
1,3-Dichlorobenzene	ug/g	<0.05	0.05	2586149
1,4-Dichlorobenzene	ug/g	<0.05	0.05	2586149
Dichlorodifluoromethane (FREON 12)	ug/g	<0.05	0.05	2586149
1,1-Dichloroethane	ug/g	<0.05	0.05	2586149
1,2-Dichloroethane	ug/g	<0.05	0.05	2586149
1,1-Dichloroethylene	ug/g	<0.05	0.05	2586149
cis-1,2-Dichloroethylene	ug/g	<0.05	0.05	2586149
trans-1,2-Dichloroethylene	ug/g	<0.05	0.05	2586149
1,2-Dichloropropane	ug/g	<0.05	0.05	2586149
cis-1,3-Dichloropropene	ug/g	<0.03	0.03	2586149
trans-1,3-Dichloropropene	ug/g	<0.04	0.04	2586149
Ethylbenzene	ug/g	<0.02	0.02	2586149
Ethylene Dibromide	ug/g	<0.05	0.05	2586149
Hexane	ug/g	<0.05	0.05	2586149
Methylene Chloride(Dichloromethane)	ug/g	<0.05	0.05	2586149
Methyl Isobutyl Ketone	ug/g	<0.5	0.5	2586149
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.5	0.5	2586149
Methyl t-butyl ether (MTBE)	ug/g	<0.05	0.05	2586149
Styrene	ug/g	<0.05	0.05	2586149
1,1,1,2-Tetrachloroethane	ug/g	<0.05	0.05	2586149
1,1,2,2-Tetrachloroethane	ug/g	<0.05	0.05	2586149
Tetrachloroethylene	ug/g	<0.05	0.05	2586149
Toluene	ug/g	<0.02	0.02	2586149
1,1,1-Trichloroethane	ug/g	<0.05	0.05	2586149
1,1,2-Trichloroethane	ug/g	<0.05	0.05	2586149

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 VOLATILE ORGANICS (SOIL)

Maxxam ID		KN9314		
Sampling Date		2011/08/12 07:45		
	Units	**FZ-BH11-7D-B**	**RDL**	**QC Batch**
Trichloroethylene	ug/g	<0.05	0.05	2586149
Vinyl Chloride	ug/g	<0.02	0.02	2586149
p+m-Xylene	ug/g	<0.02	0.02	2586149
o-Xylene	ug/g	<0.02	0.02	2586149
Xylene (Total)	ug/g	<0.02	0.02	2586149
Trichlorofluoromethane (FREON 11)	ug/g	<0.05	0.05	2586149
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	96		2586149
D10-o-Xylene	%	95		2586149
D4-1,2-Dichloroethane	%	104		2586149
D8-Toluene	%	104		2586149

O'REG 558 TCLP LEACHATE PREPARATION (SOIL)

Maxxam ID		KN9315		
Sampling Date		2011/08/12 07:45		
	Units	**FZ-BH11-7D-C**	**RDL**	**QC Batch**
Inorganics				
Final pH	pH	5.49		2590842
Initial pH	pH	9.33		2590842
TCLP - % Solids	%	100	0.2	2590838
TCLP Extraction Fluid	N/A	FLUID 2		2590840

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 558 TCLP METALS (SOIL)

Maxxam ID		KN9315		
Sampling Date		2011/08/12 07:45		
	Units	**FZ-BH11-7D-C**	**RDL**	**QC Batch**
Metals				
Leachable Mercury (Hg)	mg/L	<0.001	0.001	2590945
Leachable Arsenic (As)	mg/L	<0.2	0.2	2591020
Leachable Barium (Ba)	mg/L	1.1	0.2	2591020
Leachable Boron (B)	mg/L	0.2	0.1	2591020
Leachable Cadmium (Cd)	mg/L	<0.05	0.05	2591020
Leachable Chromium (Cr)	mg/L	<0.1	0.1	2591020
Leachable Lead (Pb)	mg/L	<0.1	0.1	2591020
Leachable Selenium (Se)	mg/L	<0.1	0.1	2591020
Leachable Silver (Ag)	mg/L	<0.01	0.01	2591020
Leachable Uranium (U)	mg/L	<0.01	0.01	2591020

RESULTS OF ANALYSES OF SOIL

Maxxam ID		KN9312	KN9313	KN9315	KN9316	KN9317		
Sampling Date		2011/08/11 09:30	2011/08/12 07:45	2011/08/12 07:45	2011/08/12 11:30	2011/08/12 10:15		
	Units	**FZ-BH11-4D**	**FZ-BH11-7D-A**	**FZ-BH11-7D-C**	**FZ-MW11-3**	**FZ-BH11-1S**	**RDL**	**QC Batch**
Charge/Prep Analysis								
Amount Extracted (Wet Weight) (g)	N/A			25			N/A	2589517
Inorganics								
Moisture	%				18		0.2	2586340
Phenols-4AAP	ug/g			<0.04			0.04	2590939
Miscellaneous Parameters								
Grain Size	%	COARSE	COARSE		COARSE	COARSE	N/A	2591560
Sieve - #200 (<0.075mm)	%	41	9.7		40	48	N/A	2591560
Sieve - #200 (>0.075mm)	%	59	90		60	52	N/A	2591560

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KN9315		
Sampling Date		2011/08/12 07:45		
	Units	**FZ-BH11-7D-C**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons				
Leachable (ZHE) Benzene	ug/L	<0.8	0.8	2590652
Leachable (ZHE) Toluene	ug/L	<0.8	0.8	2590652
Leachable (ZHE) Ethylbenzene	ug/L	<0.8	0.8	2590652
Leachable (ZHE) o-Xylene	ug/L	<0.8	0.8	2590652
Leachable (ZHE) p+m-Xylene	ug/L	<2	2	2590652
Leachable (ZHE) Total Xylenes	ug/L	<2	2	2590652
Leachable (ZHE) F1 (C6-C10)	ug/L	<1000	1000	2590652
Leachable (ZHE) F1 (C6-C10) - BTEX	ug/L	<1000	1000	2590652
Surrogate Recovery (%)				
Leachable (ZHE) 1,4-Difluorobenzene	%	100		2590652
Leachable (ZHE) 4-Bromofluorobenzene	%	99		2590652
Leachable (ZHE) D10-Ethylbenzene	%	97		2590652
Leachable (ZHE) D4-1,2-Dichloroethane	%	99		2590652

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B1C3566
Report Date: 2011/09/06

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MN

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		KN9313		KN9316		KN9317		
Sampling Date		2011/08/12 07:45		2011/08/12 11:30		2011/08/12 10:15		
	Units	**FZ-BH11-7D-A**	**RDL**	**FZ-MW11-3**	**RDL**	**FZ-BH11-1S**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons								
1-Methylnaphthalene	mg/kg	0.008	0.005	0.45	0.005	0.12	0.005	2587950
2-Methylnaphthalene	mg/kg	0.006	0.005	0.41	0.005	0.091	0.005	2587950
Acenaphthene	mg/kg	<0.005	0.005	0.80	0.005	0.26	0.005	2587950
Acenaphthylene	mg/kg	<0.005	0.005	0.77	0.005	0.27	0.005	2587950
Anthracene	mg/kg	<0.005	0.005	4.0	0.005	1.3	0.005	2587950
Benzo(a)anthracene	mg/kg	<0.005	0.005	5.9	0.005	3.0	0.005	2587950
Benzo(a)pyrene	mg/kg	0.007	0.005	5.0	0.005	2.7	0.005	2587950
Benzo(b)fluoranthene	mg/kg	0.007	0.005	4.1	0.005	2.3	0.005	2587950
Benzo(g,h,i)perylene	mg/kg	0.009	0.005	2.9	0.005	1.8	0.005	2587950
Benzo(j)fluoranthene	mg/kg	<0.005	0.005	2.4	0.005	1.5	0.005	2587950
Benzo(k)fluoranthene	mg/kg	0.006	0.005	2.5	0.005	1.5	0.005	2587950
Chrysene	mg/kg	0.006	0.005	5.5	0.005	3.0	0.005	2587950
Dibenz(a,h)anthracene	mg/kg	<0.005	0.005	1.0	0.005	0.59	0.005	2587950
Fluoranthene	mg/kg	0.014	0.005	16(1)	0.05	7.5(1)	0.05	2587950
Fluorene	mg/kg	<0.005	0.005	2.2	0.005	0.50	0.005	2587950
Indeno(1,2,3-cd)pyrene	mg/kg	0.007	0.005	2.9	0.005	1.7	0.005	2587950
Naphthalene	mg/kg	0.007	0.005	0.79	0.005	0.13	0.005	2587950
Perylene	mg/kg	<0.005	0.005	1.3	0.005	0.67	0.005	2587950
Phenanthrene	mg/kg	0.014	0.005	11(1)	0.05	4.1	0.005	2587950
Pyrene	mg/kg	0.011	0.005	12(1)	0.05	6.0	0.005	2587950
Surrogate Recovery (%)								
D10-Anthracene	%	66		81		73		2587950
D14-Terphenyl	%	76		91		82		2587950
D8-Acenaphthylene	%	82		81		78		2587950

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Elevated PAH RDL(s) due to sample dilution.

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		KN9318		KN9319	KN9321		KN9328		
Sampling Date		2011/08/12 10:30		2011/08/12 10:45	2011/08/12		2011/08/12		
	Units	**FZ-BH11-3S**	**RDL**	**FZ-BH11-4S**	**DUP 3**	**RDL**	**DUP 4**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	0.032	0.005	0.20	0.17	0.005	0.034	0.005	2587950
2-Methylnaphthalene	mg/kg	0.029	0.005	0.21	0.11	0.005	0.029	0.005	2587950
Acenaphthene	mg/kg	0.024	0.005	0.36	0.55	0.005	0.023	0.005	2587950
Acenaphthylene	mg/kg	0.060	0.005	0.47	0.32	0.005	0.063	0.005	2587950
Anthracene	mg/kg	0.15	0.005	2.6	2.2	0.005	0.16	0.005	2587950
Benzo(a)anthracene	mg/kg	0.44	0.005	5.7	4.0	0.005	0.47	0.005	2587950
Benzo(a)pyrene	mg/kg	0.54	0.005	5.0	3.6	0.005	0.52	0.005	2587950
Benzo(b)fluoranthene	mg/kg	0.47	0.005	3.8	2.8	0.005	0.46	0.005	2587950
Benzo(g,h,i)perylene	mg/kg	0.41	0.005	3.3	2.2	0.005	0.39	0.005	2587950
Benzo(j)fluoranthene	mg/kg	0.30	0.005	2.3	1.8	0.005	0.29	0.005	2587950
Benzo(k)fluoranthene	mg/kg	0.30	0.005	2.3	1.8	0.005	0.29	0.005	2587950
Chrysene	mg/kg	0.48	0.005	5.4	4.0	0.005	0.51	0.005	2587950
Dibenz(a,h)anthracene	mg/kg	0.13	0.005	1.0	0.75	0.005	0.12	0.005	2587950
Fluoranthene	mg/kg	0.95	0.005	14(1)	12(1)	0.05	1.0	0.005	2587950
Fluorene	mg/kg	0.031	0.005	0.68	0.80	0.005	0.029	0.005	2587950
Indeno(1,2,3-cd)pyrene	mg/kg	0.39	0.005	3.1	2.1	0.005	0.37	0.005	2587950
Naphthalene	mg/kg	0.028	0.005	0.28	0.19	0.005	0.029	0.005	2587950
Perylene	mg/kg	0.14	0.005	1.3	0.88	0.005	0.14	0.005	2587950
Phenanthrene	mg/kg	0.46	0.005	8.0(1)	7.0(1)	0.05	0.47	0.005	2587950
Pyrene	mg/kg	0.76	0.005	11(1)	9.4(1)	0.05	0.83	0.005	2587950
Surrogate Recovery (%)									
D10-Anthracene	%	69		76	75		69		2587950
D14-Terphenyl	%	79		90	83		81		2587950
D8-Acenaphthylene	%	77		77	81		77		2587950

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Elevated PAH RDL(s) due to sample dilution.

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KN9316		
Sampling Date		2011/08/12 11:30		
	Units	**FZ-MW11-3**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons				
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	1200	100	2589836

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Test Summary

Maxxam ID KN9312 **Collected** 2011/08/11
Sample ID FZ-BH11-4D **Shipped**
Matrix Soil **Received** 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Sieve, 75um	PSIV	2591560	N/A	2011/08/24	LAKHVIR KALER

Maxxam ID KN9313 **Collected** 2011/08/12
Sample ID FZ-BH11-7D-A **Shipped**
Matrix Soil **Received** 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2586902	2011/08/18	2011/08/19	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2592364	2011/08/24	2011/08/24	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2591003	N/A	2011/08/25	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2591177	2011/08/23	2011/08/23	VIVIANA CANZONIERI
Moisture	BAL	2591219	N/A	2011/08/23	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2587950	2011/08/19	2011/08/24	GINA THOMPSON
Sieve, 75um	PSIV	2591560	N/A	2011/08/24	LAKHVIR KALER

Maxxam ID KN9313 Dup **Collected** 2011/08/12
Sample ID FZ-BH11-7D-A **Shipped**
Matrix Soil **Received** 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Sieve, 75um	PSIV	2591560	N/A	2011/08/24	LAKHVIR KALER

Test Summary

Maxxam ID KN9314
Sample ID FZ-BH11-7D-B
Matrix Soil

Collected 2011/08/12
Shipped
Received 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2586347	2011/08/18	2011/08/19	PAUL RUBINATO
MOISTURE	BAL	2582245	N/A	2011/08/18	LYNDSEY HART
Volatile Organic Compounds in Soil	P&T/MS	2586149	2011/08/18	2011/08/19	DANIEL KIM

Maxxam ID KN9315
Sample ID FZ-BH11-7D-C
Matrix Soil

Collected 2011/08/12
Shipped
Received 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
CCME F1 Hydrocarbons/BTEX in Leachate	HSGC/MSFD	2590652	2011/08/23	2011/08/24	ANCA GANEA
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2583985	2011/08/16	2011/08/18	LYNDSEY HART
Mercury (TCLP Leachable) (mg/L)	CVAA	2590945	N/A	2011/08/23	MAGDALENA CARLOS
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	2591020	2011/08/23	2011/08/23	GRACE BU
MOISTURE	BAL	2582245	N/A	2011/08/18	LYNDSEY HART
Phenols (4AAP)	TECH	2590939	N/A	2011/08/23	BRAMDEO MOTIRAM
TCLP - % Solids	BAL	2590838	2011/08/22	2011/08/23	JIAN (KEN) WANG
TCLP - Extraction Fluid		2590840	N/A	2011/08/23	JIAN (KEN) WANG
TCLP - Initial and final pH	PH	2590842	N/A	2011/08/23	JIAN (KEN) WANG
TCLP Zero Headspace Extraction		2589517	2011/08/22	2011/08/22	FOZIA TABASUM

Maxxam ID KN9315 Dup
Sample ID FZ-BH11-7D-C
Matrix Soil

Collected 2011/08/12
Shipped
Received 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
CCME F1 Hydrocarbons/BTEX in Leachate	HSGC/MSFD	2590652	2011/08/23	2011/08/24	ANCA GANEA
Phenols (4AAP)	TECH	2590939	N/A	2011/08/23	BRAMDEO MOTIRAM
TCLP Zero Headspace Extraction		2589517	2011/08/22	2011/08/22	FOZIA TABASUM

Test Summary

Maxxam ID KN9316
Sample ID FZ-MW11-3
Matrix Soil

Collected 2011/08/12
Shipped
Received 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2586902	2011/08/18	2011/08/19	NATALIYA GNIDASH
Hot Water Extractable Boron	ICP	2592364	2011/08/24	2011/08/24	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2591003	N/A	2011/08/25	LUSINE KHACHATRYAN
TEH in Soil (AA PIRI)	GC/FID	2592460	2011/08/19	2011/08/26	KELLY KEEPING
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2586347	2011/08/18	2011/08/19	PAUL RUBINATO
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2583985	2011/08/16	2011/08/18	LYNDSEY HART
F4G (CCME Hydrocarbons Gravimetric)	BAL	2589836	2011/08/22	2011/08/23	LYNDSEY HART
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2591177	2011/08/23	2011/08/23	VIVIANA CANZONIERI
MOISTURE	BAL	2586340	N/A	2011/08/22	HABIBA ESSAK
PAH in sediment by GC/MS (Low Level)	GC/MS	2587950	2011/08/19	2011/08/25	GINA THOMPSON
VPH in Soil (PIRI2)	PTGC/MS	2600237	2011/08/19	2011/08/31	CHRISTIE RENARD
Sieve, 75um	PSIV	2591560	N/A	2011/08/24	LAKHVIR KALER
ModTPH (T2) Calc. for Soil	CALC	2583749	N/A	2011/09/01	AUTOMATED STATCHK

Maxxam ID KN9317
Sample ID FZ-BH11-1S
Matrix Soil

Collected 2011/08/12
Shipped
Received 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2592364	2011/08/24	2011/08/24	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2591003	N/A	2011/08/25	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2591177	2011/08/23	2011/08/23	VIVIANA CANZONIERI
Moisture	BAL	2591444	N/A	2011/08/23	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2587950	2011/08/19	2011/08/25	GINA THOMPSON
Sieve, 75um	PSIV	2591560	N/A	2011/08/24	LAKHVIR KALER

Test Summary

Maxxam ID KN9317 Dup **Collected** 2011/08/12
Sample ID FZ-BH11-1S **Shipped**
Matrix Soil **Received** 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hexavalent Chromium in Soil by IC	IC/SPEC	2591003	N/A	2011/08/25	LUSINE KHACHATRYAN

Maxxam ID KN9318 **Collected** 2011/08/12
Sample ID FZ-BH11-3S **Shipped**
Matrix Soil **Received** 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2592364	2011/08/24	2011/08/24	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2591003	N/A	2011/08/25	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2591177	2011/08/23	2011/08/23	VIVIANA CANZONIERI
Moisture	BAL	2591444	N/A	2011/08/23	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2587950	2011/08/19	2011/08/25	GINA THOMPSON

Maxxam ID KN9319 **Collected** 2011/08/12
Sample ID FZ-BH11-4S **Shipped**
Matrix Soil **Received** 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2592364	2011/08/24	2011/08/24	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2591003	N/A	2011/08/25	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2591177	2011/08/23	2011/08/23	VIVIANA CANZONIERI
Moisture	BAL	2591444	N/A	2011/08/23	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2587950	2011/08/19	2011/08/25	GINA THOMPSON

Test Summary

Maxxam ID KN9320
Sample ID DUP 2
Matrix Soil

Collected 2011/08/12
Shipped
Received 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2583985	2011/08/16	2011/08/18	LYNDSEY HART
MOISTURE	BAL	2582245	N/A	2011/08/18	LYNDSEY HART

Maxxam ID KN9320 Dup
Sample ID DUP 2
Matrix Soil

Collected 2011/08/12
Shipped
Received 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2583985	2011/08/16	2011/08/18	LYNDSEY HART
MOISTURE	BAL	2582245	N/A	2011/08/18	LYNDSEY HART

Maxxam ID KN9321
Sample ID DUP 3
Matrix Soil

Collected 2011/08/12
Shipped
Received 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2592364	2011/08/24	2011/08/24	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2591003	N/A	2011/08/25	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2591177	2011/08/23	2011/08/23	VIVIANA CANZONIERI
Moisture	BAL	2591444	N/A	2011/08/23	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2587950	2011/08/19	2011/08/25	GINA THOMPSON

Test Summary

Maxxam ID KN9328
Sample ID DUP 4
Matrix Soil

Collected 2011/08/12
Shipped
Received 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Hot Water Extractable Boron	ICP	2592364	2011/08/24	2011/08/24	AZITA FAZAELI
Hexavalent Chromium in Soil by IC	IC/SPEC	2591003	N/A	2011/08/25	LUSINE KHACHATRYAN
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2591177	2011/08/23	2011/08/23	VIVIANA CANZONIERI
Moisture	BAL	2591444	N/A	2011/08/23	LAKHVIR KALER
PAH in sediment by GC/MS (Low Level)	GC/MS	2587950	2011/08/19	2011/08/25	GINA THOMPSON

Maxxam ID KN9329
Sample ID DUP 5
Matrix Soil

Collected 2011/08/12
Shipped
Received 2011/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in soil by GC/MS	GC/MS	2586902	2011/08/18	2011/08/19	NATALIYA GNIDASH
Moisture	BAL	2591444	N/A	2011/08/23	LAKHVIR KALER

Package 1	7.0°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Hexavalent Chromium
Due to colour interferences, some samples required dilution. Detection limits were adjusted accordingly.

Sample KN9316-01: ABN Analysis: Due to the sample matrix, the sample required dilution. Detection limits were adjusted accordingly.

Sample KN9329-01: ABN Analysis: Due to the sample matrix, the sample required dilution. Detection limits were adjusted accordingly.

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
2582245	Moisture	2011/08/18							11.3	50		
2583985	o-Terphenyl	2011/08/17	70	30 - 130	66	30 - 130	69	%				
2583985	F2 (C10-C16 Hydrocarbons)	2011/08/18	97	60 - 130	98	60 - 130	<10	ug/g	NC	50		
2583985	F3 (C16-C34 Hydrocarbons)	2011/08/18	97	60 - 130	98	60 - 130	<10	ug/g	NC	50		
2583985	F4 (C34-C50 Hydrocarbons)	2011/08/18	97	60 - 130	98	60 - 130	<10	ug/g	NC	50		
2586149	4-Bromofluorobenzene	2011/08/19	96	60 - 140	96	60 - 140	96	%				
2586149	D10-o-Xylene	2011/08/19	99	50 - 130	105	50 - 130	102	%				
2586149	D4-1,2-Dichloroethane	2011/08/19	105	60 - 140	103	60 - 140	100	%				
2586149	D8-Toluene	2011/08/19	103	60 - 140	104	60 - 140	105	%				
2586149	Acetone (2-Propanone)	2011/08/19	91	60 - 140	64	60 - 140	<0.5	ug/g				
2586149	Benzene	2011/08/19	93	60 - 140	100	60 - 140	<0.02	ug/g				
2586149	Bromodichloromethane	2011/08/19	87	60 - 140	95	60 - 140	<0.05	ug/g				
2586149	Bromoform	2011/08/19	88	60 - 140	93	60 - 140	<0.05	ug/g				
2586149	Bromomethane	2011/08/19	64	60 - 140	68	60 - 140	<0.05	ug/g				
2586149	Carbon Tetrachloride	2011/08/19	91	60 - 140	99	60 - 140	<0.05	ug/g				
2586149	Chlorobenzene	2011/08/19	95	60 - 140	101	60 - 140	<0.05	ug/g				
2586149	Chloroform	2011/08/19	94	60 - 140	100	60 - 140	<0.05	ug/g				
2586149	Dibromochloromethane	2011/08/19	89	60 - 140	96	60 - 140	<0.05	ug/g				
2586149	1,2-Dichlorobenzene	2011/08/19	94	60 - 140	101	60 - 140	<0.05	ug/g				
2586149	1,3-Dichlorobenzene	2011/08/19	94	60 - 140	102	60 - 140	<0.05	ug/g				
2586149	1,4-Dichlorobenzene	2011/08/19	94	60 - 140	103	60 - 140	<0.05	ug/g				
2586149	Dichlorodifluoromethane (FREON 12)	2011/08/19	87	60 - 140	90	60 - 140	<0.05	ug/g				
2586149	1,1-Dichloroethane	2011/08/19	94	60 - 140	102	60 - 140	<0.05	ug/g				
2586149	1,2-Dichloroethane	2011/08/19	95	60 - 140	100	60 - 140	<0.05	ug/g	NC	50		
2586149	1,1-Dichloroethylene	2011/08/19	97	60 - 140	105	60 - 140	<0.05	ug/g				
2586149	cis-1,2-Dichloroethylene	2011/08/19	88	60 - 140	94	60 - 140	<0.05	ug/g				
2586149	trans-1,2-Dichloroethylene	2011/08/19	90	60 - 140	97	60 - 140	<0.05	ug/g				
2586149	1,2-Dichloropropane	2011/08/19	95	60 - 140	101	60 - 140	<0.05	ug/g				
2586149	cis-1,3-Dichloropropene	2011/08/19	89	60 - 140	97	60 - 140	<0.03	ug/g				
2586149	trans-1,3-Dichloropropene	2011/08/19	92	60 - 140	99	60 - 140	<0.04	ug/g				
2586149	Ethylbenzene	2011/08/19	97	60 - 140	105	60 - 140	<0.02	ug/g				
2586149	Ethylene Dibromide	2011/08/19	94	60 - 140	101	60 - 140	<0.05	ug/g	NC	50		
2586149	Hexane	2011/08/19	91	60 - 140	89	60 - 140	<0.05	ug/g	NC	50		
2586149	Methylene Chloride(Dichloromethane)	2011/08/19	82	60 - 140	87	60 - 140	<0.05	ug/g				
2586149	Methyl Isobutyl Ketone	2011/08/19	107	60 - 140	109	60 - 140	<0.5	ug/g				
2586149	Methyl Ethyl Ketone (2-Butanone)	2011/08/19	107	60 - 140	88	60 - 140	<0.5	ug/g				
2586149	Methyl t-butyl ether (MTBE)	2011/08/19	89	60 - 140	94	60 - 140	<0.05	ug/g	NC	50		
2586149	Styrene	2011/08/19	98	60 - 140	105	60 - 140	<0.05	ug/g				
2586149	1,1,1,2-Tetrachloroethane	2011/08/19	93	60 - 140	99	60 - 140	<0.05	ug/g				
2586149	1,1,2,2-Tetrachloroethane	2011/08/19	98	60 - 140	101	60 - 140	<0.05	ug/g				

Maxxam Job #: B1C3566
Report Date: 2011/09/06

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MN

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
2586149	Tetrachloroethylene	2011/08/19	86	60 - 140	93	60 - 140	<0.05	ug/g				
2586149	Toluene	2011/08/19	96	60 - 140	103	60 - 140	<0.02	ug/g				
2586149	1,1,1-Trichloroethane	2011/08/19	92	60 - 140	99	60 - 140	<0.05	ug/g				
2586149	1,1,2-Trichloroethane	2011/08/19	92	60 - 140	98	60 - 140	<0.05	ug/g				
2586149	Trichloroethylene	2011/08/19	90	60 - 140	96	60 - 140	<0.05	ug/g				
2586149	Vinyl Chloride	2011/08/19	95	60 - 140	102	60 - 140	<0.02	ug/g				
2586149	p+m-Xylene	2011/08/19	97	60 - 140	105	60 - 140	<0.02	ug/g				
2586149	o-Xylene	2011/08/19	93	60 - 140	100	60 - 140	<0.02	ug/g				
2586149	Trichlorofluoromethane (FREON 11)	2011/08/19	95	60 - 140	101	60 - 140	<0.05	ug/g				
2586149	Xylene (Total)	2011/08/19					<0.02	ug/g				
2586340	Moisture	2011/08/22							0.8	50		
2586347	1,4-Difluorobenzene	2011/08/18			91	60 - 140	89	%				
2586347	4-Bromofluorobenzene	2011/08/18			110	60 - 140	99	%				
2586347	D10-Ethylbenzene	2011/08/18			99	30 - 130	111	%				
2586347	D4-1,2-Dichloroethane	2011/08/18			88	60 - 140	82	%				
2586347	Benzene	2011/08/18			88	60 - 140	<0.02	ug/g	3.9	50		
2586347	Toluene	2011/08/18			102	60 - 140	<0.02	ug/g	5.9	50		
2586347	Ethylbenzene	2011/08/18			108	60 - 140	<0.02	ug/g	4.6	50		
2586347	o-Xylene	2011/08/18			104	60 - 140	<0.02	ug/g	1.1	50		
2586347	p+m-Xylene	2011/08/18			108	60 - 140	<0.04	ug/g	4.5	50		
2586347	F1 (C6-C10)	2011/08/18			76	60 - 140	<10	ug/g	2.2	50		
2586347	Total Xylenes	2011/08/18					<0.04	ug/g				
2586347	F1 (C6-C10) - BTEX	2011/08/18					<10	ug/g				
2586902	2,4,6-Tribromophenol	2011/08/19	61	10 - 130	82	10 - 130	34	%				
2586902	2-Fluorobiphenyl	2011/08/19	84	30 - 130	103	30 - 130	96	%				
2586902	2-Fluorophenol	2011/08/19	53	10 - 130	76	10 - 130	80	%				
2586902	D14-Terphenyl (FS)	2011/08/19	74	30 - 130	96	30 - 130	98	%				
2586902	D5-Nitrobenzene	2011/08/19	56	30 - 130	80	30 - 130	78	%				
2586902	D5-Phenol	2011/08/19	49	10 - 130	83	10 - 130	79	%				
2586902	1,2,4-Trichlorobenzene	2011/08/19	82	30 - 130	112	30 - 130	<0.05	ug/g	NC	50		
2586902	1-Methylnaphthalene	2011/08/19	90	30 - 130	107	30 - 130	<0.03	ug/g	NC	50		
2586902	2,4,5-Trichlorophenol	2011/08/19	55	10 - 130	85	10 - 130	<0.08	ug/g	NC	50		
2586902	2,4,6-Trichlorophenol	2011/08/19	70	10 - 130	92	10 - 130	<0.1	ug/g	NC	50		
2586902	2,4-Dichlorophenol	2011/08/19	25	10 - 130	79	10 - 130	<0.1	ug/g	NC	50		
2586902	2,4-Dimethylphenol	2011/08/19	70	10 - 130	96	10 - 130	<0.2	ug/g	NC	50		
2586902	2,4-Dinitrophenol	2011/08/19	7.7 (1, 2)	10 - 130	2.7 (1, 2)	10 - 130	<0.2	ug/g	NC	50		
2586902	2,4-Dinitrotoluene	2011/08/19	44	30 - 130	87	30 - 130	<0.1	ug/g	NC	50		
2586902	2,6-Dinitrotoluene	2011/08/19	47	30 - 130	94	30 - 130	<0.1	ug/g	NC	50		
2586902	2-Chlorophenol	2011/08/19	59	10 - 130	89	10 - 130	<0.08	ug/g	NC	50		
2586902	2-Methylnaphthalene	2011/08/19	88	30 - 130	108	30 - 130	<0.03	ug/g	NC	50		

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Franz Environmental Inc
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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
2586902	3,3'-Dichlorobenzidine	2011/08/19	83	30 - 130	112	30 - 130	<0.5	ug/g	NC	50		
2586902	Acenaphthene	2011/08/19	103	30 - 130	104	30 - 130	<0.03	ug/g	NC	50		
2586902	Acenaphthylene	2011/08/19	83	30 - 130	100	30 - 130	<0.05	ug/g	NC	50		
2586902	Anthracene	2011/08/19	98	30 - 130	105	30 - 130	<0.03	ug/g	NC	50		
2586902	Benzo(a)anthracene	2011/08/19	80	30 - 130	98	30 - 130	<0.05	ug/g	NC	50		
2586902	Benzo(a)pyrene	2011/08/19	91	30 - 130	105	30 - 130	<0.05	ug/g	NC	50		
2586902	Benzo(b/j)fluoranthene	2011/08/19	83	30 - 130	104	30 - 130	<0.1	ug/g	NC	50		
2586902	Benzo(g,h,i)perylene	2011/08/19	70	30 - 130	86	30 - 130	<0.1	ug/g	NC	50		
2586902	Benzo(k)fluoranthene	2011/08/19	101	30 - 130	114	30 - 130	<0.03	ug/g	NC	50		
2586902	Biphenyl	2011/08/19	104	30 - 130	115	30 - 130	<0.05	ug/g	NC	50		
2586902	Bis(2-chloroethyl)ether	2011/08/19	65	30 - 130	93	30 - 130	<0.2	ug/g	NC	50		
2586902	Bis(2-chloroisopropyl)ether	2011/08/19	79	30 - 130	94	30 - 130	<0.1	ug/g	NC	50		
2586902	Bis(2-ethylhexyl)phthalate	2011/08/19	73	30 - 130	100	30 - 130	<1	ug/g	NC	50		
2586902	Chrysene	2011/08/19	117	30 - 130	107	30 - 130	<0.05	ug/g	NC	50		
2586902	Dibenz(a,h)anthracene	2011/08/19	63	30 - 130	83	30 - 130	<0.05	ug/g	NC	50		
2586902	Diethyl phthalate	2011/08/19	89	30 - 130	102	30 - 130	<0.2	ug/g	NC	50		
2586902	Dimethyl phthalate	2011/08/19	91	30 - 130	114	30 - 130	<0.2	ug/g	NC	50		
2586902	Fluoranthene	2011/08/19	81	30 - 130	106	30 - 130	<0.05	ug/g	NC	50		
2586902	Fluorene	2011/08/19	98	30 - 130	112	30 - 130	<0.03	ug/g	NC	50		
2586902	Indeno(1,2,3-cd)pyrene	2011/08/19	57	30 - 130	75	30 - 130	<0.08	ug/g	NC	50		
2586902	Naphthalene	2011/08/19	99	30 - 130	105	30 - 130	<0.03	ug/g	NC	50		
2586902	p-Chloroaniline	2011/08/19	102	30 - 130	113	30 - 130	<0.2	ug/g	NC	50		
2586902	Pentachlorophenol	2011/08/19	21	10 - 130	15	10 - 130	<0.1	ug/g	NC	50		
2586902	Phenanthrene	2011/08/19	109	30 - 130	106	30 - 130	<0.05	ug/g	NC	50		
2586902	Phenol	2011/08/19	63	10 - 130	89	10 - 130	<0.09	ug/g	NC	50		
2586902	Pyrene	2011/08/19	91	30 - 130	110	30 - 130	<0.05	ug/g	NC	50		
2587950	D10-Anthracene	2011/08/24	78	30 - 130	75	30 - 130	93	%				
2587950	D14-Terphenyl	2011/08/24	89	30 - 130	85	30 - 130	98	%				
2587950	D8-Acenaphthylene	2011/08/24	82	30 - 130	79	30 - 130	77	%				
2587950	1-Methylnaphthalene	2011/08/25	113	30 - 130	96	30 - 130	<0.005	mg/kg	NC	50		
2587950	2-Methylnaphthalene	2011/08/25	79	30 - 130	83	30 - 130	<0.005	mg/kg	NC	50		
2587950	Acenaphthene	2011/08/25	97	30 - 130	97	30 - 130	<0.005	mg/kg	NC	50		
2587950	Acenaphthylene	2011/08/25	97	30 - 130	98	30 - 130	<0.005	mg/kg	NC	50		
2587950	Anthracene	2011/08/25	114	30 - 130	126	30 - 130	<0.005	mg/kg	NC	50		
2587950	Benzo(a)anthracene	2011/08/25	118	30 - 130	98	30 - 130	<0.005	mg/kg	NC	50		
2587950	Benzo(a)pyrene	2011/08/25	107	30 - 130	112	30 - 130	<0.005	mg/kg	NC	50		
2587950	Benzo(b)fluoranthene	2011/08/25	98	30 - 130	98	30 - 130	<0.005	mg/kg	NC	50		
2587950	Benzo(g,h,i)perylene	2011/08/25	114	30 - 130	119	30 - 130	<0.005	mg/kg	NC	50		
2587950	Benzo(j)fluoranthene	2011/08/25	114	30 - 130	118	30 - 130	<0.005	mg/kg	NC	50		
2587950	Benzo(k)fluoranthene	2011/08/25	108	30 - 130	108	30 - 130	<0.005	mg/kg	NC	50		

Maxxam Job #: B1C3566
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Franz Environmental Inc
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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
2587950	Chrysene	2011/08/25	117	30 - 130	94	30 - 130	<0.005	mg/kg	NC	50		
2587950	Dibenz(a,h)anthracene	2011/08/25	111	30 - 130	114	30 - 130	<0.005	mg/kg	NC	50		
2587950	Fluoranthene	2011/08/25	120	30 - 130	112	30 - 130	<0.005	mg/kg	NC	50		
2587950	Fluorene	2011/08/25	100	30 - 130	99	30 - 130	<0.005	mg/kg	NC	50		
2587950	Indeno(1,2,3-cd)pyrene	2011/08/25	118	30 - 130	117	30 - 130	<0.005	mg/kg	NC	50		
2587950	Naphthalene	2011/08/25	87	30 - 130	94	30 - 130	<0.005	mg/kg	NC	50		
2587950	Perylene	2011/08/25	106	30 - 130	108	30 - 130	<0.005	mg/kg	NC	50		
2587950	Phenanthrene	2011/08/25	101	30 - 130	120	30 - 130	<0.005	mg/kg	NC	50		
2587950	Pyrene	2011/08/25	120	30 - 130	108	30 - 130	<0.005	mg/kg	NC	50		
2589836	F4G-sg (Grav. Heavy Hydrocarbons)	2011/08/23			94	65 - 135	<100	ug/g	1.6	50		
2590652	Leachable (ZHE) 1,4-Difluorobenzene	2011/08/24	101	60 - 140	102	60 - 140	101	%				
2590652	Leachable (ZHE) 4-Bromofluorobenzene	2011/08/24	100	60 - 140	100	60 - 140	100	%				
2590652	Leachable (ZHE) D10-Ethylbenzene	2011/08/24	98	30 - 130	99	30 - 130	100	%				
2590652	Leachable (ZHE) D4-1,2-Dichloroethane	2011/08/24	100	60 - 140	101	60 - 140	100	%				
2590652	Leachable (ZHE) Benzene	2011/08/24	84	70 - 130	86	70 - 130	<0.8	ug/L	NC	40		
2590652	Leachable (ZHE) Toluene	2011/08/24	93	70 - 130	94	70 - 130	<0.8	ug/L	NC	40		
2590652	Leachable (ZHE) Ethylbenzene	2011/08/24	95	70 - 130	97	70 - 130	<0.8	ug/L	NC	40		
2590652	Leachable (ZHE) o-Xylene	2011/08/24	96	70 - 130	97	70 - 130	<0.8	ug/L	NC	40		
2590652	Leachable (ZHE) p+m-Xylene	2011/08/24	94	70 - 130	95	70 - 130	<2	ug/L	NC	40		
2590652	Leachable (ZHE) F1 (C6-C10)	2011/08/24	104	70 - 130	96	70 - 130	<1000	ug/L	NC	40		
2590652	Leachable (ZHE) Total Xylenes	2011/08/24					<2	ug/L	NC	40		
2590652	Leachable (ZHE) F1 (C6-C10) - BTEX	2011/08/24					<1000	ug/L	NC	40		
2590939	Phenols-4AAP	2011/08/23	85	75 - 125	100	75 - 125	<0.04	ug/g	NC	35		
2590945	Leachable Mercury (Hg)	2011/08/23	109	75 - 125	110	80 - 120	<0.001	mg/L	NC	25		
2591003	Chromium (VI)	2011/08/25	8.8(1, 3)	75 - 125	105	80 - 120	<0.2	ug/g	NC	25	112	75 - 125
2591020	Leachable Arsenic (As)	2011/08/23	99	75 - 125	100	85 - 115	<0.2	mg/L	NC	35		
2591020	Leachable Barium (Ba)	2011/08/23	100	75 - 125	101	85 - 115	<0.2	mg/L	NC	35		
2591020	Leachable Boron (B)	2011/08/23	105	75 - 125	110	85 - 115	<0.1	mg/L	NC	35		
2591020	Leachable Cadmium (Cd)	2011/08/23	99	75 - 125	97	85 - 115	<0.05	mg/L	NC	35		
2591020	Leachable Chromium (Cr)	2011/08/23	102	75 - 125	102	85 - 115	<0.1	mg/L	NC	35		
2591020	Leachable Lead (Pb)	2011/08/23	98	75 - 125	96	85 - 115	<0.1	mg/L	NC	35		
2591020	Leachable Selenium (Se)	2011/08/23	100	75 - 125	94	85 - 115	<0.1	mg/L	NC	35		
2591020	Leachable Silver (Ag)	2011/08/23	95	75 - 125	93	85 - 115	<0.01	mg/L	NC	35		
2591020	Leachable Uranium (U)	2011/08/23	97	75 - 125	96	85 - 115	<0.01	mg/L	NC	35		
2591177	Acid Extractable Antimony (Sb)	2011/08/23	97	75 - 125			<0.2	ug/g	NC	30	102	75 - 125
2591177	Acid Extractable Arsenic (As)	2011/08/23	99	75 - 125			<1	ug/g	2.7	30	103	75 - 125
2591177	Acid Extractable Barium (Ba)	2011/08/23	NC(4)	75 - 125			<0.5	ug/g	1.6	30	104	75 - 125
2591177	Acid Extractable Beryllium (Be)	2011/08/23	101	75 - 125			<0.2	ug/g	NC	30	98	75 - 125
2591177	Acid Extractable Boron (B)	2011/08/23	95	75 - 125			<5	ug/g	NC	30	95	75 - 125
2591177	Acid Extractable Cadmium (Cd)	2011/08/23	100	75 - 125			<0.1	ug/g	NC	30	102	75 - 125

Maxxam Job #: B1C3566
Report Date: 2011/09/06

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Sampler Initials: MN

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
2591177	Acid Extractable Chromium (Cr)	2011/08/23	93	75 - 125			<1	ug/g	2.8	30	98	75 - 125
2591177	Acid Extractable Cobalt (Co)	2011/08/23	94	75 - 125			<0.1	ug/g	7.3	30	100	75 - 125
2591177	Acid Extractable Copper (Cu)	2011/08/23	94	75 - 125			<0.5	ug/g	6.4	30	104	75 - 125
2591177	Acid Extractable Lead (Pb)	2011/08/23	NC(4)	75 - 125			<1	ug/g	28.0	30	104	75 - 125
2591177	Acid Extractable Molybdenum (Mo)	2011/08/23	102	75 - 125			<0.5	ug/g	0.7	30	100	75 - 125
2591177	Acid Extractable Nickel (Ni)	2011/08/23	94	75 - 125			<0.5	ug/g	3.3	30	100	75 - 125
2591177	Acid Extractable Selenium (Se)	2011/08/23	100	75 - 125			<0.5	ug/g	NC	30	105	75 - 125
2591177	Acid Extractable Silver (Ag)	2011/08/23	99	75 - 125			<0.2	ug/g	NC	30	101	75 - 125
2591177	Acid Extractable Thallium (Tl)	2011/08/23	97	75 - 125			<0.05	ug/g	NC	30	103	75 - 125
2591177	Acid Extractable Uranium (U)	2011/08/23	105	75 - 125			<0.05	ug/g	4.1	30	111	75 - 125
2591177	Acid Extractable Vanadium (V)	2011/08/23	95	75 - 125			<5	ug/g	NC	30	102	75 - 125
2591177	Acid Extractable Zinc (Zn)	2011/08/23	NC(4)	75 - 125			<5	ug/g	2.2	30	105	75 - 125
2591177	Acid Extractable Mercury (Hg)	2011/08/23	101	75 - 125			<0.05	ug/g			102	75 - 125
2591219	Moisture	2011/08/23							1.1	20		
2591444	Moisture	2011/08/23							3.1	20		
2591560	Sieve - #200 (<0.075mm)	2011/08/24							1.9	20	88	86 - 91
2591560	Sieve - #200 (>0.075mm)	2011/08/24							0.2	20	12	9 - 14
2592364	Hot Water Ext. Boron (B)	2011/08/24					<0.05	ug/g	NC	35	104	85 - 115
2592460	Aliphatic >C10-C12	2011/08/25			80	30 - 130	<8.0	mg/kg	0.009	50		
2592460	Aliphatic >C12-C16	2011/08/25			91	30 - 130	<15	mg/kg	NC	50		
2592460	Aliphatic >C16-C21	2011/08/25			98	30 - 130	<15	mg/kg	NC	50		
2592460	Aliphatic >C21-<C32	2011/08/25			96	30 - 130	<15	mg/kg	NC	50		
2592460	Aromatic >C10-C12	2011/08/25			120	30 - 130	<4.0	mg/kg	4.2	50		
2592460	Aromatic >C12-C16	2011/08/25			122	30 - 130	<15	mg/kg	NC	50		
2592460	Aromatic >C16-C21	2011/08/25			129	30 - 130	<15	mg/kg	NC	50		
2592460	Aromatic >C21-<C32	2011/08/25			104	30 - 130	<15	mg/kg	10.7	50		
2592460	Isobutylbenzene - Extractable	2011/08/25					114	%				
2592460	n-Dotriacontane - Extractable	2011/08/25					76	%				
2600237	Isobutylbenzene - Volatile	2011/08/31	83	60 - 140	103	60 - 140	102	%				
2600237	Benzene	2011/08/31	83	60 - 140	102	60 - 140	<0.03	mg/kg	NC	50		
2600237	Toluene	2011/08/31	105	60 - 140	105	60 - 140	<0.03	mg/kg	NC	50		
2600237	Ethylbenzene	2011/08/31	101	60 - 140	103	60 - 140	<0.03	mg/kg	NC	50		
2600237	Xylene (Total)	2011/08/31	107	60 - 140	107	60 - 140	<0.05	mg/kg	NC	50		
2600237	Aliphatic >C6-C8	2011/08/31					<0.1	mg/kg	NC	50		
2600237	Aliphatic >C8-C10	2011/08/31					<0.4	mg/kg	NC	50		
2600237	>C8-C10 Aromatics (-EX)	2011/08/31					<0.1	mg/kg	NC	50		

QUALITY ASSURANCE REPORT

			Leachate Blank	
QC Batch	Parameter	Date	Value	Units
2590652	Leachable (ZHE) 1,4-Difluorobenzene	2011/08/24	99	%
2590652	Leachable (ZHE) 4-Bromofluorobenzene	2011/08/24	101	%
2590652	Leachable (ZHE) D10-Ethylbenzene	2011/08/24	91	%
2590652	Leachable (ZHE) D4-1,2-Dichloroethane	2011/08/24	100	%
2590652	Leachable (ZHE) Benzene	2011/08/24	<0.8	ug/L
2590652	Leachable (ZHE) Toluene	2011/08/24	<0.8	ug/L
2590652	Leachable (ZHE) Ethylbenzene	2011/08/24	<0.8	ug/L
2590652	Leachable (ZHE) o-Xylene	2011/08/24	<0.8	ug/L
2590652	Leachable (ZHE) p+m-Xylene	2011/08/24	<2	ug/L
2590652	Leachable (ZHE) F1 (C6-C10)	2011/08/24	<1000	ug/L
2590652	Leachable (ZHE) Total Xylenes	2011/08/24	<2	ug/L
2590652	Leachable (ZHE) F1 (C6-C10) - BTEX	2011/08/24	<1000	ug/L
2590945	Leachable Mercury (Hg)	2011/08/23	<0.001	mg/L
2591020	Leachable Arsenic (As)	2011/08/23	<0.2	mg/L
2591020	Leachable Barium (Ba)	2011/08/23	<0.2	mg/L
2591020	Leachable Boron (B)	2011/08/23	<0.1	mg/L
2591020	Leachable Cadmium (Cd)	2011/08/23	<0.05	mg/L
2591020	Leachable Chromium (Cr)	2011/08/23	<0.1	mg/L
2591020	Leachable Lead (Pb)	2011/08/23	<0.1	mg/L
2591020	Leachable Selenium (Se)	2011/08/23	<0.1	mg/L
2591020	Leachable Silver (Ag)	2011/08/23	<0.01	mg/L
2591020	Leachable Uranium (U)	2011/08/23	<0.01	mg/L

N/A = Not Applicable
RPD = Relative Percent Difference
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
Leachate Blank: A blank matrix containing all reagents used in the leaching procedure. Used to determine any process contamination.
QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.
(1) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.
(2) - The recovery was below the lower control limit. This may represent a low bias in some results for this specific analyte.
(3) - The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample.
(4) - The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

Validation Signature Page

Maxxam Job #: B1C3566

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

CRISTINA CARRIERE, Scientific Services

Floyd Mayede

FLOYD MAYEDE, Senior Analyst

Paul

PAUL RUBINATO, Analyst, Maxxam Analytics

RoseMarie MacDonald

ROSE MACDONALD, Scientific Specialist (Organics)

Validation Signature Page

Maxxam Job #: B1C3566

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Suzana Popović

SUZANA POPOVIC, Supervisor, Hydrocarbons

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 2

INVOICE INFORMATION:

Company Name: #10988 Franz Environmental Inc
Contact Name: Invoices, Lillian & Andrew
Address: 329 Churchill Ave N Suite 200
Ottawa ON K1Z 5B8
Phone: (613)721-0555 Fax: (613)721-0029
Email: ahenderson@franzenvironmental.com;lellis@franze

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name: Andrew Henderson
Address:
Phone: (613)721-0555 x226 Fax:
Email: ahenderson@franzenvironmental.com

PROJECT INFORMATION:

Quotation #: B14374
P.O. #:
Project #: 1329-1102
Project Name: 200 Lees Phase II ESA
Site #:
Sampled By: MIGUEL MADRID

Laboratory Use Only:

MAXXAM JOB #:
BOTTLE ORDER #: 275135
CHAIN OF CUSTODY #: C#275135-16-01
PROJECT MANAGER: JULIE CLEMENT

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☒ Ind/Comm ☐ Coarse
☒ Table 3 ☐ Agri/Other
☒ Table 9 ☒ For RSC

Other Regulations

☐ CCME
☐ Reg. 558
☐ MISA
☐ PWQO
☐ Other

SPECIAL INSTRUCTIONS

15-Aug-11 17:00
JULIE CLEMENT
B1C3566
JOF OTT-011

Include Criteria on Certificate of Analysis (Y/N)

Note: For MOE regulated drinking water samples - pleas

SAMPLES MUST BE KEPT COOL (< 10ºC) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: Time Required:
Rush Confirmation Number: (call lab for #)

REC'D IN OTTAWA

ANALYSIS REQUESTED (Please be specific):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	O'Reg 153 Volatile Organics	O'Reg 153 Semivolatile Organics Package	O'Reg 153 PAHs	O'Reg 153 Metals Package	Phenols (4AAP)	O'Reg 153 Petroleum Hydrocarbons	Sieve, 75um	pH CaCl2 EXTRACT	O'Reg 558 TCLP Metals & BTEX	PHC Fractionation	# of Bottles	Comments
1	FZ-BH11-4D		11/08/11	9:30	SOIL									✓				1	
2	FZ-BH11-7D-A		12/08/11	7:46	SOIL				✓	✓	✓			✓				4	LIMITED SOIL FOR METALS
3	FZ-BH11-7D-B		〃	〃	SOIL			✓					✓					5	NO PHC F2-F4 MOISTURE INCLUDED
4	FZ-BH11-7DC		〃	〃	SOIL							✓	✓			✓		5	NO BTEX/F1 ~~NO TCLP [illegible]~~
5	FZ-MW11-3		〃	11:30	SOIL				✓	✓	✓		✓	✓			✓	10	MOISTURE INCLUDED LIMITED SOIL FOR METALS
6	FZ-BH11-1S		〃	10:15	SOIL					✓	✓			✓				3	LIMITED SOIL FOR METALS
7	FZ-BH11-3S		〃	10:30	SOIL					✓	✓							2	〃
8	FZ-BH11-4S		〃	10:45						✓	✓							2	〃
9	Dup2		〃										✓					1	NO BTEX/F1
10	Dup3		〃							✓	✓							2	LIMITED SOIL FOR METALS

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
/Andrew Henderson	15/08/2011	1700	Josh Freeman	2011/08/15	17:00	

Laboratory Use Only

Time Sensitive	Temperature (ºC) on Receipt	Custody Seal	Yes	No
	9/8/9 7/7/7 ON ICE	Present		✓
		Intact		✓

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 2 of 2

INVOICE INFORMATION:

Company Name: #10988 Franz Environmental Inc
Contact Name: Invoices, Lillian & Andrew
Address: 329 Churchill Ave N Suite 200
Ottawa ON K1Z 5B8
Phone: (613)721-0555 Fax: (613)721-0029
Email: ahenderson@franzenvironmental.com;lellis@franze

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name: Andrew Henderson
Address:
Phone: (613)721-0555 x226 Fax:
Email: ahenderson@franzenvironmental.com

PROJECT INFORMATION:

Quotation #: B14374
P.O. #:
Project #: 1329-1102
Project Name: 200 Lees Phase II ESA
Site #:
Sampled By: Miguel Madrid

Laboratory Use Only:

MAXXAM JOB #:
BOTTLE ORDER #: 275135
CHAIN OF CUSTODY #: C#275135-10-01
PROJECT MANAGER: JULIE CLEMENT

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☒ Ind/Comm ☐ Coarse
☒ Table 3 ☐ Agri/Other
☒ Table 1 ☒ For RSC

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg. 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ______
☐ PWQO
☐ Other ______

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ____

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10ºC) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	O'Reg 153 Volatile Organics	O'Reg 153 Semivolatile Organics Package	O'Reg 153 PAHs	O'Reg 153 Metals Package	Phenols (4AAP)	O'Reg 153 Petroleum Hydrocarbons	Sieve, 75um	pH CaCl2 EXTRACT	O'Reg 558 TCLP Metals & BTEX		# of Bottles	Comments
1	DUP4		12/08/11		SOIL					✓	✓							2	LIMITED Soil for METALS
2	DUP5		11		SOIL				✓									1	
3					SOIL														
4					SOIL														
5					SOIL														
6					SOIL														
7					SOIL														
8					SOIL														
9					SOIL														
10					SOIL														

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ______ Time Required: ______ ☐
Rush Confirmation Number: ______ *(call lab for #)*

REC'D IN OTTAWA

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
Andrew Henderson	15/08/2011	1700	Josh Freeman	2011/08/15	17:00	

Laboratory Use Only

Time Sensitive	Temperature (ºC) on Receipt	Custody Seal	Yes	No
	9/8/9 7/7/7 ON ICE	Present		✓
		Intact		✓

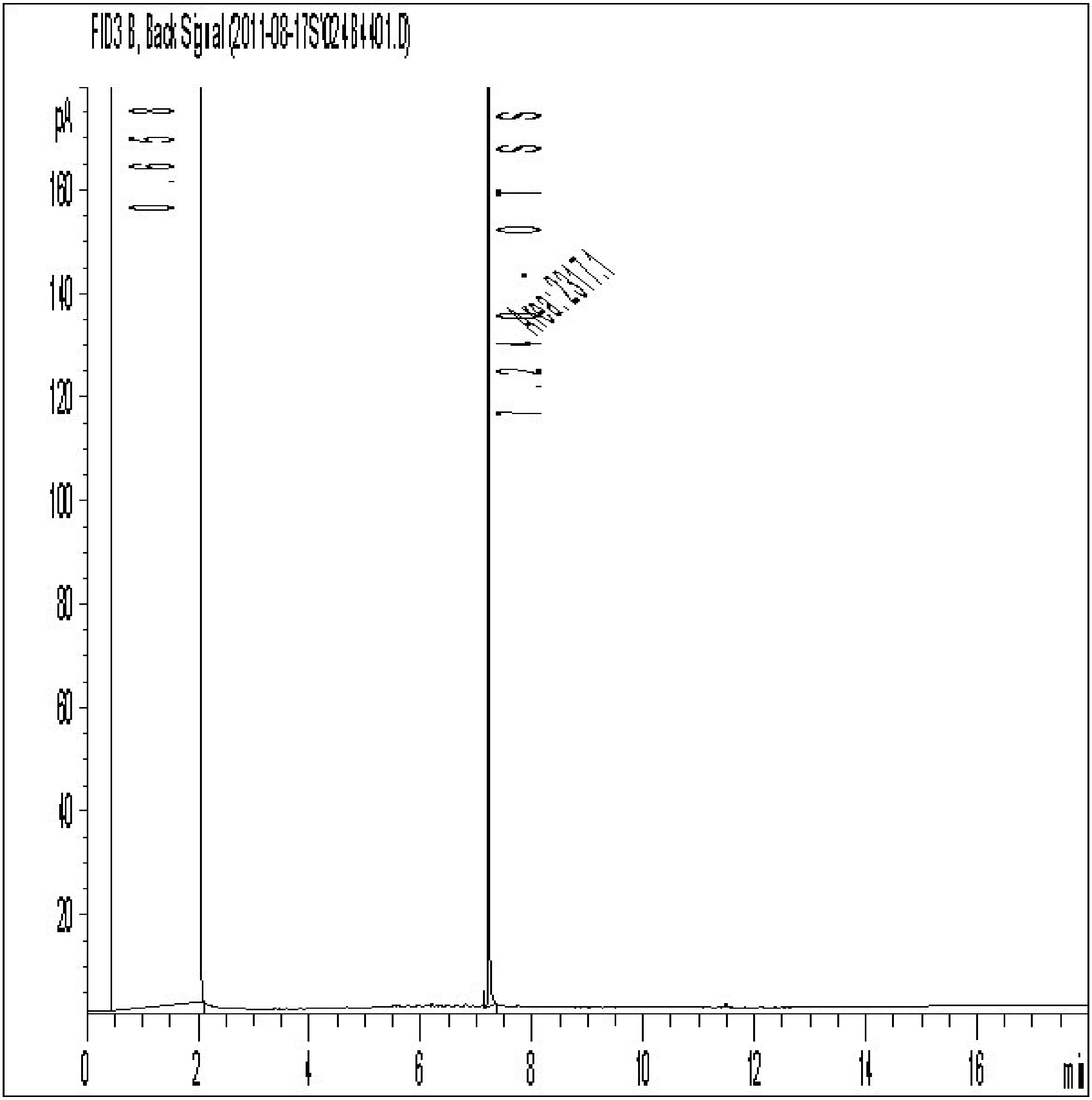
White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

Franz Environmental Inc
Report Date: 2011/09/06
Client Project #: 1329-1102
Maxxam Job #: B1C3566
Project name: 200 Lees Avenue, Phase II ESA
Maxxam Sample: KN9315
Client ID: FZ-BH11-7D-C

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

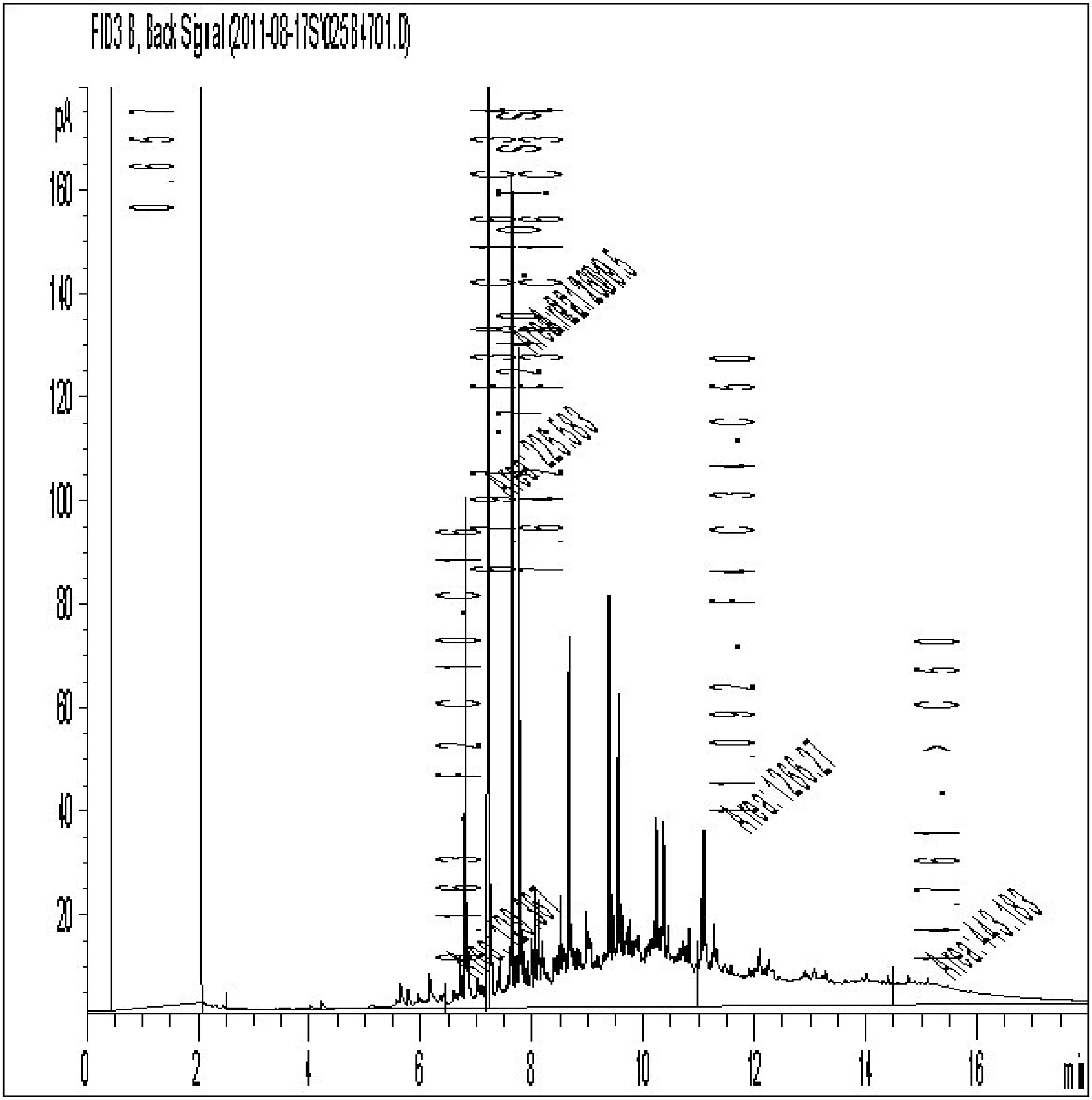


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Report Date: 2011/09/06
Maxxam Job #: B1C3566
Maxxam Sample: KN9316

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FZ-MW11-3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

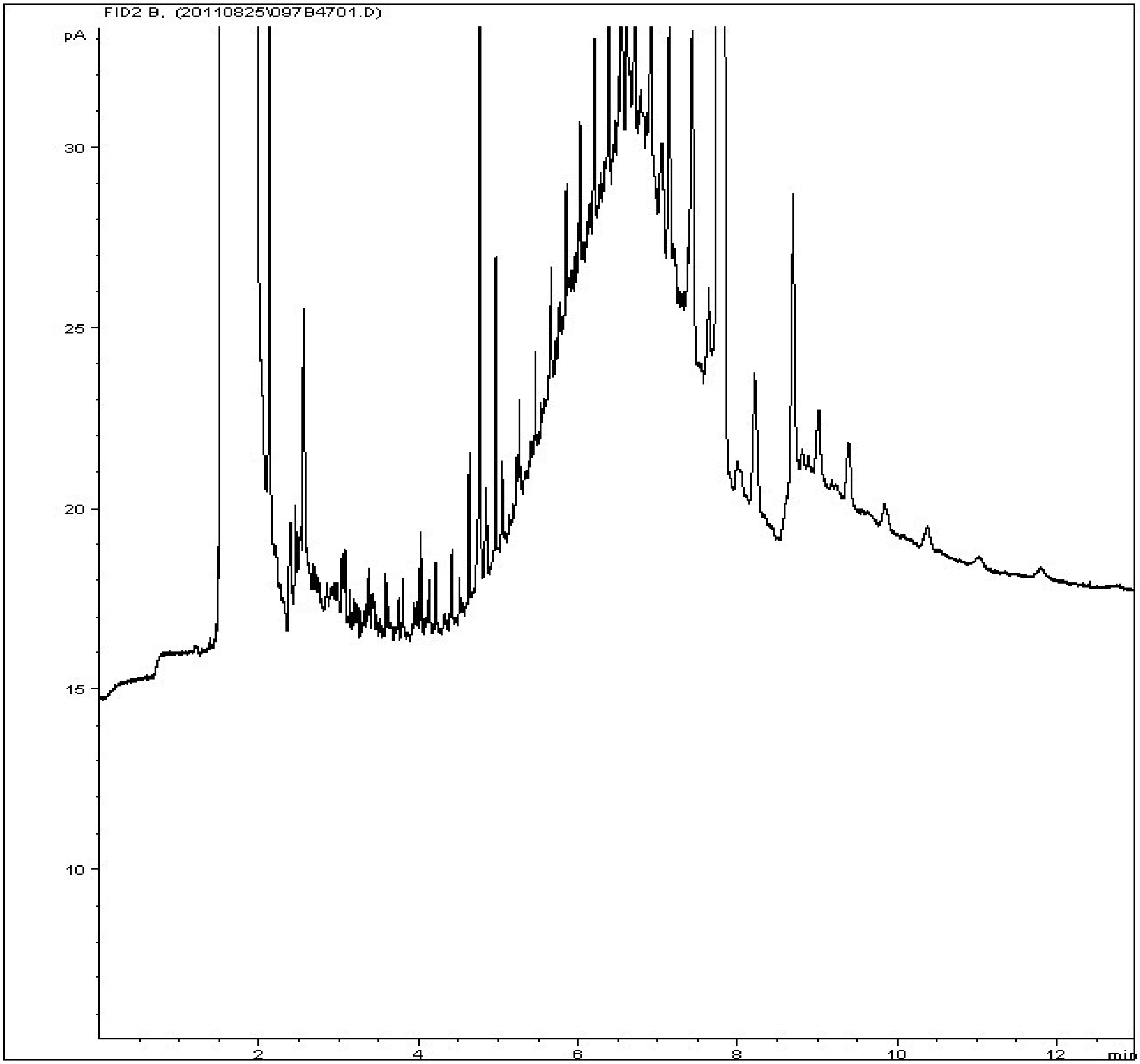


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FZ-MW11-3

Report Date: 2011/09/06
Maxxam Job #: B1C3566
Maxxam Sample: KN9316

TEH in Soil (AA PIRI) Chromatogram

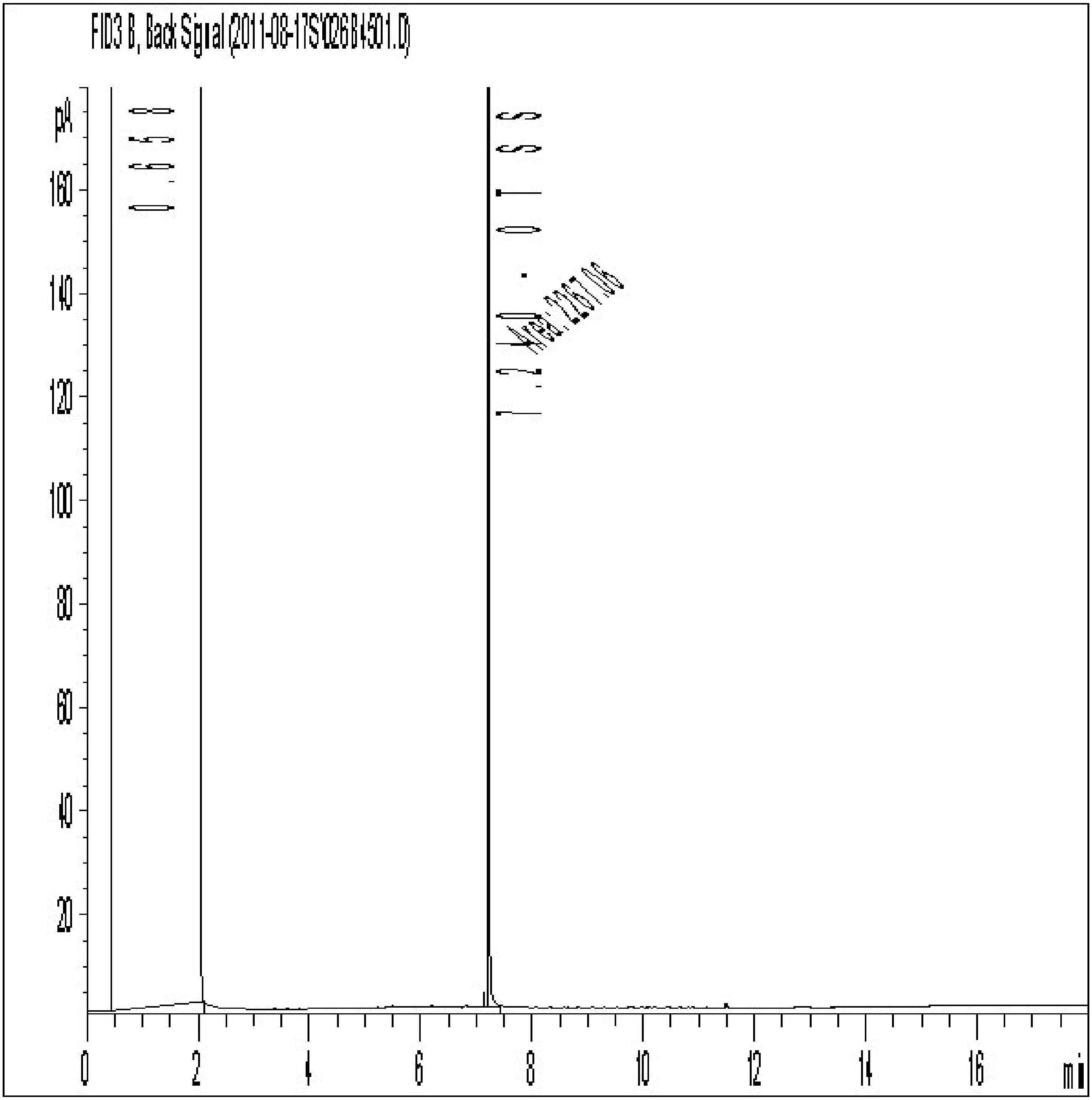


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: DUP 2

Report Date: 2011/09/06
Maxxam Job #: B1C3566
Maxxam Sample: KN9320

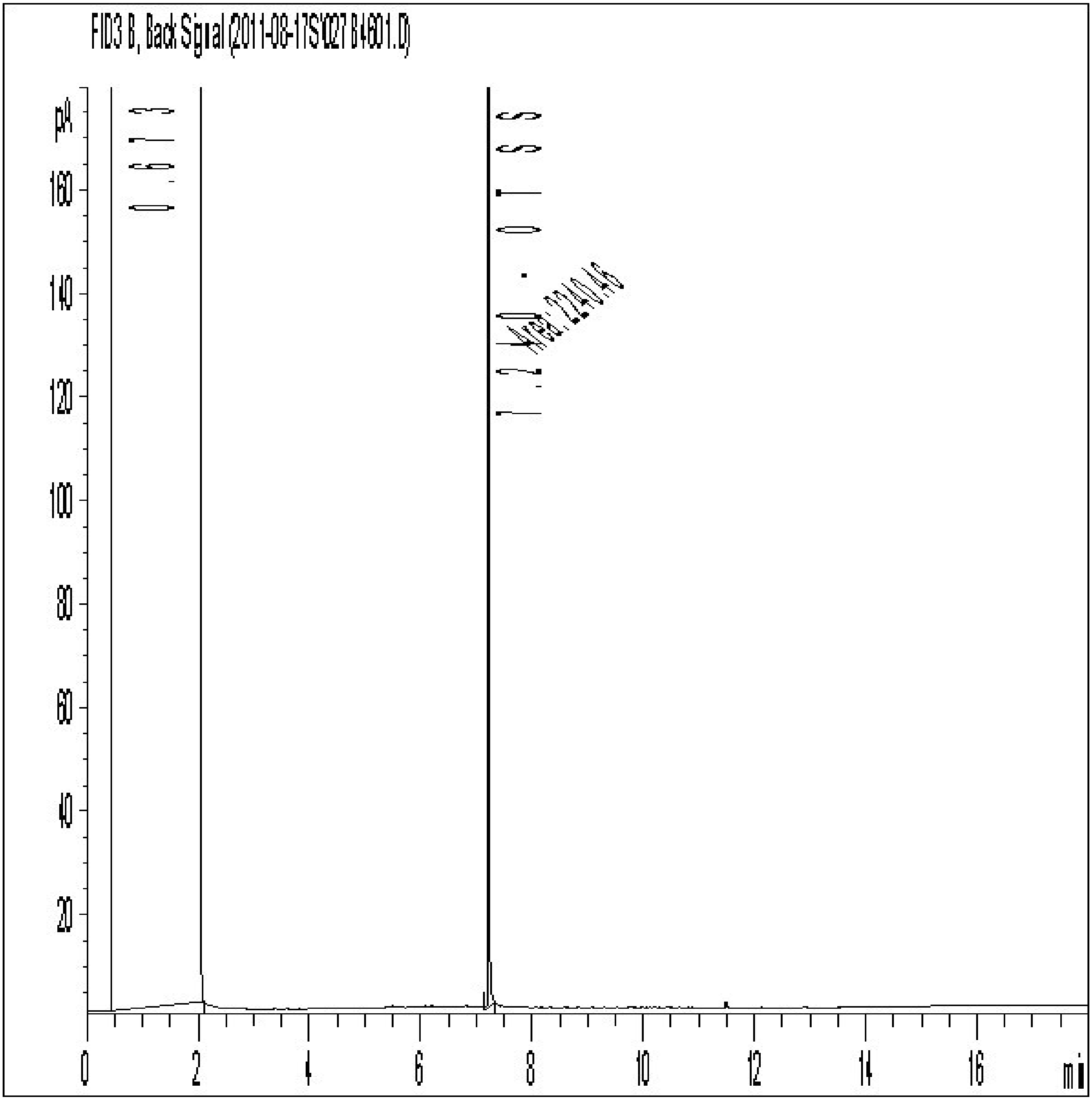
Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Franz Environmental Inc
Report Date: 2011/09/06
Client Project #: 1329-1102
Maxxam Job #: B1C3566
Project name: 200 Lees Avenue, Phase II ESA
Maxxam Sample: KN9320 Lab-Dup
Client ID: DUP 2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Your C.O.C. #: 27518803, 275188-03-01, 275188-04-01

Attention: Andrew Henderson
Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2011/08/30

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1C7456
Received: 2011/08/22, 12:30

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
ABN Compounds in Water by SIM GC/MS (1)	4	2011/08/25	2011/08/26	CAM SOP-00301	EPA 8270 (modified)
Chromium (VI) in Water (1)	9	N/A	2011/08/25	CAM SOP-00436	EPA 7199
Petroleum Hydro. CCME F1 & BTEX in Water	4	N/A	2011/08/24	OTT SOP-00002	CCME CWS
Petroleum Hydro. CCME F1 & BTEX in Water	3	N/A	2011/08/25	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water	4	2011/08/23	2011/08/24	OTT SOP-00001	CCME Hydrocarbons
Petroleum Hydrocarbons F2-F4 in Water	2	2011/08/23	2011/08/25	OTT SOP-00001	CCME Hydrocarbons
Mercury (1)	9	2011/08/29	2011/08/29	CAM SOP-00453	EPA 7470
Dissolved Metals by ICPMS (1)	9	N/A	2011/08/29	CAM SOP-00447	EPA 6020
PAH Compounds in Water by GC/MS (SIM) (1)	3	2011/08/24	2011/08/26	CAM SOP-00318	EPA 8270
Phenols (4AAP) (1)	5	N/A	2011/08/23	CAM SOP-00444	MOE ROPHEN-E3179
Volatile Organic Compounds in Water (1)	4	N/A	2011/08/29	CAM SOP-00226	EPA 8260 modified

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) This test was performed by Maxxam Analytics Mississauga

../2

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JULIE CLEMENT, Ottawa Customer Service
Email: JClement@maxxam.ca
Phone# (613) 274-3549

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

RESULTS OF ANALYSES OF WATER

Maxxam ID		KP9363	KP9364	KP9365	KP9367	KP9368		
Sampling Date		2011/08/17 12:00	2011/08/18 17:00	2011/08/19 11:00	2011/08/18 12:00	2011/08/18 12:00		
	Units	**MW11-4**	**BH00-5**	**BH00-4**	**MW11-DUP1**	**CHMW01-2**	**RDL**	**QC Batch**
Inorganics								
Phenols-4AAP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	2591733

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		KP9360		KP9361		KP9362	KP9363	KP9364		
Sampling Date		2011/08/19 12:00		2011/08/19 16:00		2011/08/21 16:00	2011/08/17 12:00	2011/08/18 17:00		
	Units	**CHMW01-1**	**RDL**	**MW11-3**	**RDL**	**F2-MW11-5-AUG11**	**MW11-4**	**BH00-5**	**RDL**	**QC Batch**
Metals										
Dissolved Cesium (Cs)	ug/L	<0.2	0.2	<0.2	0.2	<0.2	<0.2	<0.2	0.2	2597482
Dissolved Rubidium (Rb)	ug/L	0.8	0.2	5.9	0.2	2.6	15	0.4	0.2	2597482
Dissolved Antimony (Sb)	ug/L	<0.5	0.5	<0.5	0.5	<0.5	<0.5	<0.5	0.5	2597482
Dissolved Arsenic (As)	ug/L	<2(1)	2	<2(1)	2	<1	<1	<1	1	2597482
Dissolved Barium (Ba)	ug/L	210	2	21	2	120	69	290	2	2597482
Dissolved Beryllium (Be)	ug/L	<0.5	0.5	<0.5	0.5	<0.5	<0.5	<0.5	0.5	2597482
Dissolved Boron (B)	ug/L	200	10	200	10	170	710	91	10	2597482
Dissolved Cadmium (Cd)	ug/L	0.1	0.1	<0.1	0.1	0.1	<0.1	<0.1	0.1	2597482
Dissolved Chromium (Cr)	ug/L	<5	5	<5	5	<5	<5	<5	5	2597482
Dissolved Cobalt (Co)	ug/L	<1(1)	1	<0.5	0.5	1(1)	<1(1)	2(1)	1	2597482
Dissolved Copper (Cu)	ug/L	2	1	<1	1	3	<1	<1	1	2597482
Dissolved Lead (Pb)	ug/L	<0.5	0.5	<0.5	0.5	<0.5	1.3	<0.5	0.5	2597482
Dissolved Molybdenum (Mo)	ug/L	<0.5	0.5	2.5	0.5	12	1.3	1.8	0.5	2597482
Dissolved Nickel (Ni)	ug/L	3(1)	2	<1	1	13	<2(1)	2(1)	2	2597482
Dissolved Selenium (Se)	ug/L	9	2	<2	2	<2	<2	<2	2	2597482
Dissolved Silver (Ag)	ug/L	0.5	0.1	0.2	0.1	<0.1	0.2	<0.1	0.1	2597482
Dissolved Sodium (Na)	ug/L	550000	100	720000	1000	350000	390000	460000	100	2597482
Dissolved Thallium (Tl)	ug/L	0.06	0.05	<0.05	0.05	<0.05	<0.05	<0.05	0.05	2597482
Dissolved Uranium (U)	ug/L	2.0	0.1	0.2	0.1	7.3	2.3	2.9	0.1	2597482
Dissolved Vanadium (V)	ug/L	<1(1)	1	<1(1)	1	<0.5	1.3	1.0	0.5	2597482
Dissolved Zinc (Zn)	ug/L	<5	5	<5	5	20	15	<5	5	2597482

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Detection Limit was raised due to matrix interferences.

Maxxam Job #: B1C7456
Report Date: 2011/08/30

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		KP9365		KP9367	KP9368		KP9369		
Sampling Date		2011/08/19 11:00		2011/08/18 12:00	2011/08/18 12:00		2011/08/20 12:30		
	Units	**BH00-4**	**RDL**	**MW11-DUP1**	**CHMW01-2**	**RDL**	**F2-MW11-6-AUG11**	**RDL**	**QC Batch**
Metals									
Dissolved Cesium (Cs)	ug/L	<0.2	0.2	<0.2	<0.2	0.2	<0.2	0.2	2597482
Dissolved Rubidium (Rb)	ug/L	1.1	0.2	46	45	0.2	1.7	0.2	2597482
Dissolved Antimony (Sb)	ug/L	<0.5	0.5	<0.5	<0.5	0.5	<0.5	0.5	2597482
Dissolved Arsenic (As)	ug/L	<2(1)	2	2	2	1	<2(1)	2	2597482
Dissolved Barium (Ba)	ug/L	69	2	120	120	2	150	2	2597482
Dissolved Beryllium (Be)	ug/L	<0.5	0.5	<0.5	<0.5	0.5	<0.5	0.5	2597482
Dissolved Boron (B)	ug/L	370	10	420	420	10	91	10	2597482
Dissolved Cadmium (Cd)	ug/L	0.2	0.1	<0.1	<0.1	0.1	0.1	0.1	2597482
Dissolved Chromium (Cr)	ug/L	<5	5	<5	<5	5	<5	5	2597482
Dissolved Cobalt (Co)	ug/L	2(1)	1	<0.5	<0.5	0.5	7(1)	1	2597482
Dissolved Copper (Cu)	ug/L	2	1	<1	<1	1	2	1	2597482
Dissolved Lead (Pb)	ug/L	<0.5	0.5	<0.5	<0.5	0.5	<0.5	0.5	2597482
Dissolved Molybdenum (Mo)	ug/L	1.6	0.5	1.0	0.9	0.5	6.5	0.5	2597482
Dissolved Nickel (Ni)	ug/L	10(1)	2	<1	<1	1	8(1)	2	2597482
Dissolved Selenium (Se)	ug/L	<2	2	<2	<2	2	<2	2	2597482
Dissolved Silver (Ag)	ug/L	0.1	0.1	<0.1	<0.1	0.1	<0.1	0.1	2597482
Dissolved Sodium (Na)	ug/L	820000	1000	300000	300000	100	580000	1000	2597482
Dissolved Thallium (Tl)	ug/L	0.07	0.05	<0.05	<0.05	0.05	<0.05	0.05	2597482
Dissolved Uranium (U)	ug/L	4.3	0.1	0.4	0.4	0.1	4.1	0.1	2597482
Dissolved Vanadium (V)	ug/L	<1(1)	1	1.6	1.6	0.5	<1(1)	1	2597482
Dissolved Zinc (Zn)	ug/L	<5	5	<5	<5	5	6	5	2597482

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Detection Limit was raised due to matrix interferences.

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KP9372		
Sampling Date		2011/08/20		
	Units	**TRIP BLANK 3099**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons				
F1 (C6-C10)	ug/L	<25	25	2591012
F1 (C6-C10) - BTEX	ug/L	<25	25	2591012
Surrogate Recovery (%)				
1,4-Difluorobenzene	%	104		2591012
4-Bromofluorobenzene	%	103		2591012
D10-Ethylbenzene	%	93		2591012
D4-1,2-Dichloroethane	%	97		2591012

O'REG 153 METALS PACKAGE (WATER)

Maxxam ID		KP9360	KP9361	KP9362	KP9363	KP9364		
Sampling Date		2011/08/19 12:00	2011/08/19 16:00	2011/08/21 16:00	2011/08/17 12:00	2011/08/18 17:00		
	Units	**CHMW01-1**	**MW11-3**	**F2-MW11-5-AUG11**	**MW11-4**	**BH00-5**	**RDL**	**QC Batch**
Metals								
Chromium (VI)	ug/L	<5	<5	<5	<5	<5	5	2592877
Mercury (Hg)	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2597165

Maxxam ID		KP9365		KP9367		KP9368	KP9369		
Sampling Date		2011/08/19 11:00		2011/08/18 12:00		2011/08/18 12:00	2011/08/20 12:30		
	Units	**BH00-4**	**QC Batch**	**MW11-DUP1**	**QC Batch**	**CHMW01-2**	**F2-MW11-6-AUG11**	**RDL**	**QC Batch**
Metals									
Chromium (VI)	ug/L	<5	2592877	<5	2592879	<5	<5	5	2592877
Mercury (Hg)	ug/L	<0.1	2597165	<0.1	2597165	<0.1	<0.1	0.1	2597165

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 PAHS (WATER)

Maxxam ID		KP9361	KP9363	KP9365		
Sampling Date		2011/08/19 16:00	2011/08/17 12:00	2011/08/19 11:00		
	Units	**MW11-3**	**MW11-4**	**BH00-4**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons						
Acenaphthene	ug/L	<0.05	<0.05	<0.05	0.05	2592132
Acenaphthylene	ug/L	<0.05	<0.05	<0.05	0.05	2592132
Anthracene	ug/L	<0.05	0.11	<0.05	0.05	2592132
Benzo(a)anthracene	ug/L	<0.05	0.29	<0.05	0.05	2592132
Benzo(a)pyrene	ug/L	<0.01	0.25	<0.01	0.01	2592132
Benzo(b/j)fluoranthene	ug/L	<0.05	0.31	<0.05	0.05	2592132
Benzo(g,h,i)perylene	ug/L	<0.1	0.1	<0.1	0.1	2592132
Benzo(k)fluoranthene	ug/L	<0.05	0.13	<0.05	0.05	2592132
Chrysene	ug/L	<0.05	0.29	<0.05	0.05	2592132
Dibenz(a,h)anthracene	ug/L	<0.1	<0.1	<0.1	0.1	2592132
Fluoranthene	ug/L	<0.05	0.65	<0.05	0.05	2592132
Fluorene	ug/L	<0.05	<0.05	<0.05	0.05	2592132
Indeno(1,2,3-cd)pyrene	ug/L	<0.1	0.2	<0.1	0.1	2592132
1-Methylnaphthalene	ug/L	<0.05	<0.05	<0.05	0.05	2592132
2-Methylnaphthalene	ug/L	<0.05	<0.05	<0.05	0.05	2592132
Naphthalene	ug/L	<0.05	<0.05	<0.05	0.05	2592132
Phenanthrene	ug/L	<0.03	0.40	<0.03	0.03	2592132
Pyrene	ug/L	<0.05	0.54	<0.05	0.05	2592132
Surrogate Recovery (%)						
D10-Anthracene	%	87	81	88		2592132
D14-Terphenyl (FS)	%	79	72	83		2592132
D8-Acenaphthylene	%	86	80	85		2592132

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 PETROLEUM HYDROCARBONS (WATER)

Maxxam ID		KP9361	KP9363	KP9364	KP9365	KP9367	KP9368		
Sampling Date		2011/08/19 16:00	2011/08/17 12:00	2011/08/18 17:00	2011/08/19 11:00	2011/08/18 12:00	2011/08/18 12:00		
	Units	**MW11-3**	**MW11-4**	**BH00-5**	**BH00-4**	**MW11-DUP1**	**CHMW01-2**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons									
Benzene	ug/L	<0.20	<0.20			<0.20	<0.20	0.20	2591012
Toluene	ug/L	0.24	0.27			<0.20	<0.20	0.20	2591012
Ethylbenzene	ug/L	<0.20	<0.20			<0.20	<0.20	0.20	2591012
o-Xylene	ug/L	<0.20	<0.20			<0.20	<0.20	0.20	2591012
p+m-Xylene	ug/L	<0.40	<0.40			<0.40	<0.40	0.40	2591012
Total Xylenes	ug/L	<0.40	<0.40			<0.40	<0.40	0.40	2591012
F1 (C6-C10)	ug/L	<25	<25	<25	<25	<25	<25	25	2591012
F1 (C6-C10) - BTEX	ug/L	<25	<25	<25	<25	<25	<25	25	2591012
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	<100	100	2591480
F3 (C16-C34 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	<100	100	2591480
F4 (C34-C50 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	<100	100	2591480
Reached Baseline at C50	ug/L	YES	YES	YES	YES	YES	YES		2591480
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	106	107	109	106	105	107		2591012
4-Bromofluorobenzene	%	94	91	94	88	87	86		2591012
D10-Ethylbenzene	%	92	94	87	94	93	93		2591012
D4-1,2-Dichloroethane	%	97	99	100	98	96	98		2591012
o-Terphenyl	%	119	109	120	111	119	122		2591480

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (WATER)

Maxxam ID		KP9360	KP9364	KP9367	KP9368		
Sampling Date		2011/08/19 12:00	2011/08/18 17:00	2011/08/18 12:00	2011/08/18 12:00		
	Units	**CHMW01-1**	**BH00-5**	**MW11-DUP1**	**CHMW01-2**	**RDL**	**QC Batch**
Semivolatile Organics							
1,2,4-Trichlorobenzene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2594627
1-Methylnaphthalene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2594627
2,4,5-Trichlorophenol	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2594627
2,4,6-Trichlorophenol	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2594627
2,4-Dichlorophenol	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2594627
2,4-Dimethylphenol	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2594627
2,4-Dinitrophenol	ug/L	<2	<2	<2	<2	2	2594627
2,4-Dinitrotoluene	ug/L	<0.3	<0.3	<0.3	<0.3	0.3	2594627
2,6-Dinitrotoluene	ug/L	<0.3	<0.3	<0.3	<0.3	0.3	2594627
2-Chlorophenol	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2594627
2-Methylnaphthalene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2594627
3,3'-Dichlorobenzidine	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2594627
Acenaphthene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2594627
Acenaphthylene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2594627
Anthracene	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	2594627
Benzo(a)anthracene	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	2594627
Benzo(a)pyrene	ug/L	<0.01	<0.01	<0.01	<0.01	0.01	2594627
Benzo(b/j)fluoranthene	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	2594627
Benzo(g,h,i)perylene	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	2594627
Benzo(k)fluoranthene	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	2594627
Biphenyl	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2594627
Bis(2-chloroethyl)ether	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2594627
Bis(2-chloroisopropyl)ether	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2594627
Bis(2-ethylhexyl)phthalate	ug/L	<1	<1	<1	<1	1	2594627
Chrysene	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	2594627
Dibenz(a,h)anthracene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2594627
Diethyl phthalate	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2594627
Dimethyl phthalate	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2594627
Fluoranthene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2594627
Fluorene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2594627
Indeno(1,2,3-cd)pyrene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2594627
Naphthalene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2594627
p-Chloroaniline	ug/L	<1	<1	<1	<1	1	2594627
Pentachlorophenol	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2594627

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (WATER)

Maxxam ID		KP9360	KP9364	KP9367	KP9368		
Sampling Date		2011/08/19 12:00	2011/08/18 17:00	2011/08/18 12:00	2011/08/18 12:00		
	Units	**CHMW01-1**	**BH00-5**	**MW11-DUP1**	**CHMW01-2**	**RDL**	**QC Batch**
Phenanthrene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2594627
Phenol	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2594627
Pyrene	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	2594627
Surrogate Recovery (%)							
2,4,6-Tribromophenol	%	71	69	68	69		2594627
2-Fluorobiphenyl	%	54	57	36	40		2594627
2-Fluorophenol	%	25	27	17	20		2594627
D14-Terphenyl (FS)	%	93	93	91	93		2594627
D5-Nitrobenzene	%	37	41	26 (1)	29 (1)		2594627
D5-Phenol	%	17	17	11	12		2594627

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Surrogate recovery was below the lower control limit due to matrix interference. This may represent a low bias in some results.

O'REG 153 VOLATILE ORGANICS (WATER)

Maxxam ID		KP9364	KP9365	KP9366	KP9372		
Sampling Date		2011/08/18 17:00	2011/08/19 11:00	2011/08/18 17:00	2011/08/20		
	Units	**BH00-5**	**BH00-4**	**MW11-DUP2**	**TRIP BLANK 3099**	**RDL**	**QC Batch**
Volatile Organics							
Acetone (2-Propanone)	ug/L	<10	<10	<10	<10	10	2592486
Benzene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
Bromodichloromethane	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
Bromoform	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
Bromomethane	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2592486
Carbon Tetrachloride	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
Chlorobenzene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
Chloroform	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
Dibromochloromethane	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
1,2-Dichlorobenzene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
1,3-Dichlorobenzene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
1,4-Dichlorobenzene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
Dichlorodifluoromethane (FREON 12)	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2592486
1,1-Dichloroethane	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
1,2-Dichloroethane	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
1,1-Dichloroethylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
cis-1,2-Dichloroethylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
trans-1,2-Dichloroethylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
1,2-Dichloropropane	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
cis-1,3-Dichloropropene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
trans-1,3-Dichloropropene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
Ethylbenzene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
Ethylene Dibromide	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
Hexane	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2592486
Methylene Chloride(Dichloromethane)	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2592486
Methyl Isobutyl Ketone	ug/L	<5	<5	<5	<5	5	2592486
Methyl Ethyl Ketone (2-Butanone)	ug/L	<5	<5	<5	<5	5	2592486
Methyl t-butyl ether (MTBE)	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
Styrene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
1,1,1,2-Tetrachloroethane	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
1,1,2,2-Tetrachloroethane	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
Tetrachloroethylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
Toluene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
1,1,1-Trichloroethane	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 VOLATILE ORGANICS (WATER)

Maxxam ID		KP9364	KP9365	KP9366	KP9372		
Sampling Date		2011/08/18 17:00	2011/08/19 11:00	2011/08/18 17:00	2011/08/20		
	Units	**BH00-5**	**BH00-4**	**MW11-DUP2**	**TRIP BLANK 3099**	**RDL**	**QC Batch**
1,1,2-Trichloroethane	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
Trichloroethylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
Vinyl Chloride	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
p+m-Xylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
o-Xylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
Xylene (Total)	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2592486
Trichlorofluoromethane (FREON 11)	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2592486
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	105	110	112	104		2592486
D4-1,2-Dichloroethane	%	101	99	99	97		2592486
D8-Toluene	%	91	90	92	93		2592486

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Test Summary

Maxxam ID KP9360 **Collected** 2011/08/19
Sample ID CHMW01-1 **Shipped**
Matrix Water **Received** 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in Water by SIM GC/MS	GC/MS	2594627	2011/08/25	2011/08/26	NATALIYA GNIDASH
Chromium (VI) in Water	IC	2592877	N/A	2011/08/25	LUSINE KHACHATRYAN
Mercury	CVAA	2597165	2011/08/29	2011/08/29	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2597482	N/A	2011/08/29	JOHN BOWMAN

Maxxam ID KP9361 **Collected** 2011/08/19
Sample ID MW11-3 **Shipped**
Matrix Water **Received** 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chromium (VI) in Water	IC	2592877	N/A	2011/08/25	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2591012	N/A	2011/08/24	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2591480	2011/08/23	2011/08/24	LYNDSEY HART
Mercury	CVAA	2597165	2011/08/29	2011/08/29	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2597482	N/A	2011/08/29	JOHN BOWMAN
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2592132	2011/08/24	2011/08/26	DARRYL TILLER

Maxxam ID KP9361 Dup **Collected** 2011/08/19
Sample ID MW11-3 **Shipped**
Matrix Water **Received** 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Mercury	CVAA	2597165	2011/08/29	2011/08/29	MAGDALENA CARLOS

Test Summary

Maxxam ID	KP9362	**Collected**	2011/08/21
Sample ID	F2-MW11-5-AUG11	**Shipped**	
Matrix	Water	**Received**	2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chromium (VI) in Water	IC	2592877	N/A	2011/08/25	LUSINE KHACHATRYAN
Mercury	CVAA	2597165	2011/08/29	2011/08/29	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2597482	N/A	2011/08/29	JOHN BOWMAN

Maxxam ID	KP9362 Dup	**Collected**	2011/08/21
Sample ID	F2-MW11-5-AUG11	**Shipped**	
Matrix	Water	**Received**	2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	2597482	N/A	2011/08/29	JOHN BOWMAN

Maxxam ID	KP9363	**Collected**	2011/08/17
Sample ID	MW11-4	**Shipped**	
Matrix	Water	**Received**	2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chromium (VI) in Water	IC	2592877	N/A	2011/08/25	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2591012	N/A	2011/08/24	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2591480	2011/08/23	2011/08/24	LYNDSEY HART
Mercury	CVAA	2597165	2011/08/29	2011/08/29	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2597482	N/A	2011/08/29	JOHN BOWMAN
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2592132	2011/08/24	2011/08/26	DARRYL TILLER
Phenols (4AAP)	TECH/PHEN	2591733	N/A	2011/08/23	BRAMDEO MOTIRAM

Test Summary

Maxxam ID KP9364
Sample ID BH00-5
Matrix Water

Collected 2011/08/18
Shipped
Received 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in Water by SIM GC/MS	GC/MS	2594627	2011/08/25	2011/08/26	NATALIYA GNIDASH
Chromium (VI) in Water	IC	2592877	N/A	2011/08/25	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2591012	N/A	2011/08/24	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2591480	2011/08/23	2011/08/24	LYNDSEY HART
Mercury	CVAA	2597165	2011/08/29	2011/08/29	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2597482	N/A	2011/08/29	JOHN BOWMAN
Phenols (4AAP)	TECH/PHEN	2591733	N/A	2011/08/23	BRAMDEO MOTIRAM
Volatile Organic Compounds in Water	P&T/MS	2592486	N/A	2011/08/29	AMPOMAH ADUTWUM

Maxxam ID KP9365
Sample ID BH00-4
Matrix Water

Collected 2011/08/19
Shipped
Received 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chromium (VI) in Water	IC	2592877	N/A	2011/08/25	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2591012	N/A	2011/08/24	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2591480	2011/08/23	2011/08/24	LYNDSEY HART
Mercury	CVAA	2597165	2011/08/29	2011/08/29	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2597482	N/A	2011/08/29	JOHN BOWMAN
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2592132	2011/08/24	2011/08/26	DARRYL TILLER
Phenols (4AAP)	TECH/PHEN	2591733	N/A	2011/08/23	BRAMDEO MOTIRAM
Volatile Organic Compounds in Water	P&T/MS	2592486	N/A	2011/08/29	AMPOMAH ADUTWUM

Test Summary

Maxxam ID KP9365 Dup
Sample ID BH00-4
Matrix Water

Collected 2011/08/19
Shipped
Received 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chromium (VI) in Water	IC	2592877	N/A	2011/08/25	LUSINE KHACHATRYAN

Maxxam ID KP9366
Sample ID MW11-DUP2
Matrix Water

Collected 2011/08/18
Shipped
Received 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Volatile Organic Compounds in Water	P&T/MS	2592486	N/A	2011/08/29	AMPOMAH ADUTWUM

Maxxam ID KP9367
Sample ID MW11-DUP1
Matrix Water

Collected 2011/08/18
Shipped
Received 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in Water by SIM GC/MS	GC/MS	2594627	2011/08/25	2011/08/26	NATALIYA GNIDASH
Chromium (VI) in Water	IC	2592879	N/A	2011/08/25	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2591012	N/A	2011/08/25	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2591480	2011/08/23	2011/08/25	LYNDSEY HART
Mercury	CVAA	2597165	2011/08/29	2011/08/29	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2597482	N/A	2011/08/29	JOHN BOWMAN
Phenols (4AAP)	TECH/PHEN	2591733	N/A	2011/08/23	BRAMDEO MOTIRAM

Test Summary

Maxxam ID KP9367 Dup
Sample ID MW11-DUP1
Matrix Water

Collected 2011/08/18
Shipped
Received 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in Water by SIM GC/MS	GC/MS	2594627	2011/08/25	2011/08/26	NATALIYA GNIDASH

Maxxam ID KP9368
Sample ID CHMW01-2
Matrix Water

Collected 2011/08/18
Shipped
Received 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in Water by SIM GC/MS	GC/MS	2594627	2011/08/25	2011/08/26	NATALIYA GNIDASH
Chromium (VI) in Water	IC	2592877	N/A	2011/08/25	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2591012	N/A	2011/08/25	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2591480	2011/08/23	2011/08/25	LYNDSEY HART
Mercury	CVAA	2597165	2011/08/29	2011/08/29	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2597482	N/A	2011/08/29	JOHN BOWMAN
Phenols (4AAP)	TECH/PHEN	2591733	N/A	2011/08/23	BRAMDEO MOTIRAM

Maxxam ID KP9369
Sample ID F2-MW11-6-AUG11
Matrix Water

Collected 2011/08/20
Shipped
Received 2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chromium (VI) in Water	IC	2592877	N/A	2011/08/25	LUSINE KHACHATRYAN
Mercury	CVAA	2597165	2011/08/29	2011/08/29	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2597482	N/A	2011/08/29	JOHN BOWMAN

Test Summary

Maxxam ID	KP9372	**Collected**	2011/08/20
Sample ID	TRIP BLANK 3099	**Shipped**	
Matrix	Water	**Received**	2011/08/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2591012	N/A	2011/08/25	STEVE ROBERTS
Volatile Organic Compounds in Water	P&T/MS	2592486	N/A	2011/08/29	AMPOMAH ADUTWUM

Package 1	5.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Custody seal was not present on the cooler.

All sample bottles contained visual sediment, which was included in the analysis as per the Protocol for Analytical Methods Use in the Assesment of Properties under part XV.1 of the Environmental Protection Act.

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**
2591012	1,4-Difluorobenzene	2011/08/24	92	70 - 130	104	70 - 130	105	%		
2591012	4-Bromofluorobenzene	2011/08/24	114	70 - 130	118	70 - 130	109	%		
2591012	D10-Ethylbenzene	2011/08/24	72	70 - 130	93	70 - 130	95	%		
2591012	D4-1,2-Dichloroethane	2011/08/24	113	70 - 130	94	70 - 130	94	%		
2591012	Benzene	2011/08/24	78	70 - 130	86	70 - 130	<0.20	ug/L	NC	40
2591012	Toluene	2011/08/24	86	70 - 130	99	70 - 130	<0.20	ug/L	NC	40
2591012	Ethylbenzene	2011/08/24	81	70 - 130	102	70 - 130	<0.20	ug/L	NC	40
2591012	o-Xylene	2011/08/24	101	70 - 130	111	70 - 130	<0.20	ug/L	NC	40
2591012	p+m-Xylene	2011/08/24	80	70 - 130	99	70 - 130	<0.40	ug/L	NC	40
2591012	F1 (C6-C10)	2011/08/24	87	70 - 130	88	70 - 130	<25	ug/L	NC	40
2591012	Total Xylenes	2011/08/24					<0.40	ug/L	NC	40
2591012	F1 (C6-C10) - BTEX	2011/08/24					<25	ug/L	NC	40
2591480	o-Terphenyl	2011/08/24	124	30 - 130	123	30 - 130	123	%		
2591480	F2 (C10-C16 Hydrocarbons)	2011/08/24	96	60 - 130	87	60 - 130	<100	ug/L	1.7	50
2591480	F3 (C16-C34 Hydrocarbons)	2011/08/24	96	60 - 130	87	60 - 130	<100	ug/L	4.1	50
2591480	F4 (C34-C50 Hydrocarbons)	2011/08/24	96	60 - 130	87	60 - 130	<100	ug/L	NC	50
2591733	Phenols-4AAP	2011/08/23	103	75 - 125	101	75 - 125	0.001, RDL=0.001	mg/L	6.3	25
2592132	D10-Anthracene	2011/08/25	80	50 - 130	84	50 - 130	83	%		
2592132	D14-Terphenyl (FS)	2011/08/25	71	50 - 130	79	50 - 130	75	%		
2592132	D8-Acenaphthylene	2011/08/25	83	50 - 130	95	50 - 130	84	%		
2592132	Acenaphthene	2011/08/25	97	50 - 130	80	50 - 130	<0.05	ug/L	NC	40
2592132	Acenaphthylene	2011/08/25	104	50 - 130	82	50 - 130	<0.05	ug/L	NC	40
2592132	Anthracene	2011/08/25	90	50 - 130	81	50 - 130	<0.05	ug/L	NC	40
2592132	Benzo(a)anthracene	2011/08/25	90	50 - 130	95	50 - 130	<0.05	ug/L		
2592132	Benzo(a)pyrene	2011/08/25	91	50 - 130	107	50 - 130	<0.01	ug/L		
2592132	Benzo(b/j)fluoranthene	2011/08/25	84	50 - 130	95	50 - 130	<0.05	ug/L		
2592132	Benzo(g,h,i)perylene	2011/08/25	78	50 - 130	73	50 - 130	<0.1	ug/L		
2592132	Benzo(k)fluoranthene	2011/08/25	92	50 - 130	93	50 - 130	<0.05	ug/L		
2592132	Chrysene	2011/08/25	87	50 - 130	88	50 - 130	<0.05	ug/L		
2592132	Dibenz(a,h)anthracene	2011/08/25	87	50 - 130	78	50 - 130	<0.1	ug/L		
2592132	Fluoranthene	2011/08/25	92	50 - 130	84	50 - 130	<0.05	ug/L	NC	40
2592132	Fluorene	2011/08/25	104	50 - 130	84	50 - 130	<0.05	ug/L	NC	40
2592132	Indeno(1,2,3-cd)pyrene	2011/08/25	84	50 - 130	80	50 - 130	<0.1	ug/L		
2592132	1-Methylnaphthalene	2011/08/25	80	50 - 130	76	50 - 130	<0.05	ug/L	NC	40
2592132	2-Methylnaphthalene	2011/08/25	83	50 - 130	71	50 - 130	<0.05	ug/L	NC	40
2592132	Naphthalene	2011/08/25	89	50 - 130	79	50 - 130	<0.05	ug/L	NC	40
2592132	Phenanthrene	2011/08/25	93	50 - 130	80	50 - 130	<0.03	ug/L	NC	40
2592132	Pyrene	2011/08/25	94	50 - 130	87	50 - 130	<0.05	ug/L		
2592486	4-Bromofluorobenzene	2011/08/29	115	70 - 130	108	70 - 130	103	%		
2592486	D4-1,2-Dichloroethane	2011/08/29	91	70 - 130	93	70 - 130	99	%		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2592486	D8-Toluene	2011/08/29	99	70 - 130	98	70 - 130	92	%		
2592486	Acetone (2-Propanone)	2011/08/29	68	60 - 140	100	60 - 140	<10	ug/L	NC	30
2592486	Benzene	2011/08/29	101	70 - 130	100	70 - 130	<0.1	ug/L	NC	30
2592486	Bromodichloromethane	2011/08/29	100	70 - 130	100	70 - 130	<0.1	ug/L	NC	30
2592486	Bromoform	2011/08/29	115	70 - 130	113	70 - 130	<0.2	ug/L	NC	30
2592486	Bromomethane	2011/08/29	90	60 - 140	85	60 - 140	<0.5	ug/L	NC	30
2592486	Carbon Tetrachloride	2011/08/29	108	70 - 130	107	70 - 130	<0.1	ug/L	NC	30
2592486	Chlorobenzene	2011/08/29	104	70 - 130	102	70 - 130	<0.1	ug/L	NC	30
2592486	Chloroform	2011/08/29	101	70 - 130	102	70 - 130	<0.1	ug/L	NC	30
2592486	Dibromochloromethane	2011/08/29	110	70 - 130	108	70 - 130	<0.2	ug/L	NC	30
2592486	1,2-Dichlorobenzene	2011/08/29	104	70 - 130	103	70 - 130	<0.2	ug/L	NC	30
2592486	1,3-Dichlorobenzene	2011/08/29	110	70 - 130	107	70 - 130	<0.2	ug/L	NC	30
2592486	1,4-Dichlorobenzene	2011/08/29	111	70 - 130	109	70 - 130	<0.2	ug/L	NC	30
2592486	Dichlorodifluoromethane (FREON 12)	2011/08/29	85	60 - 140	84	60 - 140	<0.5	ug/L	NC	30
2592486	1,1-Dichloroethane	2011/08/29	98	70 - 130	98	70 - 130	<0.1	ug/L	NC	30
2592486	1,2-Dichloroethane	2011/08/29	99	70 - 130	98	70 - 130	<0.2	ug/L	NC	30
2592486	1,1-Dichloroethylene	2011/08/29	91	70 - 130	90	70 - 130	<0.1	ug/L	NC	30
2592486	cis-1,2-Dichloroethylene	2011/08/29	101	70 - 130	101	70 - 130	<0.1	ug/L	NC	30
2592486	trans-1,2-Dichloroethylene	2011/08/29	99	70 - 130	101	70 - 130	<0.1	ug/L	NC	30
2592486	1,2-Dichloropropane	2011/08/29	96	70 - 130	96	70 - 130	<0.1	ug/L	NC	30
2592486	cis-1,3-Dichloropropene	2011/08/29	105	70 - 130	103	70 - 130	<0.2	ug/L	NC	30
2592486	trans-1,3-Dichloropropene	2011/08/29	100	70 - 130	95	70 - 130	<0.2	ug/L	NC	30
2592486	Ethylbenzene	2011/08/29	111	70 - 130	105	70 - 130	<0.1	ug/L	NC	30
2592486	Ethylene Dibromide	2011/08/29	105	70 - 130	103	70 - 130	<0.2	ug/L	NC	30
2592486	Hexane	2011/08/29	99	70 - 130	85	70 - 130	<0.5	ug/L	NC	30
2592486	Methylene Chloride(Dichloromethane)	2011/08/29	84	70 - 130	83	70 - 130	<0.5	ug/L	NC	30
2592486	Methyl Isobutyl Ketone	2011/08/29	95	70 - 130	92	70 - 130	<5	ug/L	NC	30
2592486	Methyl Ethyl Ketone (2-Butanone)	2011/08/29	85	60 - 140	102	60 - 140	<5	ug/L	NC	30
2592486	Methyl t-butyl ether (MTBE)	2011/08/29	96	70 - 130	98	70 - 130	<0.2	ug/L	NC	30
2592486	Styrene	2011/08/29	113	70 - 130	110	70 - 130	<0.2	ug/L	NC	30
2592486	1,1,1,2-Tetrachloroethane	2011/08/29	109	70 - 130	107	70 - 130	<0.1	ug/L	NC	30
2592486	1,1,2,2-Tetrachloroethane	2011/08/29	96	70 - 130	93	70 - 130	<0.2	ug/L	NC	30
2592486	Tetrachloroethylene	2011/08/29	112	70 - 130	107	70 - 130	<0.1	ug/L	NC	30
2592486	Toluene	2011/08/29	105	70 - 130	100	70 - 130	<0.2	ug/L	NC	30
2592486	1,1,1-Trichloroethane	2011/08/29	108	70 - 130	106	70 - 130	<0.1	ug/L	NC	30
2592486	1,1,2-Trichloroethane	2011/08/29	99	70 - 130	96	70 - 130	<0.2	ug/L	NC	30
2592486	Trichloroethylene	2011/08/29	111	70 - 130	112	70 - 130	<0.1	ug/L	NC	30
2592486	Vinyl Chloride	2011/08/29	78	70 - 130	77	70 - 130	<0.2	ug/L	NC	30
2592486	p+m-Xylene	2011/08/29	115	70 - 130	106	70 - 130	<0.1	ug/L	NC	30
2592486	o-Xylene	2011/08/29	108	70 - 130	104	70 - 130	<0.1	ug/L	NC	30

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**
2592486	Trichlorofluoromethane (FREON 11)	2011/08/29	96	70 - 130	95	70 - 130	<0.2	ug/L	NC	30
2592486	Xylene (Total)	2011/08/29					<0.1	ug/L	NC	30
2592877	Chromium (VI)	2011/08/25	106	80 - 120	96	90 - 110	<5	ug/L	NC	25
2592879	Chromium (VI)	2011/08/25	106	80 - 120	97	90 - 110	<5	ug/L	NC	25
2594627	2,4,6-Tribromophenol	2011/08/26	86	10 - 130	86	10 - 130	62	%		
2594627	2-Fluorobiphenyl	2011/08/26	69	30 - 130	87	30 - 130	66	%		
2594627	2-Fluorophenol	2011/08/26	32	10 - 130	50	10 - 130	38	%		
2594627	D14-Terphenyl (FS)	2011/08/26	92	30 - 130	92	30 - 130	90	%		
2594627	D5-Nitrobenzene	2011/08/26	51	30 - 130	73	30 - 130	55	%		
2594627	D5-Phenol	2011/08/26	21	10 - 130	30	10 - 130	23	%		
2594627	1,2,4-Trichlorobenzene	2011/08/26	58	30 - 130	78	30 - 130	<0.1	ug/L	NC	40
2594627	1-Methylnaphthalene	2011/08/26	70	30 - 130	87	30 - 130	<0.2	ug/L	NC	40
2594627	2,4,5-Trichlorophenol	2011/08/26	91	10 - 130	97	10 - 130	<0.2	ug/L	NC	40
2594627	2,4,6-Trichlorophenol	2011/08/26	85	10 - 130	96	10 - 130	<0.2	ug/L	NC	40
2594627	2,4-Dichlorophenol	2011/08/26	61	10 - 130	81	10 - 130	<0.1	ug/L	NC	40
2594627	2,4-Dimethylphenol	2011/08/26	53	10 - 130	66	10 - 130	<0.5	ug/L	NC	40
2594627	2,4-Dinitrophenol	2011/08/26	93	10 - 130	87	10 - 130	<2	ug/L	NC	40
2594627	2,4-Dinitrotoluene	2011/08/26	102	30 - 130	104	30 - 130	<0.3	ug/L	NC	40
2594627	2,6-Dinitrotoluene	2011/08/26	98	30 - 130	104	30 - 130	<0.3	ug/L	NC	40
2594627	2-Chlorophenol	2011/08/26	55	10 - 130	78	10 - 130	<0.1	ug/L	NC	40
2594627	2-Methylnaphthalene	2011/08/26	70	30 - 130	87	30 - 130	<0.2	ug/L	NC	40
2594627	3,3'-Dichlorobenzidine	2011/08/26	106	30 - 130	134(1, 2)	30 - 130	<0.5	ug/L	NC	40
2594627	Acenaphthene	2011/08/26	80	30 - 130	91	30 - 130	<0.2	ug/L	NC	40
2594627	Acenaphthylene	2011/08/26	78	30 - 130	90	30 - 130	<0.2	ug/L	NC	40
2594627	Anthracene	2011/08/26	95	30 - 130	95	30 - 130	<0.05	ug/L	NC	40
2594627	Benzo(a)anthracene	2011/08/26	104	30 - 130	102	30 - 130	<0.05	ug/L	NC	40
2594627	Benzo(a)pyrene	2011/08/26	104	30 - 130	103	30 - 130	<0.01	ug/L	NC	40
2594627	Benzo(b/j)fluoranthene	2011/08/26	106	30 - 130	105	30 - 130	<0.05	ug/L	NC	40
2594627	Benzo(g,h,i)perylene	2011/08/26	89	30 - 130	89	30 - 130	<0.05	ug/L	NC	40
2594627	Benzo(k)fluoranthene	2011/08/26	110	30 - 130	111	30 - 130	<0.05	ug/L	NC	40
2594627	Biphenyl	2011/08/26	77	30 - 130	93	30 - 130	<0.1	ug/L	NC	40
2594627	Bis(2-chloroethyl)ether	2011/08/26	58	30 - 130	85	30 - 130	<0.5	ug/L	NC	40
2594627	Bis(2-chloroisopropyl)ether	2011/08/26	60	30 - 130	88	30 - 130	<0.5	ug/L	NC	40
2594627	Bis(2-ethylhexyl)phthalate	2011/08/26	122	30 - 130	116	30 - 130	<1	ug/L	NC	40
2594627	Chrysene	2011/08/26	106	30 - 130	105	30 - 130	<0.05	ug/L	NC	40
2594627	Dibenz(a,h)anthracene	2011/08/26	90	30 - 130	90	30 - 130	<0.1	ug/L	NC	40
2594627	Diethyl phthalate	2011/08/26	101	30 - 130	103	30 - 130	<0.1	ug/L	NC	40
2594627	Dimethyl phthalate	2011/08/26	109	30 - 130	115	30 - 130	<0.1	ug/L	NC	40
2594627	Fluoranthene	2011/08/26	104	30 - 130	103	30 - 130	<0.2	ug/L	NC	40
2594627	Fluorene	2011/08/26	95	30 - 130	101	30 - 130	<0.2	ug/L	NC	40

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2594627	Indeno(1,2,3-cd)pyrene	2011/08/26	88	30 - 130	87	30 - 130	<0.1	ug/L	NC	40
2594627	Naphthalene	2011/08/26	64	30 - 130	83	30 - 130	<0.2	ug/L	NC	40
2594627	p-Chloroaniline	2011/08/26	67	30 - 130	89	30 - 130	<1	ug/L	NC	40
2594627	Pentachlorophenol	2011/08/26	84	10 - 130	81	10 - 130	<0.1	ug/L	NC	40
2594627	Phenanthrene	2011/08/26	95	30 - 130	96	30 - 130	<0.1	ug/L	NC	40
2594627	Phenol	2011/08/26	26	10 - 130	35	10 - 130	<0.5	ug/L	NC	40
2594627	Pyrene	2011/08/26	108	30 - 130	106	30 - 130	<0.05	ug/L	NC	40
2597165	Mercury (Hg)	2011/08/29	106	75 - 125	104	80 - 120	<0.1	ug/L	NC	25
2597482	Dissolved Cesium (Cs)	2011/08/29	84	80 - 120	88(1)	90 - 110	<0.2	ug/L	NC	25
2597482	Dissolved Rubidium (Rb)	2011/08/29	92	80 - 120	93	90 - 110	<0.2	ug/L	7.6	25
2597482	Dissolved Antimony (Sb)	2011/08/29	107	80 - 120	104	90 - 110	<0.5	ug/L	NC	25
2597482	Dissolved Arsenic (As)	2011/08/29	103	80 - 120	97	90 - 110	<1	ug/L	NC	25
2597482	Dissolved Barium (Ba)	2011/08/29	93	80 - 120	95	90 - 110	<2	ug/L	2.6	25
2597482	Dissolved Beryllium (Be)	2011/08/29	99	80 - 120	98	90 - 110	<0.5	ug/L	NC	25
2597482	Dissolved Boron (B)	2011/08/29	91	80 - 120	95	90 - 110	<10	ug/L	0.6	25
2597482	Dissolved Cadmium (Cd)	2011/08/29	101	80 - 120	101	90 - 110	<0.1	ug/L	NC	25
2597482	Dissolved Chromium (Cr)	2011/08/29	96	80 - 120	98	90 - 110	<5	ug/L	NC	25
2597482	Dissolved Cobalt (Co)	2011/08/29	96	80 - 120	97	90 - 110	<0.5	ug/L	NC	25
2597482	Dissolved Copper (Cu)	2011/08/29	91	80 - 120	97	90 - 110	<1	ug/L	NC	25
2597482	Dissolved Lead (Pb)	2011/08/29	96	80 - 120	99	90 - 110	<0.5	ug/L	NC	25
2597482	Dissolved Molybdenum (Mo)	2011/08/29	104	80 - 120	100	90 - 110	<0.5	ug/L	0.9	25
2597482	Dissolved Nickel (Ni)	2011/08/29	95	80 - 120	98	90 - 110	<1	ug/L	8.1	25
2597482	Dissolved Selenium (Se)	2011/08/29	105	80 - 120	96	90 - 110	<2	ug/L	NC	25
2597482	Dissolved Silver (Ag)	2011/08/29	87	80 - 120	98	90 - 110	<0.1	ug/L	NC	25
2597482	Dissolved Sodium (Na)	2011/08/29	NC	80 - 120	97	90 - 110	<100	ug/L	1	25
2597482	Dissolved Thallium (Tl)	2011/08/29	97	80 - 120	99	90 - 110	<0.05	ug/L	NC	25
2597482	Dissolved Uranium (U)	2011/08/29	102	80 - 120	101	90 - 110	<0.1	ug/L	0.1	25

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2597482	Dissolved Vanadium (V)	2011/08/29	98	80 - 120	97	90 - 110	0.9, RDL=0.5	ug/L	NC	25
2597482	Dissolved Zinc (Zn)	2011/08/29	94	80 - 120	98	90 - 110	<5	ug/L	NC	25

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) - The recovery was above the upper control limit. This may represent a high bias in some results for this specific analyte. For results that were not detected (ND), this potential bias has no impact.

Validation Signature Page

Maxxam Job #: B1C7456

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Paul

PAUL RUBINATO, Analyst, Maxxam Analytics

BRAD NEWMAN, Scientific Specialist

STEVE ROBERTS, Lab Supervisor, Ottawa

Floyd Mayede

FLOYD MAYEDE, Senior Analyst

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 2

INVOICE INFORMATION:

Company Name: #10988 Franz Environmental Inc
Contact Name: Invoices, Lillian & Andrew
Address: 329 Churchill Ave N Suite 200
Ottawa ON K1Z 5B8
Phone: (613)721-0555 Fax: (613)721-0029
Email: ahenderson@franzenvironmental.com;lellis@franze

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name: Andrew Henderson
Address:
Phone: (613)721-0555 x226 Fax:
Email: ahenderson@franzenvironmental.com

PROJECT INFORMATION:

Quotation #: B14374
P.O. #:
Project #: 1329-1102
Project Name: 200 Lees Ph II
Site #:
Sampled By:

Laboratory Use Only:

MAXXAM JOB #:
BOTTLE ORDER #: 275188
CHAIN OF CUSTODY #: C#275188-03-01
PROJECT MANAGER: JULIE CLEMENT

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☒ Table 3 ☐ Agri/Other
☒ Table I ☑ For RSC

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg. 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ____
☐ PWQO
☐ Other ____

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ____

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

TURNAROUND TIME (TAT) REQUIRED:

E ADVANCE NOTICE FOR RUSH PROJECTS

not specified): ☒
days for most tests.
r certain tests such as BOD and Dioxins/Furans are > 5
anager for details.
pplies to entire submission)
____ Time Required: ____ ☐
____ *(call lab for #)*

22-Aug-11 12:30
JULIE CLEMENT
B1C7456
JOF OTT-001

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	O'Reg 153 Volatile Organics	O'Reg 153 Semivolatile Organics Package	O'Reg 153 PAHs	O'Reg 153 Metals Package	Phenols (4AAP)	O'Reg 153 Petroleum Hydrocarbons					# of Bottles	Comments
1		CHMW01-1	19/8/11	1200	GW	N	Y		X		X							7	NOTE EXTRA BOTTLES FOR PAH - DO NOT RUN
2		MW11-3	19/8/11	1600	GW	↓	↓			X	X		X					10	
3		F2-MW11-5-Aug11	21/8/11	1600	GW	↓	↓				X							3	
4		MW11-4	17/8/11	1200	GW	↓	↓			X	X	X	X					13	NOTE EXTRA ABN BOTTLES. DO NOT RUN
5		BH00-5	18/8/11	1700	GW	↓	↓	X	X		X	X	X					16	NOTE EXTRA BOTTLES FOR PAH, DO NOT RUN. Cr(VI) exceeds hold - please ru
6		BH00-4	19/8/11	1100	GW	↓	↓	X		X	X	X	X					16	EXTRA FOR ABN, DO NOT RUN
7		MW11-DUP2	18/8/11	1700	GW	↓	↓	X										3	
8		MW11-DUP1	18/8/11	1200	GW	↓	↓		X		X	X	X					13	EXTRA FOR PAH, DO NOT RUN
9		CHMW01-2	18/8/11	1200	GW	↓	↓		X		X	X	X					13	AS ABOVE
10		F2-MW11-6-Aug11	20/8/11	1230	GW	↓	↓				X							3	REC'D IN OTTAWA

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
Andrew Henderson	2011/08/22	1000	/ Habiba Fasek	11/08/22	12:30	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	5/5/7	Present		✓
		Intact		✓

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

3/4/2 6/6/5 ON ICE

Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 2 of 2

INVOICE INFORMATION:

Company Name: #10988 Franz Environmental Inc
Contact Name: Invoices, Lillian & Andrew
Address: 329 Churchill Ave N Suite 200
Ottawa ON K1Z 5B8
Phone: (613)721-0555 Fax: (613)721-0029
Email: ahenderson@franzenvironmental.com;lellis@franze

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name: Andrew Henderson
Address:
Phone: (613)721-0555 x226 Fax:
Email: ahenderson@franzenvironmental.com

PROJECT INFORMATION:

Quotation #: B14374
P.O. #:
Project #: 1329-1102
Project Name: 200 Lees Ph II
Site #:
Sampled By:

Laboratory Use Only:

MAXXAM JOB #:	BOTTLE ORDER #:
	275188
CHAIN OF CUSTODY #:	**PROJECT MANAGER:**
C#275188-04-01	JULIE CLEMENT

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☑ Table 3 ☐ Agri/Other
☒ Table 9 ☐ For RSC

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg. 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ____
☐ PWQO
☐ Other ____

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ____

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	O'Reg 153 Volatile Organics	O'Reg 153 Semivolatile Organics Package	O'Reg 153 PAHs	O'Reg 153 Metals Package	Phenols (4AAP)	O'Reg 153 Petroleum Hydrocarbons					# of Bottles	Comments
1		TRIP BLANK 3099	—	—	GW	N	N	X					X					6	NOTE ONLY VOLATILES FOR PHCS.
2					GW														
3					GW														
4					GW														
5					GW														
6					GW														
7					GW														
8					GW														
9					GW														
10					GW														

REC'D IN OTTAWA

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ____ Time Required: ____ ☐
Rush Confirmation Number: ____ *(call lab for #)*

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
Andrew Henderson	2011/08/22	1000	/ Habiba Essak	11/08/22	12:30	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	5/5/7 3/4/2 6/6/5	Present		✓
		Intact		✓

ON ICE

White: Maxxam Yellow: Client

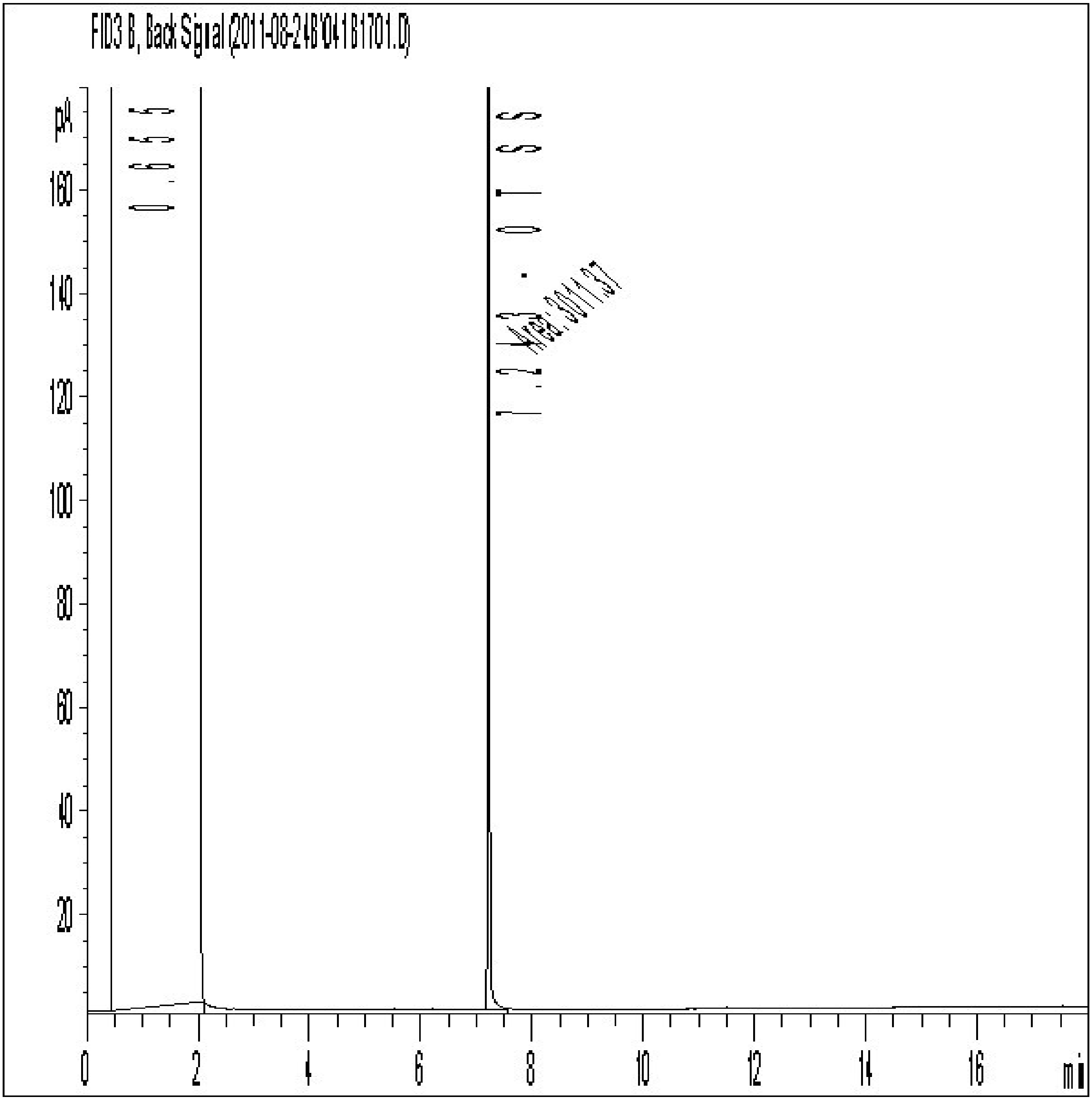
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Success Through Science®

Report Date: 2011/08/30
Maxxam Job #: B1C7456
Maxxam Sample: KP9361

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: MW11-3

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



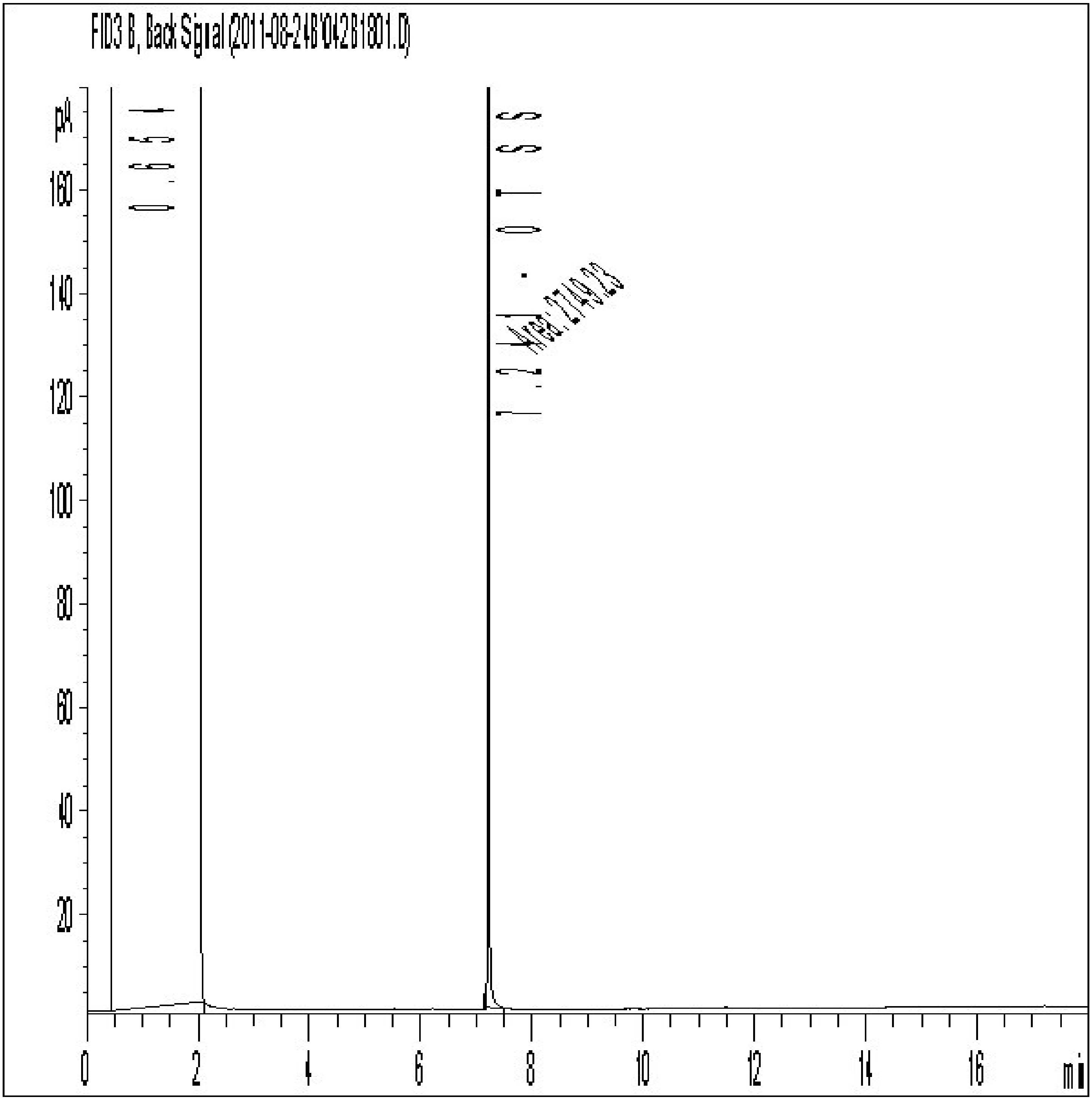
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

Report Date: 2011/08/30
Maxxam Job #: B1C7456
Maxxam Sample: KP9363

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: MW11-4

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

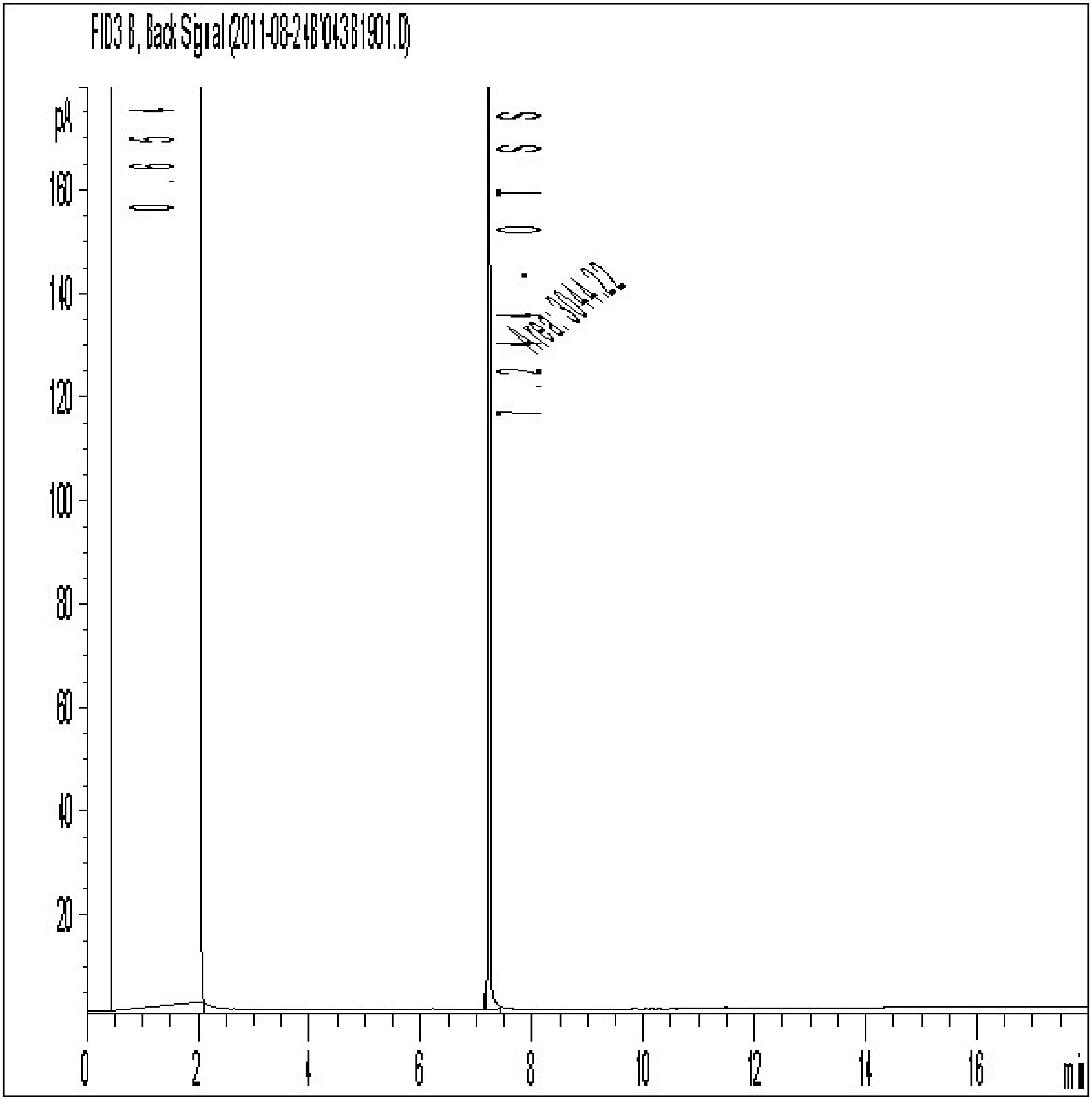


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

Franz Environmental Inc
Report Date: 2011/08/30 Client Project #: 1329-1102
Maxxam Job #: B1C7456 Project name: 200 Lees Avenue, Phase II ESA
Maxxam Sample: KP9364 Client ID: BH00-5

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



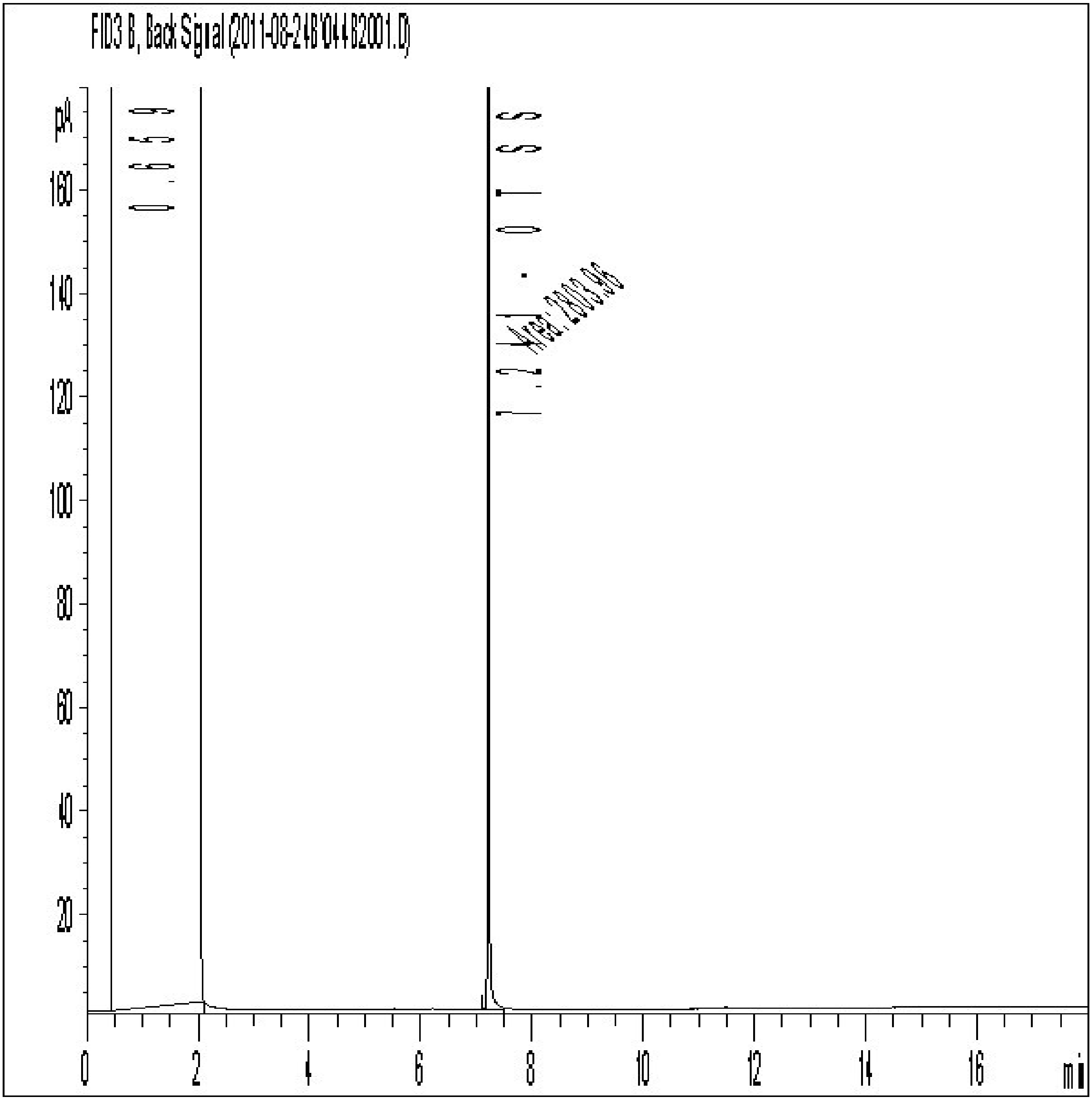
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

Report Date: 2011/08/30
Maxxam Job #: B1C7456
Maxxam Sample: KP9365

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: BH00-4

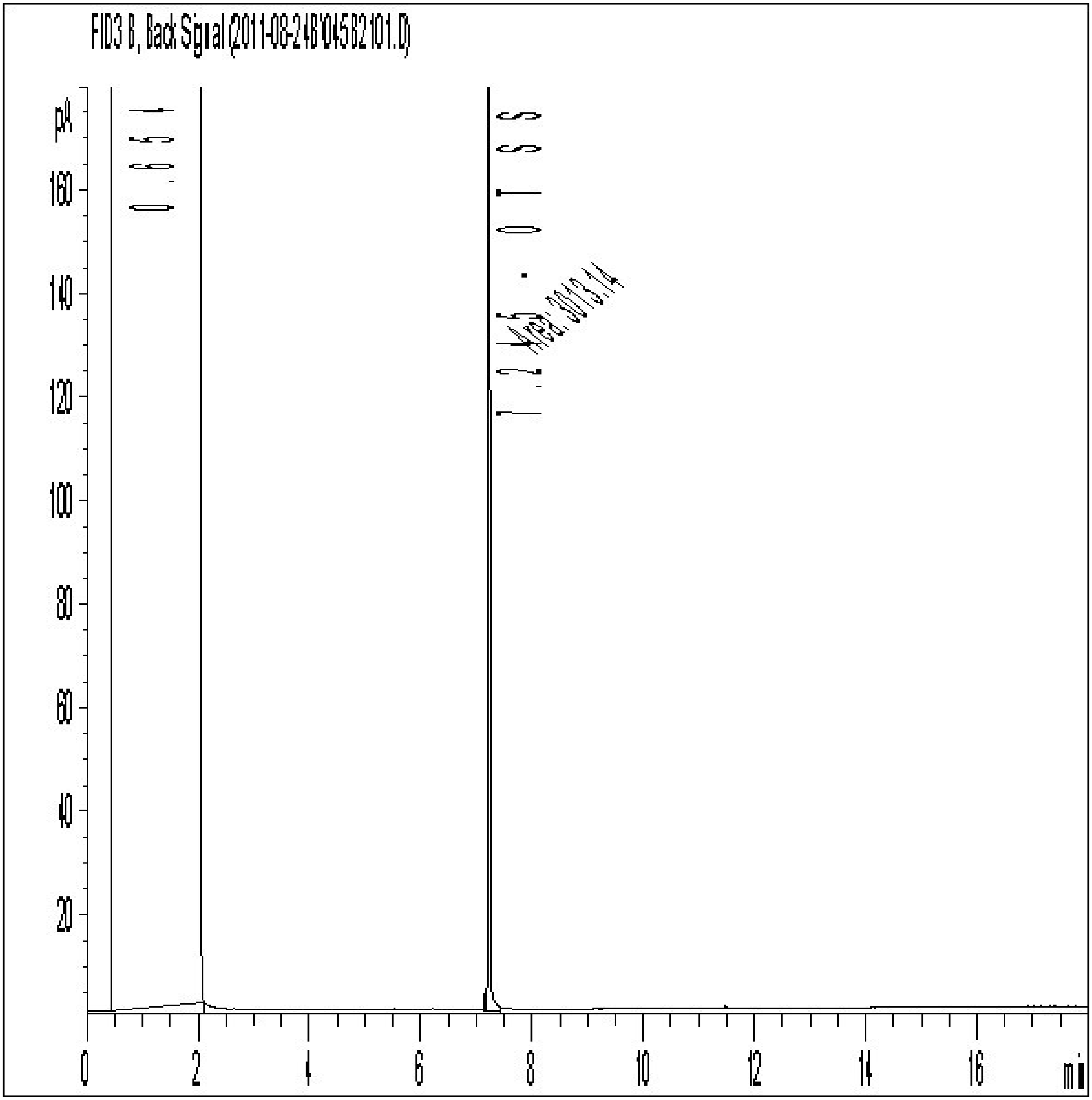
Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Franz Environmental Inc
Report Date: 2011/08/30
Client Project #: 1329-1102
Maxxam Job #: B1C7456
Project name: 200 Lees Avenue, Phase II ESA
Maxxam Sample: KP9367
Client ID: MW11-DUP1

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



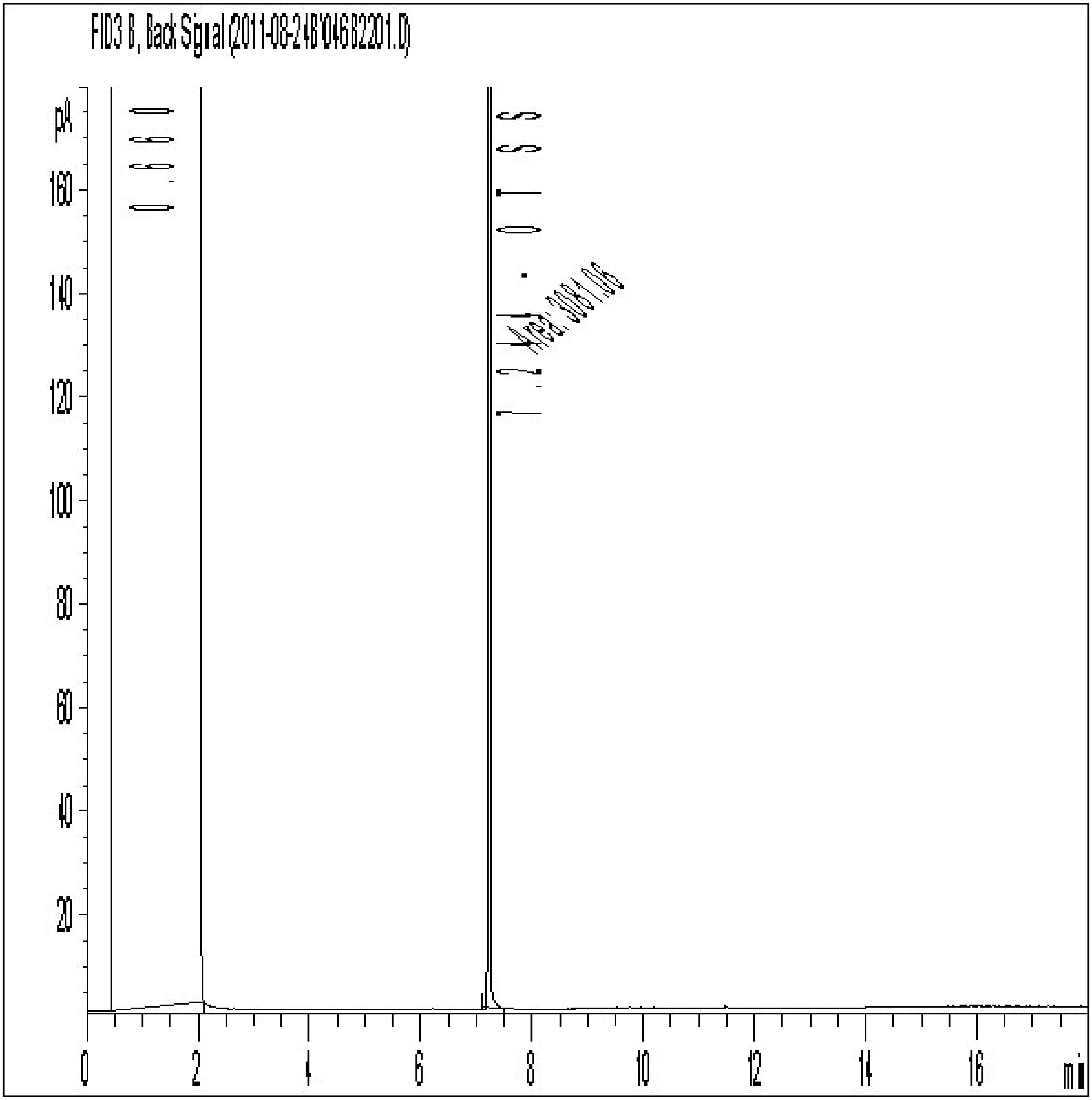
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

Report Date: 2011/08/30
Maxxam Job #: B1C7456
Maxxam Sample: KP9368

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: CHMW01-2

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Your C.O.C. #: 27518808, 275188-08-01

Attention: Andrew Henderson
Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2011/09/06

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1D0755
Received: 2011/08/25, 14:08

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
ABN Compounds in Water by SIM GC/MS	1	2011/09/01	2011/09/01	CAM SOP-00301	EPA 8270 (modified)
PAH Compounds in Water by GC/MS (SIM)	1	2011/08/29	2011/08/30	CAM SOP-00318	EPA 8270

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JULIE CLEMENT, Ottawa Customer Service
Email: JClement@maxxam.ca
Phone# (613) 274-3549

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Job #: B1D0755
Report Date: 2011/09/06

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA

O'REG 153 PAHS (WATER)

Maxxam ID		KR5151		
Sampling Date		2011/08/25 10:40		
	Units	**F2-MW11-6-AUG11B**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons				
Acenaphthene	ug/L	<0.05	0.05	2597971
Acenaphthylene	ug/L	<0.05	0.05	2597971
Anthracene	ug/L	<0.05	0.05	2597971
Benzo(a)anthracene	ug/L	<0.05	0.05	2597971
Benzo(a)pyrene	ug/L	0.02	0.01	2597971
Benzo(b/j)fluoranthene	ug/L	<0.05	0.05	2597971
Benzo(g,h,i)perylene	ug/L	<0.1	0.1	2597971
Benzo(k)fluoranthene	ug/L	<0.05	0.05	2597971
Chrysene	ug/L	<0.05	0.05	2597971
Dibenz(a,h)anthracene	ug/L	<0.1	0.1	2597971
Fluoranthene	ug/L	0.07	0.05	2597971
Fluorene	ug/L	<0.05	0.05	2597971
Indeno(1,2,3-cd)pyrene	ug/L	<0.1	0.1	2597971
1-Methylnaphthalene	ug/L	<0.05	0.05	2597971
2-Methylnaphthalene	ug/L	<0.05	0.05	2597971
Naphthalene	ug/L	0.07	0.05	2597971
Phenanthrene	ug/L	0.08	0.03	2597971
Pyrene	ug/L	0.05	0.05	2597971
Surrogate Recovery (%)				
D10-Anthracene	%	58		2597971
D14-Terphenyl (FS)	%	54		2597971
D8-Acenaphthylene	%	40 (1)		2597971

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Surrogate recovery was below the lower control limit due to matrix interference. This may represent a low bias in some results.

Maxxam Job #: B1D0755
Report Date: 2011/09/06

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (WATER)

Maxxam ID		KR5152		
Sampling Date		2011/08/25 11:30		
	Units	**F2-MW11-5-AUG11B**	**RDL**	**QC Batch**
Semivolatile Organics				
1,2,4-Trichlorobenzene	ug/L	<0.1	0.1	2601334
1-Methylnaphthalene	ug/L	<0.2	0.2	2601334
2,4,5-Trichlorophenol	ug/L	<0.2	0.2	2601334
2,4,6-Trichlorophenol	ug/L	<0.2	0.2	2601334
2,4-Dichlorophenol	ug/L	<0.1	0.1	2601334
2,4-Dimethylphenol	ug/L	<0.5	0.5	2601334
2,4-Dinitrophenol	ug/L	<2	2	2601334
2,4-Dinitrotoluene	ug/L	<0.3	0.3	2601334
2,6-Dinitrotoluene	ug/L	<0.3	0.3	2601334
2-Chlorophenol	ug/L	<0.1	0.1	2601334
2-Methylnaphthalene	ug/L	<0.2	0.2	2601334
3,3'-Dichlorobenzidine	ug/L	<1(1)	1	2601334
Acenaphthene	ug/L	<0.2	0.2	2601334
Acenaphthylene	ug/L	<0.2	0.2	2601334
Anthracene	ug/L	<0.05	0.05	2601334
Benzo(a)anthracene	ug/L	<0.05	0.05	2601334
Benzo(a)pyrene	ug/L	0.01	0.01	2601334
Benzo(b/j)fluoranthene	ug/L	<0.05	0.05	2601334
Benzo(g,h,i)perylene	ug/L	<0.05	0.05	2601334
Benzo(k)fluoranthene	ug/L	<0.05	0.05	2601334
Biphenyl	ug/L	<0.1	0.1	2601334
Bis(2-chloroethyl)ether	ug/L	<0.5	0.5	2601334
Bis(2-chloroisopropyl)ether	ug/L	<0.5	0.5	2601334
Bis(2-ethylhexyl)phthalate	ug/L	<1	1	2601334
Chrysene	ug/L	<0.05	0.05	2601334
Dibenz(a,h)anthracene	ug/L	<0.1	0.1	2601334
Diethyl phthalate	ug/L	<0.1	0.1	2601334
Dimethyl phthalate	ug/L	<0.1	0.1	2601334
Fluoranthene	ug/L	<0.2	0.2	2601334
Fluorene	ug/L	<0.2	0.2	2601334
Indeno(1,2,3-cd)pyrene	ug/L	<0.1	0.1	2601334
Naphthalene	ug/L	<0.2	0.2	2601334
p-Chloroaniline	ug/L	<1	1	2601334
Pentachlorophenol	ug/L	<0.1	0.1	2601334

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Detection Limit was raised due to matrix interferences.

Maxxam Job #: B1D0755
Report Date: 2011/09/06

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA

O'REG 153 SEMIVOLATILE ORGANICS PACKAGE (WATER)

Maxxam ID		KR5152		
Sampling Date		2011/08/25 11:30		
	Units	**F2-MW11-5-AUG11B**	**RDL**	**QC Batch**
Phenanthrene	ug/L	<0.1	0.1	2601334
Phenol	ug/L	<0.5	0.5	2601334
Pyrene	ug/L	<0.05	0.05	2601334
Surrogate Recovery (%)				
2,4,6-Tribromophenol	%	81		2601334
2-Fluorobiphenyl	%	78		2601334
2-Fluorophenol	%	43		2601334
D14-Terphenyl (FS)	%	94		2601334
D5-Nitrobenzene	%	60		2601334
D5-Phenol	%	26		2601334

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Test Summary

Maxxam ID KR5151
Sample ID F2-MW11-6-AUG11B
Matrix Water

Collected 2011/08/25
Shipped
Received 2011/08/25

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2597971	2011/08/29	2011/08/30	DARRYL TILLER

Maxxam ID KR5152
Sample ID F2-MW11-5-AUG11B
Matrix Water

Collected 2011/08/25
Shipped
Received 2011/08/25

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
ABN Compounds in Water by SIM GC/MS	GC/MS	2601334	2011/09/01	2011/09/01	NATALIYA GNIDASH

Package 1	10.3°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Custody seal was not present on the cooler.

All sample bottles contained visual sediment, which was included in the analysis as per the Protocol for Analytical Methods Use in the Assesment of Properties under part XV.1 of the Environmental Protection Act.

Maxxam Job #: B1D0755
Report Date: 2011/09/06

Franz Environmental Inc
Client Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**
2597971	D10-Anthracene	2011/08/30	87	50 - 130	80	50 - 130	67	%		
2597971	D14-Terphenyl (FS)	2011/08/30	98	50 - 130	90	50 - 130	74	%		
2597971	D8-Acenaphthylene	2011/08/30	86	50 - 130	65	50 - 130	53	%		
2597971	Acenaphthene	2011/08/30	91	50 - 130	74	50 - 130	<0.05	ug/L	NC	40
2597971	Acenaphthylene	2011/08/30	95	50 - 130	72	50 - 130	<0.05	ug/L	NC	40
2597971	Anthracene	2011/08/30	84	50 - 130	81	50 - 130	<0.05	ug/L		
2597971	Benzo(a)anthracene	2011/08/30	95	50 - 130	87	50 - 130	<0.05	ug/L		
2597971	Benzo(a)pyrene	2011/08/30	105	50 - 130	94	50 - 130	<0.01	ug/L	NC	40
2597971	Benzo(b/j)fluoranthene	2011/08/30	103	50 - 130	91	50 - 130	<0.05	ug/L		
2597971	Benzo(g,h,i)perylene	2011/08/30	89	50 - 130	84	50 - 130	<0.1	ug/L		
2597971	Benzo(k)fluoranthene	2011/08/30	110	50 - 130	110	50 - 130	<0.05	ug/L		
2597971	Chrysene	2011/08/30	96	50 - 130	92	50 - 130	<0.05	ug/L		
2597971	Dibenz(a,h)anthracene	2011/08/30	108	50 - 130	100	50 - 130	<0.1	ug/L		
2597971	Fluoranthene	2011/08/30	100	50 - 130	97	50 - 130	<0.05	ug/L		
2597971	Fluorene	2011/08/30	99	50 - 130	85	50 - 130	<0.05	ug/L	NC	40
2597971	Indeno(1,2,3-cd)pyrene	2011/08/30	95	50 - 130	90	50 - 130	<0.1	ug/L		
2597971	1-Methylnaphthalene	2011/08/30	84	50 - 130	68	50 - 130	<0.05	ug/L		
2597971	2-Methylnaphthalene	2011/08/30	84	50 - 130	65	50 - 130	<0.05	ug/L		
2597971	Naphthalene	2011/08/30	98	50 - 130	74	50 - 130	<0.05	ug/L	NC	40
2597971	Phenanthrene	2011/08/30	96	50 - 130	93	50 - 130	<0.03	ug/L	NC	40
2597971	Pyrene	2011/08/30	103	50 - 130	99	50 - 130	<0.05	ug/L		
2601334	2,4,6-Tribromophenol	2011/09/01	70	10 - 130	95	10 - 130	62	%		
2601334	2-Fluorobiphenyl	2011/09/01	76	30 - 130	92	30 - 130	86	%		
2601334	2-Fluorophenol	2011/09/01	31	10 - 130	58	10 - 130	50	%		
2601334	D14-Terphenyl (FS)	2011/09/01	75	30 - 130	97	30 - 130	93	%		
2601334	D5-Nitrobenzene	2011/09/01	44	30 - 130	80	30 - 130	72	%		
2601334	D5-Phenol	2011/09/01	15	10 - 130	36	10 - 130	29	%		
2601334	1,2,4-Trichlorobenzene	2011/09/01	65	30 - 130	88	30 - 130	<0.1	ug/L		
2601334	1-Methylnaphthalene	2011/09/01	89	30 - 130	106	30 - 130	<0.2	ug/L		
2601334	2,4,5-Trichlorophenol	2011/09/01	65	10 - 130	106	10 - 130	<0.2	ug/L		
2601334	2,4,6-Trichlorophenol	2011/09/01	80	10 - 130	106	10 - 130	<0.2	ug/L		
2601334	2,4-Dichlorophenol	2011/09/01	54	10 - 130	86	10 - 130	<0.1	ug/L		
2601334	2,4-Dimethylphenol	2011/09/01	79	10 - 130	84	10 - 130	<0.5	ug/L		
2601334	2,4-Dinitrophenol	2011/09/01	17	10 - 130	35	10 - 130	<2	ug/L		
2601334	2,4-Dinitrotoluene	2011/09/01	81	30 - 130	106	30 - 130	<0.3	ug/L		
2601334	2,6-Dinitrotoluene	2011/09/01	48	30 - 130	109	30 - 130	<0.3	ug/L		
2601334	2-Chlorophenol	2011/09/01	51	10 - 130	87	10 - 130	<0.1	ug/L		
2601334	2-Methylnaphthalene	2011/09/01	43	30 - 130	107	30 - 130	<0.2	ug/L		
2601334	3,3'-Dichlorobenzidine	2011/09/01	12(1, 2)	30 - 130	128	30 - 130	<0.5	ug/L		
2601334	Acenaphthene	2011/09/01	119	30 - 130	106	30 - 130	<0.2	ug/L		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2601334	Acenaphthylene	2011/09/01	100	30 - 130	104	30 - 130	<0.2	ug/L		
2601334	Anthracene	2011/09/01	104	30 - 130	99	30 - 130	<0.05	ug/L		
2601334	Benzo(a)anthracene	2011/09/01	127	30 - 130	119	30 - 130	<0.05	ug/L		
2601334	Benzo(a)pyrene	2011/09/01	90	30 - 130	118	30 - 130	<0.01	ug/L		
2601334	Benzo(b/j)fluoranthene	2011/09/01	83	30 - 130	119	30 - 130	<0.05	ug/L		
2601334	Benzo(g,h,i)perylene	2011/09/01	78	30 - 130	114	30 - 130	<0.05	ug/L		
2601334	Benzo(k)fluoranthene	2011/09/01	100	30 - 130	131 (1, 3)	30 - 130	<0.05	ug/L		
2601334	Biphenyl	2011/09/01	100	30 - 130	106	30 - 130	<0.1	ug/L		
2601334	Bis(2-chloroethyl)ether	2011/09/01	63	30 - 130	93	30 - 130	<0.5	ug/L		
2601334	Bis(2-chloroisopropyl)ether	2011/09/01	69	30 - 130	93	30 - 130	<0.5	ug/L		
2601334	Bis(2-ethylhexyl)phthalate	2011/09/01	82	30 - 130	113	30 - 130	<1	ug/L		
2601334	Chrysene	2011/09/01	131 (1, 4)	30 - 130	122	30 - 130	<0.05	ug/L		
2601334	Dibenz(a,h)anthracene	2011/09/01	68	30 - 130	113	30 - 130	<0.1	ug/L		
2601334	Diethyl phthalate	2011/09/01	92	30 - 130	103	30 - 130	<0.1	ug/L		
2601334	Dimethyl phthalate	2011/09/01	94	30 - 130	118	30 - 130	<0.1	ug/L		
2601334	Fluoranthene	2011/09/01	101	30 - 130	120	30 - 130	<0.2	ug/L		
2601334	Fluorene	2011/09/01	113	30 - 130	117	30 - 130	<0.2	ug/L		
2601334	Indeno(1,2,3-cd)pyrene	2011/09/01	65	30 - 130	110	30 - 130	<0.1	ug/L		
2601334	Naphthalene	2011/09/01	98	30 - 130	103	30 - 130	<0.2	ug/L		
2601334	p-Chloroaniline	2011/09/01	67	30 - 130	93	30 - 130	<1	ug/L		
2601334	Pentachlorophenol	2011/09/01	85	10 - 130	100	10 - 130	<0.1	ug/L		
2601334	Phenanthrene	2011/09/01	133 (1)	30 - 130	111	30 - 130	<0.1	ug/L		
2601334	Phenol	2011/09/01	24	10 - 130	42	10 - 130	<0.5	ug/L		
2601334	Pyrene	2011/09/01	107	30 - 130	122	30 - 130	<0.05	ug/L		

N/A = Not Applicable

RPD = Relative Percent Difference

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) - The recovery was below the lower control limit. This may represent a low bias in some results for this specific analyte.

(3) - The recovery was above the upper control limit. This may represent a high bias in some results for this specific analyte. For results that were not detected (ND), this potential bias has no impact.

(4) - The recovery was above the upper control limit. This may represent a high bias in some results for flagged analytes. For results that were not detected (ND), this potential bias has no impact.

Validation Signature Page

Maxxam Job #: B1D0755

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

FLOYD MAYEDE, Senior Analyst

YUAN ZHOU, gc\ms Technician

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-653-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUS

25-Aug-11 14:08
JULIE CLEMENT
B1D0755
FW ENV-899

Page 1 of 1

INVOICE INFORMATION:

Company Name: #10988 Franz Environmental Inc
Contact Name: Invoices, Lillian & Andrew
Address: 329 Churchill Ave N Suite 200
Ottawa ON K1Z 5B8
Phone: (613)721-0555 Fax: (613)721-0029
Email: ahenderson@franzenvironmental.com;lellis@franze

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name: Andrew Henderson
Address:
Phone: (613)721-0555 x226 Fax:
Email: ahenderson@franzenvironmental.com

PROJECT INFORMATION:

Quotation #: B14374
P.O. #:
Project #: 1329-1102
Project Name: 200 LEES PHASE TWO
Site #:
Sampled By: AH

Only:

BOTTLE ORDER #: 275188

CHAIN OF CUSTODY #: C#275188-08-01

PROJECT MANAGER: JULIE CLEMENT

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☒ Table 3 ☐ Agri/Other
☒ Table 9 ☒ For RSC

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg. 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ______
☐ PWQO
☐ Other ______

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ___

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ______ Time Required: ______ ☐
Rush Confirmation Number: ______ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	O'Reg 153 Volatile Organics	O'Reg 153 Semivolatile Organics Package	O'Reg 153 PAHs	O'Reg 153 Metals Package	Phenols (4AAP)	O'Reg 153 Petroleum Hydrocarbons					# of Bottles	Comments
1		FZ-MW11-6-AUG11B	25/8/11	1640	GW	N	–			X								3	NOTE EXTRA BOTTLE – PLEASE HOLD
2		FZ-MW11-5-AUG11B	25/8/11	1130	GW	N	–		X									3	HOLD EXTRA BOTTLE. (LOW VOLUME)
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

REC'D IN OTTAWA

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
Andrew Henderson	2011/08/25	2:08pm	/ Shaun Colbert	2011/08/25	2:08pm	
			ASAD BHAIDU	2011/08/26	09:27	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	11/10/10	Present		✓
		Intact		✓

IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

9/8/8°C

Your Project #: 1329-1102
Site Location: 200 Lees Avenue, Phase II ESA
Your C.O.C. #: 27518807, 275188-07-01

Attention: Andrew Henderson
Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2011/09/07

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1D5027
Received: 2011/09/02, 11:42

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Chromium (VI) in Water	2	N/A	2011/09/06	CAM SOP-00436	EPA 7199
Petroleum Hydro. CCME F1 & BTEX in Water (1)	2	N/A	2011/09/02	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water (1)	2	2011/09/06	2011/09/06	OTT SOP-00001	CCME Hydrocarbons
Mercury	2	2011/09/06	2011/09/07	CAM SOP-00453	EPA 7470
Dissolved Metals by ICPMS	2	N/A	2011/09/06	CAM SOP-00447	EPA 6020
PAH Compounds in Water by GC/MS (SIM)	2	2011/09/03	2011/09/06	CAM SOP-00318	EPA 8270

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) This test was performed by Maxxam Ottawa

../2

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JULIE CLEMENT, Ottawa Customer Service
Email: JClement@maxxam.ca
Phone# (613) 274-3549

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

O'REG 153 METALS PACKAGE (WATER)

Maxxam ID		KT4937	KT4938		
Sampling Date		2011/09/02	2011/09/02		
	Units	**FRMW11-1**	**FRMW11-2**	**RDL**	**QC Batch**
Metals					
Chromium (VI)	ug/L	<5	<5	5	2604045
Mercury (Hg)	ug/L	<0.1	<0.1	0.1	2605236
Dissolved Antimony (Sb)	ug/L	<0.5	<0.5	0.5	2604274
Dissolved Arsenic (As)	ug/L	2	1	1	2604274
Dissolved Barium (Ba)	ug/L	110	1200	2	2604274
Dissolved Beryllium (Be)	ug/L	<0.5	<0.5	0.5	2604274
Dissolved Boron (B)	ug/L	320	50	10	2604274
Dissolved Cadmium (Cd)	ug/L	<0.1	<0.1	0.1	2604274
Dissolved Chromium (Cr)	ug/L	<5	<5	5	2604274
Dissolved Cobalt (Co)	ug/L	4.0	1.0	0.5	2604274
Dissolved Copper (Cu)	ug/L	1	<1	1	2604274
Dissolved Lead (Pb)	ug/L	<0.5	<0.5	0.5	2604274
Dissolved Molybdenum (Mo)	ug/L	18	21	0.5	2604274
Dissolved Nickel (Ni)	ug/L	5	7	1	2604274
Dissolved Selenium (Se)	ug/L	2	2	2	2604274
Dissolved Silver (Ag)	ug/L	<0.1	<0.1	0.1	2604274
Dissolved Sodium (Na)	ug/L	220000	270000	100	2604274
Dissolved Thallium (Tl)	ug/L	<0.05	<0.05	0.05	2604274
Dissolved Uranium (U)	ug/L	1.7	2.6	0.1	2604274
Dissolved Vanadium (V)	ug/L	1.5	3.1	0.5	2604274
Dissolved Zinc (Zn)	ug/L	19	<5	5	2604274

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 PAHS (WATER)

Maxxam ID		KT4937	KT4938		
Sampling Date		2011/09/02	2011/09/02		
	Units	**FRMW11-1**	**FRMW11-2**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons					
Acenaphthene	ug/L	<0.05	<0.05	0.05	2604071
Acenaphthylene	ug/L	<0.05	<0.05	0.05	2604071
Anthracene	ug/L	<0.05	<0.05	0.05	2604071
Benzo(a)anthracene	ug/L	<0.05	<0.05	0.05	2604071
Benzo(a)pyrene	ug/L	<0.01	<0.01	0.01	2604071
Benzo(b/j)fluoranthene	ug/L	<0.05	<0.05	0.05	2604071
Benzo(g,h,i)perylene	ug/L	<0.1	<0.1	0.1	2604071
Benzo(k)fluoranthene	ug/L	<0.05	<0.05	0.05	2604071
Chrysene	ug/L	<0.05	<0.05	0.05	2604071
Dibenz(a,h)anthracene	ug/L	<0.1	<0.1	0.1	2604071
Fluoranthene	ug/L	<0.05	<0.05	0.05	2604071
Fluorene	ug/L	<0.05	<0.05	0.05	2604071
Indeno(1,2,3-cd)pyrene	ug/L	<0.1	<0.1	0.1	2604071
1-Methylnaphthalene	ug/L	<0.05	<0.05	0.05	2604071
2-Methylnaphthalene	ug/L	<0.05	<0.05	0.05	2604071
Naphthalene	ug/L	<0.05	<0.05	0.05	2604071
Phenanthrene	ug/L	<0.03	<0.03	0.03	2604071
Pyrene	ug/L	<0.05	<0.05	0.05	2604071
Surrogate Recovery (%)					
D10-Anthracene	%	86	84		2604071
D14-Terphenyl (FS)	%	85	83		2604071
D8-Acenaphthylene	%	78	71		2604071

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O'REG 153 PETROLEUM HYDROCARBONS (WATER)

Maxxam ID		KT4937	KT4938		
Sampling Date		2011/09/02	2011/09/02		
	Units	**FRMW11-1**	**FRMW11-2**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons					
Benzene	ug/L	<0.20	<0.20	0.20	2603029
Toluene	ug/L	<0.20	<0.20	0.20	2603029
Ethylbenzene	ug/L	<0.20	<0.20	0.20	2603029
o-Xylene	ug/L	<0.20	<0.20	0.20	2603029
p+m-Xylene	ug/L	<0.40	<0.40	0.40	2603029
Total Xylenes	ug/L	<0.40	<0.40	0.40	2603029
F1 (C6-C10)	ug/L	<25	<25	25	2603029
F1 (C6-C10) - BTEX	ug/L	<25	<25	25	2603029
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	100	2604662
F3 (C16-C34 Hydrocarbons)	ug/L	<100	<100	100	2604662
F4 (C34-C50 Hydrocarbons)	ug/L	<100	<100	100	2604662
Reached Baseline at C50	ug/L	YES	YES		2604662
Surrogate Recovery (%)					
1,4-Difluorobenzene	%	99	98		2603029
4-Bromofluorobenzene	%	85	81		2603029
D10-Ethylbenzene	%	90	96		2603029
D4-1,2-Dichloroethane	%	97	96		2603029
o-Terphenyl	%	118	118		2604662

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Test Summary

Maxxam ID	KT4937	**Collected**	2011/09/02
Sample ID	FRMW11-1	**Shipped**	
Matrix	Water	**Received**	2011/09/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chromium (VI) in Water	IC	2604045	N/A	2011/09/06	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2603029	N/A	2011/09/02	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2604662	2011/09/06	2011/09/06	LYNDSEY HART
Mercury	CVAA	2605236	2011/09/06	2011/09/07	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2604274	N/A	2011/09/06	HUA REN
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2604071	2011/09/03	2011/09/06	DARRYL TILLER

Maxxam ID	KT4937 Dup	**Collected**	2011/09/02
Sample ID	FRMW11-1	**Shipped**	
Matrix	Water	**Received**	2011/09/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	2604274	N/A	2011/09/06	HUA REN

Maxxam ID	KT4938	**Collected**	2011/09/02
Sample ID	FRMW11-2	**Shipped**	
Matrix	Water	**Received**	2011/09/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chromium (VI) in Water	IC	2604045	N/A	2011/09/06	LUSINE KHACHATRYAN
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2603029	N/A	2011/09/02	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2604662	2011/09/06	2011/09/06	LYNDSEY HART
Mercury	CVAA	2605236	2011/09/06	2011/09/07	MAGDALENA CARLOS
Dissolved Metals by ICPMS	ICP/MS	2604274	N/A	2011/09/06	HUA REN
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2604071	2011/09/03	2011/09/06	DARRYL TILLER

Test Summary

Maxxam ID KT4938 Dup
Sample ID FRMW11-2
Matrix Water

Collected 2011/09/02
Shipped
Received 2011/09/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2604071	2011/09/03	2011/09/06	DARRYL TILLER

Package 1	15.0°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Custody seal was not present on the cooler.

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2603029	1,4-Difluorobenzene	2011/09/02	97	70 - 130	98	70 - 130	102	%		
2603029	4-Bromofluorobenzene	2011/09/02	106	70 - 130	109	70 - 130	82	%		
2603029	D10-Ethylbenzene	2011/09/02	96	70 - 130	91	70 - 130	89	%		
2603029	D4-1,2-Dichloroethane	2011/09/02	98	70 - 130	94	70 - 130	96	%		
2603029	Benzene	2011/09/02	90	70 - 130	89	70 - 130	<0.20	ug/L	NC	40
2603029	Toluene	2011/09/02	100	70 - 130	101	70 - 130	<0.20	ug/L	NC	40
2603029	Ethylbenzene	2011/09/02	98	70 - 130	102	70 - 130	<0.20	ug/L	NC	40
2603029	o-Xylene	2011/09/02	101	70 - 130	109	70 - 130	<0.20	ug/L	0.7	40
2603029	p+m-Xylene	2011/09/02	96	70 - 130	99	70 - 130	<0.40	ug/L	2.2	40
2603029	F1 (C6-C10)	2011/09/02	71	70 - 130	78	70 - 130	<25	ug/L	NC	40
2603029	Total Xylenes	2011/09/02					<0.40	ug/L	1.3	40
2603029	F1 (C6-C10) - BTEX	2011/09/02					<25	ug/L	NC	40
2604045	Chromium (VI)	2011/09/06	102	80 - 120	102	90 - 110	<5	ug/L	NC	25
2604071	D10-Anthracene	2011/09/06	83	50 - 130	83	50 - 130	94	%		
2604071	D14-Terphenyl (FS)	2011/09/06	83	50 - 130	84	50 - 130	90	%		
2604071	D8-Acenaphthylene	2011/09/06	78	50 - 130	79	50 - 130	79	%		
2604071	Acenaphthene	2011/09/06	84	50 - 130	86	50 - 130	<0.05	ug/L	NC	40
2604071	Acenaphthylene	2011/09/06	93	50 - 130	96	50 - 130	<0.05	ug/L	NC	40
2604071	Anthracene	2011/09/06	96	50 - 130	97	50 - 130	<0.05	ug/L	NC	40
2604071	Benzo(a)anthracene	2011/09/06	93	50 - 130	94	50 - 130	<0.05	ug/L	NC	40
2604071	Benzo(a)pyrene	2011/09/06	94	50 - 130	96	50 - 130	<0.01	ug/L	NC	40
2604071	Benzo(b/j)fluoranthene	2011/09/06	82	50 - 130	80	50 - 130	<0.05	ug/L	NC	40
2604071	Benzo(g,h,i)perylene	2011/09/06	84	50 - 130	85	50 - 130	<0.1	ug/L	NC	40
2604071	Benzo(k)fluoranthene	2011/09/06	81	50 - 130	79	50 - 130	<0.05	ug/L	NC	40
2604071	Chrysene	2011/09/06	78	50 - 130	80	50 - 130	<0.05	ug/L	NC	40
2604071	Dibenz(a,h)anthracene	2011/09/06	87	50 - 130	90	50 - 130	<0.1	ug/L	NC	40
2604071	Fluoranthene	2011/09/06	92	50 - 130	94	50 - 130	<0.05	ug/L	NC	40
2604071	Fluorene	2011/09/06	83	50 - 130	86	50 - 130	<0.05	ug/L	NC	40
2604071	Indeno(1,2,3-cd)pyrene	2011/09/06	89	50 - 130	91	50 - 130	<0.1	ug/L	NC	40
2604071	1-Methylnaphthalene	2011/09/06	71	50 - 130	73	50 - 130	<0.05	ug/L	NC	40
2604071	2-Methylnaphthalene	2011/09/06	71	50 - 130	73	50 - 130	<0.05	ug/L	NC	40
2604071	Naphthalene	2011/09/06	75	50 - 130	80	50 - 130	<0.05	ug/L	NC	40
2604071	Phenanthrene	2011/09/06	85	50 - 130	88	50 - 130	<0.03	ug/L	NC	40
2604071	Pyrene	2011/09/06	92	50 - 130	95	50 - 130	<0.05	ug/L	NC	40
2604274	Dissolved Antimony (Sb)	2011/09/06	98	80 - 120	103	80 - 120	<0.5	ug/L	NC	20
2604274	Dissolved Arsenic (As)	2011/09/06	92	80 - 120	95	80 - 120	<1	ug/L	NC	20
2604274	Dissolved Barium (Ba)	2011/09/06	89	80 - 120	98	80 - 120	<2	ug/L	4.4	20
2604274	Dissolved Beryllium (Be)	2011/09/06	91	80 - 120	96	80 - 120	<0.5	ug/L	NC	20
2604274	Dissolved Boron (B)	2011/09/06	NC	80 - 120	94	80 - 120	<10	ug/L	6.3	20
2604274	Dissolved Cadmium (Cd)	2011/09/06	95	80 - 120	103	80 - 120	<0.1	ug/L	NC	20

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**
2604274	Dissolved Chromium (Cr)	2011/09/06	88	80 - 120	95	80 - 120	<5	ug/L	NC	20
2604274	Dissolved Cobalt (Co)	2011/09/06	87	80 - 120	94	80 - 120	<0.5	ug/L	0.3	20
2604274	Dissolved Copper (Cu)	2011/09/06	83	80 - 120	95	80 - 120	<1	ug/L	NC	20
2604274	Dissolved Lead (Pb)	2011/09/06	89	80 - 120	99	80 - 120	<0.5	ug/L	NC	20
2604274	Dissolved Molybdenum (Mo)	2011/09/06	99	80 - 120	101	80 - 120	<0.5	ug/L	2.8	20
2604274	Dissolved Nickel (Ni)	2011/09/06	85	80 - 120	95	80 - 120	<1	ug/L	3.7	20
2604274	Dissolved Selenium (Se)	2011/09/06	91	80 - 120	99	80 - 120	<2	ug/L	NC	20
2604274	Dissolved Silver (Ag)	2011/09/06	76(1)	80 - 120	98	80 - 120	<0.1	ug/L	NC	20
2604274	Dissolved Sodium (Na)	2011/09/06	NC	80 - 120	100	80 - 120	<100	ug/L	2.6	20
2604274	Dissolved Thallium (Tl)	2011/09/06	91	80 - 120	98	80 - 120	<0.05	ug/L	NC	20
2604274	Dissolved Uranium (U)	2011/09/06	96	80 - 120	102	80 - 120	<0.1	ug/L	1.0	20
2604274	Dissolved Vanadium (V)	2011/09/06	89	80 - 120	97	80 - 120	<0.5	ug/L	NC	20
2604274	Dissolved Zinc (Zn)	2011/09/06	89	80 - 120	100	80 - 120	<5	ug/L	NC	20
2604662	o-Terphenyl	2011/09/06	119	30 - 130	111	30 - 130	100	%		
2604662	F2 (C10-C16 Hydrocarbons)	2011/09/06	101	60 - 130	98	60 - 130	<100	ug/L	NC	50
2604662	F3 (C16-C34 Hydrocarbons)	2011/09/06	101	60 - 130	98	60 - 130	<100	ug/L	NC	50
2604662	F4 (C34-C50 Hydrocarbons)	2011/09/06	101	60 - 130	98	60 - 130	<100	ug/L	NC	50
2605236	Mercury (Hg)	2011/09/07	93	75 - 125	93	80 - 120	<0.1	ug/L	NC	25

N/A = Not Applicable

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Validation Signature Page

Maxxam Job #: B1D5027

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

CRISTINA CARRIERE, Scientific Services

Paul

PAUL RUBINATO, Analyst, Maxxam Analytics

Yuan Zhou

YUAN ZHOU, gc\ms Technician

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-653-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION:

Company Name: #10988 Franz Environmental Inc
Contact Name: Invoices, Lillian & Andrew
Address: 329 Churchill Ave N Suite 200
Ottawa ON K1Z 5B8
Phone: (613)721-0555 Fax: (613)721-0029
Email: ahenderson@franzenvironmental.com;lellis@franze

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name: Andrew Henderson
Address:
Phone: (613)721-0555 x226 Fax:
Email: ahenderson@franzenvironmental.com

PROJECT INFORMATION:

Quotation #: B14374
P.O. #:
Project #: 1329-1102
Project Name: 200 Lees Ave Phase TWO
Site #:
Sampled By:

Laboratory Use Only:

MAXXAM JOB #:
BOTTLE ORDER #: 275188
CHAIN OF CUSTODY #: C#275188-07-01
PROJECT MANAGER: JULIE CLEMENT

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☒ Table 3 ☐ Agri/Other
☒ Table 9 ☒ **For RSC**

Include Criteria on Certificate of Analysis (Y/N)? ____

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg. 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ____________
☐ PWQO
☐ Other ____________

SPECIAL INSTRUCTIONS

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10ºC) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: — Time Required: 2DAY ☒
Rush Confirmation Number: PN 1102578 (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	O'Reg 153 Volatile Organics	O'Reg 153 Semivolatile Organics Package	O'Reg 153 PAHs	O'Reg 153 Metals Package	Phenols (4AAP)	O'Reg 153 Petroleum Hydrocarbons					# of Bottles	Comments
1		FRMW11-1	Sept2	AM	W		Y			X	X		X					10	
2		FRMW11-2	↓	↓	↓		Y			X	X		X					10	
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

2-Sep-11 11:42
JULIE CLEMENT
B1D5027
JOF OTT-001

REC'D IN OTTAWA

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
Catherine LeBlanc	11/09/02	11:10am	Josh Freeman	2011/09/02	11:42	

Laboratory Use Only

Time Sensitive	Temperature (ºC) on Receipt	Custody Seal	Yes	No
	16/14/15	Present		✓
	ON ICE	Intact		✓

White: Maxxam Yellow: Client

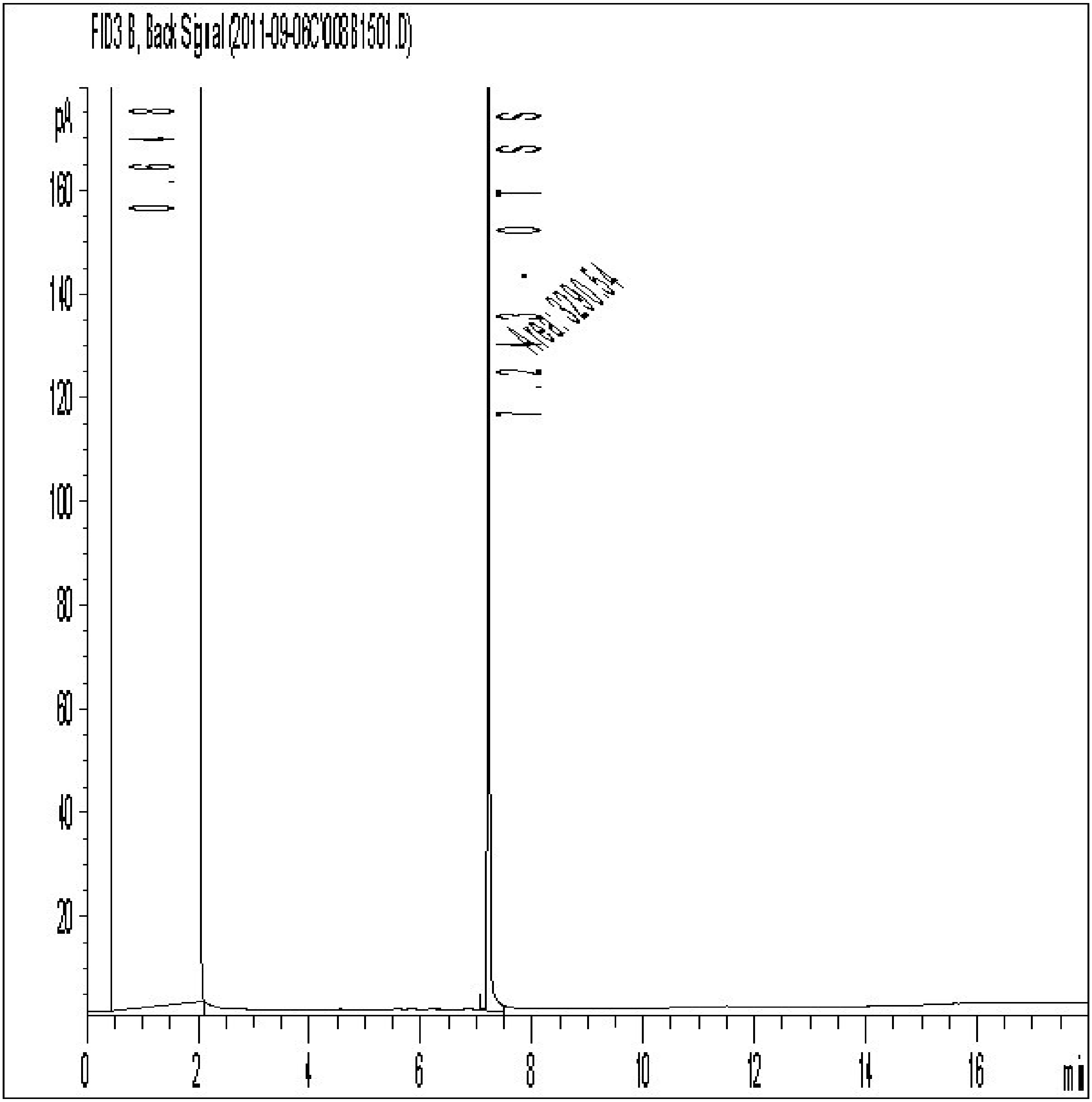
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

Report Date: 2011/09/07
Maxxam Job #: B1D5027
Maxxam Sample: KT4937

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FRMW11-1

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

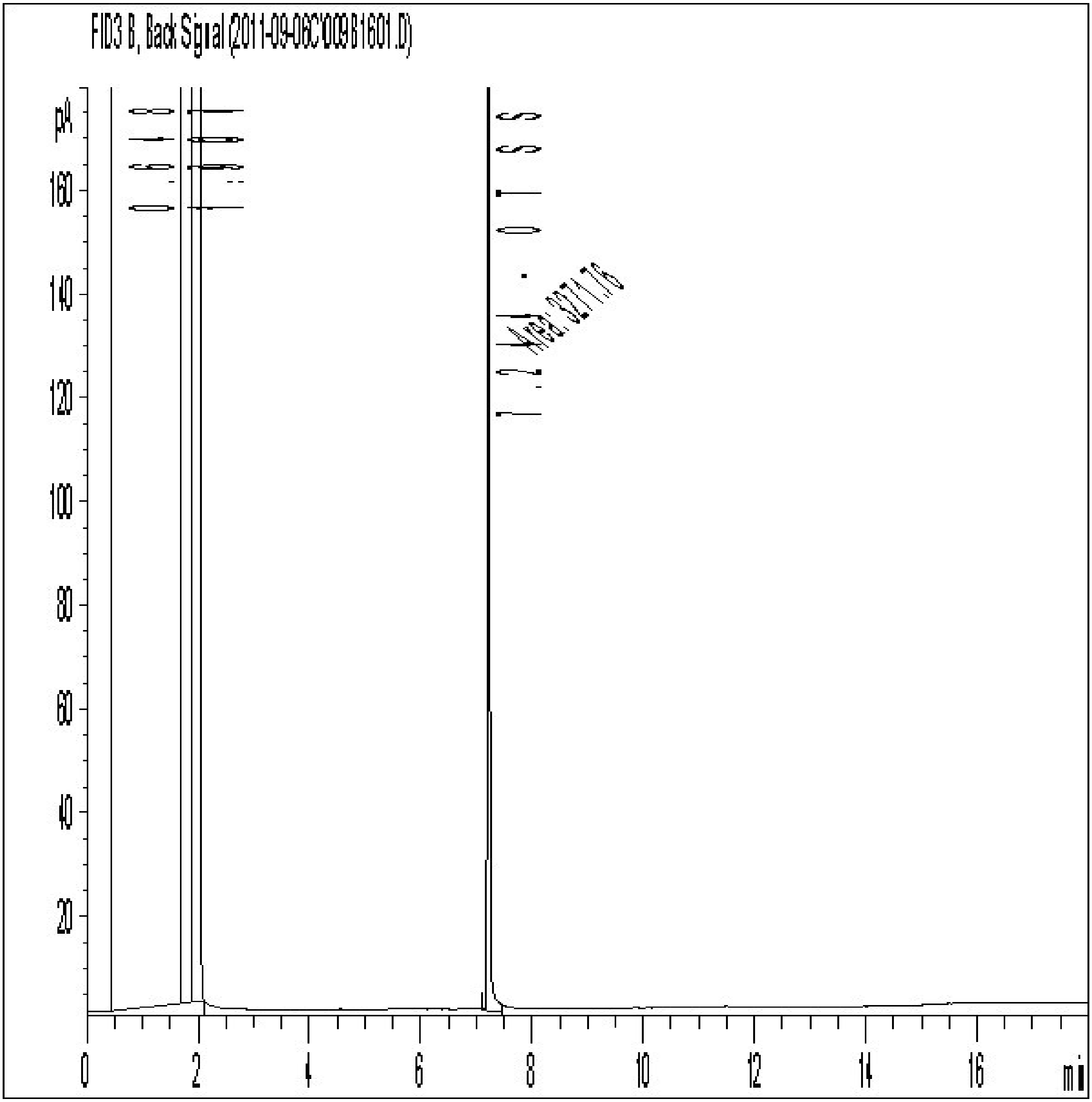


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Franz Environmental Inc
Client Project #: 1329-1102
Project name: 200 Lees Avenue, Phase II ESA
Client ID: FRMW11-2

Report Date: 2011/09/07
Maxxam Job #: B1D5027
Maxxam Sample: KT4938

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

Your Project #: 1329-1102
Site Location: 200 LEES PHASE TWO
Your C.O.C. #: 06219

Attention: Andrew Henderson
Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2011/09/07

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1D0820
Received: 2011/08/26, 10:45

Sample Matrix: AIR
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
BTEX and CCME Compounds in Air(TO-15mod)	10	N/A	2011/09/01	BRL SOP-00304	EPA TO-15mod
Canister Pressure (TO-15)	10	N/A	2011/09/01	BRL SOP-00304	EPA TO-15
Volatile Organics in Air (TO-15) (1)	10	N/A	2011/09/01	BRL SOP-00304	EPA TO-15

(1) Air sampling canisters have been cleaned in accordance with U.S. EPA Method TO14A. At the end of the cleaning, evacuation, and pressurization cycles, one canister was selected and was pressurized with Zero Air. This canister was then analyzed via TO14A on a GC/MS. The canister must have been found to contain <0.2 ppbv concentration of all target analytes in order for the batch to have been considered clean. Each canister also underwent a leak check prior to shipment.

Please Note: SUMMA® canister samples will be retained by Maxxam for a period of 5 calendar days from the date of this report, after which time they will be cleaned for reuse. If you require a longer sample storage period, please contact your service representative.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

THERESA STEPHENSON, Project Manager
Email: TStephenson@maxxam.ca
Phone# (905) 817-5763

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics Inc. is a NELAC accredited laboratory. Certificate # CANA001. Use of the NELAC logo however does not insure that Maxxam is accredited for all of the methods indicated. This certificate shall not be reproduced except in full, without the written approval of Maxxam Analytics Inc. Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section.

Total cover pages: 1

Franz Environmental Inc
Maxxam Job #: B1D0820
Client Project #: 1329-1102
Report Date: 2011/09/07
Site Location: 200 LEES PHASE TWO

RESULTS OF ANALYSES OF AIR

Maxxam ID		KR5385	KR5386	KR5387	KR5388	KR5389	
Sampling Date		2011/08/23 13:20	2011/08/23 13:20	2011/08/23	2011/08/23	2011/08/25 08:41	
COC Number		06219	06219	06219	06219	06219	
	Units	**NECRAWL-AUG11 / 1267**	**SECRAWL-AUG11 / T21648**	**DUP-AUG11 / T21628**	**TRIP-AUG11 / 1281**	**VP11-3-AUG11 / 1331**	**QC Batch**

Volatile Organics							
Pressure on Receipt	psig	(-3.4)	(-3.4)	(-3.7)	(-13.7)	(-1.5)	2604625

QC Batch = Quality Control Batch

Maxxam ID		KR5390	KR5391	KR5392	KR5393	KR5394	
Sampling Date		2011/08/25 09:15	2011/08/25 09:45	2011/08/25 12:19	2011/08/25	2011/08/25	
COC Number		06219	06219	06219	06219	06219	
	Units	**VP11-1-AUG11 / 1302**	**VP11-2-AUG11 / 1196**	**VP11-4-AUG11 / 358**	**DUP02-AUG11 / 255**	**TRIP 02-AUG11 / 284**	**QC Batch**

Volatile Organics							
Pressure on Receipt	psig	(-3.5)	(-2)	(-1.8)	(-2)	(-13.5)	2603138

QC Batch = Quality Control Batch

VOLATILE ORGANIC HYDROCARBONS BY GC/MS (AIR)

Maxxam ID		KR5385	KR5386	KR5387	KR5388	KR5389		
Sampling Date		2011/08/23 13:20	2011/08/23 13:20	2011/08/23	2011/08/23	2011/08/25 08:41		
COC Number		06219	06219	06219	06219	06219		
	Units	**NECRAWL-AUG11 / 1267**	**SECRAWL-AUG11 / T21648**	**DUP-AUG11 / T21628**	**TRIP-AUG11 / 1281**	**VP11-3-AUG11 / 1331**	**RDL**	**QC Batch**

Volatile Organics								
F1-BTEX, C6-C10 (as Toluene)	ug/m3	15	73	31	<5	1330	5	2606542
F2, C10-C16 (as Decane)	ug/m3	18	30	65	<5	279	5	2606542
Benzene	ug/m3	<1	2	<1	<1	2	1	2606542
Toluene	ug/m3	7	7	6	<2	26	2	2606542
Ethylbenzene	ug/m3	3	3	3	<2	3	2	2606542
Total Xylenes	ug/m3	9	10	9	<2	10	2	2606542
Surrogate Recovery (%)								
1,4-Difluorobenzene	%	78	83	82	93	85		2606542
Bromochloromethane	%	85	85	84	91	87		2606542
D5-Chlorobenzene	%	62	69	68	88	75		2606542

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANIC HYDROCARBONS BY GC/MS (AIR)

Maxxam ID		KR5390	KR5391	KR5392	KR5393	KR5394		
Sampling Date		2011/08/25 09:15	2011/08/25 09:45	2011/08/25 12:19	2011/08/25	2011/08/25		
COC Number		06219	06219	06219	06219	06219		
	Units	**VP11-1-AUG11 / 1302**	**VP11-2-AUG11 / 1196**	**VP11-4-AUG11 / 358**	**DUP02-AUG11 / 255**	**TRIP 02-AUG11 / 284**	**RDL**	**QC Batch**

Volatile Organics								
F1-BTEX, C6-C10 (as Toluene)	ug/m3	2990	1380	872	3680	<5	5	2603402
F2, C10-C16 (as Decane)	ug/m3	1140	898	918	2200	<5	5	2603402
Benzene	ug/m3	1	<1	24	<1	<1	1	2603402
Toluene	ug/m3	33	25	61	33	<2	2	2603402
Ethylbenzene	ug/m3	6	3	<2	6	<2	2	2603402
Total Xylenes	ug/m3	23	11	6	24	<2	2	2603402
Surrogate Recovery (%)								
1,4-Difluorobenzene	%	80	80	81	80	83		2603402
Bromochloromethane	%	82	83	81	81	81		2603402
D5-Chlorobenzene	%	71	74	77	75	85		2603402

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		KR5385			KR5386				
Sampling Date		2011/08/23 13:20			2011/08/23 13:20				
COC Number		06219			06219				
	Units	**NECRAWL-AUG11 / 1267**	**ug/m3**	**DL (ug/m3)**	**SECRAWL-AUG11 / T21648**	**RDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Volatile Organics									
Naphthalene	ppbv	<2.0	<10.5	10.5	<2.0	2.0	<10.5	10.5	2604471

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		KR5387			KR5388				
Sampling Date		2011/08/23			2011/08/23				
COC Number		06219			06219				
	Units	**DUP-AUG11 / T21628**	**ug/m3**	**DL (ug/m3)**	**TRIP-AUG11 / 1281**	**RDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Volatile Organics									
Naphthalene	ppbv	<2.0	<10.5	10.5	<2.0	2.0	<10.5	10.5	2604471

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		KR5389				KR5390				
Sampling Date		2011/08/25 08:41				2011/08/25 09:15				
COC Number		06219				06219				
	Units	**VP11-3-AUG11 / 1331**	**ug/m3**	**DL (ug/m3)**	**QC Batch**	**VP11-1-AUG11 / 1302**	**RDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Volatile Organics										
Naphthalene	ppbv	<2.0	<10.5	10.5	2604471	<2.0	2.0	<10.5	10.5	2602907

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		KR5391			KR5392				
Sampling Date		2011/08/25 09:45			2011/08/25 12:19				
COC Number		06219			06219				
	Units	**VP11-2-AUG11 / 1196**	**ug/m3**	**DL (ug/m3)**	**VP11-4-AUG11 / 358**	**RDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Volatile Organics									
Naphthalene	ppbv	<2.0	<10.5	10.5	<2.0	2.0	<10.5	10.5	2602907

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		KR5393			KR5394				
Sampling Date		2011/08/25			2011/08/25				
COC Number		06219			06219				
	Units	**DUP02-AUG11 / 255**	**ug/m3**	**DL (ug/m3)**	**TRIP 02-AUG11 / 284**	**RDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Volatile Organics									
Naphthalene	ppbv	<2.0	<10.5	10.5	<2.0	2.0	<10.5	10.5	2602907

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Test Summary

Maxxam ID	KR5385	**Collected**	2011/08/23
Sample ID	NECRAWL-AUG11 / 1267	**Shipped**	
Matrix	AIR	**Received**	2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2606542	N/A	2011/09/01	DIANE TEMNIUK
Canister Pressure (TO-15)	PRES	2604625	N/A	2011/09/01	DIANE TEMNIUK
Volatile Organics in Air (TO-15)	GC/MS	2604471	N/A	2011/09/01	DIANE TEMNIUK

Maxxam ID	KR5385 Dup	**Collected**	2011/08/23
Sample ID	NECRAWL-AUG11 / 1267	**Shipped**	
Matrix	AIR	**Received**	2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2606542	N/A	2011/09/01	DIANE TEMNIUK
Volatile Organics in Air (TO-15)	GC/MS	2604471	N/A	2011/09/01	DIANE TEMNIUK

Maxxam ID	KR5386	**Collected**	2011/08/23
Sample ID	SECRAWL-AUG11 / T21648	**Shipped**	
Matrix	AIR	**Received**	2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2606542	N/A	2011/09/01	DIANE TEMNIUK
Canister Pressure (TO-15)	PRES	2604625	N/A	2011/09/01	DIANE TEMNIUK
Volatile Organics in Air (TO-15)	GC/MS	2604471	N/A	2011/09/01	DIANE TEMNIUK

Maxxam ID	KR5387	**Collected**	2011/08/23
Sample ID	DUP-AUG11 / T21628	**Shipped**	
Matrix	AIR	**Received**	2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2606542	N/A	2011/09/01	DIANE TEMNIUK
Canister Pressure (TO-15)	PRES	2604625	N/A	2011/09/01	DIANE TEMNIUK
Volatile Organics in Air (TO-15)	GC/MS	2604471	N/A	2011/09/01	DIANE TEMNIUK

Maxxam ID	KR5388	**Collected**	2011/08/23
Sample ID	TRIP-AUG11 / 1281	**Shipped**	
Matrix	AIR	**Received**	2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2606542	N/A	2011/09/01	DIANE TEMNIUK
Canister Pressure (TO-15)	PRES	2604625	N/A	2011/09/01	DIANE TEMNIUK
Volatile Organics in Air (TO-15)	GC/MS	2604471	N/A	2011/09/01	DIANE TEMNIUK

Maxxam ID	KR5389	**Collected**	2011/08/25
Sample ID	VP11-3-AUG11 / 1331	**Shipped**	
Matrix	AIR	**Received**	2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2606542	N/A	2011/09/01	DIANE TEMNIUK
Canister Pressure (TO-15)	PRES	2604625	N/A	2011/09/01	DIANE TEMNIUK
Volatile Organics in Air (TO-15)	GC/MS	2604471	N/A	2011/09/01	DIANE TEMNIUK

Test Summary

Maxxam ID KR5390
Sample ID VP11-1-AUG11 / 1302
Matrix AIR
Collected 2011/08/25
Shipped
Received 2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2603402	N/A	2011/09/01	YAO LIANG SUN
Canister Pressure (TO-15)	PRES	2603138	N/A	2011/09/01	YAO LIANG SUN
Volatile Organics in Air (TO-15)	GC/MS	2602907	N/A	2011/09/01	YAO LIANG SUN

Maxxam ID KR5391
Sample ID VP11-2-AUG11 / 1196
Matrix AIR
Collected 2011/08/25
Shipped
Received 2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2603402	N/A	2011/09/01	YAO LIANG SUN
Canister Pressure (TO-15)	PRES	2603138	N/A	2011/09/01	YAO LIANG SUN
Volatile Organics in Air (TO-15)	GC/MS	2602907	N/A	2011/09/01	YAO LIANG SUN

Maxxam ID KR5392
Sample ID VP11-4-AUG11 / 358
Matrix AIR
Collected 2011/08/25
Shipped
Received 2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2603402	N/A	2011/09/01	YAO LIANG SUN
Canister Pressure (TO-15)	PRES	2603138	N/A	2011/09/01	YAO LIANG SUN
Volatile Organics in Air (TO-15)	GC/MS	2602907	N/A	2011/09/01	YAO LIANG SUN

Maxxam ID KR5393
Sample ID DUP02-AUG11 / 255
Matrix AIR
Collected 2011/08/25
Shipped
Received 2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2603402	N/A	2011/09/01	YAO LIANG SUN
Canister Pressure (TO-15)	PRES	2603138	N/A	2011/09/01	YAO LIANG SUN
Volatile Organics in Air (TO-15)	GC/MS	2602907	N/A	2011/09/01	YAO LIANG SUN

Maxxam ID KR5394
Sample ID TRIP 02-AUG11 / 284
Matrix AIR
Collected 2011/08/25
Shipped
Received 2011/08/26

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
BTEX and CCME Compounds in Air(TO-15	GC/MS	2603402	N/A	2011/09/01	YAO LIANG SUN
Canister Pressure (TO-15)	PRES	2603138	N/A	2011/09/01	YAO LIANG SUN
Volatile Organics in Air (TO-15)	GC/MS	2602907	N/A	2011/09/01	YAO LIANG SUN

GENERAL COMMENTS

Results relate only to the items tested.

Franz Environmental Inc
Attention: Andrew Henderson
Client Project #: 1329-1102
P.O. #:
Site Location: 200 LEES PHASE TWO

Quality Assurance Report

Maxxam Job Number: GB1D0820

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
2602907	LSY	Method Blank	Naphthalene	2011/09/01	<2.0		ppbv	
2603402	LSY	Spiked Blank	1,4-Difluorobenzene	2011/09/01		97	%	60 - 140
			Bromochloromethane	2011/09/01		95	%	60 - 140
			D5-Chlorobenzene	2011/09/01		97	%	60 - 140
			Benzene	2011/09/01		97	%	70 - 130
			Toluene	2011/09/01		102	%	70 - 130
			Ethylbenzene	2011/09/01		101	%	70 - 130
			Total Xylenes	2011/09/01		100	%	70 - 130
		Method Blank	1,4-Difluorobenzene	2011/09/01		90	%	60 - 140
			Bromochloromethane	2011/09/01		88	%	60 - 140
			D5-Chlorobenzene	2011/09/01		88	%	60 - 140
			F1-BTEX, C6-C10 (as Toluene)	2011/09/01	<5		ug/m3	
			F2, C10-C16 (as Decane)	2011/09/01	<5		ug/m3	
			Benzene	2011/09/01	<1		ug/m3	
			Toluene	2011/09/01	<2		ug/m3	
			Ethylbenzene	2011/09/01	<2		ug/m3	
			Total Xylenes	2011/09/01	<2		ug/m3	
2604471	DVO	Method Blank	Naphthalene	2011/09/01	<2.0		ppbv	
		RPD - Sample/Sample Dup	Naphthalene	2011/09/01	NC		%	25
2606542	DVO	Spiked Blank	1,4-Difluorobenzene	2011/09/01		103	%	60 - 140
			Bromochloromethane	2011/09/01		101	%	60 - 140
			D5-Chlorobenzene	2011/09/01		102	%	60 - 140
			Benzene	2011/09/01		113	%	70 - 130
			Toluene	2011/09/01		115	%	70 - 130
			Ethylbenzene	2011/09/01		115	%	70 - 130
			Total Xylenes	2011/09/01		114	%	70 - 130
		Method Blank	1,4-Difluorobenzene	2011/09/01		90	%	60 - 140
			Bromochloromethane	2011/09/01		91	%	60 - 140
			D5-Chlorobenzene	2011/09/01		81	%	60 - 140
			F1-BTEX, C6-C10 (as Toluene)	2011/09/01	<5		ug/m3	
			F2, C10-C16 (as Decane)	2011/09/01	<5		ug/m3	
			Benzene	2011/09/01	<1		ug/m3	
			Toluene	2011/09/01	<2		ug/m3	
			Ethylbenzene	2011/09/01	<2		ug/m3	
			Total Xylenes	2011/09/01	<2		ug/m3	
		RPD - Sample/Sample Dup	F1-BTEX, C6-C10 (as Toluene)	2011/09/01	NC		%	25
			F2, C10-C16 (as Decane)	2011/09/01	NC		%	25
			Benzene	2011/09/01	NC		%	25
			Toluene	2011/09/01	NC		%	25
			Ethylbenzene	2011/09/01	NC		%	25
			Total Xylenes	2011/09/01	NC		%	25

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

APPENDIX J

Limitations

This report has been prepared exclusively for the University of Ottawa. The report may not be relied upon by any other person or entity without the express written consent from Franz Environmental Inc.

Any use, which a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. Franz Environmental Inc. (FRANZ) accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Some of the information presented in this report was provided through existing documents and interviews. Although attempts were made, whenever possible, to obtain a minimum of two confirmatory sources of information, FRANZ, in certain instances, has been required to assume that the information provided is accurate.

The conclusions presented represent the best judgment of the assessors based on current environmental standards, previous reports, and on the site conditions observed in July and August, 2011. Due to the nature of the investigation and the limited data available, the assessors cannot warrant against undiscovered environmental liabilities.

Should additional information become available, FRANZ requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

There is no warranty, expressed or implied that the work reported herein has uncovered all potential environmental liabilities, nor does the report preclude the possibility of contamination outside of the areas of investigation. The findings of this report were developed in a manner consistent with a level of care and skill normally exercised by members of the environmental science and engineering profession currently practicing under similar conditions in the area.

A potential remains for the presence of unknown, unidentified, or unforeseen surface and sub-surface contamination. Any evidence of such potential site contamination would require appropriate surface and sub-surface exploration and testing.

If new information is developed in future work (which may include excavations, borings, or other studies), FRANZ should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.