FRANZ ENVIRONMENTAL INC.

CONSULTING ENGINEERING TECHNOLOGIES

Supplementary Environmental Site Assessment
Coal Tar Impacts

200 Lees Avenue,
Ottawa, Ontario

FINAL REPORT

Prepared for:

University of Ottawa
1 Nicholas Street, Suite 807
Ottawa, Ontario
K1N 6N5

Prepared by:

Franz Environmental Inc.
329 Churchill Avenue, Suite 200
Ottawa, Ontario
K1Z 5B8
(613) 721-0555

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EXECUTIVE SUMMARY

Franz Environmental Inc. (FRANZ), was retained by the University of Ottawa (uOttawa) to conduct environmental site assessment (ESA) activities on the western portion of uOttawa's property at 200 Lees Avenue and on the adjacent areas belonging to the City of Ottawa at 193 Lees Avenue ("the Site").

This report was prepared in accordance with the FRANZ proposal prepared for project 1329-1202, *Proposed Environmental Site Assessment Work Program; Coal Tar Plume - Potential Environmental Concern; 200 Lees Avenue, Ottawa, Ontario* dated September 19, 2012. The project was completed under uOttawa Work Order 4001C00377 and project number 067-001-056.

FRANZ reviewed previous reports on coal tar impacts at the Site and on adjacent properties for historical information about coal tar impacts.

Before 1920, the Ottawa Gas Co. constructed a gas works at 175 Lees Avenue, across Lees Avenue from the Site. The gas works operated until 1957. In 1981-83, the former gas works property was developed as a Transitway station by the Regional Municipality of Ottawa-Carleton. In 1986, tarry substances were observed in the pumphouse of the Lees Avenue Transitway station and in pump station outfall to the Rideau River. A leachate collection and treatment facility was then constructed to collect and treat coal tar contaminated water at the Transitway station.

Drilling and sampling investigations conducted on the former gas company property revealed areas of coal tar impacts. The impacts were found by other investigations to have migrated onto the 200 Lees Avenue Site.

In order to assess the current status of coal tar impacts at the Site, FRANZ conducted an environmental site investigation at the Site in two stages: an initial phase of ground water monitoring and sampling in May, 2012 (Stage I) and an intrusive investigation in September, 2012 (Stage II). Soil and ground water samples were compared to Ontario's *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* using full depth generic site condition standards in a non-potable ground water condition with coarse grained soil and community land use.

During Stage I, eight ground water samples (including one duplicate) were collected from Site monitoring wells in May, 2012. Ground water samples from two wells exhibited exceedances of the site condition standards for polycyclic aromatic hydrocarbons.

Based on the results of the Stage I program, FRANZ designed a second phase to further delineate coal tar impacts on the Site. Stage II of the investigation involved advancing five boreholes at the Site and collecting soil and ground water samples.

Soil samples collected from all five boreholes exhibited exceedances of site condition standards for polycyclic aromatic hydrocarbons and metals. No exceedances of standards for petroleum hydrocarbons or polychlorinated biphenyls were found in soil. These results are consistent with previous investigations. The impacts are likely caused by the dumping of incinerator waste across the Site as fill.

Fourteen ground water samples (including one duplicate) were collected in the Stage II Investigation. Samples were analyzed for polycyclic aromatic hydrocarbons, metals, petroleum hydrocarbons and polychlorinated biphenyls. Exceedances of site condition standards (Ontario's *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* using full depth generic site condition standards in a non-potable ground water condition with coarse grained soil and community land use) were found at a single well, MW12-11. The sample collected from MW12-11 exhibited exceedances of standards for acenaphthylene and petroleum hydrocarbon fraction F2. No other exceedances of standards for any parameter were found in any well in the Stage II investigation.

Current ground water flow at the Site is to the northwest, towards the Transitway pumping system across Lees Avenue from the Site. Although there is limited data on hydraulic gradients for the area closest to the Rideau River, FRANZ expects that there is interaction between ground water and surface water in the area adjacent to the river.

Concentrations of dissolved polycyclic aromatic hydrocarbons in ground water indicate the presence of free phase product in the westernmost portion of the Site, adjacent to Lees Avenue, at monitoring wells MW12-11 and OW-120B-86 (and in BH00-1 during Stage I, although not Stage II). Coal tar impacts in soil were reported by others during installation at both MW12-11 and OW-120B-86.

Soil and ground water results in the Stage I and Stage II investigation have allowed FRANZ to prepare an estimate of the area impacted by coal tar at the Site. The total area of coal tar impacts is on the order of 3,200 m^2 based on observation of impacts during previous drilling programs at the Site and on assessment of polycyclic aromatic hydrocarbon solubility in ground water. The total area of the Site where ground water exceeds the Ontario's *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* using full depth generic site condition standards in a non-potable ground water condition with coarse grained soil and community land use is on the order of 3,600 m^2.

The potential for future mobility of impacted ground water to the east and south (i.e., further onto the Site) appears to be low as a result of the hydraulic influence of the Transitway pump and

treat system. The pump and treat system causes flow of ground water back towards the source area of free phase impacts caused by the former gas plant and away from the Site. As a result, both free phase and dissolved phase impacts appear to be stable. This is expected to remain the case as long as the pump and treat system remains in operation; however, the stability of the free and dissolved phases may change if the pump and treat system is replaced.

This executive summary should be read in conjunction with the main report and is subject to the same limitations described in Section 8.0.

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GLOSSARY OF TERMS AND ACRONYMS

Aromatic Compounds: Chemical organic compounds that contain planar ring systems in the molecule structure. Typical aromatic hydrocarbons are benzene, toluene, ethylbenzene and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs).

Aromatic Ring: Basic carbon system that forms aromatic compounds, which can be monocyclic (one aromatic ring) as in benzene, bicyclic (two aromatic rings) as in naphthalene or polycyclic (three or more aromatic rings) as in anthracene.

Benzene, Toluene, Ethylbenzene, Xylenes (BTEX): Typical volatile organic compounds (VOCs) found in petroleum derivatives.

Coal Tar: Among the by-products when coal is carbonized to make coke or gasified to make coal gas. They are complex and variable mixtures of phenols, PAHs, and heterocyclic compounds.

Dissolved Phase: System of dissolved solids forming molecules uniformly distributed in the ground water.

Non-Aqueous Phase Liquid (NAPL): Portion of separate immiscible phase (free phase) capable of gravity drainage and/or pressure driven flow through the subsurface. It can be either denser than water (DNAPL) or lighter than water (LNAPL).

Polycyclic Aromatic Hydrocarbon (PAH): Aromatic compound consisting of fused aromatic rings. They occur in oil, coal, and tar deposits, and are produced as byproducts of fuel burning (whether fossil fuel or biomass). Naphthalene is the simplest example of a PAH (two aromatic rings). Benzo(ghi)perylene is a PAH with six aromatic rings. The higher the number of rings the higher the molecular weight.

Water Solubility: Extent to which a compound will dissolve in water. The log of solubility is generally inversely related to molecular weight. The higher the molecular weight the lower the water solubility.

1.0 INTRODUCTION

Franz Environmental Inc. (FRANZ), was retained by the University of Ottawa (uOttawa) to conduct supplementary environmental site assessment (ESA) activities on the western portion of uOttawa's property at 200 Lees Avenue and adjacent areas ("the Site", see Figure 1, Appendix A).

This report was prepared in accordance with the FRANZ proposal prepared for project 1329-1202, *Proposed Environmental Site Assessment Work Program; Coal Tar Plume - Potential Environmental Concern; 200 Lees Avenue, Ottawa, Ontario* dated September 19, 2012. The project was completed under uOttawa Work Order 4001C00377 and project number 067-001-056.

1.1 Project Objectives

The objective of the project was to identify the absence/presence of historical coal tar impacts from the neighbouring off-site sources and to attempt to delineate impacts on the Site.

1.2 Scope of Work

In order to fulfill the project objectives identified in Section 1.1, FRANZ performed the following tasks:

- Preparation of a health and safety plan;
- Reviewing previous reports on coal tar impacts at the Site and on adjacent properties;
- Measuring ground water elevations at monitoring wells across the site;
- Drilling boreholes and installing new monitoring wells;
- Collecting representative soil samples for laboratory analysis;
- Collecting ground water samples from new and existing monitoring wells;
- Determination of contaminant types and concentrations through laboratory analysis;
- Characterizing the subsurface impacts at the Site; and
- Reporting.

2.0 BACKGROUND

2.1 Site Description

The area under investigation in this report comprises two separate addresses, owned by two parties. The properties included in the investigation, presented on Figure 1 (Appendix A) are:

- 200 Lees Avenue, owned by uOttawa, and
- 193 Lees Avenue, owned by the City of Ottawa.

2.1.1 200 Lees Avenue

200 Lees Avenue is an irregularly shaped property covering an area of approximately 350 m by 200 m (70,000m^2). The Site is bordered to the west by a below-grade section of the reserved bus lane of the Ottawa transit system (i.e., the Transitway), to the north by a bike trail and Highway 417, and to the east and south by the Rideau River.

Five interconnected buildings are present on Site, occupying the central portion of the property. The primary area of interest for this investigation is the western portion of the Site, adjacent to the historical source of coal tar impacts, comprising asphalt parking areas, grassed areas, and roadways.

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 area of interest for this investigation is the western portion of the property at 200 Lees Avenue, closest to the Transitway.

2.1.2 193 Lees Avenue

193 Lees Avenue is a triangular property located north of 200 Lees Avenue, but south of Lees Avenue and the Queensway. It is fully grassed, and not currently utilized. The property covers slightly less than 4,000 m^2.

The Site is located on a parcel of land with Property Identifier Number 042030631. The legal description of the parcel of land where the Site is located is PT N-1/2 LG CON D RF; RP5R 6221 PART 1.

For the purposes of this report, “the Site” is considered to be the two properties considered together.

2.2 Site History

The 200 Lees Avenue property was used as a landfill between 1906 and 1947 for material generated during the burning of domestic and commercial waste from a nearby incinerator. The Site also received un-burned waste (possibly domestic and commercial) for several years early in the 20th century. An ash, cinder and garbage landfill layer is found across the entire Site and is a source of metals and polycyclic aromatic hydrocarbon (PAH) contamination. This layer of impacts has been observed in historical air photo analysis to extend as far as Chestnut Street in the west, more than 400 metres from the Site (Gartner Lee, 1980). Once the landfill was closed, the Site was developed in the 1960s as a campus by Algonquin College of Ottawa. The campus was transferred to the University of Ottawa in 2007.

A coal gasification plant was also located near the Site to the northwest. When OC Transpo developed the nearby Transitway, a containment barrier enclosing coal tar/PAH ground water contamination from the gasification plan was breached allowing impacted ground water to enter the western portion of the Site. Various investigative soil sampling programs completed at the Site revealed contaminated fill layers in the subsurface in this portion of the Site that are a result of past operations at the gasification plant.

The gas plant was first constructed on Lees Avenue sometime between 1915 and 1920. The Ottawa Gas Co. had relocated its gas works from the King Edward Street - York Street location to Lees Avenue (which is now partially included in the property at 191 Lees Avenue - see Figure 2, Appendix A). Gas plant operations changed from retort coal gasification to carburetted water gas in the late 1930s. The Lees Avenue gas works was a large facility that operated for about 37 years or until 1957 when natural gas pipelines made the operation uneconomical. The plant was operated under different company names including the Ottawa Gas Co.; Ottawa Heat, Light and Power Co.; Interprovincial Utilities Ltd.; and Consumers Gas Co. The former gas plant property is located on the north side of Lees Avenue, south of Highway 417 and between Lees Avenue on ramps to the west and the Lees Avenue overpass to the east. The gas plant structures were demolished in 1966-67 and are shown on Figure 2 (Appendix A).

In 1981-83, the property was developed as a below ground bus Transitway station by the Regional Municipality of Ottawa-Carleton. Continued pumping was required to prevent the bus station from flooding. A 1220 mm diameter storm sewer was constructed to discharge the pumped water from the Transitway station directly to the Rideau River.

In late April 1986, tars were observed in the pumphouse of the Lees Avenue Transitway station and in the adjacent Rideau River in the vicinity of the outfall from the pumping station. The discovery of this contamination resulted in closure of the Lees Avenue Transitway station and installation of a boom to contain the oil slick on the Rideau River. Later in 1986, a leachate collection and treatment facility was constructed to collect and treat coal tar contaminated water

at the Transitway station. The removal of an estimated 40 m^3 of tar from the bottom of the River over a 100 m by 40 m area was also undertaken in the late 80's. Drilling and sampling investigations conducted on the property at 169 Lees Avenue have shown that the foundation of the 4,250 m^3 gas holding tank is contaminated with coal tar. Other investigations, as discussed in Section 2.3, have confirmed that the coal tar impacts are also present on the 200 Lees Avenue Site.

2.3 Selected Previous Reports

FRANZ reviewed the reports and documents in Table 2-1 in support of this investigation. A summary of the pertinent information is provided following the table. The area around the Site has been studied in detail, and Table 2-1 does not provide a comprehensive list of documents available. Instead, the table is focussed on information relevant to coal tar impacts at the Site and in immediately adjacent areas.

Table 2-1: Selected Reports on the Site and Adjacent Properties

Title of Report	**Date of Report**	**Report Author**	**Report Funded by / Submitted to**	**Short Reference**
Fact Sheets on "Lees Avenue Coal Tar Problem" #1 Outline #3 Rideau River Cleanup Study #4 Groundwater Contaminant Migration Study	Sept. 4, 1986	Ontario Ministry of the Environment	Unknown (appears to be for general public release)	Coal Tar Fact Sheets (1986)
Lees Avenue Hydrogeologic Study (in two volumes)	May 15, 1987	INTERA Technologies Ltd.	Ontario Ministry of the Environment	INTERA Hydrogeology Study (1987)
Characterization of Subsurface Materials / Conditions Geotechnical and Environmental Considerations Algonquin College Rideau Campus, Ottawa, Ontario	August, 2000	Golder Associates Ltd.	University of Ottawa Environmental Health and Safety Service	Golder Geotechnical Report (2000)
Final Report for MOE Submittal Human-Health and Ecological Site-Specific Risk Assessment Algonquin College, Rideau Campus	July 12, 2002	CH2M Hill Canada Ltd.	Algonquin College	CH2M Hill Risk Assessment (2002)

Title of Report	Date of Report	Report Author	Report Funded by / Submitted to	Short Reference
Geotechnical and Environmental Overview Algonquin College Property – Rideau Campus Ottawa, Ontario	April, 2007	Golder Associates Ltd.	University of Ottawa	Golder Overview (2007)
Phase One Environmental Site Assessment Rideau Campus, former Algonquin College 200 Lees Avenue Ottawa, Ontario (DRAFT)	August 15, 2007	Franz Environmental Inc.	University of Ottawa	FRANZ Phase One ESA (2007)
Phase 1 Environmental Site Assessment, 191 and 193 Lees Avenue, Ottawa, Ontario	January 17, 2012	Geofirma Engineering Ltd.	City of Ottawa	Geofirma Phase 1
Phase 2 Environmental Site Assessment, 191 and 193 Lees Avenue, Ottawa, Ontario	June 27, 2012	Geofirma Engineering Ltd.	City of Ottawa	Geofirma Phase 2

2.3.1 Coal Tar Fact Sheets

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 Queensway 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, to study the extent of contamination in the Rideau River and collect and treat any coal tar material reaching the river, and to conduct hydrogeological studies of the general area.

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. It was noted that contamination is commonly found as droplets mixed with the riverbed sediment, and that the area of greatest concentration was by the Transitway bridge. In that area, the riverbed was reported to be 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 high levels of benzene, toluene and xylenes (BTEX) were found on the south side of Lees Avenue "close to the road near Algonquin College" (i.e., the Site) and "some lower levels" of BTEX were found on the Site itself.

2.3.2 INTERA Hydrogeology Study (1987)

The 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; sludge; 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 what is now the 170 Lees Avenue property, 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.

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 1×10^{-4} to 1×10^{-7} m/s for the fill unit, 1×10^{-4} to 1×10^{-8} m/s for the alluvium, and 1×10^{-5} to 1×10^{-6} m/s for the shale bedrock. The hydraulic conductivity for the basal till unit was not measured directly, but was estimated to be less than 10^{-8} m/s.

INTERA observed tar saturated soils in its intrusive investigation around the building at 170 Lees Avenue, and on the properties between Lees Avenue and the Queensway. One location at the Site, in the northwest corner adjacent to the access road, was found to have "visible oil and tar contamination." Concentrations of naphthalene, benzo(a)pyrene, benzene and ethylbenzene were observed across the western portion of the Site, including adjacent to the Rideau River and northwest of Building E.

Ground water flow direction was observed to be influenced by pumping systems for the Transitway and underground parking garages at nearby apartment buildings.

2.3.3 Golder Associates Ltd. Geotechnical Report (2000)

During a period of considering the purchase of the 200 Lees property, uOttawa 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 indicated that 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 did not find any exceedances in ground water of Ontario Standards in place at the time.

2.3.4 CH2M Hill Risk Assessment (2002)

Algonquin College retained 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 report 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 ground water samples, collecting vapour samples, and collecting soil samples from crawl spaces.

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; however four strategies were recommended to address potential human health risks for maintenance workers:

- Developing a site-specific health and safety plan;
- Minimum of 6 inch of clean fill to be retained on the site;
- Installation of a fence at the top of the embankment to reduce the potential for erosion; and
- Monitoring of methane concentrations in the crawl space.

2.3.5 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.

Geological conditions related to the coal tar impacts were summarized as follows: bedrock is found at depths between 10 and 13 metres m bgs, and ground water is found between 3 and 8.5 metres below ground surface. The coal tar impacts are discussed in similar terms as previous reports.

2.3.6 FRANZ Phase I ESA, Draft (2007)

In 2007, FRANZ completed a Phase I ESA for the Site, after it was purchased from Algonquin College by uOttawa. The Phase I ESA provided a qualitative assessment of the environmental conditions of the Site based on a records review, interview and site visit.

FRANZ identified issues of potential environmental concern based on potentially contaminating activities at the Site and on surrounding properties. Of interest for the current investigation, FRANZ identified an area of soil and ground water PAH contamination on the northwestern portion of the Site. The area was identified as coal tar impacts associated with activities at the former gasification plant across Lees Avenue from the Site. The Phase I ESA indicated that free

phase product had also been observed on-site in this area. FRANZ also indicated that additional contaminants potentially associated with the gasification activities and related impact included: polychlorinated biphenyls (PCBs), petroleum hydrocarbons (PHCs), phenols, and various sulphur and nitrogen.

No recommendations were provided in the Draft Phase I ESA.

2.3.7 Geofirma Phase 1 ESA (2012)

The Geofirma Phase I ESA addresses potential environmental concerns at 191 Lees Avenue (the Lees Transitway Station property) and 193 Lees Avenue (the triangular property to the north of the University's property at 200 Lees, considered to be part of "the Site" in this report). Geofirma was retained by the City and performed a standard Phase I ESA, including a records review, interviews and a site visit.

The report identifies eighteen APECs, all based on historical use of the 191 and 193 Lees Avenue properties for coal and oil gasification. The APECs are all based on historical gas plant structures, none of which are south of Lees Avenue (i.e., none of which are on the Site as defined in this report). The report also identifies "the entire former manufactured gas plant" property as an APEC "based on routine spillage of tars and disposal of other gas plant wastes."

Contaminants of potential concern in soil and ground water, as identified in the Geofirma Phase 1, are PAHs, BTEX, cyanide, and heavy metals.

A Conceptual Site Model is developed in the Phase 1 ESA report. Of particular interest is the description of hydrostratigraphic units at 191 and 193 Lees Avenue. According to Geofirma, there are four units at the Site, presented in descending order from the surface:

- **Fill Unit:** composed of "sandy, granular anthropogenic material," including cinders, ash and other debris. The unit is, on average, 3-5 m thick and found 0-5 m below ground surface. The unit is permeable and unsaturated.
- **Alluvium Unit:** composed of silt and fine sand, representing reworked fluvial deposits of the former Ottawa River drainage channel. The unit is, on average, 3-8 m thick and found 3-10 m below ground surface. The unit is both permeable and saturated, and is the main transmissive unit for ground water at the property.
- **Basal Glacial Till Unit:** composed of dense, compact sandy silt with some clay and gravel. The unit is a maximum of four metres thick, and is found at depths of 7-11 m below ground surface. The unit is not hydraulically conductive, and "appears to act as a confining unit to the underlying bedrock." The unit is not continuous across all of the 191 and 193 Lees Avenue properties.
- **Shale Bedrock:** composed of competent black shale of the Billings Formation. The unit is found at depths of 10-12 m below ground surface. Several metres of the upper portion

of the bedrock are weathered and fractured, allowing water conduction. Below the upper few metres of the bedrock, hydraulic conductivity is lower, comparable to the basal till.

The report also describes the operation of the ground water treatment system at 191 Lees Avenue. According to the report, the system began operation in 1986 after the identification of coal tar impacts in the Rideau River (from the outfall of the Transitway pumping station). The treatment system consists of a dual, parallel treatment train of surge tanks, separators, bag filters and carbon filtration. Treated ground water is discharged to the sanitary sewer.

Average monthly flow rates for the treatment system have halved since 1986 to approximately 100 m^3 per month in recent years. Average naphthalene concentrations in the treatment system influent have decreased by a factor of 50 since 1986, although average total PAH concentrations in the influent have been more variable over the same period. Geofirma concludes that this is the result of consistent levels of dissolved PAHs with occasional spikes caused by mobilization of non-aqueous phase blebs of coal tar.

Geofirma calculates that the system removes 18.2 L of coal tar per year, and concludes that "it is clear that the ground water collection treatment system is not an effective mass removal system for coal tar contamination."

Finally, the report provides a preliminary evaluation of an innovative treatment technology for coal tar impacts.

2.3.8 Geofirma Phase 2 ESA (2012)

Based on impacts identified in the Geofirma Phase 1 ESA, Geofirma advanced 12 boreholes, all of which were completed as monitoring wells, across the 191 and 193 Lees Avenue properties. Geofirma collected soil samples from the boreholes and ground water samples from both newly-installed and existing wells.

Geofirma found that the coal tar to the north of Lees Avenue is mostly present within the deeper part of the alluvium unit, pooled on top of the basal till unit. Coal tar was primarily found north of Lees Avenue below the Transitway parking lot; however, some coal tar was identified at the Site (in BH12-11), which is "consistent with historical movement of coal tar down the sloping till surface to the southeast" according to Geofirma.

Impacts were observed in soil in two boreholes during previous drilling programs at the Site. In 2012, Geofirma observed "coal tar and sheen" at elevations of 52.4 to 50.8 m ASL in MW12-11. In 1986, Conestoga-Rovers (CRA 1986b) had observed coal tar impacts in the same area, at OW120B-86. Impacts were observed between 60.02 and 59.00 m ASL, and from 53.01 to 52.00 m ASL.

3.0 INVESTIGATIVE METHODOLOGY

Investigation of coal tar impacts at the Site took place in two phases: an initial phase of ground water monitoring and sampling in May, 2012 and an intrusive investigation in September, 2012. The program consisted of the following elements:

- Revising the site-specific health and safety plan (prior to the field work);

Stage I (May):

- Collecting water levels from seven existing monitoring wells;
- Collection of ground water samples from these seven wells;

Stage II (September):

- Obtaining utility clearances for the proposed drilling locations;
- Advancing boreholes at five locations;
- Collecting and field screening soil samples;
- Installing monitoring wells in all five boreholes;
- Monitoring and sampling ground water; and
- Obtaining a survey of newly-installed wells.

Investigation procedures are described below.

3.1 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.

4.0 SITE CONDITION STANDARDS

The Ontario Ministry of the Environment developed the document titled *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* ("Site Condition Standards" or "SCS"), updated from time to time, which provides the numeric Standards for use at contaminated sites in Ontario. The version of the document currently in force is dated April 15, 2011.

The SCS document provides different numeric values for concentration of compounds in soil, ground water and sediment depending on site conditions. Nine tables in the document provide values depending on:

- land use (*agricultural or other, commercial, community, industrial, institutional, parkland or residential*).
- soil type (*coarse or fine*).
- ground water potability (*potable or non-potable*).
- proximity to a water body (*where a water body is within 30 metres*)
- shallow soil conditions (*where one third or more of the site contains soil with less than two metres of overburden above bedrock*)
- whether surface soils are being considered separately ("stratified" site conditions).

Land use at the site is *community*, as described in the definition in Section 1 of Ontario Regulation 153/04, *Records of Site Condition, Part XV.1 of the Act*.

> 3. *Use of a classroom in a building by a university that is authorized to operate pursuant to section 3 of the Post-secondary Education Choice and Excellence Act, 2000.*

Previous work at the Site by FRANZ and others (FRANZ, 2011) has indicated that the soils at the site are coarse-grained.

Potable water is supplied to the Site by the Municipality of Ottawa water supply system. As a result, non-potable SCS apply to the Site.

The Site is located adjacent to the Rideau River; however, the wells involved in this investigation are not adjacent to the surface water. FRANZ expects that if future redevelopment of the Site is undertaken following a remedial / risk management strategy, the Site will be split into Environmental Management Units (EMUs) to aid in development and the Record of Site Condition process. The EMUs will divide the Site into smaller subunits that will consider the 30 m buffer land requirement adjacent to the Rideau River, the presence of coal tar and the possible land use changes from Community Use status. As a result, FRANZ did not adopt the SCS for use within 30 m of a surface water body for this investigation.

Previous intrusive investigations at the Site and well installation records indicate that the Site is not a "shallow soil" site.

While it is possible to consider impacts in surface soil separately from those in subsurface soil using stratified SCS, FRANZ expects that similar areas of impact would be identified at the Site. As a result, full depth SCS (which may always be used) are applied for this investigation.

Selected Soil and Ground Water Standards

Based on the rationale outlined above, FRANZ selected the following SCS to evaluate the analytical data from soil and ground water samples collected during this 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).

4.1 Stage I Program

FRANZ conducted a ground water monitoring and sampling program in the Lees Avenue remediation area on May 28, 2012. The objective of the field program was to update the current status of the coal tar and dissolved phase ground water impacts.

Existing monitoring wells identified during the Site visit are summarized in the table below (see also Figure 3, Appendix A):

Table 4-1: Stage I Investigation, Monitoring Wells

Well	Well Depth (m)	Screened Material
OW-120B-86	13.0	overburden
north of 120B-86 (unidentified)	10.5	unknown
BH 00-1	6.0	overburden
OW-122C-86	8.5	overburden
OW-122B-86	11.6	overburden
OW-506C	6.4	overburden
OW-506B	10.8	overburden
OW-506A	15.4	bedrock

All identified monitoring wells were monitored and ground water samples collected with the exception of OW-506C due to well integrity issues (twisted casing). Monitoring well labelled "north of 120B-86" during the May sampling round is believed to be MW12-11, a monitoring well

installed by Geofirma on February 17, 2012, although there are discrepancies in the well depth measured on site and the one recorded in the borehole log.

4.1.1 Ground Water Monitoring

FRANZ conducted an initial ground water monitoring and sampling round on May 28, 2012.

Ground water monitoring was conducted with an oil/water interface probe, which indicates the depth to water or separate-phase liquid. Depths were measured relative to the top of the well casing to millimeter accuracy. Select well casing elevations were subsequently surveyed by Farley, Smith and Denis (see Section 4.2.6), allowing for the ground water elevation to be determined.

4.1.2 Ground Water Sampling

FRANZ collected eight ground water samples (including one duplicate) using dedicated inertial (Waterra®) pump systems. Ground water samples were submitted to Paracel Laboratories Ltd. for the analysis of PAHs.

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).

FRANZ noticed that old stagnant water appeared to be present in the majority of the wells during the monitoring events. No immiscible oil layers were identified in any well; however, darker colour and organic odours in the water were noted in wells OW-120B-86 and BH 00-1. Sheen was also observed in well BH 00-1 located in the parking lot east of Building “C”.

4.2 Stage II Program

Based on the results of the Stage I program, FRANZ designed a second stage to further delineate coal tar impacts on the Site.

4.2.1 Utility Clearances

On September 26, 2012, FRANZ contacted Ontario1Call to determine the location of underground utilities at the Site. Ontario1Call notified representatives of Allstream (telecom), Hydro Ottawa (power), Group Telecom (telecom), Enbridge (gas), Bell Canada (telecom) and Atria Networks (telecom).

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 September 26, 2012, prior to the borehole drilling program.

4.2.2 Advancing Boreholes

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 five boreholes at the Site, all five of which were completed as monitoring wells.

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 10.04 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. Disposable nitrile gloves, replaced after collecting each sample, were worn when handling sampling tools and samples.

Field observations and soil sampling information at each borehole location are recorded in the individual borehole logs presented in Appendix D.

Soil cores generated during the work program were placed in drums, which were subsequently disposed by Lacombe Waste Services, of Ottawa.

4.2.3 Soil Sampling and Field Screening

Soil samples were collected for field logging. Selected samples, based on the expected degree of potential impacts, were submitted for laboratory analysis. Soil samples were field screened for volatile impacts with an RKI Eagle combustible gas meter. The RKI Eagle was used as a secondary source for selecting soil samples for submission, as the types of impacts expected on the Site (PAHs and metals in soil) do not cause elevated readings on this instrument. Combustible gas readings were collected after soil samples had been placed in polyethylene bags and allowed to equilibrate with ambient conditions for approximately five minutes.

Soil samples to be analyzed were placed directly into laboratory-supplied sample containers. Soil samples for potential BTEX, and PHC F1 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. Soil samples were logged according to their originating unit in the subsurface.

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 (see Appendix C).

4.2.4 Monitoring Well Installation

FRANZ installed five monitoring wells as part of the intrusive investigation at the Site, labelled MW1-12 through MW5-12. The monitoring wells were installed in boreholes advanced by Strata on September 30 and October 1, 2012, to investigate ground water conditions and to obtain ground water samples for subsequent laboratory analysis. Soil sample collection during the advance of the boreholes is described in Section 4.2.3. Borehole and monitoring well logs are presented in Appendix D.

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 2" (50 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 in accordance with O.Reg 903. Well tags and construction details are presented in Table 4-2, below.

Table 4-2: 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**	**Well Tag Number**
1-12	50 mm / PVC	Flush Mount	62.20 m	6.91 m - 9.96 m	55.29 m - 52.24 m	#10 Slot (i.e., 2.54 mm wide)	A135009
2-12	50 mm / PVC	Flush Mount	61.79 m	6.21 m - 9.26 m	55.58 m - 52.53 m	#10 Slot	A135010
3-12	50 mm / PVC	Flush Mount	62.02 m	5.55 m - 8.60 m	56.47 m - 53.42 m	#10 Slot	A135011
4-12	50 mm / PVC	Flush Mount	61.89 m	6.05 m - 9.10 m	55.84 m - 52.79 m	#10 Slot	A135012

Monitoring Well	Well Diameter / Material	Completion	Top of Pipe Elevation (m asl)	Screened Interval (m bgs)	Screened Interval (m asl)	Screen Details	Well Tag Number
5-12	50 mm / PVC	Flush Mount	61.86 m	6.99 m - 10.04 m	54.87 m - 51.82 m	#10 Slot	A135013

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.

4.2.5 Ground Water Monitoring and Sampling

Ground water levels were measured at each monitoring well using a Solinst ® Water Level Meter. Prior to sampling, newly installed monitoring wells were developed using overpumping techniques with Waterra® tubing and foot valves. Ground water conditions such as turbidity, colour, odour, etc. were continuously observed and recorded during development and purging activities.

After well development was complete, water purging and sampling was completed using 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, the five new wells and eight previously-installed wells (total of 13) were sampled as part of the proposed work program.

The following sampling protocols were followed:

- Background wells were sampled first, followed by potentially more impacted wells;
- Dedicated Waterra samplers were used for sampling;
- Samples for inorganics (specifically heavy metals) were field filtered using high capacity 0.45 micron filters.
- Samples for organic parameters (e.g. PAHs, PHCs) were not filtered, and no headspace was allowed.

Ground water samples were collected and placed 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 (see Appendix C).

4.2.6 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 October 15, 2012. 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.

4.3 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.
- 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 Canadian Association for Laboratory Accreditation Inc. (CALA), Standards Council of Canada (SCC) and Ontario Ministry of the Environment guidelines. Laboratory QA/QC is documented in the certificates of analysis provided in Appendix C.

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:

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

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 (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 4-3, below.

Table 4-3: 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, $RPD = \frac{|X_1 - X_2|}{X_{average}} \times 100$

IDL – instrument detection limit
LRL – laboratory reporting limit

4.4 Laboratory

Ground water samples from Stage I of the Investigation were sent to Paracel Laboratories in Ottawa, Ontario for chemical analysis.

Soil and ground water samples from Stage II of the investigation were sent to Maxxam Analytics in Ottawa, Ontario for chemical analysis

Both Paracel and Maxxam are certified by CALA and have internal QA/QC protocols. The laboratory QA/QC documentation is provided with the analytical report and was reviewed by FRANZ as part of the QA/QC protocol.

The laboratory reports and chain of custody forms are presented in Appendix C.

5.0 RESULTS

5.1 Stage I Investigation

Eight ground water samples (including one duplicate) were collected from Site monitoring wells in May, 2012 and analyzed for PAH parameters. Results are presented on Figure 4 (Appendix A), and in Table B-1 (Appendix B).

Ground water samples from two wells exhibited exceedances of the SCS for PAHs. A primary sample and its duplicate collected from BH00-1 exhibited exceedances of the SCS for benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene (although the duplicate sample did not contain detectable concentrations of the latter compound, the detection limit was elevated above the SCS). A ground water sample collected from OW-120B-86 exhibited exceedances of eight PAHs, and one detection limit above SCS.

No NAPL or DNAPL was observed in the Stage I investigation.

5.2 Stage II Investigation

5.2.1 Soil Analytical Results

Twelve soil samples (including two duplicates) were collected from five boreholes and analyzed for **PAHs** in the Stage II investigation. Results are presented on Figure 5 (Appendix A) and in Table B-5 (Appendix B).

Six samples (including one duplicate) collected from all five boreholes exhibited exceedances of SCS for PAH parameters. Exceedances of the benzo(a)pyrene SCS were observed in all six exceeding samples. Eight other PAHs were also found to exceed SCS in one or more samples. All exceedances were observed in the upper surficial sand and ash fill layer, and none of the soil samples collected from the glacial till material below the sand and ash fill exhibited exceedances for any PAH parameters.

No exceedances of **PHC** SCS were found in any of the ten soil samples (including one duplicate) collected. Results are presented in Table B-6 (Appendix B).

Ten soil samples (including one duplicate) were collected from five boreholes and analyzed for **metals** in the Stage II investigation. Results are presented in Table B-7 (Appendix B). Exceedances of SCS are identified on Figure 5, Appendix A.

Six samples (including one duplicate) collected from all five boreholes exhibited exceedances of SCS for metals parameters. As with PAHs, all exceedances were observed in the upper surficial sand and ash fill layer. None of the metals samples collected from the till below the fill layer exhibited exceedances of metals parameters. The most commonly observed exceedances were of lead and zinc SCS (six samples each) followed by arsenic, copper, cadmium, chromium and selenium.

No exceedances of **PCB** SCS were found in any of the five soil samples collected. Results are presented in Table B-8 (Appendix B).

5.2.2 Ground Water Elevations

Although ground water elevations were measured at most Site wells as part of the Stage II investigation, top of casing elevations relative to a geodetic benchmark are not available for some wells. As a result, ground water elevations are not available for all Site wells. Elevations are presented on Figure 3, Appendix A and in Table 5-1, below.

Table 5-1: Ground Water Elevations

Monitoring Well	**Installed by (year)**	**Top of Casing Elevation** (m ASL)	**Water Level (October 2 - 4, 2012)** (m)	**Ground Water Elevation** (m ASL)
MW12-11	Geofirma (2012)	63.08	9.32	53.76
MW12-12	Geofirma (2012)	61.65	7.1	54.55
OW122B	Conestoga-Rovers (1986)	61.85	6.96	54.89
OW122C	Conestoga-Rovers (1986)	61.70	6.87	54.83
MW1-12	FRANZ (2012)	62.20	6.83	55.37
MW2-12	FRANZ (2012)	61.79	7.16	54.63
MW3-12	FRANZ (2012)	62.02	7.26	54.76
MW4-12	FRANZ (2012)	61.89	7.42	54.47
MW5-12	FRANZ (2012)	61.86	6.87	54.99

Ground water on the western portion of the Site flows to the northwest, towards the Transitway ground water treatment system, consistent with previous interpretations. Elevations and interpreted ground water flow direction are presented on Figure 3 (Appendix A).

5.2.3 Ground Water Analytical Results

Fourteen ground water samples (including one duplicate) were collected in the Stage II Investigation and analyzed for **PAHs**. One ground water sample, from monitoring well MW12-11, exhibited an exceedance of the SCS for acenaphthylene. Results are presented on Figure 4 (Appendix A) and in Table B-1 (Appendix B).

Fourteen ground water samples (including one duplicate) were collected in the Stage II Investigation and analyzed for **PHCs**. One ground water sample (collected from MW12-11) exhibited an exceedance of the SCS for PHC fraction F2. Results are presented in Table B-2 (Appendix B)

Five ground water samples and one duplicate were collected in the Stage II Investigation and analyzed for **metals**. None of the ground water samples exhibited exceedances of the SCS, consistent with previous sampling at 200 Lees Avenue. Results are presented in Table B-3 (Appendix B).

Five ground water samples were collected in the Stage II Investigation and analyzed for **PCBs**. None of the ground water samples exhibited exceedances of the SCS. Results are presented in Table B-4 (Appendix B).

5.3 Quality Assurance and Quality Control

Two field duplicate soil sample (BH-12-DUP1 and BH-12-DUP2) and one field duplicate ground water sample in each of the investigation stages (DUP1 in Stage I and DUP01-12 in Stage II) were submitted to the laboratory for analysis. The duplicate soil samples were analyzed for PAHs (both duplicate samples); and PHCs, BTEX and metals (BH-12-DUP1 only). The duplicate ground water samples were analyzed for PAHs (both duplicate samples); and PHCs, and BTEX (for DUP01-12 only). 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 4.3. The results of the calculated RPDs are presented along with the analytical results in Appendix C and are summarized below:

5.3.1 Soil

For **PAHs**, QA/QC results ranged from “acceptable” results to a calculated RPD of 131% for benzo(a)anthracene between BH3-12-2 and its duplicate. In general, calculated duplicate evaluations between BH3-12-1 and its duplicate BH-12-DUP1 were acceptable, while duplicate evaluations of PAH parameters between BH3-12-2 and its duplicate BH-12-DUP2 were unacceptable. One potential reason for the unacceptable values for duplicate evaluations between BH3-12-2 and its duplicate is the very low levels of impacts observed. When concentrations of contaminants are low, small variations in the composition of primary and duplicate samples can result in high percentage differences, while the absolute values of the difference is very low. Concentrations of contaminants in BH3-12-1 and its duplicate were much higher, and duplicate evaluations were generally acceptable in that pair; however, the results underline the contingent nature of environmental sampling and the need for a conservative approach when delineating impacts, especially when standards for a compound are low.

Duplicate evaluations of **PHCs and BTEX** were all within acceptable ranges as defined by Table 4-3. This was largely the result of both parent and duplicate samples containing undetectable concentrations of BTEX, F1 and F2, a condition that is evaluated as “acceptable.”

Duplicate evaluations of **metals** were all within acceptable ranges as defined by Table 4-3.

No duplicates were collected as part of the evaluation of **PCBs**.

5.3.2 Ground Water

For **PAHs**, QA/QC results ranged from "acceptable" results to a calculated RPD of 43% for benzo(b/j)fluoranthene between BH00-1 and its duplicate in the Stage I investigation. In general, calculated duplicate evaluations between MW12-12 and its duplicate DUP01-12 (from Stage II of the investigation) were acceptable, while duplicate evaluations of PAHs between BH00-1 and its duplicate were unacceptable for several parameters. One potential reason for the unacceptable values for duplicate evaluations between BH00-1 and its duplicate is the different methods of sampling used in Stage I and Stage II of the investigation. Samples were collected in Stage I with foot valves and tubing, and in Stage II with a peristaltic pump. Sampling with a peristaltic pump allows fewer entrained fines, which tend to elevate concentrations of PAHs and can be distributed unevenly between a primary and duplicate sample. It is also much simpler to collect a proper duplicate with a peristaltic pump – foot valves and tubing make smooth switches between sample bottles very difficult.

Duplicate evaluations of **PHCs and BTEX** were all within acceptable ranges as defined by Table 4-3. This was largely the result of both parent and duplicate samples containing undetectable concentrations of PHC fractions F1-F4, a condition that is evaluated as "acceptable."

No duplicates were collected as part of the evaluation of **PCBs** or **metals**.

6.0 DISCUSSION

6.1 Site Geology

The Conceptual Site Model of the adjacent property provides the basis for a discussion of hydrostratigraphic units at the Site. As described in Section 2.3.7, above, there are four units at the Site, presented in descending order from the surface:

- **Fill Unit:** Sandy fill with debris, including construction materials, ash and coal.
- **Alluvium Unit:** Silt and fine sand.
- **Basal Glacial Till Unit:** Dense, compact sandy silt with some clay and gravel.
- **Shale Bedrock:** Competent black shale.

During the Stage II investigation, FRANZ advanced boreholes through the fill unit into the alluvium unit.

Some topsoil was observed at the surface in boreholes 02-12 and 03-12. In boreholes 01-12, 04-12 and 05-12, sand and gravel was the surficial material. Below this surface layer of approximately 1 metre in thickness, FRANZ observed the fill unit described by Geofirma. The fill unit consisted of fine and coarse sand with debris, consisting of ash, wood, brick, concrete, glass, fabric and plastic. Black sand and some staining was observed in this unit. This unit was found to depths of approximately 5 metres, which is consistent with previous investigations by FRANZ and others at the Site.

Below the fill unit, FRANZ encountered a unit of sand and gravel, consistent with Geofirma's description of the alluvium unit. This unit was found to depths of at least ten metres, where FRANZ installed two of the five boreholes.

FRANZ did not encounter the basal glacial till unit, nor the shale bedrock in the 2012 investigation.

FRANZ did not observe any indications of free phase liquids (i.e., coal tar) during the intrusive investigation. This absence of observed coal tar may not be conclusive proof of the absence of impacts in the areas investigated: dense, non-aqueous phase liquids like coal tend to form discrete pools or lenses which are difficult to detect by drilling. These soil free phase impacts would likely be indicated indirectly by elevated levels of dissolved phase PAHs, which are discussed in Section 6.4.

6.2 Ground Water Flow Regime

Intera's review of ground water flow in the years before the Transitway and the pumping system were constructed (Intera, 1987) indicates a flow from the former coal gasification facility onto the Site. There is also a component of flow onto the Site from the north. Intera also identifies a hydrogeological depression in the area immediately north of Building C.

Current ground water flow at the Site is to the northwest, towards the Transitway pumping system across Lees Avenue from the Site (see Figure 3, Appendix A). The Transitway leachate collection and treatment facility was installed by Conestoga-Rovers and Associates to collect and treat coal tar contaminated water at the Transitway station after the identification of impacts in 1986. In this investigation, and in previous work at the Site, FRANZ has observed a radius of influence of more than 200 metres from the Transitway pumping system.

Although there is limited data on hydraulic gradients for the area closest to the Rideau River, FRANZ expects that there is interaction between ground water and surface water in the area adjacent to the river.

6.3 Assessing Types and Source of Impacts

Dissolved PAH concentrations in ground water above SCS were found only in monitoring wells located in the furthest west portion of the Site, consistent with previous sampling rounds. In Stage I of the investigation, samples exceeding SCS were collected from OW-120B-86 and BH00-1. In Stage II of the investigation, the sole sample exhibiting an exceedance of the SCS was collected from MW12-11.

A short summary of total PAHs in ground water is provided in Table 6-1, below. Non-detect chemical concentrations were replaced with the detection limit, and the concentrations of all PAHs were summed to give a brief summary of the locations where total PAH levels were elevated.

Table 6-1: Total PAHs in Ground Water

	Monitoring Well	Total PAHs (µg/L)	Comment
Stage I	OW-120B-86	1183.15	
	North of 120B-86	9.75	
	OW-122B-86	0.85	No PAHs detected
	OW-122C-86	0.85	No PAHs detected
	BH00-1	8.68	
	DUP1	9.34	
	OW506B	0.85	No PAHs detected
	OW506C	0.85	No PAHs detected
Stage II	BH00-1	0.911	No PAHs detected
	OQ122C-86	0.911	No PAHs detected
	OW122C-86	0.911	No PAHs detected
	OW506A	0.911	No PAHs detected
	OW506B	0.911	No PAHs detected
	MW12-11	151.757	
	MW12-12	2.48	
	DUP01-12	2.26	
	MW12-16	0.911	No PAHs detected
	MW01-12	0.956	
	MW02-12	0.911	No PAHs detected
	MW03-12	0.99	
	MW04-12	1.173	
	MW05-12	0.911	No PAHs detected

During Stage I, total dissolved PAH concentrations were two orders of magnitude higher in well OW-120B-86 than the other two wells nearby. The two to three aromatic ring PAH compounds dominate, with naphthalene, 1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, and phenanthrene are the most prevalent in the sample collected from OW-120B-86 (see Table B-1, Appendix B). This is a typical relative dissolved PAH distribution observed in coal tar impacted sites.

Similarly, during Stage II, concentrations of total PAHs in a ground water sample collected from MW12-11 (immediately adjacent to OW-120B-86) were almost two orders of magnitude higher than any other ground water sample collected in Stage II. The highest concentrations of PAHs observed in the sample collected from MW12-11 were naphthalene, methylnaphthalenes, and acenaphtylene, similar to the sample collected from OW-120B-86 in Stage I, and also typical of coal tar impacted sites.

MW12-11 and OW-120B-86 are the closest Site wells to the former coal gasification plant north of Lees Avenue. OW-120B-86 is screened from approximately 49 metres above sea level to 50.5 metres above sea level, in a sand unit directly above the till. MW12-11 is screened from 50.6 metres above sea level to 52.1 metres above sea level, in a sand unit directly above the till.

The location of the monitoring wells where levels of PAHs exceeding SCS also indicates that the source of impacts is the previously-identified coal tar.

Metals impacts in soil were coincident with the fill layer. In previous investigations, this unit has been found to exhibit exceedances of SCS across the 200 Lees Avenue property. Metals and PAHs are consistent with the dumping of incinerated materials, known to have occurred in the fill unit.

6.4 The Presence of Non-Aqueous Phase Liquids

Although no direct evidence of immiscible (free) product was observed during either stage of ground water monitoring activities, percent saturation of the dissolved phase may be used as an indirect line of evidence for the presence of non-aqueous phase liquids (NAPL).

A common method for assessing the likelihood of a NAPL pool in the subsurface involves the comparison of dissolved concentrations in ground water. Based on numerous scientific experiments, it is considered that the observation of dissolved-phase concentrations greater than 1% of a contaminant's effective solubility infers the presence of a NAPL phase. This is a "rule of thumb" concentration, as the magnitude of the dissolved phase concentrations observed in a monitoring well will depend on factors (other than the presence/absence of NAPL) such as well location, depth, well intake or screen zone, and the size and nature (pool, residual, ganglia) of the source.

With these limitations in mind, a review of the maximum concentrations of the least mobile PAH compounds (five to six aromatic ring compounds) detected in the monitoring wells during Stage I (when the highest concentrations were observed) was included in this assessment. Maximum concentrations of the least mobile compounds were compared to 1% of their solubility in water. Concentrations equal to or greater than that value were considered to be indicative of the presence of NAPL. The 1% solubility exceedances are summarized as follows (with solubility values obtained from Ontario's rationale document for the development of SCS)

Table 6-2: High Molecular Weight PAH Solubility

Stage	Well ID	PAH Compound	Concentration (µg/L)	Solubility in Water (µg/L)	Solubility Exceedance (%)
Stage I	OW-120B-86	Benzo[g,h,i]perylene	2.88	0.26	1108%
		Benzo[b]fluoranthene	5.09	1.5	339%
		Benzo[k]fluoranthene	0.1	0.8	13%
	BH00-1	Benzo[g,h,i]perylene	0.6	0.26	231%
		Benzo[b]fluoranthene	0.74	1.5	49%
		Benzo[k]fluoranthene	0.29	0.8	36%
Stage II	MW12-11	Benzo[g,h,i]perylene	<0.050	0.26	NA
		Benzo[b]fluoranthene	0.11	1.5	7%
		Benzo[k]fluoranthene	<0.050	0.8	NA

Concentrations well in excess of 1% of the solubility values were noted for high molecular weight PAH compounds in wells OW-120B-86 and BH00-1 in Stage I and in MW12-11 in Stage II.

The presence of high molecular weight PAHs above the water solubility limits in the west portion of the Site, along with soil impacts observed previously in the area, indicates the presence of coal tar contamination.

The much higher concentrations of PAHs observed in Stage I may partially be a result of sampling methodology. As discussed in Section 4.0 and 4.2, a foot valve and tubing was used to collect samples in Stage I, while a peristaltic pump was used in Stage II. The peristaltic pump tends to collect samples that are more representative of ground water conditions, as it minimizes the collection of entrained fines. PAH molecules are hydrophobic and adsorb readily to these small particles, which elevates the concentration of PAHs observed in ground water.

There were very few detections of PAHs in ground water at the monitoring wells installed in 2012 during Stage II. No PAHs were detected in ground water at MW02-12 or MW05-12. The only PAH detected at MW01-12 was naphthalene, at less than twice the detection limit. Low levels of multiple PAH compounds were detected at MW03-12 and MW04-12. There were no detections in any of the FRANZ 2012 wells of benzo[g,h,i]perylene, benzo[b]fluoranthene or benzo[k]fluoranthene, which were the compounds found above solubility limits in the area of expected coal tar impacts. As a result, FRANZ believes that free phase impacts are likely confined to the western portion of the Site, as indicated in Section 6.5. Further mobility of PAH impacts to ground water and to a lesser degree soil appear to be influenced and limited by the Transitway pump and treat system.

6.5 Extent of Impacts

The current coal tar and aqueous (ground water) impacts is presented on Figure 6, Appendix A.

The impacts were identified based on previously-identified coal tar impacts in soil (by others), and on the observations of PAHs in ground water, as described in Section 6.4, above.

The total area of coal tar impacts at the Site is on the order of 3,200 m^2.

The total area of the Site where ground water exceeds the SCS for PAHs is on the order of 3,600 m^2.

7.0 CONCLUSIONS

1. Franz Environmental Inc. (FRANZ), was retained by the University of Ottawa (uOttawa) to conduct environmental site assessment (ESA) activities the western portion of uOttawa's property at 200 Lees Avenue and on the adjacent areas belonging to the City at 193 Lees Avenue ("the Site").

2. This report was prepared in accordance with the FRANZ proposal prepared for project 1329-1202, *Proposed Environmental Site Assessment Work Program; Coal Tar Plume - Potential Environmental Concern; 200 Lees Avenue, Ottawa, Ontario* dated September 19, 2012. The project was completed under uOttawa Work Order 4001C00377 and project number 067-001-056.

3. FRANZ reviewed previous reports on coal tar impacts at the Site and on adjacent properties for historical information about coal tar impacts.

4. Before 1920, the Ottawa Gas Co. constructed a gas works at 175 Lees Avenue, across Lees Avenue from the Site. The gas works operated until 1957. In 1981-83, the former gas works property was developed as a Transitway station by the Regional Municipality of Ottawa-Carleton. In 1986, tarry substances were observed in the pumphouse of the Lees Avenue Transitway station and in pump station outfall to the Rideau River. A leachate collection and treatment facility was then constructed to collect and treat coal tar contaminated water at the Transitway station.

5. Drilling and sampling investigations conducted on the former gas company property revealed areas of coal tar impacts. The impacts were found by other investigations to have migrated onto the 200 Lees Avenue Site.

6. In order to assess the current status of coal tar impacts at the Site, FRANZ conducted an environmental site investigation at the Site in two stages: an initial phase of ground water monitoring and sampling in May, 2012 (Stage I) and an intrusive investigation in September, 2012 (Stage II).

7. During Stage I, eight ground water samples (including one duplicate) were collected from Site monitoring wells in May, 2012. Ground water samples from two wells exhibited polycyclic aromatic hydrocarbon exceedances of Ontario's *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* using full depth generic site condition standards in a non-potable ground water condition with coarse grained soil and community land use.

8. Based on the results of the Stage I program, FRANZ designed a second phase to further delineate coal tar impacts on the Site. Stage II of the investigation involved advancing five boreholes at the Site and collecting soil and ground water samples.

9. Soil samples collected from all five boreholes exhibited polycyclic aromatic hydrocarbons and metals exceedances of Ontario's *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* using full depth generic site condition standards in a non-potable ground water condition with coarse grained soil and community land use. No exceedances of standards for petroleum hydrocarbons or polychlorinated biphenyls were found in soil. These results are consistent with previous investigations. The impacts are likely caused by the dumping of incinerator waste across the Site as fill.

10. Fourteen ground water samples (including one duplicate) were collected in the Stage II Investigation. Samples were analyzed for polycyclic aromatic hydrocarbons, metals, petroleum hydrocarbons and polychlorinated biphenyls. Exceedances of Ontario's *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* using full depth generic site condition standards in a non-potable ground water condition with coarse grained soil and community land use were found at a single well, MW12-11. The sample collected from MW12-11 exhibited exceedances of standards for acenaphthylene and petroleum hydrocarbon fraction F2. No other exceedances of standards for any parameter were found in any well in the Stage II investigation.

11. Current ground water flow at the Site is to the northwest, towards the Transitway pumping system across Lees Avenue from the Site. Although there is limited data on hydraulic gradients for the area closest to the Rideau River, FRANZ expects that there is interaction between ground water and surface water in the area adjacent to the river.

12. Concentrations of dissolved polycyclic aromatic hydrocarbons in ground water indicate the presence of free phase product in the westernmost portion of the Site, adjacent to Lees Avenue, at monitoring wells MW12-11 and OW-120B-86 (and in BH00-1 during Stage I, although not Stage II). Coal tar impacts in soil were observed during installation at both MW12-11 and OW-120B-86.

13. Soil and ground water results in the Stage I and Stage II investigation have allowed FRANZ to prepare an estimate of the area impacted by coal tar at the Site. The total area of coal tar impacts at the Site is on the order of 3,200 m^2. The total area of the Site where ground water exceeds the SCS for polycyclic aromatic hydrocarbons is on the order of 3,600 m^2.

14. The potential for future mobility of impacted ground water to the east and south (i.e., further onto the Site) appears to be low as a result of the hydraulic influence of the Transitway pump and treat system. The pump and treat system causes flow of ground water back towards the source area of free phase impacts caused by the former gas plant and away from the Site. As a result, both free phase and dissolved phase impacts appear to be stable.

8.0 LIMITATIONS

This report has been prepared exclusively for the University of Ottawa. Any other person or entity may not rely upon the report without the express written consent from Franz Environmental Inc. and the University of Ottawa.

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 site visits in May and September, 2012. 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.

9.0 REFERENCES

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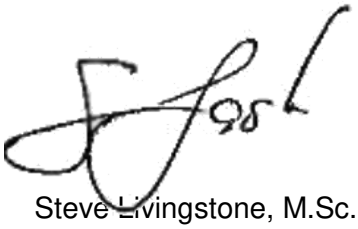
Zeiner, S.*T., Realistic Criteria for the Evaluation of Field Duplicate Sample Results,* Proceedings of Superfund XV, November 29-December 1, 1994, Sheraton Washington Hotel, Washington, D.C.

10.0 CLOSURE

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

Sincerely,

Franz Environmental Inc.



Andrew Henderson, B.A.Sc., P.Eng.
Report Author

Steve Livingstone, M.Sc., P.Geo.
Project Manager

Distribution: Addressee (1 copy)
FRANZ (1 copy)

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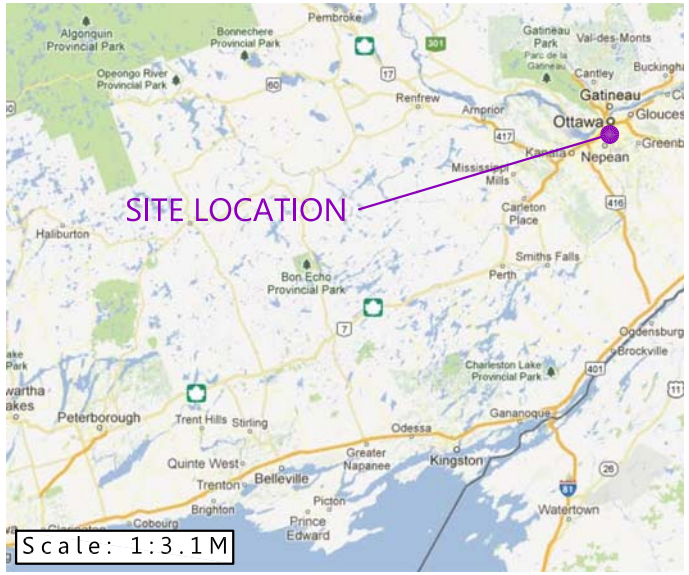
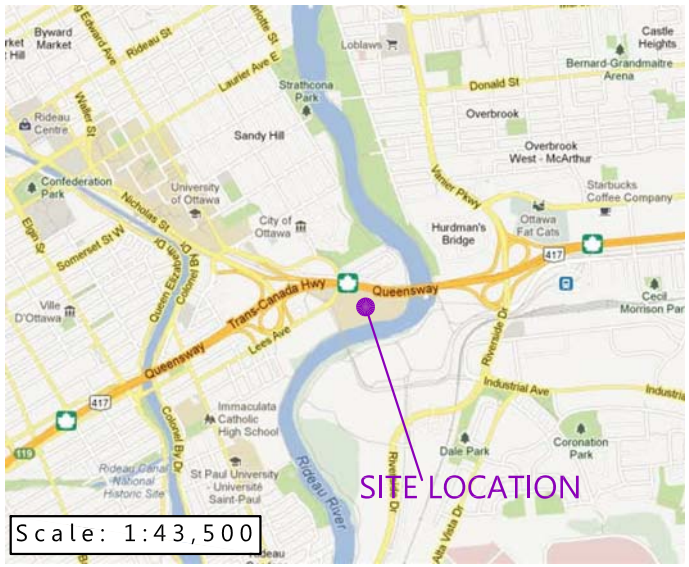
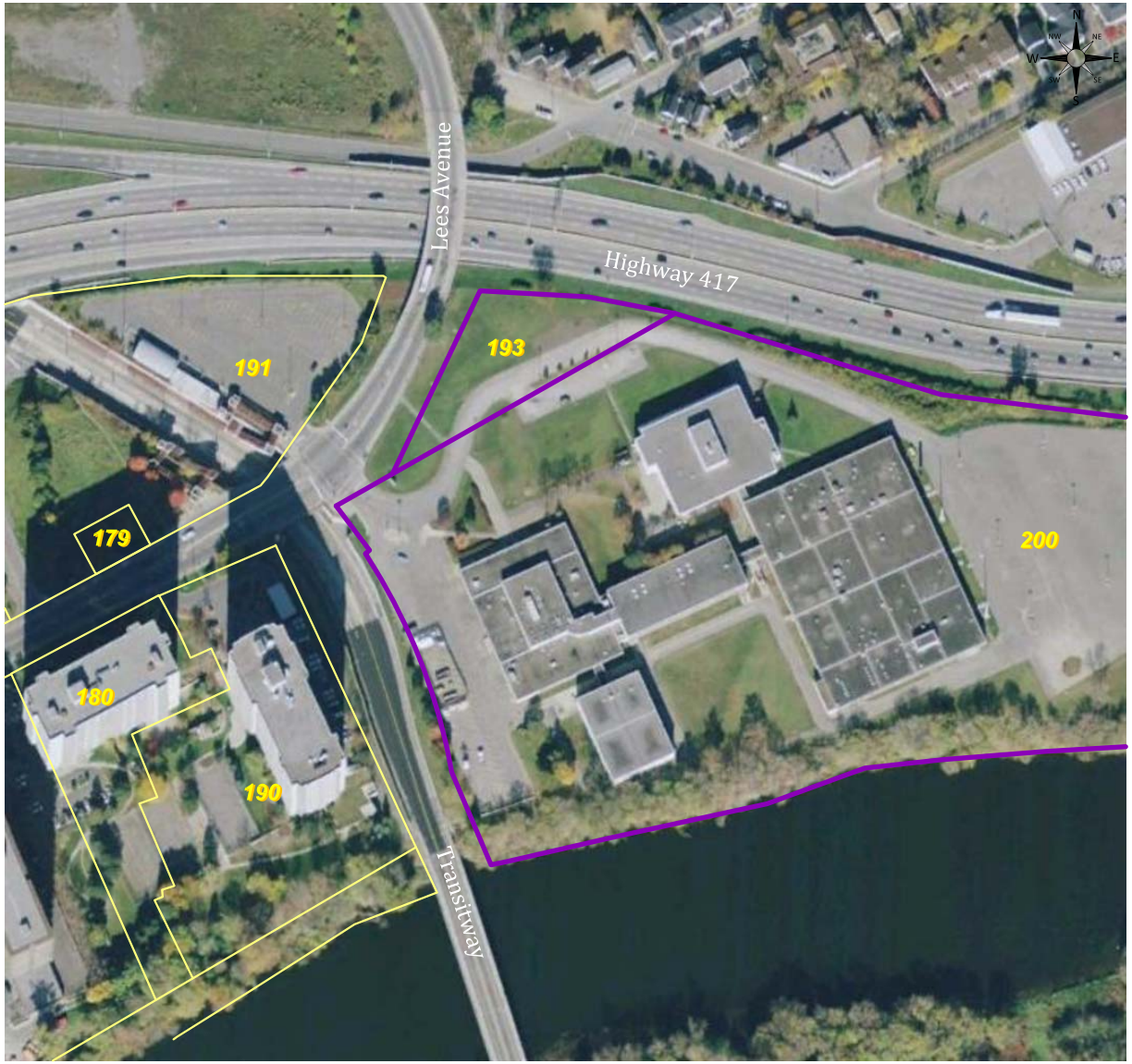
APPENDIX A

Figures







Legend

- Municipal Property Boundaries
- Study Area Property Boundaries
- 190 Municipal Address (on Lees Avenue)

Reference: Google Earth (image date 09/30/2008) and Google Maps, accessed April 2013.

Title: Site Location

FRANZ ENVIRONMENTAL INC.
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Project: Environmental Site Assessment
Coal Tar Plume
200 Lees Ave, Ottawa, Ontario

Date: April 2013

Client: University of Ottawa

SCALE 1:3000
75 60 45 30 15 0 75
metres

Figure 1

updated on:5-Apr-13 by rfletcher

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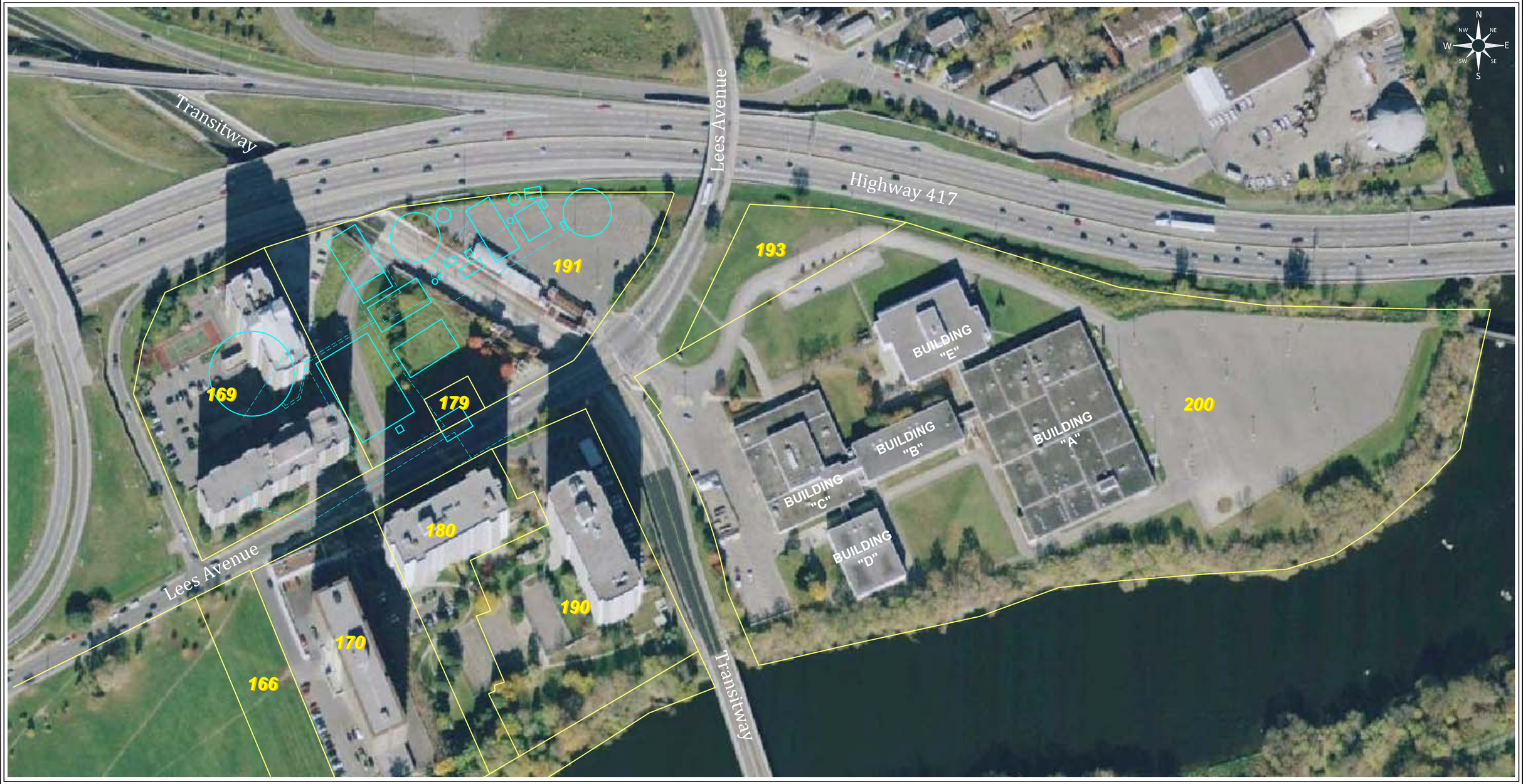

Legend

Historic Gas Plant Structure

193 Property Boundary

ND - Non Detected

Title: Historic Gas Plant Structure and Property Boundaries

FRANZ ENVIRONMENTAL INC.
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Project: Environmental Site Assessment
Coal Tar Plume
200 Lees Ave, Ottawa, Ontario

Date: April 2013

Client: University of Ottawa

Scale 1:2000
24 16 8 0 20 40 60
metres

Figure 2

updated on:4-Apr-13 by station2user

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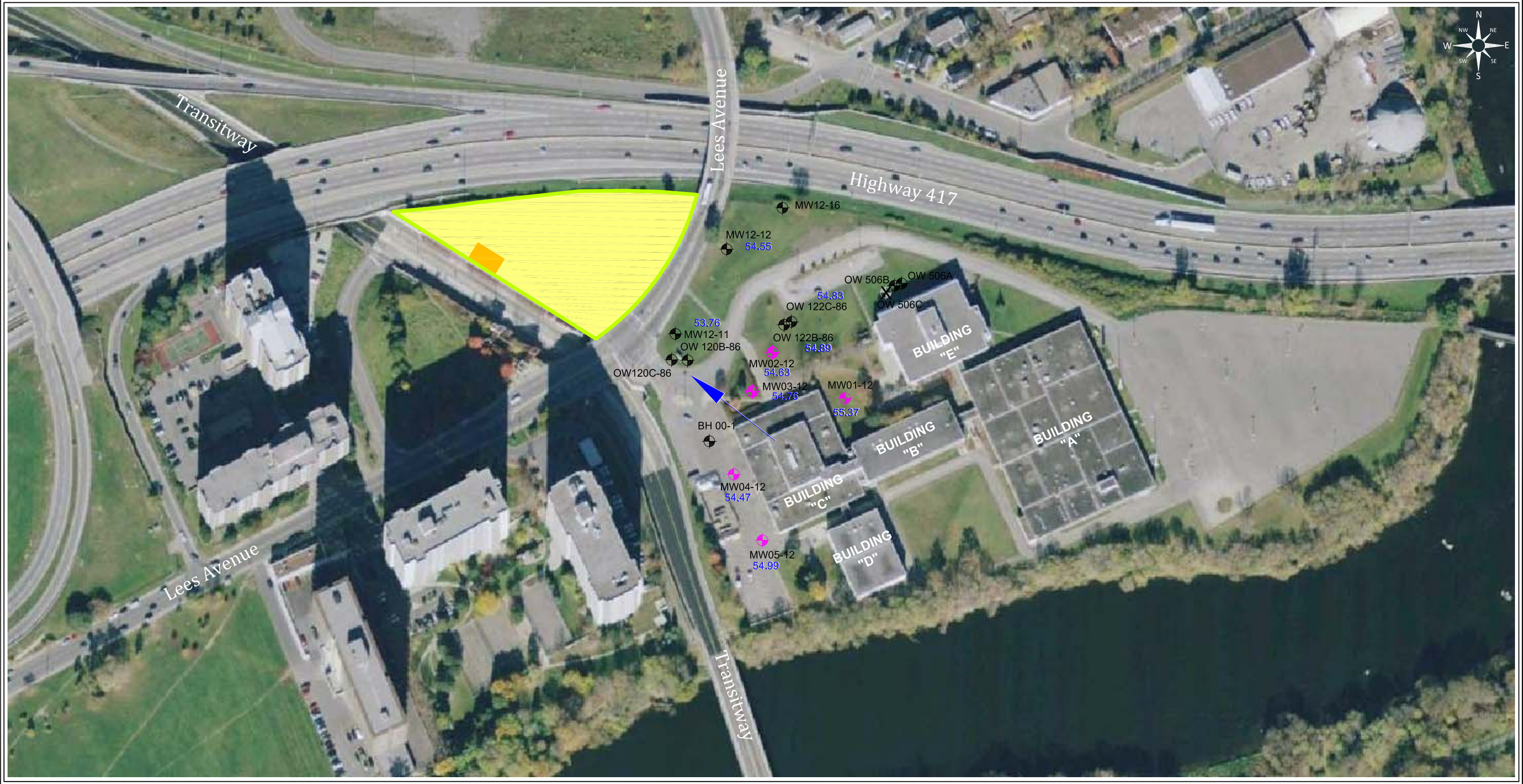

Legend

- Existing Monitoring Well Locations, by others
- Monitoring Well Locations, installed 2012 by Franz
- Interpreted Ground Water Flow Direction
- 54.47 Ground Water Elevation
- Source Area
- Ground Water Treatment System Building
- Well Destroyed/Missing

ND - Non Detected

Title: Ground Water Treatment System Building and Source Area

FRANZ ENVIRONMENTAL INC.
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Project: Environmental Site Assessment
Coal Tar Plume
200 Lees Ave, Ottawa, Ontario

Date: April 2013

Client: University of Ottawa

Scale 1:2000
24 16 8 0 20 40 60
metres

Figure 3

updated on:4-Apr-13 by rfletcher

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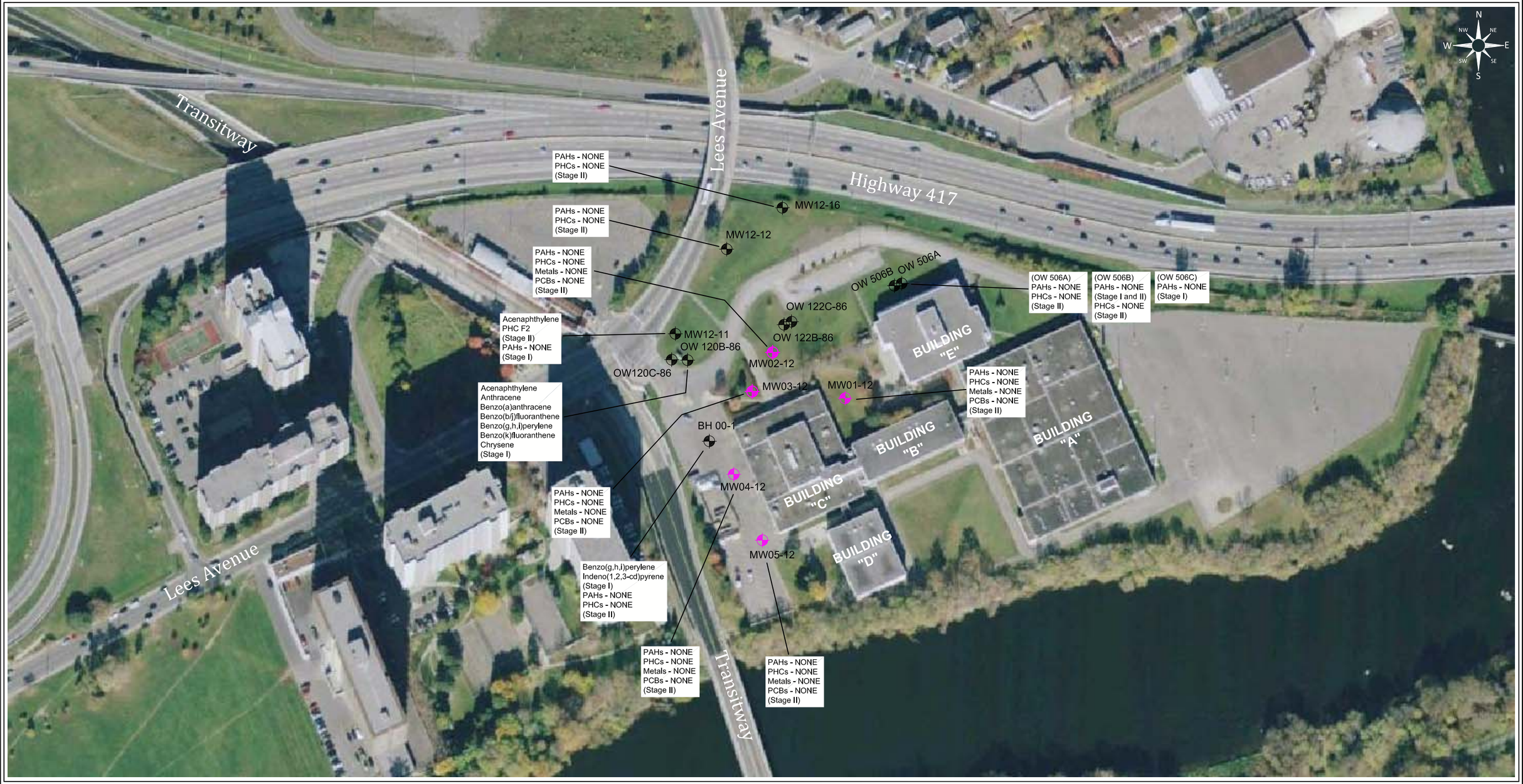

Legend

- Monitoring Well Locations, by others
- Monitoring Well Locations, installed 2012 by Franz
- benzo(a)pyrene — Indicates compounds exceeding ground water standards
  Investigation stage is also indicated: "None" indicates no exceedances

ND - Non Detected

Title: Summary of Ground Water Exceedances
Stage I and II Investigations

FRANZ ENVIRONMENTAL INC.
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Project: Environmental Site Assessment
Coal Tar Plume
200 Lees Ave, Ottawa, Ontario

Date: April 2013

Client: University of Ottawa

Scale 1:2000
24 16 8 0 20 40 60
metres

Figure 4

updated on:4-Apr-13 by rfletcher

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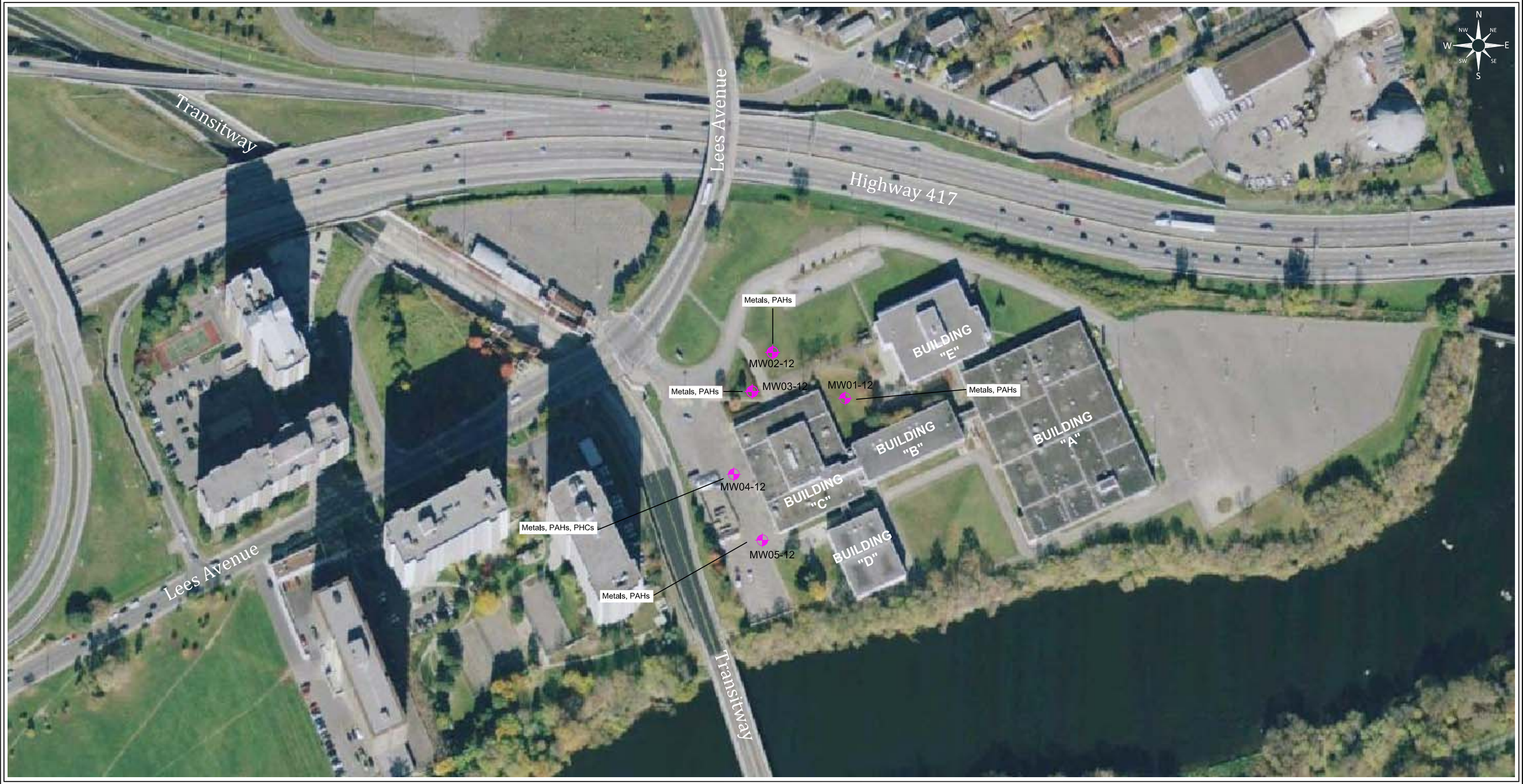

Legend

Monitoring Well Locations, installed 2012 by Franz

metals, PAHs — Indicates compounds exceeding soil standards

ND - Non Detected

Title: Summary of Soil Exceedances
Stage II Investigation October 2012

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project: Environmental Site Assessment
Coal Tar Plume
200 Lees Ave, Ottawa, Ontario

Date: April 2013

Client: University of Ottawa

Scale 1:2000
24 16 8 0 20 40 60
metres

Figure 5

updated on:4-Apr-13 by rfletcher

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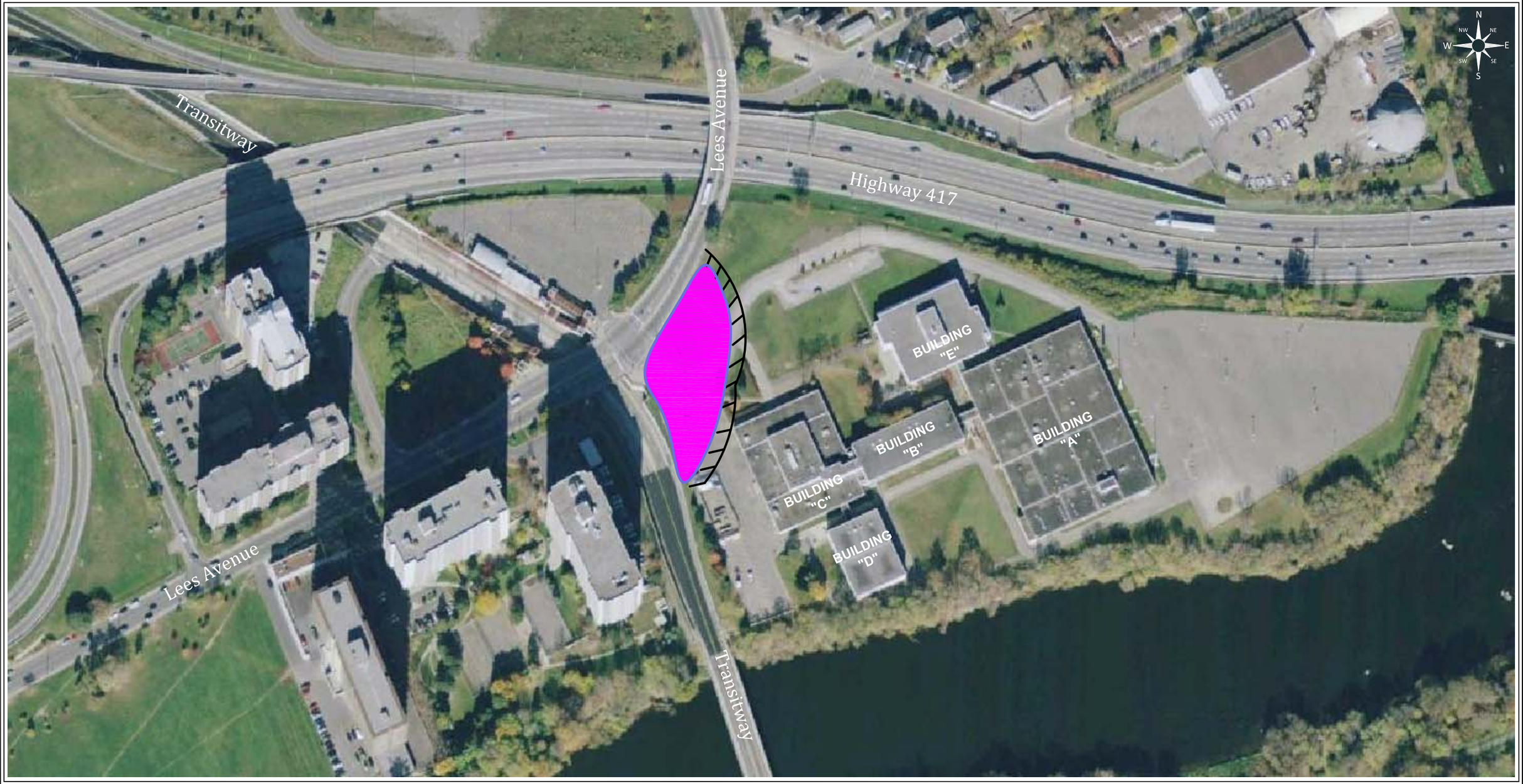

Legend

Updated extent of subsurface contamination by dissolved PAHs area (Franz, 2012)

Coal/Oil/Tar impact at 191 and 200 Lees Ave

Title: Estimated Extent of Impacts at 193 and 200 Lees Avenue

FRANZ ENVIRONMENTAL INC.
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Project: Environmental Site Assessment
Coal Tar Plume
200 Lees Ave, Ottawa, Ontario

Date: April 2013

Client: University of Ottawa

Scale 1:2000
24 16 8 0 20 40 60
metres

Figure 6

updated on:4-Apr-13 by rfletcher

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APPENDIX B

Tables

Table B-1
Ground Water Analytical Results, Polycyclic Aromatic Hydrocarbons

			Stage I Investigation									Stage II Investigation			
Borehole / Monitoring Well		**O.Reg. 153/04 Table 3[1]**	OW-120B-86	MW12-11	OW-122B-86	OW-122C-86	BH00-1	Duplicate of BH00-1	Duplicate Evaluation	OW506B	OW506C	BH00-1	OW122B-86	OW122C-86	OW506A
Sample ID			**OW-120B-86**	**North of 120B-86**	**OW-122B-86**	**OW-122C-86**	**BH00-1**	**DUP1**		**OW506B**	**OW506C**	**BH00-1**	**OQ122C-86**	**OW122C-86**	**OW506A**
Sample Date			05/28/2012	05/28/2012	05/28/2012	05/28/2012	05/29/2012	05/29/2012		05/29/2012	05/29/2012	03/10/2012	02/10/2012	03/10/2012	03/10/2012
Laboratory Sample ID			1222150-01	1222150-02	1222150-03	1222150-04	1222150-05	1222150-08		1222150-06	1222150-07	PC5752	PC5751	PC5753	PC5756
Parameters (µg/L)	Acenaphthene	600	3.58	0.16	<0.05	<0.05	<0.25	<0.25	Acceptable	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	Acenaphthylene	1.8	68.7	0.90	<0.05	<0.05	<0.25	<0.25	Acceptable	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	Anthracene	2.4	12.8	0.02	<0.01	<0.01	0.07	0.09	22%	<0.01	<0.01	<0.050	<0.050	<0.050	<0.050
	Benzo(a)anthracene	4.7	8.62	<0.01	<0.01	<0.01	<0.05	0.44	0.415	<0.01	<0.01	<0.050	<0.050	<0.050	<0.050
	Benzo(a)pyrene	0.81	5.91	<0.01	<0.01	<0.01	0.47	0.43	9%	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010
	Benzo(b/j)fluoranthene	0.75	5.09	<0.05	<0.05	<0.05	0.74	0.48	43%	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	Benzo(g,h,i)perylene	0.2	2.88	<0.05	<0.05	<0.05	0.6	0.58	3%	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	Benzo(k)fluoranthene	0.4	3.20	<0.05	<0.05	<0.05	0.29	0.37	22%	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	1,1-Biphenyl	---	8.82	<0.05	<0.05	<0.05	<0.25	<0.25	Acceptable	<0.05	<0.05	-	-	-	-
	Chrysene	1	7.45	<0.05	<0.05	<0.05	<0.25	1.00	0.875	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	Dibenz(a,h)anthracene	0.52	<2.50	<0.05	<0.05	<0.05	<0.25	<0.25	Acceptable	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	Fluoranthene	130	10.5	0.04	<0.01	<0.01	1.23	1.12	9%	<0.01	<0.01	<0.050	<0.050	<0.050	<0.050
	Fluorene	400	22.2	<0.05	<0.05	<0.05	<0.25	<0.25	Acceptable	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	Indeno(1,2,3-cd)pyrene	0.2	<2.50	<0.05	<0.05	<0.05	0.26	<0.25	0.135	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	1-Methylnaphthalene	---	111	3.01	<0.05	<0.05	<0.25	<0.25	Acceptable	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	2-Methylnaphthalene	---	102	<0.05	<0.05	<0.05	<0.25	<0.25	Acceptable	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	Methylnaphthalene (1&2)	1800	213	3.01	<0.10	<0.10	<0.50	<0.50	Acceptable	<0.10	<0.10	<0.071	<0.071	<0.071	<0.071
	Naphthalene	1400	542	1.96	<0.05	<0.05	<0.25	<0.25	Acceptable	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
	Phenanthrene	580	31.8	0.13	<0.05	<0.05	0.7	0.65	7%	<0.05	<0.05	<0.030	<0.030	<0.030	<0.030
	Pyrene	68	18.6	0.05	<0.01	<0.01	1.52	1.43	6%	<0.01	<0.01	<0.050	<0.050	<0.050	<0.050

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 duplicate evaluation

<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-1
Ground Water Analytical Results, Polycyclic Aromatic Hydrocarbons

Borehole / Monitoring Well		O.Reg. 153/04 Table 3[1]	Stage II Investigation											
			OW506B	MW12-11	MW12-12	Duplicate of MW12-12	Duplicate Evaluation	MW12-16	MW01-12	MW02-12	MW03-12	MW04-12	MW05-12	Laboratory Duplicate of MW05-12
Sample ID			**OW506B**	**MW12-11**	**MW12-12**	**DUP01-12**		**MW12-16**	**MW01-12**	**MW02-12**	**MW03-12**	**MW04-12**	**MW05-12**	**MW05-12 Lab-Dup**
Sample Date			03/10/2012	04/10/2012	04/10/2012	04/10/2012		03/10/2012	04/10/2012	04/10/2012	04/10/2012	02/10/2012	02/10/2012	02/10/2012
Laboratory Sample ID			PC5754	PC5786	PC5787	PC5789		PC5755	PC5788	PC5758	PC5757	PC5750	PC5749	PC5749
Parameters (µg/L)	Acenaphthene	600	<0.050	1.4	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Acenaphthylene	1.8	<0.050	22	0.18	0.18	0	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Anthracene	2.4	<0.050	0.66	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Benzo(a)anthracene	4.7	<0.050	0.27	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	0.05	<0.050	<0.050
	Benzo(a)pyrene	0.81	<0.010	0.097	<0.010	<0.010	Acceptable	<0.010	<0.010	<0.010	<0.010	0.042	<0.010	<0.010
	Benzo(b/j)fluoranthene	0.75	<0.050	0.11	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	0.059	<0.050	<0.050
	Benzo(g,h,i)perylene	0.2	<0.050	<0.050	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Benzo(k)fluoranthene	0.4	<0.050	<0.050	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	1,1-Biphenyl	---	-	-	-	-		-	-	-	-	-	-	-
	Chrysene	1	<0.050	0.27	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Dibenz(a,h)anthracene	0.52	<0.050	<0.050	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Fluoranthene	130	<0.050	0.74	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	0.13	<0.050	<0.050
	Fluorene	400	<0.050	4.8	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Indeno(1,2,3-cd)pyrene	0.2	<0.050	<0.050	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	1-Methylnaphthalene	---	<0.050	30	0.75	0.67	11%	<0.050	<0.050	<0.050	0.051	<0.050	<0.050	<0.050
	2-Methylnaphthalene	---	<0.050	1.3	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Methylnaphthalene (1&2)	1800	<0.071	31	0.75	0.67	11%	<0.071	<0.071	<0.071	<0.071	<0.071	<0.071	-
	Naphthalene	1400	<0.050	57	0.11	<0.050	0.085	<0.050	0.095	<0.050	0.12	0.061	<0.050	<0.050
	Phenanthrene	580	<0.030	0.71	<0.030	0.03	0.015	<0.030	<0.030	<0.030	0.038	0.1	<0.030	<0.030
	Pyrene	68	<0.050	1.2	<0.050	<0.050	Acceptable	<0.050	<0.050	<0.050	<0.050	0.11	<0.050	<0.050

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 duplicate evaluation

<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-2
Ground Water Analytical Results, Petroleum Hydrocarbons

Borehole / Monitoring Well		**O.Reg. 153/04 Table 3[1]**	BH00-1	OW122B-86	OW122C-86	OW506A	Lab Dup. of OW506A	OW506B	MW12-11	MW12-12	Duplicate of MW12-12	Duplicate Evaluation	MW12-16	MW01-12	MW02-12	MW03-12	MW04-12	MW05-12
Sample ID			BH00-1	OW122B-86	OW122C-86	OW506A	OW506A Lab-Dup	OW506B	MW12-11	MW12-12	DUP01-12		MW12-16	MW01-12	MW02-12	MW03-12	MW04-12	MW05-12
Sample Date			3/10/12	2/10/12	3/10/12	3/10/12	3/10/12	3/10/12	4/10/12	4/10/12	4/10/12		3/10/12	4/10/12	4/10/12	4/10/12	2/10/12	2/10/12
Laboratory Sample ID			PC5752	PC5751	PC5753	PC5756	PC5756	PC5754	PC5786	PC5787	PC5789		PC5755	PC5788	PC5758	PC5757	PC5750	PC5749
Parameters (µg/L)	Benzene	44	<0.20	<0.20	<0.20	<0.20	-	<0.20	7.5	8.4	8.4	0%	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Toluene	18000	<0.20	<0.20	<0.20	<0.20	-	<0.20	3.1	<0.20	0.22	0.12	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Ethylbenzene	2300	<0.20	<0.20	<0.20	<0.20	-	<0.20	76	3.4	3.4	0%	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	o-Xylenes	---	<0.20	<0.20	<0.20	<0.20	-	<0.20	30	0.52	0.56	0.07	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	m,p-Xylenes	---	<0.40	<0.40	<0.40	<0.40	-	<0.40	15	<0.40	<0.40	Acceptable	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
	Total Xylenes	4200	<0.40	<0.40	<0.40	<0.40	-	<0.40	45	0.52	0.56	7%	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
	PHC fraction F1 (C6-C10)	---	<25	<25	<25	<25	-	<25	170	<25	<25	Acceptable	<25	<25	<25	<25	<25	<25
	PHC fraction F1 (C6-C10) - BTEX	750	<25	<25	<25	<25	-	<25	42	<25	<25	Acceptable	<25	<25	<25	<25	<25	<25
	PHC fraction F2 (C10-C16)	150	<100	-	<100	<100	<100	<100	760	<100	<100	Acceptable	<100	<100	<100	<100	<100	<100
	PHC fraction F3 (C16-C34)	500	<100	-	<100	<100	<100	<100	<100	<100	<100	Acceptable	<100	<100	<100	<100	<100	<100
	PHC fraction F4 (C34-C50)	500	<100	-	<100	<100	<100	<100	<100	<100	<100	Acceptable	<100	<100	<100	<100	<100	<100
	Chromatogram to baseline at nC50		Yes	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	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).

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-3
Ground Water Analytical Results, Metals

Borehole / Monitoring Well		O.Reg. 153/04 Table 3[1]	MW01-12	MW02-12	MW03-12	MW04-12	MW05-12	Laboratory Dup of MW05-12
Sample ID		**MW01-12**	**MW02-12**	**MW03-12**	**MW04-12**	**MW05-12**	**MW05-12 Lab-Dup**	
Sample Date			04/10/2012	04/10/2012	04/10/2012	02/10/2012	02/10/2012	02/10/2012
Laboratory Certificate			PC5788	PC5758	PC5757	PC5750	PC5749	PC5749
Parameters (µg/L)	Dissolved Antimony (Sb)	20000	2.4	<0.5	<0.5	0.7	<0.5	<0.5
	Dissolved Arsenic (As)	1900	3	<1	<1	1	<1	<1
	Dissolved Barium (Ba)	29000	280	37	67	180	49	49
	Dissolved Beryllium (Be)	67	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Dissolved Boron (B)	45000	570	510	370	490	830	870
	Dissolved Cadmium (Cd)	2.7	0.2	0.6	<0.1	<0.1	<0.1	<0.1
	Dissolved Chromium (Cr)	810	<5	<5	<5	<5	<5	<5
	Dissolved Cobalt (Co)	66	3.1	0.7	2.1	3.3	<3	<3
	Dissolved Copper (Cu)	87	4	<1	3	2	2	2
	Dissolved Lead (Pb)	25	3.5	<0.5	<0.5	0.8	<0.5	<0.5
	Dissolved Molybdenum (Mo)	9200	5.7	<0.5	1.8	10	3.3	3.5
	Dissolved Nickel (Ni)	490	<5	<1	<5	<5	<5	<5
	Dissolved Selenium (Se)	63	<2	<2	6	<2	<2	<2
	Dissolved Silver (Ag)	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Dissolved Sodium (Na)	2300000	160000	390000	880000	660000	630000	650000
	Dissolved Thallium (Tl)	510	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Dissolved Uranium (U)	420	0.4	<0.1	1	1.4	1	1
	Dissolved Vanadium (V)	250	1.7	1.5	<3	<3	<3	<3
	Dissolved Zinc (Zn)	1100	120	<5	17	89	22	23

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).

RPD Relative percent difference (See report for RPD calculation details).

80% Denotes unacceptable RPD.

--- 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

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

Table B-4
Ground Water Analytical Results, Polychlorinated Biphenyls

Borehole / Monitoring Well		**O.Reg. 153/04 Table 3**[1]	**MW01-12**	**MW02-12**	**MW03-12**	**MW04-12**	**MW05-12**
Sample ID			**MW01-12**	**MW02-12**	**MW03-12**	**MW04-12**	**MW05-12**
Sample Date			04/10/2012	04/10/2012	04/10/2012	02/10/2012	02/10/2012
Laboratory Certificate			PC5788	PC5758	PC5757	PC5750	PC5749
Parameters (µg/L)	Aroclor 1016	---	<0.05	<0.05	<0.05	<0.05	<0.05
	Aroclor 1221	---	<0.05	<0.05	<0.05	<0.05	<0.05
	Aroclor 1232	---	<0.05	<0.05	<0.05	<0.05	<0.05
	Aroclor 1242	---	<0.05	<0.05	<0.05	<0.05	<0.05
	Aroclor 1248	---	<0.05	<0.05	<0.05	<0.05	<0.05
	Aroclor 1254	---	<0.05	<0.05	<0.05	<0.05	<0.05
	Aroclor 1260	---	<0.05	<0.05	<0.05	<0.05	<0.05
	Aroclor 1262	---	<0.05	<0.05	<0.05	<0.05	<0.05
	Aroclor 1268	---	<0.05	<0.05	<0.05	<0.05	<0.05
	Total PCB	7.8	<0.05	<0.05	<0.05	<0.05	<0.05

Notes:

Soil, Ground Water and Sediment Standards for Use Under Section XV.1 of the Ontario Environmental Protection Act

1 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).

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-5
Soil Analytical Results, Polycyclic Aromatic Hydrocarbons

Soil Description			SAND and debris	Sand and gravel	ASH, brown, dry with thin topsoil cover	Sand and gravel	SAND and ash, with topsoil cover	SAND and ash, with topsoil cover	Duplicate Evaluation	Sand and gravel	Sand and gravel	Duplicate Evaluation	SAND, debris and ash
Borehole / Monitoring Well			BH1-12	BH1-12	BH2-12	BH2-12	BH3-12	BH3-12		BH3-12	BH3-12		BH4-12
Sample ID		**O.Reg. 153/04 Table 3[1]**	**BH1-12-1**	**BH1-12-2**	**BH2-12-1**	**BH2-12-2**	**BH3-12-1**	**BH-12-DUP1**		**BH3-12-2**	**BH-12-DUP2**		**BH4-12-1**
Sample Depth (m)			0 - 5.0	5.7 - 10.4	0 - 2.1	4.6 - 6.2	0 - 5.0	0 - 5.0		7.6 - 9.1	7.6 - 9.1		0 - 4.7
Sample Date			30/09/2012	30/09/2012	01/10/2012	01/10/2012	30/09/2012	30/09/2012		30/09/2012	30/09/2012		30/09/2012
Laboratory Sample ID			PB3325	PB3326	PB3328	PB3329	PB3331	PB3343		PB3332	PB3344		PB3334
% Moisture			19.0	11.0	18.0	7.4	19.0	18.0		10.0	9.6		21.0
Parameters (µg/g)	Acenaphthene	96	0.064	<0.0050	0.051	<0.0050	<0.050	0.068	0.043	<0.0050	<0.0050	Acceptable	<0.25
	Acenaphthylene	0.15	0.07	<0.0050	0.25	<0.0050	0.25	0.31	21%	0.0092	<0.0050	0.0067	<0.25
	Anthracene	0.67	0.21	<0.0050	0.27	<0.0050	0.22	0.32	37%	0.017	0.0054	0.0116	1.4
	Benzo(a)anthracene	0.96	0.94	<0.0050	1.1	<0.0050	0.8	1.1	32%	0.067	0.014	131%	5.2
	Benzo(a)pyrene	0.3	0.54	<0.0050	0.88	<0.0050	0.73	0.92	23%	0.061	0.014	125%	3.7
	Benzo(b/j)fluoranthene	0.96	0.98	<0.0050	1.2	<0.0050	0.96	1.2	22%	0.073	0.019	117%	5.5
	Benzo(g,h,i)perylene	9.6	0.35	<0.0050	0.5	<0.0050	0.52	0.56	7%	0.045	0.019	81%	2.1
	Benzo(k)fluoranthene	0.96	0.29	<0.0050	0.39	<0.0050	0.38	0.43	12%	0.023	0.0072	105%	1.7
	Chrysene	9.6	1	<0.0050	1.1	<0.0050	0.85	1.1	26%	0.077	0.024	105%	5.6
	Dibenz(a,h)anthracene	0.1	0.08	<0.0050	0.16	<0.0050	0.15	0.16	0.01	0.0092	<0.0050	0.0067	0.6
	Fluoranthene	9.6	2.5	<0.0050	2.2	<0.0050	1.3	1.8	32%	0.11	0.026	124%	9.7
	Fluorene	62	0.15	<0.0050	0.12	<0.0050	0.051	0.087	0.036	0.0099	<0.0050	0.0074	0.34
	Indeno(1,2,3-cd)pyrene	0.76	0.37	<0.0050	0.58	<0.0050	0.57	0.66	15%	0.045	0.015	100%	2.2
	1-Methylnaphthalene	---	<0.050	<0.0050	0.039	<0.0050	<0.050	<0.050	Acceptable	<0.0050	<0.0050	Acceptable	<0.25
	2-Methylnaphthalene	---	<0.050	<0.0050	0.044	<0.0050	<0.050	<0.050	Acceptable	<0.0050	<0.0050	Acceptable	<0.25
	Methylnaphthalene, 2-(1-)	76	<0.071	<0.0071	0.083	<0.0071	<0.071	<0.071	Acceptable	<0.0071	<0.0071	Acceptable	<0.35
	Naphthalene	9.6	0.069	<0.0050	0.066	<0.0050	<0.050	0.054	0.029	<0.0050	<0.0050	Acceptable	<0.25
	Phenanthrene	12	0.65	0.0052	1.3	<0.0050	0.56	0.91	48%	0.043	0.014	102%	4.7
	Pyrene	96	2.6	0.0052	1.7	<0.0050	1.1	1.5	31%	0.13	0.033	119%	8.1

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).

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-5
Soil Analytical Results, Polycyclic Aromatic Hydrocarbons

		O.Reg. 153/04 Table 3[1]			
Soil Description			Sand and gravel	SAND, ash	Sand and gravel
Borehole / Monitoring Well			BH4-12	BH5-12	BH5-12
Sample ID			**BH4-12-2**	**BH5-12-1**	**BH5-12-2**
Sample Depth (m)			8.1 - 9.6	0 - 6.1	9-10.0
Sample Date			30/09/2012	01/10/2012	01/10/2012
Laboratory Sample ID			PB3338	PB3340	PB3341
% Moisture			8.0	21.0	10.0
Parameters (µg/g)	Acenaphthene	96	<0.0050	0.063	<0.0050
	Acenaphthylene	0.15	<0.0050	0.18	<0.0050
	Anthracene	0.67	0.0081	0.34	<0.0050
	Benzo(a)anthracene	0.96	0.015	1.1	<0.0050
	Benzo(a)pyrene	0.3	0.01	0.67	<0.0050
	Benzo(b/j)fluoranthene	0.96	0.012	0.84	<0.0050
	Benzo(g,h,i)perylene	9.6	0.0063	0.35	<0.0050
	Benzo(k)fluoranthene	0.96	<0.0050	0.29	<0.0050
	Chrysene	9.6	0.02	0.94	<0.0050
	Dibenz(a,h)anthracene	0.1	<0.0050	0.11	<0.0050
	Fluoranthene	9.6	0.038	2.2	<0.0050
	Fluorene	62	<0.0050	0.12	<0.0050
	Indeno(1,2,3-cd)pyrene	0.76	0.0058	0.42	<0.0050
	1-Methylnaphthalene	---	<0.0050	0.033	<0.0050
	2-Methylnaphthalene	---	<0.0050	0.055	<0.0050
	Methylnaphthalene, 2-(1-)	76	<0.0071	0.087	<0.0071
	Naphthalene	9.6	<0.0050	0.087	<0.0050
	Phenanthrene	12	0.022	1.3	0.0067
	Pyrene	96	0.031	1.7	<0.0050

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).

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-6
Soil Analytical Results, Petroleum Hydrocarbons

Soil Description			SAND and debris	Sand and gravel	ASH, brown, dry with thin topsoil cover	Sand and gravel	SAND and ash, with topsoil cover	SAND and ash, with topsoil cover	Duplicate Evaluation	SAND and ash, with topsoil cover	SAND, debris and ash	Sand and gravel	SAND, ash	Sand and gravel	Sand and gravel
Borehole / Monitoring Well		**O.Reg. 153/04 Table 3[1]**	BH1-12	BH1-12	BH2-12	BH2-12	BH3-12	BH3-12		BH3-12	BH4-12	BH4-12	BH5-12	BH5-12	BH5-12
Sample ID			**BH1-12-1**	**BH1-12-2**	**BH2-12-1**	**BH2-12-2**	**BH3-12-1**	**BH-12-DUP1**		**BH-12-DUP1 Lab-Dup**	**BH4-12-1**	**BH4-12-2**	**BH5-12-1**	**BH5-12-2**	**BH5-12-2 Lab-Dup**
Sample Depth (m)			0 - 5.0	5.7 - 10.4	0 - 2.1	4.6 - 6.2	0 - 5.0	0 - 5.0		0 - 5.0	0 - 4.7	8.1 - 9.6	0 - 6.1	10.05 - 11.0	10.05 - 11.0
Sample Date			30/09/2012	30/09/2012	01/10/2012	01/10/2012	30/09/2012	30/09/2012		30/09/2012	30/09/2012	30/09/2012	01/10/2012	01/10/2012	01/10/2012
Laboratory Sample ID			PB3325	PB3326	PB3328	PB3329	PB3331	PB3343		PB3343	PB3334	PB3338	PB3340	PB3341	PB3341
% Moisture			19.0	11.0	18.0	7.4	19.0	18.0		18.0	21.0	8.0	21.0	10.0	
Parameters (µg/g)	Benzene	0.32	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	Acceptable	---	<0.02	<0.02	<0.02	<0.02	<0.02
	Toluene	68	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	Acceptable	---	<0.02	<0.02	<0.02	<0.02	<0.02
	Ethylbenzene	9.5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	Acceptable	---	<0.02	<0.02	<0.02	<0.02	<0.02
	o-Xylenes	---	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	Acceptable	---	<0.02	<0.02	<0.02	<0.02	<0.02
	m,p-Xylenes	---	0.06	<0.04	<0.04	<0.04	<0.04	<0.04	Acceptable	---	<0.04	<0.04	<0.04	<0.04	<0.04
	Total Xylenes	26	0.09	<0.04	<0.04	<0.04	<0.04	<0.04	Acceptable	---	<0.04	<0.04	<0.04	<0.04	<0.04
	PHC fraction F1 (C6-C10)	---	<10	<10	<10	<10	<10	<10	Acceptable	---	<10	<10	<10	<10	<10
	PHC fraction F1 (C6-C10) - BTEX	55	<10	<10	<10	<10	<10	<10	Acceptable	---	<10	<10	<10	<10	<10
	PHC fraction F2 (C10-C16)	230	<10	<10	<10	<10	<10	<10	Acceptable	<10	<10	<10	<10	<10	---
	PHC fraction F3 (C16-C34)	1700	270	<10	59	<10	85	110	26%	120	630	<10	170	<10	---
	PHC fraction F4 (C34-C50)	3300	81	<10	37	<10	78	110	34%	190 (2)	230	<10	66	<10	---
	Chromatogram to baseline at nC50	---	Yes	Yes	Yes	Yes	Yes	No	NA	No	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) According to the lab, Recovery or RPD for this parameter is outside control limits; however, the overall quality control for this analysis meets acceptability criteria.

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-7
Soil Analytical Results, Metals

Soil Description		**O.Reg. 153/04 Table 3[1]**	SAND and debris	Sand and Gravel	ASH, brown, dry with thin topsoil cover	Sand and Gravel	SAND and ash, with topsoil cover	SAND and ash, with topsoil cover	Duplicate Evaluation	SAND and ash, with topsoil cover	SAND, debris and ash	Sand and Gravel	SAND, ash
Borehole / Monitoring Well			BH1-12	BH1-12	BH2-12	BH2-12	BH3-12	BH3-12		BH4-12	BH4-12	BH5-12	BH5-12
Sample ID			**BH1-12-1**	**BH1-12-2**	**BH2-12-1**	**BH2-12-2**	**BH3-12-1**	**BH-12-DUP1**		**BH4-12-1**	**BH4-12-2**	**BH5-12-1**	**BH5-12-2**
Sample Depth (m)			0 - 5.0	5.7 - 10.4	0 - 2.1	4.6 - 6.2	0 - 5.0	0 - 5.0		0 - 4.7	8.1 - 9.6	0 - 6.1	10.05 - 11.0
Sample Date			30/09/2012	30/09/2012	01/10/2012	01/10/2012	30/09/2012	30/09/2012		30/09/2012	30/09/2012	01/10/2012	01/10/2012
Laboratory Sample ID			PB3325	PB3326	PB3328	PB3329	PB3331	PB3343		PB3334	PB3338	PB3340	PB3341
Parameters (µg/g)	Acid Extractable Aluminum (Al)	---	5000	3600	5500	3000	6100	6100	0%	4000	5700	5200	4100
	Acid Extractable Antimony (Sb)	40	9.4	<0.20	12	<0.20	8.5	9.3	9%	11	0.21	11	<0.20
	Acid Extractable Arsenic (As)	18	28	2.1	16	1.6	17	15	13%	19	4.2	38	2.8
	Acid Extractable Barium (Ba)	670	510	62	320	69	290	260	11%	500	67	320	51
	Acid Extractable Beryllium (Be)	8	0.43	<0.20	0.69	<0.20	0.63	0.54	15%	0.32	0.24	0.56	0.21
	Acid Extractable Bismuth (Bi)	---	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	Acceptable	<1.0	<1.0	<1.0	<1.0
	Acid Extractable Boron (B)	120	8.4	<5.0	5.8	<5.0	23	21	9%	6.6	<5.0	18	<5.0
	Acid Extractable Cadmium (Cd)	1.9	13	<0.10	0.85	<0.10	1.3	1.2	8%	0.84	<0.10	2	<0.10
	Acid Extractable Calcium (Ca)	---	16000	71000	25000	59000	33000	34000	3%	17000	46000	16000	86000
	Acid Extractable Chromium (Cr)	160	800	9.9	29	8.9	19	17	11%	30	13	24	10
	Acid Extractable Cobalt (Co)	80	9.6	4.8	8.7	4.5	10	9.7	3%	6.4	7.6	7.1	5.8
	Acid Extractable Copper (Cu)	230	1800	11	290	9.3	210	150	33%	3100	24	170	15
	Acid Extractable Iron (Fe)	---	46000	11000	41000	9900	21000	20000	5%	44000	17000	26000	13000
	Acid Extractable Lead (Pb)	120	26000	3.8	1100	3.3	610	500	20%	1700	12	1000	6.3
	Acid Extractable Magnesium (Mg)	---	880	6600	2100	6000	3200	3100	3%	2800	7900	1400	7400
	Acid Extractable Manganese (Mn)	---	360	170	300	160	270	260	4%	210	270	160	270
	Acid Extractable Molybdenum (Mo)	40	3.6	1	6.6	0.62	3.5	3	15%	2.9	2.3	6.3	1.1
	Acid Extractable Nickel (Ni)	270	17	11	28	8.6	23	22	4%	26	21	44	13
	Acid Extractable Phosphorus (P)	---	1000	900	1300	990	940	830	12%	740	810	1100	850
	Acid Extractable Potassium (K)	---	530	980	580	840	760	770	1%	610	1100	670	970
	Acid Extractable Selenium (Se)	5.5	6.6	<0.50	1.2	<0.50	1.5	1.3	14%	1.9	<0.50	3.6	<0.50
	Acid Extractable Silver (Ag)	40	1.3	<0.20	2.2	<0.20	0.43	0.41	5%	1.3	<0.20	0.61	<0.20
	Acid Extractable Sodium (Na)	---	240	260	250	190	960	990	3%	610	230	540	250
	Acid Extractable Strontium (Sr)	---	100	140	160	120	120	120	0%	88	99	83	150
	Acid Extractable Thallium (Tl)	3.3	0.27	0.067	0.14	0.074	0.19	0.18	5%	0.11	0.093	0.17	0.063
	Acid Extractable Tin (Sn)	---	470	<5.0	270	<5.0	140	180	25%	410	<5.0	170	<5.0
	Acid Extractable Uranium (U)	33	0.53	0.88	0.7	0.65	0.59	0.63	7%	0.68	1.1	1.7	0.8
	Acid Extractable Vanadium (V)	86	23	21	28	18	26	27	4%	21	20	25	19
	Acid Extractable Zinc (Zn)	340	1500	23	720	19	460	450	2%	1100	32	1000	19

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

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

--- Not analysed or no criterion/guideline established.

Table B-8
Soil Analytical Results, Polychlorinated Biphenyls

Soil Description		O.Reg. 153/04 Table 3[1]	SAND and debris	ASH, brown, dry with thin topsoil cover	SAND and ash, with topsoil cover	SAND and ash, with topsoil cover	Sand and Gravel
Borehole / Monitoring Well			BH1-12	BH2-12	BH3-12	BH4-12	BH5-12
Sample ID			**BH1-12-1**	**BH2-12-1**	**BH3-12-1**	**BH4-12-1**	**BH5-12-1**
Sample Depth (m)			0 - 5.0	0 - 2.1	0 - 5.0	0 - 4.7	0 - 6.1
Sample Date			30/09/2012	01/10/2012	30/09/2012	30/09/2012	01/10/2012
Laboratory Certificate			PB3325	PB3328	PB3331	PB3334	PB3340
Parameters (µg/g)	Aroclor 1016	---	<0.010	<0.010	<0.010	<0.010	<0.010
	Aroclor 1221	---	<0.010	<0.010	<0.010	<0.010	<0.010
	Aroclor 1232	---	<0.010	<0.010	<0.010	<0.010	<0.010
	Aroclor 1242	---	<0.010	<0.010	<0.010	<0.010	<0.010
	Aroclor 1248	---	<0.010	<0.010	<0.010	<0.010	<0.010
	Aroclor 1254	---	<0.010	<0.010	<0.010	<0.010	<0.010
	Aroclor 1260	---	<0.010	<0.010	0.013	<0.010	<0.010
	Aroclor 1262	---	<0.010	<0.010	<0.010	<0.010	<0.010
	Aroclor 1268	---	<0.010	<0.010	<0.010	<0.010	<0.010
	Total PCB	1.1	<0.010	<0.010	0.013	<0.010	<0.010

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).

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

APPENDIX C

Laboratory Reports and Chain of Custody Forms

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Certificate of Analysis

Franz Environmental Inc. (Ottawa)
329 Churchill Ave, Suite 200
Ottawa, ON K1Z 5B8
Attn: Miguel Madrid

Phone: (613) 72100555
Fax: (613) 721-0029

Client PO:
Project: 1329-1202
Custody: 93310

Report Date: 4-Jun-2012
Order Date: 29-May-2012
Order #: 1222150

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

Paracel ID	Client ID
1222150-01	OW-120B-86
1222150-02	North of 120B-86
1222150-03	OW-122B-86
1222150-04	OW-122C-86
1222150-05	BH00-1
1222150-06	OW506B
1222150-07	OW506C
1222150-08	DUP1

Approved By: Mark Foto

Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 04-Jun-2012
Order Date:29-May-2012

Client: **Franz Environmental Inc. (Ottawa)**

Client PO: Project Description: 1329-1202

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PAHs by GC-MS, standard scan	EPA 625 - GC-MS, extraction	31-May-12	1-Jun-12

Certificate of Analysis

Report Date: 04-Jun-2012
Order Date:29-May-2012

Client: **Franz Environmental Inc. (Ottawa)**

Client PO: Project Description: 1329-1202

	Client ID:	OW-120B-86	North of 120B-86	OW-122B-86	OW-122C-86
	Sample Date:	28-May-12	28-May-12	28-May-12	28-May-12
	Sample ID:	1222150-01	1222150-02	1222150-03	1222150-04
	MDL/Units	Water	Water	Water	Water
Semi-Volatiles					
Acenaphthene	0.05 ug/L	3.58	0.16	<0.05	<0.05
Acenaphthylene	0.05 ug/L	68.7	0.90	<0.05	<0.05
Anthracene	0.01 ug/L	12.8	0.02	<0.01	<0.01
Benzo [a] anthracene	0.01 ug/L	8.62	<0.01	<0.01	<0.01
Benzo [a] pyrene	0.01 ug/L	5.91	<0.01	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L	5.09	<0.05	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	2.88	<0.05	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L	3.20	<0.05	<0.05	<0.05
Biphenyl	0.05 ug/L	8.82	<0.05	<0.05	<0.05
Chrysene	0.05 ug/L	7.45	<0.05	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	<2.50 [1]	<0.05	<0.05	<0.05
Fluoranthene	0.01 ug/L	10.5	0.04	<0.01	<0.01
Fluorene	0.05 ug/L	22.2	<0.05	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<2.50 [1]	<0.05	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L	111	3.01	<0.05	<0.05
2-Methylnaphthalene	0.05 ug/L	102	<0.05	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	213	3.01	<0.10	<0.10
Naphthalene	0.05 ug/L	542	1.96	<0.05	<0.05
Phenanthrene	0.05 ug/L	31.8	0.13	<0.05	<0.05
Pyrene	0.01 ug/L	18.6	0.05	<0.01	<0.01
2-Fluorobiphenyl	Surrogate	112%	75.3%	73.7%	71.5%
Terphenyl-d14	Surrogate	108%	101%	102%	101%

Certificate of Analysis

Report Date: 04-Jun-2012
Order Date:29-May-2012

Client: **Franz Environmental Inc. (Ottawa)**

Client PO: Project Description: 1329-1202

	Client ID:	BH00-1	OW506B	OW506C	DUP1
	Sample Date:	29-May-12	29-May-12	29-May-12	29-May-12
	Sample ID:	1222150-05	1222150-06	1222150-07	1222150-08
	MDL/Units	Water	Water	Water	Water
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.25 [2] [3]	<0.05	<0.05	<0.25 [2]
Acenaphthylene	0.05 ug/L	<0.25 [2] [3]	<0.05	<0.05	<0.25 [2]
Anthracene	0.01 ug/L	0.07 [3]	<0.01	<0.01	0.09
Benzo [a] anthracene	0.01 ug/L	<0.05 [2] [3]	<0.01	<0.01	0.44
Benzo [a] pyrene	0.01 ug/L	0.47 [3]	<0.01	<0.01	0.43
Benzo [b] fluoranthene	0.05 ug/L	0.74 [3]	<0.05	<0.05	0.48
Benzo [g,h,i] perylene	0.05 ug/L	0.60 [3]	<0.05	<0.05	0.58
Benzo [k] fluoranthene	0.05 ug/L	0.29 [3]	<0.05	<0.05	0.37
Biphenyl	0.05 ug/L	<0.25 [2] [3]	<0.05	<0.05	<0.25 [2]
Chrysene	0.05 ug/L	<0.25 [2] [3]	<0.05	<0.05	1.00
Dibenzo [a,h] anthracene	0.05 ug/L	<0.25 [2] [3]	<0.05	<0.05	<0.25 [2]
Fluoranthene	0.01 ug/L	1.23 [3]	<0.01	<0.01	1.12
Fluorene	0.05 ug/L	<0.25 [2] [3]	<0.05	<0.05	<0.25 [2]
Indeno [1,2,3-cd] pyrene	0.05 ug/L	0.26 [3]	<0.05	<0.05	<0.25 [2]
1-Methylnaphthalene	0.05 ug/L	<0.25 [2] [3]	<0.05	<0.05	<0.25 [2]
2-Methylnaphthalene	0.05 ug/L	<0.25 [2] [3]	<0.05	<0.05	<0.25 [2]
Methylnaphthalene (1&2)	0.10 ug/L	<0.50 [2] [3]	<0.10	<0.10	<0.50 [2]
Naphthalene	0.05 ug/L	<0.25 [2] [3]	<0.05	<0.05	<0.25 [2]
Phenanthrene	0.05 ug/L	0.70 [3]	<0.05	<0.05	0.65
Pyrene	0.01 ug/L	1.52 [3]	<0.01	<0.01	1.43
2-Fluorobiphenyl	Surrogate	-	69.9%	68.0%	65.9%
Terphenyl-d14	Surrogate	-	86.2%	92.5%	73.8%

Certificate of Analysis

Client: **Franz Environmental Inc. (Ottawa)**

Client PO:

Project Description: 1329-1202

Report Date: 04-Jun-2012
Order Date:29-May-2012

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Biphenyl	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*16.6*		*ug/L*		*83.0*	*50-140*			
Surrogate: Terphenyl-d14	*22.9*		*ug/L*		*115*	*50-140*			

Certificate of Analysis

Report Date: 04-Jun-2012
Order Date:29-May-2012

Client: **Franz Environmental Inc. (Ottawa)**

Client PO: Project Description: 1329-1202

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Semi-Volatiles									
Acenaphthene	4.13	0.05	ug/L	ND	82.6	50-140			
Acenaphthylene	4.61	0.05	ug/L	ND	92.1	50-140			
Anthracene	4.19	0.01	ug/L	ND	83.8	50-140			
Benzo [a] anthracene	4.03	0.01	ug/L	ND	80.7	50-140			
Benzo [a] pyrene	4.38	0.01	ug/L	ND	87.7	50-140			
Benzo [b] fluoranthene	3.18	0.05	ug/L	ND	63.5	50-140			
Benzo [g,h,i] perylene	2.76	0.05	ug/L	ND	55.2	50-140			
Benzo [k] fluoranthene	3.26	0.05	ug/L	ND	65.2	50-140			
Biphenyl	4.15	0.05	ug/L	ND	82.9	50-140			
Chrysene	4.18	0.05	ug/L	ND	83.7	50-140			
Dibenzo [a,h] anthracene	3.53	0.05	ug/L	ND	70.5	50-140			
Fluoranthene	3.89	0.01	ug/L	ND	77.8	50-140			
Fluorene	4.17	0.05	ug/L	ND	83.4	50-140			
Indeno [1,2,3-cd] pyrene	3.25	0.05	ug/L	ND	65.0	50-140			
1-Methylnaphthalene	3.73	0.05	ug/L	ND	74.6	50-140			
2-Methylnaphthalene	3.92	0.05	ug/L	ND	78.4	50-140			
Naphthalene	4.25	0.05	ug/L	ND	84.9	50-140			
Phenanthrene	4.14	0.05	ug/L	ND	82.7	50-140			
Pyrene	4.15	0.01	ug/L	ND	82.9	50-140			
Surrogate: 2-Fluorobiphenyl	*16.5*		*ug/L*		*82.6*	*50-140*			

Certificate of Analysis

Report Date: 04-Jun-2012
Order Date:29-May-2012

Client: **Franz Environmental Inc. (Ottawa)**

Client PO: Project Description: 1329-1202

Qualifier Notes:

Sample Qualifiers :

1 : Elevated detection limit because of dilution required due to high target analyte concentration.

2 : Elevated detection limits due to the nature of the sample matrix.

3 : Surrogates not available due to extract dilution.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Your Project #: 1329-1202
Your C.O.C. #: 37602301, 376023-01-01, 376023-02-01

Attention: Miguel Madrid
Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2012/10/11

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2F2781
Received: 2012/10/02, 14:50

Sample Matrix: Soil
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Methylnaphthalene Sum (1)	1	N/A	2012/10/09	CAM SOP - 00301	EPA 8270
Methylnaphthalene Sum (1)	11	N/A	2012/10/10	CAM SOP - 00301	EPA 8270
Petroleum Hydro. CCME F1 & BTEX in Soil	10	2012/10/03	2012/10/03	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	3	2012/10/03	2012/10/03	OTT SOP-00001	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	7	2012/10/03	2012/10/04	OTT SOP-00001	CCME CWS
Acid Extr. Metals (aqua regia) by ICPMS (1)	7	2012/10/09	2012/10/09	CAM SOP-00447	EPA 6020
Acid Extr. Metals (aqua regia) by ICPMS (1)	3	2012/10/11	2012/10/11	CAM SOP-00447	EPA 6020
MOISTURE	8	N/A	2012/10/03	CAM SOP-00445	McKeague 2nd ed 1978
MOISTURE	2	N/A	2012/10/05	CAM SOP-00445	McKeague 2nd ed 1978
Moisture (1)	2	N/A	2012/10/05	CAM SOP-00445	R.Carter,1993
PAH Compounds in Soil by GC/MS (SIM) (1)	9	2012/10/05	2012/10/06	CAM SOP - 00318	EPA 8270
PAH Compounds in Soil by GC/MS (SIM) (1)	3	2012/10/05	2012/10/07	CAM SOP - 00318	EPA 8270
Polychlorinated Biphenyl in Soil (1)	5	2012/10/05	2012/10/05	CAM SOP-00309	SW846 8082

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. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

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

Maxxam Job #: B2F2781
Report Date: 2012/10/11

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

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

Maxxam Job #: B2F2781
Report Date: 2012/10/11

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

O'REG 153 ICPMS METALS (SOIL)

Maxxam ID		PB3325		PB3328		PB3331		
Sampling Date		2012/09/30		2012/10/01		2012/09/30		
	Units	**BH1-12-1**	**RDL**	**BH2-12-1**	**RDL**	**BH3-12-1**	**RDL**	**QC Batch**
Metals								
Acid Extractable Aluminum (Al)	ug/g	5000	50	5500	50	6100	50	2995202
Acid Extractable Antimony (Sb)	ug/g	9.4	0.20	12	0.20	8.5	0.20	2995202
Acid Extractable Arsenic (As)	ug/g	28	1.0	16	1.0	17	1.0	2995202
Acid Extractable Barium (Ba)	ug/g	510	0.50	320	0.50	290	0.50	2995202
Acid Extractable Beryllium (Be)	ug/g	0.43	0.20	0.69	0.20	0.63	0.20	2995202
Acid Extractable Bismuth (Bi)	ug/g	1.6	1.0	<1.0	1.0	<1.0	1.0	2995202
Acid Extractable Boron (B)	ug/g	8.4	5.0	5.8	5.0	23	5.0	2995202
Acid Extractable Cadmium (Cd)	ug/g	13	0.10	0.85	0.10	1.3	0.10	2995202
Acid Extractable Calcium (Ca)	ug/g	16000	50	25000	50	33000	50	2995202
Acid Extractable Chromium (Cr)	ug/g	800	5.0	29	1.0	19	1.0	2995202
Acid Extractable Cobalt (Co)	ug/g	9.6	0.10	8.7	0.10	10	0.10	2995202
Acid Extractable Copper (Cu)	ug/g	1800	0.50	290	0.50	210	0.50	2995202
Acid Extractable Iron (Fe)	ug/g	46000	50	41000	50	21000	50	2995202
Acid Extractable Lead (Pb)	ug/g	26000	50	1100	1.0	610	1.0	2995202
Acid Extractable Magnesium (Mg)	ug/g	880	50	2100	50	3200	50	2995202
Acid Extractable Manganese (Mn)	ug/g	360	1.0	300	1.0	270	1.0	2995202
Acid Extractable Molybdenum (Mo)	ug/g	3.6	0.50	6.6	0.50	3.5	0.50	2995202
Acid Extractable Nickel (Ni)	ug/g	17	0.50	28	0.50	23	0.50	2995202
Acid Extractable Phosphorus (P)	ug/g	1000	50	1300	50	940	50	2995202
Acid Extractable Potassium (K)	ug/g	530	200	580	200	760	200	2995202
Acid Extractable Selenium (Se)	ug/g	6.6	0.50	1.2	0.50	1.5	0.50	2995202
Acid Extractable Silver (Ag)	ug/g	1.3	0.20	2.2	0.20	0.43	0.20	2995202
Acid Extractable Sodium (Na)	ug/g	240	100	250	100	960	100	2995202
Acid Extractable Strontium (Sr)	ug/g	100	1.0	160	1.0	120	1.0	2995202
Acid Extractable Thallium (Tl)	ug/g	0.27	0.050	0.14	0.050	0.19	0.050	2995202
Acid Extractable Tin (Sn)	ug/g	470	25	270	25	140	5.0	2995202
Acid Extractable Uranium (U)	ug/g	0.53	0.050	0.70	0.050	0.59	0.050	2995202
Acid Extractable Vanadium (V)	ug/g	23	5.0	28	5.0	26	5.0	2995202
Acid Extractable Zinc (Zn)	ug/g	1500	5.0	720	5.0	460	5.0	2995202

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B2F2781
Report Date: 2012/10/11

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

O'REG 153 ICPMS METALS (SOIL)

Maxxam ID		PB3334		PB3340	PB3341	PB3343		
Sampling Date		2012/09/30		2012/10/01	2012/10/01	2012/09/30		
	Units	**BH4-12-1**	**RDL**	**BH5-12-1**	**BH5-12-2**	**BH-12-DUP1**	**RDL**	**QC Batch**
Metals								
Acid Extractable Aluminum (Al)	ug/g	4000	50	5200	4100	6100	50	2995202
Acid Extractable Antimony (Sb)	ug/g	11	0.20	11	<0.20	9.3	0.20	2995202
Acid Extractable Arsenic (As)	ug/g	19	1.0	38	2.8	15	1.0	2995202
Acid Extractable Barium (Ba)	ug/g	500	0.50	320	51	260	0.50	2995202
Acid Extractable Beryllium (Be)	ug/g	0.32	0.20	0.56	0.21	0.54	0.20	2995202
Acid Extractable Bismuth (Bi)	ug/g	<1.0	1.0	<1.0	<1.0	<1.0	1.0	2995202
Acid Extractable Boron (B)	ug/g	6.6	5.0	18	<5.0	21	5.0	2995202
Acid Extractable Cadmium (Cd)	ug/g	0.84	0.10	2.0	<0.10	1.2	0.10	2995202
Acid Extractable Calcium (Ca)	ug/g	17000	50	16000	86000	34000	50	2995202
Acid Extractable Chromium (Cr)	ug/g	30	1.0	24	10	17	1.0	2995202
Acid Extractable Cobalt (Co)	ug/g	6.4	0.10	7.1	5.8	9.7	0.10	2995202
Acid Extractable Copper (Cu)	ug/g	3100	2.5	170	15	150	0.50	2995202
Acid Extractable Iron (Fe)	ug/g	44000	50	26000	13000	20000	50	2995202
Acid Extractable Lead (Pb)	ug/g	1700	1.0	1000	6.3	500	1.0	2995202
Acid Extractable Magnesium (Mg)	ug/g	2800	50	1400	7400	3100	50	2995202
Acid Extractable Manganese (Mn)	ug/g	210	1.0	160	270	260	1.0	2995202
Acid Extractable Molybdenum (Mo)	ug/g	2.9	0.50	6.3	1.1	3.0	0.50	2995202
Acid Extractable Nickel (Ni)	ug/g	26	0.50	44	13	22	0.50	2995202
Acid Extractable Phosphorus (P)	ug/g	740	50	1100	850	830	50	2995202
Acid Extractable Potassium (K)	ug/g	610	200	670	970	770	200	2995202
Acid Extractable Selenium (Se)	ug/g	1.9	0.50	3.6	<0.50	1.3	0.50	2995202
Acid Extractable Silver (Ag)	ug/g	1.3	0.20	0.61	<0.20	0.41	0.20	2995202
Acid Extractable Sodium (Na)	ug/g	610	100	540	250	990	100	2995202
Acid Extractable Strontium (Sr)	ug/g	88	1.0	83	150	120	1.0	2995202
Acid Extractable Thallium (Tl)	ug/g	0.11	0.050	0.17	0.063	0.18	0.050	2995202
Acid Extractable Tin (Sn)	ug/g	410	25	170	<5.0	180	5.0	2995202
Acid Extractable Uranium (U)	ug/g	0.68	0.050	1.7	0.80	0.63	0.050	2995202
Acid Extractable Vanadium (V)	ug/g	21	5.0	25	19	27	5.0	2995202
Acid Extractable Zinc (Zn)	ug/g	1100	5.0	1000	19	450	5.0	2995202

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B2F2781
Report Date: 2012/10/11

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

O.REG 153 PAHS IN SOIL (SOIL)

Maxxam ID		PB3325		PB3326		PB3328		PB3329		
Sampling Date		2012/09/30		2012/09/30		2012/10/01		2012/10/01		
	Units	**BH1-12-1**	**RDL**	**BH1-12-2**	**RDL**	**BH2-12-1**	**RDL**	**BH2-12-2**	**RDL**	**QC Batch**
Calculated Parameters										
Methylnaphthalene, 2-(1-)	ug/g	<0.071	0.071	<0.0071	0.0071	0.083	0.035	<0.0071	0.0071	2989428
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	0.064	0.050	<0.0050	0.0050	0.051	0.025	<0.0050	0.0050	2993380
Acenaphthylene	ug/g	0.070	0.050	<0.0050	0.0050	0.25	0.025	<0.0050	0.0050	2993380
Anthracene	ug/g	0.21	0.050	<0.0050	0.0050	0.27	0.025	<0.0050	0.0050	2993380
Benzo(a)anthracene	ug/g	0.94	0.050	<0.0050	0.0050	1.1	0.025	<0.0050	0.0050	2993380
Benzo(a)pyrene	ug/g	0.54	0.050	<0.0050	0.0050	0.88	0.025	<0.0050	0.0050	2993380
Benzo(b/j)fluoranthene	ug/g	0.98	0.050	<0.0050	0.0050	1.2	0.025	<0.0050	0.0050	2993380
Benzo(g,h,i)perylene	ug/g	0.35	0.050	<0.0050	0.0050	0.50	0.025	<0.0050	0.0050	2993380
Benzo(k)fluoranthene	ug/g	0.29	0.050	<0.0050	0.0050	0.39	0.025	<0.0050	0.0050	2993380
Chrysene	ug/g	1.0	0.050	<0.0050	0.0050	1.1	0.025	<0.0050	0.0050	2993380
Dibenz(a,h)anthracene	ug/g	0.080	0.050	<0.0050	0.0050	0.16	0.025	<0.0050	0.0050	2993380
Fluoranthene	ug/g	2.5	0.050	<0.0050	0.0050	2.2	0.025	<0.0050	0.0050	2993380
Fluorene	ug/g	0.15	0.050	<0.0050	0.0050	0.12	0.025	<0.0050	0.0050	2993380
Indeno(1,2,3-cd)pyrene	ug/g	0.37	0.050	<0.0050	0.0050	0.58	0.025	<0.0050	0.0050	2993380
1-Methylnaphthalene	ug/g	<0.050	0.050	<0.0050	0.0050	0.039	0.025	<0.0050	0.0050	2993380
2-Methylnaphthalene	ug/g	<0.050	0.050	<0.0050	0.0050	0.044	0.025	<0.0050	0.0050	2993380
Naphthalene	ug/g	0.069	0.050	<0.0050	0.0050	0.066	0.025	<0.0050	0.0050	2993380
Phenanthrene	ug/g	0.65	0.050	0.0052	0.0050	1.3	0.025	<0.0050	0.0050	2993380
Pyrene	ug/g	2.6	0.050	0.0052	0.0050	1.7	0.025	<0.0050	0.0050	2993380
Surrogate Recovery (%)										
D10-Anthracene	%	96		103		104		91		2993380
D14-Terphenyl (FS)	%	89		98		92		98		2993380
D8-Acenaphthylene	%	68		97		74		88		2993380

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B2F2781
Report Date: 2012/10/11

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

O.REG 153 PAHS IN SOIL (SOIL)

Maxxam ID		PB3331		PB3332		PB3334		PB3338		
Sampling Date		2012/09/30		2012/09/30		2012/09/30		2012/09/30		
	Units	**BH3-12-1**	**RDL**	**BH3-12-2**	**RDL**	**BH4-12-1**	**RDL**	**BH4-12-2**	**RDL**	**QC Batch**
Inorganics										
Moisture	%			10	1.0					2994169
Calculated Parameters										
Methylnaphthalene, 2-(1-)	ug/g	<0.071	0.071	<0.0071	0.0071	<0.35	0.35	<0.0071	0.0071	2989428
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	<0.050	0.050	<0.0050	0.0050	<0.25	0.25	<0.0050	0.0050	2993380
Acenaphthylene	ug/g	0.25	0.050	0.0092	0.0050	<0.25	0.25	<0.0050	0.0050	2993380
Anthracene	ug/g	0.22	0.050	0.017	0.0050	1.4	0.25	0.0081	0.0050	2993380
Benzo(a)anthracene	ug/g	0.80	0.050	0.067	0.0050	5.2	0.25	0.015	0.0050	2993380
Benzo(a)pyrene	ug/g	0.73	0.050	0.061	0.0050	3.7	0.25	0.010	0.0050	2993380
Benzo(b/j)fluoranthene	ug/g	0.96	0.050	0.073	0.0050	5.5	0.25	0.012	0.0050	2993380
Benzo(g,h,i)perylene	ug/g	0.52	0.050	0.045	0.0050	2.1	0.25	0.0063	0.0050	2993380
Benzo(k)fluoranthene	ug/g	0.38	0.050	0.023	0.0050	1.7	0.25	<0.0050	0.0050	2993380
Chrysene	ug/g	0.85	0.050	0.077	0.0050	5.6	0.25	0.020	0.0050	2993380
Dibenz(a,h)anthracene	ug/g	0.15	0.050	0.0092	0.0050	0.60	0.25	<0.0050	0.0050	2993380
Fluoranthene	ug/g	1.3	0.050	0.11	0.0050	9.7	0.25	0.038	0.0050	2993380
Fluorene	ug/g	0.051	0.050	0.0099	0.0050	0.34	0.25	<0.0050	0.0050	2993380
Indeno(1,2,3-cd)pyrene	ug/g	0.57	0.050	0.045	0.0050	2.2	0.25	0.0058	0.0050	2993380
1-Methylnaphthalene	ug/g	<0.050	0.050	<0.0050	0.0050	<0.25	0.25	<0.0050	0.0050	2993380
2-Methylnaphthalene	ug/g	<0.050	0.050	<0.0050	0.0050	<0.25	0.25	<0.0050	0.0050	2993380
Naphthalene	ug/g	<0.050	0.050	<0.0050	0.0050	<0.25	0.25	<0.0050	0.0050	2993380
Phenanthrene	ug/g	0.56	0.050	0.043	0.0050	4.7	0.25	0.022	0.0050	2993380
Pyrene	ug/g	1.1	0.050	0.13	0.0050	8.1	0.25	0.031	0.0050	2993380
Surrogate Recovery (%)										
D10-Anthracene	%	99		95		NC(1)		98		2993380
D14-Terphenyl (FS)	%	86		100		90		97		2993380
D8-Acenaphthylene	%	70		92		65		90		2993380

NC = Non-calculable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Detection Limit was raised due to matrix interferences.

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Maxxam Job #: B2F2781
Report Date: 2012/10/11

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

O.REG 153 PAHS IN SOIL (SOIL)

Maxxam ID		PB3340	PB3341		PB3343		PB3344		
Sampling Date		2012/10/01	2012/10/01		2012/09/30		2012/09/30		
	Units	**BH5-12-1**	**BH5-12-2**	**RDL**	**BH-12-DUP1**	**RDL**	**BH-12-DUP2**	**RDL**	**QC Batch**
Inorganics									
Moisture	%						9.6	1.0	2994169
Calculated Parameters									
Methylnaphthalene, 2-(1-)	ug/g	0.087	<0.0071	0.0071	<0.071	0.071	<0.0071	0.0071	2989428
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	0.063	<0.0050	0.0050	0.068	0.050	<0.0050	0.0050	2993380
Acenaphthylene	ug/g	0.18	<0.0050	0.0050	0.31	0.050	<0.0050	0.0050	2993380
Anthracene	ug/g	0.34	<0.0050	0.0050	0.32	0.050	0.0054	0.0050	2993380
Benzo(a)anthracene	ug/g	1.1	<0.0050	0.0050	1.1	0.050	0.014	0.0050	2993380
Benzo(a)pyrene	ug/g	0.67	<0.0050	0.0050	0.92	0.050	0.014	0.0050	2993380
Benzo(b/j)fluoranthene	ug/g	0.84	<0.0050	0.0050	1.2	0.050	0.019	0.0050	2993380
Benzo(g,h,i)perylene	ug/g	0.35	<0.0050	0.0050	0.56	0.050	0.019	0.0050	2993380
Benzo(k)fluoranthene	ug/g	0.29	<0.0050	0.0050	0.43	0.050	0.0072	0.0050	2993380
Chrysene	ug/g	0.94	<0.0050	0.0050	1.1	0.050	0.024	0.0050	2993380
Dibenz(a,h)anthracene	ug/g	0.11	<0.0050	0.0050	0.16	0.050	<0.0050	0.0050	2993380
Fluoranthene	ug/g	2.2	<0.0050	0.0050	1.8	0.050	0.026	0.0050	2993380
Fluorene	ug/g	0.12	<0.0050	0.0050	0.087	0.050	<0.0050	0.0050	2993380
Indeno(1,2,3-cd)pyrene	ug/g	0.42	<0.0050	0.0050	0.66	0.050	0.015	0.0050	2993380
1-Methylnaphthalene	ug/g	0.033	<0.0050	0.0050	<0.050	0.050	<0.0050	0.0050	2993380
2-Methylnaphthalene	ug/g	0.055	<0.0050	0.0050	<0.050	0.050	<0.0050	0.0050	2993380
Naphthalene	ug/g	0.087	<0.0050	0.0050	0.054	0.050	<0.0050	0.0050	2993380
Phenanthrene	ug/g	1.3	0.0067	0.0050	0.91	0.050	0.014	0.0050	2993380
Pyrene	ug/g	1.7	<0.0050	0.0050	1.5	0.050	0.033	0.0050	2993380
Surrogate Recovery (%)									
D10-Anthracene	%	87	101		112		86		2993380
D14-Terphenyl (FS)	%	103	98		96		96		2993380
D8-Acenaphthylene	%	89	95		87		84		2993380

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2012/10/11

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

O'REG 153 PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		PB3325	PB3326	PB3328	PB3329	PB3331	PB3334		PB3338		
Sampling Date		2012/09/30	2012/09/30	2012/10/01	2012/10/01	2012/09/30	2012/09/30		2012/09/30		
	Units	**BH1-12-1**	**BH1-12-2**	**BH2-12-1**	**BH2-12-2**	**BH3-12-1**	**BH4-12-1**	**QC Batch**	**BH4-12-2**	**RDL**	**QC Batch**
Inorganics											
Moisture	%	19	11	18	7.4	19	21	2989784	8.0	0.2	2989784
BTEX & F1 Hydrocarbons											
Benzene	ug/g	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	2989828	<0.02	0.02	2989828
Toluene	ug/g	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	2989828	<0.02	0.02	2989828
Ethylbenzene	ug/g	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	2989828	<0.02	0.02	2989828
o-Xylene	ug/g	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	2989828	<0.02	0.02	2989828
p+m-Xylene	ug/g	0.06	<0.04	<0.04	<0.04	<0.04	<0.04	2989828	<0.04	0.04	2989828
Total Xylenes	ug/g	0.09	<0.04	<0.04	<0.04	<0.04	<0.04	2989828	<0.04	0.04	2989828
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	<10	2989828	<10	10	2989828
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	<10	2989828	<10	10	2989828
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	<10	<10	<10	2988479	<10	10	2991353
F3 (C16-C34 Hydrocarbons)	ug/g	270	<10	59	<10	85	630	2988479	<10	10	2991353
F4 (C34-C50 Hydrocarbons)	ug/g	81	<10	37	<10	78	230	2988479	<10	10	2991353
Reached Baseline at C50	ug/g	YES	YES	YES	YES	YES	YES	2988479	YES		2991353
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	103	100	99	101	99	100	2989828	101		2989828
4-Bromofluorobenzene	%	88	87	88	88	88	89	2989828	88		2989828
D10-Ethylbenzene	%	95	106	102	108	101	101	2989828	103		2989828
D4-1,2-Dichloroethane	%	123	117	119	118	118	120	2989828	123		2989828
o-Terphenyl	%	104	99	95	102	102	105	2988479	73		2991353

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O'REG 153 PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		PB3340		PB3341	PB3341	PB3343	PB3343		
Sampling Date		2012/10/01		2012/10/01	2012/10/01	2012/09/30	2012/09/30		
	Units	**BH5-12-1**	**QC Batch**	**BH5-12-2**	**BH5-12-2 Lab-Dup**	**BH-12-DUP1**	**BH-12-DUP1 Lab-Dup**	**RDL**	**QC Batch**
Inorganics									
Moisture	%	21	2989784	10		18	18	0.2	2991361
BTEX & F1 Hydrocarbons									
Benzene	ug/g	<0.02	2989828	<0.02	<0.02	<0.02		0.02	2990547
Toluene	ug/g	<0.02	2989828	<0.02	<0.02	<0.02		0.02	2990547
Ethylbenzene	ug/g	<0.02	2989828	<0.02	<0.02	<0.02		0.02	2990547
o-Xylene	ug/g	<0.02	2989828	<0.02	<0.02	<0.02		0.02	2990547
p+m-Xylene	ug/g	<0.04	2989828	<0.04	<0.04	<0.04		0.04	2990547
Total Xylenes	ug/g	<0.04	2989828	<0.04	<0.04	<0.04		0.04	2990547
F1 (C6-C10)	ug/g	<10	2989828	<10	<10	<10		10	2990547
F1 (C6-C10) - BTEX	ug/g	<10	2989828	<10	<10	<10		10	2990547
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	<10	2991353	<10		<10	<10	10	2991353
F3 (C16-C34 Hydrocarbons)	ug/g	170	2991353	<10		110	120	10	2991353
F4 (C34-C50 Hydrocarbons)	ug/g	66	2991353	<10		110	190(1)	10	2991353
Reached Baseline at C50	ug/g	YES	2991353	YES		NO	NO		2991353
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	101	2989828	100	100	99			2990547
4-Bromofluorobenzene	%	87	2989828	88	88	88			2990547
D10-Ethylbenzene	%	97	2989828	105	103	94			2990547
D4-1,2-Dichloroethane	%	119	2989828	117	121	118			2990547
o-Terphenyl	%	73	2991353	75		73	72		2991353

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		PB3326	PB3329	PB3338		
Sampling Date		2012/09/30	2012/10/01	2012/09/30		
	Units	**BH1-12-2**	**BH2-12-2**	**BH4-12-2**	**RDL**	**QC Batch**
Metals						
Acid Extractable Aluminum (Al)	ug/g	3600	3000	5700	50	2997657
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	0.21	0.20	2997657
Acid Extractable Arsenic (As)	ug/g	2.1	1.6	4.2	1.0	2997657
Acid Extractable Barium (Ba)	ug/g	62	69	67	0.50	2997657
Acid Extractable Beryllium (Be)	ug/g	<0.20	<0.20	0.24	0.20	2997657
Acid Extractable Bismuth (Bi)	ug/g	<1.0	<1.0	<1.0	1.0	2997657
Acid Extractable Boron (B)	ug/g	<5.0	<5.0	<5.0	5.0	2997657
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	<0.10	0.10	2997657
Acid Extractable Calcium (Ca)	ug/g	71000	59000	46000	50	2997657
Acid Extractable Chromium (Cr)	ug/g	9.9	8.9	13	1.0	2997657
Acid Extractable Cobalt (Co)	ug/g	4.8	4.5	7.6	0.10	2997657
Acid Extractable Copper (Cu)	ug/g	11	9.3	24	0.50	2997657
Acid Extractable Iron (Fe)	ug/g	11000	9900	17000	50	2997657
Acid Extractable Lead (Pb)	ug/g	3.8	3.3	12	1.0	2997657
Acid Extractable Magnesium (Mg)	ug/g	6600	6000	7900	50	2997657
Acid Extractable Manganese (Mn)	ug/g	170	160	270	1.0	2997657
Acid Extractable Molybdenum (Mo)	ug/g	1.0	0.62	2.3	0.50	2997657
Acid Extractable Nickel (Ni)	ug/g	11	8.6	21	0.50	2997657
Acid Extractable Phosphorus (P)	ug/g	900	990	810	50	2997657
Acid Extractable Potassium (K)	ug/g	980	840	1100	200	2997657
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	<0.50	0.50	2997657
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	<0.20	0.20	2997657
Acid Extractable Sodium (Na)	ug/g	260	190	230	100	2997657
Acid Extractable Strontium (Sr)	ug/g	140	120	99	1.0	2997657
Acid Extractable Thallium (Tl)	ug/g	0.067	0.074	0.093	0.050	2997657
Acid Extractable Tin (Sn)	ug/g	<5.0	<5.0	<5.0	5.0	2997657
Acid Extractable Uranium (U)	ug/g	0.88	0.65	1.1	0.050	2997657
Acid Extractable Vanadium (V)	ug/g	21	18	20	5.0	2997657
Acid Extractable Zinc (Zn)	ug/g	23	19	32	5.0	2997657

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		PB3325	PB3328	PB3331	PB3334	PB3340		
Sampling Date		2012/09/30	2012/10/01	2012/09/30	2012/09/30	2012/10/01		
	Units	**BH1-12-1**	**BH2-12-1**	**BH3-12-1**	**BH4-12-1**	**BH5-12-1**	**RDL**	**QC Batch**
PCBs								
Aroclor 1016	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2993371
Aroclor 1221	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2993371
Aroclor 1232	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2993371
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2993371
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2993371
Aroclor 1254	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2993371
Aroclor 1260	ug/g	<0.010	<0.010	0.013	<0.010	<0.010	0.010	2993371
Aroclor 1262	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2993371
Aroclor 1268	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2993371
Total PCB	ug/g	<0.010	<0.010	0.013	<0.010	<0.010	0.010	2993371
Surrogate Recovery (%)								
Decachlorobiphenyl	%	94	87	88	82	83		2993371

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2012/10/11

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

Test Summary

Maxxam ID PB3325 **Collected** 2012/09/30
Sample ID BH1-12-1 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2989828	2012/10/03	2012/10/03	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2988479	2012/10/03	2012/10/03	Lyndsey Hart
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2995202	2012/10/09	2012/10/09	Hua Ren
MOISTURE	BAL	2989784	N/A	2012/10/03	Habiba Essak
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/07	Darryl Tiller
Polychlorinated Biphenyl in Soil	GC/ECD	2993371	2012/10/05	2012/10/05	Joy Zhang

Maxxam ID PB3326 **Collected** 2012/09/30
Sample ID BH1-12-2 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2989828	2012/10/03	2012/10/03	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2988479	2012/10/03	2012/10/03	Lyndsey Hart
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2997657	2012/10/11	2012/10/11	Hua Ren
MOISTURE	BAL	2989784	N/A	2012/10/03	Habiba Essak
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/06	Darryl Tiller

Maxxam ID PB3328 **Collected** 2012/10/01
Sample ID BH2-12-1 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2989828	2012/10/03	2012/10/03	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2988479	2012/10/03	2012/10/04	Lyndsey Hart
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2995202	2012/10/09	2012/10/09	Hua Ren
MOISTURE	BAL	2989784	N/A	2012/10/03	Habiba Essak
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/06	Darryl Tiller
Polychlorinated Biphenyl in Soil	GC/ECD	2993371	2012/10/05	2012/10/05	Joy Zhang

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Test Summary

Maxxam ID PB3329 **Collected** 2012/10/01
Sample ID BH2-12-2 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2989828	2012/10/03	2012/10/03	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2988479	2012/10/03	2012/10/03	Lyndsey Hart
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2997657	2012/10/11	2012/10/11	Hua Ren
MOISTURE	BAL	2989784	N/A	2012/10/03	Habiba Essak
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/06	Darryl Tiller

Maxxam ID PB3331 **Collected** 2012/09/30
Sample ID BH3-12-1 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2989828	2012/10/03	2012/10/03	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2988479	2012/10/03	2012/10/04	Lyndsey Hart
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2995202	2012/10/09	2012/10/09	Hua Ren
MOISTURE	BAL	2989784	N/A	2012/10/03	Habiba Essak
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/06	Darryl Tiller
Polychlorinated Biphenyl in Soil	GC/ECD	2993371	2012/10/05	2012/10/05	Joy Zhang

Maxxam ID PB3332 **Collected** 2012/09/30
Sample ID BH3-12-2 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Moisture	BAL	2994169	N/A	2012/10/05	Bonali Patel
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/06	Darryl Tiller

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Report Date: 2012/10/11

Franz Environmental Inc
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Test Summary

Maxxam ID PB3334 **Collected** 2012/09/30
Sample ID BH4-12-1 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2989828	2012/10/03	2012/10/03	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2988479	2012/10/03	2012/10/04	Lyndsey Hart
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2995202	2012/10/09	2012/10/09	Hua Ren
MOISTURE	BAL	2989784	N/A	2012/10/03	Habiba Essak
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/07	Darryl Tiller
Polychlorinated Biphenyl in Soil	GC/ECD	2993371	2012/10/05	2012/10/05	Joy Zhang

Maxxam ID PB3338 **Collected** 2012/09/30
Sample ID BH4-12-2 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2989828	2012/10/03	2012/10/03	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2991353	2012/10/03	2012/10/04	Lyndsey Hart
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2997657	2012/10/11	2012/10/11	Hua Ren
MOISTURE	BAL	2989784	N/A	2012/10/03	Habiba Essak
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/06	Darryl Tiller

Maxxam ID PB3340 **Collected** 2012/10/01
Sample ID BH5-12-1 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2989828	2012/10/03	2012/10/03	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2991353	2012/10/03	2012/10/04	Lyndsey Hart
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2995202	2012/10/09	2012/10/09	Hua Ren
MOISTURE	BAL	2989784	N/A	2012/10/03	Habiba Essak
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/06	Darryl Tiller
Polychlorinated Biphenyl in Soil	GC/ECD	2993371	2012/10/05	2012/10/05	Joy Zhang

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Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

Test Summary

Maxxam ID PB3341 **Collected** 2012/10/01
Sample ID BH5-12-2 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2990547	2012/10/03	2012/10/03	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2991353	2012/10/03	2012/10/04	Lyndsey Hart
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2995202	2012/10/09	2012/10/09	Hua Ren
MOISTURE	BAL	2991361	N/A	2012/10/05	Habiba Essak
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/06	Darryl Tiller

Maxxam ID PB3341 Dup **Collected** 2012/10/01
Sample ID BH5-12-2 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2990547	2012/10/03	2012/10/03	Steve Roberts

Maxxam ID PB3343 **Collected** 2012/09/30
Sample ID BH-12-DUP1 **Shipped**
Matrix Soil **Received** 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2990547	2012/10/03	2012/10/03	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2991353	2012/10/03	2012/10/04	Lyndsey Hart
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2995202	2012/10/09	2012/10/09	Hua Ren
MOISTURE	BAL	2991361	N/A	2012/10/05	Habiba Essak
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/06	Darryl Tiller

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Sampler Initials: MM

Test Summary

Maxxam ID PB3343 Dup
Sample ID BH-12-DUP1
Matrix Soil

Collected 2012/09/30
Shipped
Received 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2991353	2012/10/04	2012/10/04	Lyndsey Hart
MOISTURE	BAL	2991361	N/A	2012/10/05	Habiba Essak

Maxxam ID PB3344
Sample ID BH-12-DUP2
Matrix Soil

Collected 2012/09/30
Shipped
Received 2012/10/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2989428	N/A	2012/10/09	Automated Statchk
Moisture	BAL	2994169	N/A	2012/10/05	Bonali Patel
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	2993380	2012/10/05	2012/10/07	Darryl Tiller

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Client Project #: 1329-1202

Sampler Initials: MM

Package 1	5.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Sample PB3325-01: PAH Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PB3328-01: PAH Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PB3331-01: PAH Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PB3334-01: PAH Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PB3343-01: PAH Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

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Sampler Initials: MM

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
2988479	o-Terphenyl	2012/10/03	101	30 - 130	104	30 - 130	100	%		
2988479	F2 (C10-C16 Hydrocarbons)	2012/10/03	87	50 - 130	91	70 - 130	<10	ug/g	57.1(1)	50
2988479	F3 (C16-C34 Hydrocarbons)	2012/10/03	87	50 - 130	91	70 - 130	<10	ug/g	35.5	50
2988479	F4 (C34-C50 Hydrocarbons)	2012/10/03	87	50 - 130	91	70 - 130	<10	ug/g	NC	50
2989784	Moisture	2012/10/03							20.1	50
2989828	1,4-Difluorobenzene	2012/10/03	99	60 - 140	102	60 - 140	101	%		
2989828	4-Bromofluorobenzene	2012/10/03	89	60 - 140	89	60 - 140	85	%		
2989828	D10-Ethylbenzene	2012/10/03	108	30 - 130	114	30 - 130	102	%		
2989828	D4-1,2-Dichloroethane	2012/10/03	118	60 - 140	119	60 - 140	118	%		
2989828	Benzene	2012/10/03	93	60 - 140	110	60 - 140	<0.02	ug/g		
2989828	Toluene	2012/10/03	81	60 - 140	92	60 - 140	<0.02	ug/g		
2989828	Ethylbenzene	2012/10/03	81	60 - 140	96	60 - 140	<0.02	ug/g		
2989828	o-Xylene	2012/10/03	84	60 - 140	91	60 - 140	<0.02	ug/g		
2989828	p+m-Xylene	2012/10/03	74	60 - 140	85	60 - 140	<0.04	ug/g		
2989828	F1 (C6-C10)	2012/10/03	84	60 - 140	88	60 - 140	<10	ug/g	NC	50
2989828	Total Xylenes	2012/10/03					<0.04	ug/g		
2989828	F1 (C6-C10) - BTEX	2012/10/03					<10	ug/g	NC	50
2990547	1,4-Difluorobenzene	2012/10/03	99	60 - 140	100	60 - 140	98	%		
2990547	4-Bromofluorobenzene	2012/10/03	88	60 - 140	89	60 - 140	87	%		
2990547	D10-Ethylbenzene	2012/10/03	99	30 - 130	113	30 - 130	102	%		
2990547	D4-1,2-Dichloroethane	2012/10/03	120	60 - 140	120	60 - 140	119	%		
2990547	Benzene	2012/10/03	99	60 - 140	111	60 - 140	<0.02	ug/g	NC	50
2990547	Toluene	2012/10/03	85	60 - 140	94	60 - 140	<0.02	ug/g	NC	50
2990547	Ethylbenzene	2012/10/03	90	60 - 140	97	60 - 140	<0.02	ug/g	NC	50
2990547	o-Xylene	2012/10/03	85	60 - 140	91	60 - 140	<0.02	ug/g	NC	50
2990547	p+m-Xylene	2012/10/03	79	60 - 140	88	60 - 140	<0.04	ug/g	NC	50
2990547	F1 (C6-C10)	2012/10/03	84	60 - 140	89	60 - 140	<10	ug/g	NC	50
2990547	Total Xylenes	2012/10/03					<0.04	ug/g	NC	50
2990547	F1 (C6-C10) - BTEX	2012/10/03					<10	ug/g	NC	50
2991353	o-Terphenyl	2012/10/04	70	30 - 130	71	30 - 130	72	%		
2991353	F2 (C10-C16 Hydrocarbons)	2012/10/04	106	50 - 130	106	70 - 130	<10	ug/g	NC	50
2991353	F3 (C16-C34 Hydrocarbons)	2012/10/04	106	50 - 130	106	70 - 130	<10	ug/g	8.1	50
2991353	F4 (C34-C50 Hydrocarbons)	2012/10/04	106	50 - 130	106	70 - 130	<10	ug/g	50.7(1)	50
2991361	Moisture	2012/10/05							1.1	50
2993371	Decachlorobiphenyl	2012/10/05	109	60 - 130	103	60 - 130	106	%		
2993371	Aroclor 1260	2012/10/05	117	60 - 130	124	60 - 130	<0.010	ug/g	NC	50
2993371	Total PCB	2012/10/05	117	60 - 130	124	60 - 130	<0.010	ug/g	NC	50
2993371	Aroclor 1016	2012/10/05					<0.010	ug/g		
2993371	Aroclor 1221	2012/10/05					<0.010	ug/g		
2993371	Aroclor 1232	2012/10/05					<0.010	ug/g		

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Report Date: 2012/10/11

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

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
2993371	Aroclor 1242	2012/10/05					<0.010	ug/g	NC	50
2993371	Aroclor 1248	2012/10/05					<0.010	ug/g	NC	50
2993371	Aroclor 1254	2012/10/05					<0.010	ug/g	NC	50
2993371	Aroclor 1262	2012/10/05					<0.010	ug/g		
2993371	Aroclor 1268	2012/10/05					<0.010	ug/g		
2993380	D10-Anthracene	2012/10/07	97	50 - 130	86	50 - 130	112	%		
2993380	D14-Terphenyl (FS)	2012/10/07	79	50 - 130	92	50 - 130	94	%		
2993380	D8-Acenaphthylene	2012/10/07	79	50 - 130	82	50 - 130	83	%		
2993380	Acenaphthene	2012/10/07	72	50 - 130	97	50 - 130	<0.0050	ug/g	NC	40
2993380	Acenaphthylene	2012/10/07	73	50 - 130	85	50 - 130	<0.0050	ug/g	NC	40
2993380	Anthracene	2012/10/07	66	50 - 130	101	50 - 130	<0.0050	ug/g	NC	40
2993380	Benzo(a)anthracene	2012/10/07	81	50 - 130	91	50 - 130	<0.0050	ug/g	NC	40
2993380	Benzo(a)pyrene	2012/10/07	68	50 - 130	88	50 - 130	<0.0050	ug/g	NC	40
2993380	Benzo(b/j)fluoranthene	2012/10/07	70	50 - 130	98	50 - 130	<0.0050	ug/g	NC	40
2993380	Benzo(g,h,i)perylene	2012/10/07	75	50 - 130	100	50 - 130	<0.0050	ug/g	NC	40
2993380	Benzo(k)fluoranthene	2012/10/07	63	50 - 130	97	50 - 130	<0.0050	ug/g	NC	40
2993380	Chrysene	2012/10/07	77	50 - 130	109	50 - 130	<0.0050	ug/g	NC	40
2993380	Dibenz(a,h)anthracene	2012/10/07	75	50 - 130	98	50 - 130	<0.0050	ug/g	NC	40
2993380	Fluoranthene	2012/10/07	78	50 - 130	100	50 - 130	<0.0050	ug/g	NC	40
2993380	Fluorene	2012/10/07	74	50 - 130	98	50 - 130	<0.0050	ug/g	NC	40
2993380	Indeno(1,2,3-cd)pyrene	2012/10/07	72	50 - 130	100	50 - 130	<0.0050	ug/g	NC	40
2993380	1-Methylnaphthalene	2012/10/07	76	50 - 130	97	50 - 130	<0.0050	ug/g	NC	40
2993380	2-Methylnaphthalene	2012/10/07	73	50 - 130	93	50 - 130	<0.0050	ug/g	NC	40
2993380	Naphthalene	2012/10/07	77	50 - 130	95	50 - 130	<0.0050	ug/g	NC	40
2993380	Phenanthrene	2012/10/07	82	50 - 130	95	50 - 130	<0.0050	ug/g	NC	40
2993380	Pyrene	2012/10/07	79	50 - 130	105	50 - 130	<0.0050	ug/g	NC	40
2994169	Moisture	2012/10/05							0.8	20
2995202	Acid Extractable Aluminum (Al)	2012/10/09	NC	75 - 125	99	80 - 120	<50	ug/g		
2995202	Acid Extractable Antimony (Sb)	2012/10/09	85	75 - 125	94	80 - 120	<0.20	ug/g	NC	30
2995202	Acid Extractable Arsenic (As)	2012/10/09	91	75 - 125	95	80 - 120	<1.0	ug/g	NC	30
2995202	Acid Extractable Barium (Ba)	2012/10/09	NC	75 - 125	96	80 - 120	<0.50	ug/g	8.5	30
2995202	Acid Extractable Beryllium (Be)	2012/10/09	89	75 - 125	95	80 - 120	<0.20	ug/g	NC	30
2995202	Acid Extractable Bismuth (Bi)	2012/10/09	93	75 - 125	99	80 - 120	<1.0	ug/g		
2995202	Acid Extractable Boron (B)	2012/10/09	83	75 - 125	86	80 - 120	<5.0	ug/g	NC	30
2995202	Acid Extractable Cadmium (Cd)	2012/10/09	93	75 - 125	99	80 - 120	<0.10	ug/g	NC	30
2995202	Acid Extractable Calcium (Ca)	2012/10/09	NC	75 - 125	99	80 - 120	<50	ug/g		
2995202	Acid Extractable Chromium (Cr)	2012/10/09	91	75 - 125	98	80 - 120	<1.0	ug/g	1.8	30
2995202	Acid Extractable Cobalt (Co)	2012/10/09	90	75 - 125	96	80 - 120	<0.10	ug/g	17.0	30
2995202	Acid Extractable Copper (Cu)	2012/10/09	NC	75 - 125	96	80 - 120	<0.50	ug/g	10.8	30
2995202	Acid Extractable Iron (Fe)	2012/10/09	NC	75 - 125	99	80 - 120	<50	ug/g		

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Maxxam Job #: B2F2781
Report Date: 2012/10/11

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: MM

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
2995202	Acid Extractable Lead (Pb)	2012/10/09	93	75 - 125	101	80 - 120	<1.0	ug/g	3.6	30
2995202	Acid Extractable Magnesium (Mg)	2012/10/09	NC	75 - 125	97	80 - 120	<50	ug/g		
2995202	Acid Extractable Manganese (Mn)	2012/10/09	NC	75 - 125	100	80 - 120	<1.0	ug/g		
2995202	Acid Extractable Molybdenum (Mo)	2012/10/09	95	75 - 125	98	80 - 120	<0.50	ug/g	NC	30
2995202	Acid Extractable Nickel (Ni)	2012/10/09	89	75 - 125	99	80 - 120	<0.50	ug/g	0.5	30
2995202	Acid Extractable Phosphorus (P)	2012/10/09	NC	75 - 125	99	80 - 120	<50	ug/g		
2995202	Acid Extractable Potassium (K)	2012/10/09	NC	75 - 125	95	80 - 120	<200	ug/g		
2995202	Acid Extractable Selenium (Se)	2012/10/09	92	75 - 125	99	80 - 120	<0.50	ug/g	NC	30
2995202	Acid Extractable Silver (Ag)	2012/10/09	91	75 - 125	97	80 - 120	<0.20	ug/g	NC	30
2995202	Acid Extractable Sodium (Na)	2012/10/09	87	75 - 125	96	80 - 120	<100	ug/g		
2995202	Acid Extractable Strontium (Sr)	2012/10/09	NC	75 - 125	96	80 - 120	<1.0	ug/g		
2995202	Acid Extractable Thallium (Tl)	2012/10/09	82	75 - 125	88	80 - 120	<0.050	ug/g	NC	30
2995202	Acid Extractable Tin (Sn)	2012/10/09	93	75 - 125	99	80 - 120	<5.0	ug/g		
2995202	Acid Extractable Uranium (U)	2012/10/09	98	75 - 125	104	80 - 120	<0.050	ug/g	5.2	30
2995202	Acid Extractable Vanadium (V)	2012/10/09	94	75 - 125	99	80 - 120	<5.0	ug/g	NC	30
2995202	Acid Extractable Zinc (Zn)	2012/10/09	NC	75 - 125	96	80 - 120	<5.0	ug/g	9.8	30
2997657	Acid Extractable Aluminum (Al)	2012/10/11	NC	75 - 125	102	80 - 120	<50	ug/g		
2997657	Acid Extractable Antimony (Sb)	2012/10/11	95	75 - 125	96	80 - 120	<0.20	ug/g	NC	30
2997657	Acid Extractable Arsenic (As)	2012/10/11	96	75 - 125	96	80 - 120	<1.0	ug/g	NC	30
2997657	Acid Extractable Barium (Ba)	2012/10/11	NC	75 - 125	99	80 - 120	<0.50	ug/g	5.0	30
2997657	Acid Extractable Beryllium (Be)	2012/10/11	98	75 - 125	99	80 - 120	<0.20	ug/g	NC	30
2997657	Acid Extractable Bismuth (Bi)	2012/10/11	101	75 - 125	103	80 - 120	<1.0	ug/g		
2997657	Acid Extractable Boron (B)	2012/10/11	95	75 - 125	94	80 - 120	<5.0	ug/g	NC	30
2997657	Acid Extractable Cadmium (Cd)	2012/10/11	100	75 - 125	100	80 - 120	<0.10	ug/g	NC	30
2997657	Acid Extractable Calcium (Ca)	2012/10/11	NC	75 - 125	106	80 - 120	130, RDL=50	ug/g		
2997657	Acid Extractable Chromium (Cr)	2012/10/11	99	75 - 125	98	80 - 120	<1.0	ug/g	3.6	30
2997657	Acid Extractable Cobalt (Co)	2012/10/11	95	75 - 125	96	80 - 120	<0.10	ug/g	7.9	30
2997657	Acid Extractable Copper (Cu)	2012/10/11	93	75 - 125	97	80 - 120	<0.50	ug/g	3.2	30
2997657	Acid Extractable Iron (Fe)	2012/10/11	NC	75 - 125	100	80 - 120	<50	ug/g		
2997657	Acid Extractable Lead (Pb)	2012/10/11	99	75 - 125	103	80 - 120	<1.0	ug/g	NC	30
2997657	Acid Extractable Magnesium (Mg)	2012/10/11	NC	75 - 125	97	80 - 120	<50	ug/g		
2997657	Acid Extractable Manganese (Mn)	2012/10/11	NC	75 - 125	97	80 - 120	<1.0	ug/g		
2997657	Acid Extractable Molybdenum (Mo)	2012/10/11	102	75 - 125	100	80 - 120	<0.50	ug/g	NC	30
2997657	Acid Extractable Nickel (Ni)	2012/10/11	95	75 - 125	97	80 - 120	<0.50	ug/g	7.8	30
2997657	Acid Extractable Phosphorus (P)	2012/10/11	NC	75 - 125	97	80 - 120	<50	ug/g		
2997657	Acid Extractable Potassium (K)	2012/10/11	NC	75 - 125	95	80 - 120	<200	ug/g		
2997657	Acid Extractable Selenium (Se)	2012/10/11	98	75 - 125	97	80 - 120	<0.50	ug/g	NC	30
2997657	Acid Extractable Silver (Ag)	2012/10/11	98	75 - 125	98	80 - 120	<0.20	ug/g	NC	30
2997657	Acid Extractable Sodium (Na)	2012/10/11	99	75 - 125	99	80 - 120	<100	ug/g		
2997657	Acid Extractable Strontium (Sr)	2012/10/11	NC	75 - 125	97	80 - 120	<1.0	ug/g		

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Sampler Initials: MM

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
2997657	Acid Extractable Thallium (Tl)	2012/10/11	89	75 - 125	91	80 - 120	<0.050	ug/g	NC	30
2997657	Acid Extractable Tin (Sn)	2012/10/11	100	75 - 125	99	80 - 120	<5.0	ug/g		
2997657	Acid Extractable Uranium (U)	2012/10/11	103	75 - 125	105	80 - 120	<0.050	ug/g	2.2	30
2997657	Acid Extractable Vanadium (V)	2012/10/11	NC	75 - 125	101	80 - 120	<5.0	ug/g	3.2	30
2997657	Acid Extractable Zinc (Zn)	2012/10/11	NC	75 - 125	101	80 - 120	<5.0	ug/g	7.5	30

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.

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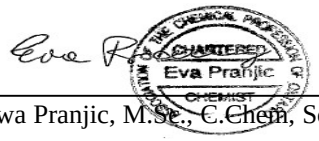
Validation Signature Page

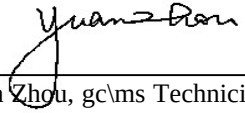
Maxxam Job #: B2F2781

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Alina Segal, Manager Main Lab - Organics



Yuan Zhou, gc\ms Technician

Paul Rubinato, Analyst, Maxxam Analytics

==========

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.

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Head Office
300-2319 St. Laurent Blvd.
Ottawa, Ontario K1G 4J8
p: 1-800-749-1947
e: paracel@paracellabs.com
www.paracellabs.com

Chain of Custody
(Lab Use Only)
No. 93310

Page 1 of 1

Client Name: Franz Environmental	Project Reference: 1329-1202	TAT: X Regular [ ] 3 Day	
Contact Name: Miguel Madrid	Quote #	[ ] 2 Day [ ] 1 Day	
Address: 329 Churchill Ave N, Suite 200 Ottawa, ON	PO #	Date Required:	
Telephone: 613-721-0555 TABLE 1	Email Address: mmadrid@franzenvironmental.com jdittburner@franzenvironmental.com		

Criteria: [ ] O. Reg. 153/04 Table __ [X] O. Reg. 153/11 (Current) Table X [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO [ ] CCME [ ] SUB (Storm) [ ] SUB (Sanitary) Municipality:_____ [ ] Other:_____

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

Paracel Order Number: 1222150

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	CrVI	B (HWS)	Required Analyses	
1	OW-120B-86	GW		1	May 29/12	PM			X					LIMITED WATER VOLUME	✓
2	North of 120B-86			1					X						✓
3	OW-122B-86			1					X					LIMITED WATER VOLUME	✓
4	OW-122C-86			1					X						✓
5	BH00-1			1	May 29/12	AM			X						✓
6	OW506B			1					X						✓
7	OW506C			1					X						✓
8	DUP1			1					X						✓
9															
10															

750:1 → COC to be submitted. - MJC

Comments: BH00-1 & DUP1 have higher silt content. Extra sample submitted "Sub-bleachers?" SC.

Method of Delivery: Paracel

Relinquished By (Print & Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
J. Dittburner	T. Bourque	SUNEEP PURI	MJC
Date/Time: May 29/12 14:00	Date/Time: 29/05/12 5:27pm	Date/Time: MAY 30, 2012 10:30	Date/Time: May 30/12 11:42
	Temperature: ____ °C	Temperature: 2.7 °C	pH Verified [ ] By: N/A

Your Project #: 1329-1202
Your C.O.C. #: 37602303, 376023-03-01, 376023-04-01

Attention: Miguel Madrid
Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2012/10/15

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2F5323
Received: 2012/10/05, 14:45

Sample Matrix: Water
Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Methylnaphthalene Sum (1)	1	N/A	2012/10/10	CAM SOP - 00301	EPA 8270
Methylnaphthalene Sum (1)	13	N/A	2012/10/12	CAM SOP - 00301	EPA 8270
Petroleum Hydro. CCME F1 & BTEX in Water	6	N/A	2012/10/07	OTT SOP-00002	CCME CWS
Petroleum Hydro. CCME F1 & BTEX in Water	8	N/A	2012/10/08	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water	2	2012/10/09	2012/10/10	OTT SOP-00001	CCME Hydrocarbons
Petroleum Hydrocarbons F2-F4 in Water	3	2012/10/09	2012/10/11	OTT SOP-00001	CCME Hydrocarbons
Petroleum Hydrocarbons F2-F4 in Water	8	2012/10/11	2012/10/11	OTT SOP-00001	CCME Hydrocarbons
Dissolved Metals by ICPMS	5	N/A	2012/10/10	CAM SOP-00447	EPA 6020
PAH Compounds in Water by GC/MS (SIM) (1)	14	2012/10/09	2012/10/10	CAM SOP-00318	EPA 8270
Polychlorinated Biphenyl in Water (1)	5	2012/10/09	2012/10/10	CAM SOP-00309	SW846 8082

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. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

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

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Maxxam Job #: B2F5323
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Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

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 #: B2F5323
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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		PC5749	PC5749		PC5750		PC5757		PC5758		PC5788		
Sampling Date		2012/10/02	2012/10/02		2012/10/02		2012/10/04		2012/10/04		2012/10/04		
	Units	**MW05-12**	**MW05-12 Lab-Dup**	**RDL**	**MW04-12**	**RDL**	**MW03-12**	**RDL**	**MW02-12**	**RDL**	**MW01-12**	**RDL**	**QC Batch**
Metals													
Dissolved Antimony (Sb)	ug/L	<0.5	<0.5	0.5	0.7	0.5	<0.5	0.5	<0.5	0.5	2.4	0.5	2996355
Dissolved Arsenic (As)	ug/L	<1	<1	1	1	1	<1	1	<1	1	3	1	2996355
Dissolved Barium (Ba)	ug/L	49	49	2	180	2	67	2	37	2	280	2	2996355
Dissolved Beryllium (Be)	ug/L	<0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	2996355
Dissolved Boron (B)	ug/L	830	870	10	490	10	370	10	510	10	570	10	2996355
Dissolved Cadmium (Cd)	ug/L	<0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.6	0.1	0.2	0.1	2996355
Dissolved Chromium (Cr)	ug/L	<5	<5	5	<5	5	<5	5	<5	5	<5	5	2996355
Dissolved Cobalt (Co)	ug/L	<3	<3	3	3.3	0.5	2.1	0.5	0.7	0.5	3.1	0.5	2996355
Dissolved Copper (Cu)	ug/L	2	2	1	2	1	3	1	<1	1	4	1	2996355
Dissolved Lead (Pb)	ug/L	<0.5	<0.5	0.5	0.8	0.5	<0.5	0.5	<0.5	0.5	3.5	0.5	2996355
Dissolved Molybdenum (Mo)	ug/L	3.3	3.5	0.5	10	0.5	1.8	0.5	<0.5	0.5	5.7	0.5	2996355
Dissolved Nickel (Ni)	ug/L	<5	<5	5	<5	5	<5	5	<1	1	<5	5	2996355
Dissolved Selenium (Se)	ug/L	<2	<2	2	<2	2	6	2	<2	2	<2	2	2996355
Dissolved Silver (Ag)	ug/L	<0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	2996355
Dissolved Sodium (Na)	ug/L	630000	650000	1000	660000	1000	880000	10000	390000	100	160000	100	2996355
Dissolved Thallium (Tl)	ug/L	<0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	2996355
Dissolved Uranium (U)	ug/L	1.0	1.0	0.1	1.4	0.1	1.0	0.1	<0.1	0.1	0.4	0.1	2996355
Dissolved Vanadium (V)	ug/L	<3	<3	3	<3	3	<3	3	1.5	0.5	1.7	0.5	2996355
Dissolved Zinc (Zn)	ug/L	22	23	5	89	5	17	5	<5	5	120	5	2996355

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxamanalytics.com

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Report Date: 2012/10/15

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		PC5751		
Sampling Date		2012/10/02		
	Units	**OQ122C-86**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons				
Benzene	ug/L	<0.20	0.20	2994677
Toluene	ug/L	<0.20	0.20	2994677
Ethylbenzene	ug/L	<0.20	0.20	2994677
o-Xylene	ug/L	<0.20	0.20	2994677
p+m-Xylene	ug/L	<0.40	0.40	2994677
Total Xylenes	ug/L	<0.40	0.40	2994677
F1 (C6-C10)	ug/L	<25	25	2994677
F1 (C6-C10) - BTEX	ug/L	<25	25	2994677
Surrogate Recovery (%)				
1,4-Difluorobenzene	%	93		2994677
4-Bromofluorobenzene	%	89		2994677
D10-Ethylbenzene	%	105		2994677
D4-1,2-Dichloroethane	%	116		2994677

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POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		PC5749	PC5750	PC5757	PC5758	PC5788		
Sampling Date		2012/10/02	2012/10/02	2012/10/04	2012/10/04	2012/10/04		
	Units	**MW05-12**	**MW04-12**	**MW03-12**	**MW02-12**	**MW01-12**	**RDL**	**QC Batch**
PCBs								
Aroclor 1016	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2995937
Aroclor 1221	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2995937
Aroclor 1232	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2995937
Aroclor 1242	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2995937
Aroclor 1248	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2995937
Aroclor 1254	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2995937
Aroclor 1260	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2995937
Aroclor 1262	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2995937
Aroclor 1268	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2995937
Total PCB	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2995937
Surrogate Recovery (%)								
Decachlorobiphenyl	%	92	91	92	82	94		2995937

RDL = Reportable Detection Limit
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O.REG 153 PAHS IN WATER (WATER)

Maxxam ID		PC5749	PC5749	PC5750	PC5751	PC5752	PC5753	PC5754	PC5755		
Sampling Date		2012/10/02	2012/10/02	2012/10/02	2012/10/02	2012/10/03	2012/10/03	2012/10/03	2012/10/03		
	Units	**MW05-12**	**MW05-12 Lab-Dup**	**MW04-12**	**OQ122C-86**	**BH00-1**	**OW122C-86**	**OW506B**	**MW12-16**	**RDL**	**QC Batch**
Calculated Parameters											
Methylnaphthalene, 2-(1-)	ug/L	<0.071		<0.071	<0.071	<0.071	<0.071	<0.071	<0.071	0.071	2993462
Polyaromatic Hydrocarbons											
Acenaphthene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Benzo(a)anthracene	ug/L	<0.050	<0.050	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Benzo(a)pyrene	ug/L	<0.010	<0.010	0.042	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2995892
Benzo(b/j)fluoranthene	ug/L	<0.050	<0.050	0.059	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Chrysene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Dibenz(a,h)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Fluoranthene	ug/L	<0.050	<0.050	0.13	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Fluorene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
1-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Naphthalene	ug/L	<0.050	<0.050	0.061	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Phenanthrene	ug/L	<0.030	<0.030	0.10	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	2995892
Pyrene	ug/L	<0.050	<0.050	0.11	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Surrogate Recovery (%)											
D10-Anthracene	%	90	83	93	116	96	95	98	89		2995892
D14-Terphenyl (FS)	%	104	101	101	109	101	108	107	100		2995892
D8-Acenaphthylene	%	90	85	92	97	94	101	97	95		2995892

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O.REG 153 PAHS IN WATER (WATER)

Maxxam ID		PC5756	PC5757	PC5758	PC5786	PC5787	PC5788	PC5789		
Sampling Date		2012/10/03	2012/10/04	2012/10/04	2012/10/04	2012/10/04	2012/10/04	2012/10/04		
	Units	**OW506A**	**MW03-12**	**MW02-12**	**MW12-11**	**MW12-12**	**MW01-12**	**DUP01-12**	**RDL**	**QC Batch**
Calculated Parameters										
Methylnaphthalene, 2-(1-)	ug/L	<0.071	<0.071	<0.071	31	0.75	<0.071	0.67	0.071	2993462
Polyaromatic Hydrocarbons										
Acenaphthene	ug/L	<0.050	<0.050	<0.050	1.4	<0.050	<0.050	<0.050	0.050	2995892
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	22	0.18	<0.050	0.18	0.050	2995892
Anthracene	ug/L	<0.050	<0.050	<0.050	0.66	<0.050	<0.050	<0.050	0.050	2995892
Benzo(a)anthracene	ug/L	<0.050	<0.050	<0.050	0.27	<0.050	<0.050	<0.050	0.050	2995892
Benzo(a)pyrene	ug/L	<0.010	<0.010	<0.010	0.097	<0.010	<0.010	<0.010	0.010	2995892
Benzo(b/j)fluoranthene	ug/L	<0.050	<0.050	<0.050	0.11	<0.050	<0.050	<0.050	0.050	2995892
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Chrysene	ug/L	<0.050	<0.050	<0.050	0.27	<0.050	<0.050	<0.050	0.050	2995892
Dibenz(a,h)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
Fluoranthene	ug/L	<0.050	<0.050	<0.050	0.74	<0.050	<0.050	<0.050	0.050	2995892
Fluorene	ug/L	<0.050	<0.050	<0.050	4.8	<0.050	<0.050	<0.050	0.050	2995892
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2995892
1-Methylnaphthalene	ug/L	<0.050	0.051	<0.050	30	0.75	<0.050	0.67	0.050	2995892
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	1.3	<0.050	<0.050	<0.050	0.050	2995892
Naphthalene	ug/L	<0.050	0.12	<0.050	57	0.11	0.095	<0.050	0.050	2995892
Phenanthrene	ug/L	<0.030	0.038	<0.030	0.71	<0.030	<0.030	0.030	0.030	2995892
Pyrene	ug/L	<0.050	<0.050	<0.050	1.2	<0.050	<0.050	<0.050	0.050	2995892
Surrogate Recovery (%)										
D10-Anthracene	%	102	91	101	84	86	90	91		2995892
D14-Terphenyl (FS)	%	104	86	90	92	86	95	91		2995892
D8-Acenaphthylene	%	88	95	93	98	95	91	95		2995892

RDL = Reportable Detection Limit
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O'REG 153 PETROLEUM HYDROCARBONS (WATER)

Maxxam ID		PC5749	PC5750	PC5752	PC5753	PC5754		PC5755	PC5756		
Sampling Date		2012/10/02	2012/10/02	2012/10/03	2012/10/03	2012/10/03		2012/10/03	2012/10/03		
	Units	**MW05-12**	**MW04-12**	**BH00-1**	**OW122C-86**	**OW506B**	**QC Batch**	**MW12-16**	**OW506A**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons											
Benzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	2994677	<0.20	<0.20	0.20	2994677
Toluene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	2994677	<0.20	<0.20	0.20	2994677
Ethylbenzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	2994677	<0.20	<0.20	0.20	2994677
o-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	2994677	<0.20	<0.20	0.20	2994677
p+m-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	2994677	<0.40	<0.40	0.40	2994677
Total Xylenes	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	2994677	<0.40	<0.40	0.40	2994677
F1 (C6-C10)	ug/L	<25	<25	<25	<25	<25	2994677	<25	<25	25	2994677
F1 (C6-C10) - BTEX	ug/L	<25	<25	<25	<25	<25	2994677	<25	<25	25	2994677
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	2995119	<100	<100	100	2997784
F3 (C16-C34 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	2995119	<100	<100	100	2997784
F4 (C34-C50 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	2995119	<100	<100	100	2997784
Reached Baseline at C50	ug/L	YES	YES	YES	YES	YES	2995119	YES	YES		2997784
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	93	92	93	91	93	2994677	93	93		2994677
4-Bromofluorobenzene	%	88	90	90	87	88	2994677	90	92		2994677
D10-Ethylbenzene	%	112	115	117	114	117	2994677	107	117		2994677
D4-1,2-Dichloroethane	%	116	116	115	114	117	2994677	116	115		2994677
o-Terphenyl	%	76	72	73	75	74	2995119	76	77		2997784

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O'REG 153 PETROLEUM HYDROCARBONS (WATER)

Maxxam ID		PC5756	PC5757	PC5758	PC5786	PC5787	PC5788	PC5789		
Sampling Date		2012/10/03	2012/10/04	2012/10/04	2012/10/04	2012/10/04	2012/10/04	2012/10/04		
	Units	**OW506A Lab-Dup**	**MW03-12**	**MW02-12**	**MW12-11**	**MW12-12**	**MW01-12**	**DUP01-12**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons										
Benzene	ug/L		<0.20	<0.20	7.5	8.4	<0.20	8.4	0.20	2994677
Toluene	ug/L		<0.20	<0.20	3.1	<0.20	<0.20	0.22	0.20	2994677
Ethylbenzene	ug/L		<0.20	<0.20	76	3.4	<0.20	3.4	0.20	2994677
o-Xylene	ug/L		<0.20	<0.20	30	0.52	<0.20	0.56	0.20	2994677
p+m-Xylene	ug/L		<0.40	<0.40	15	<0.40	<0.40	<0.40	0.40	2994677
Total Xylenes	ug/L		<0.40	<0.40	45	0.52	<0.40	0.56	0.40	2994677
F1 (C6-C10)	ug/L		<25	<25	170	<25	<25	<25	25	2994677
F1 (C6-C10) - BTEX	ug/L		<25	<25	42	<25	<25	<25	25	2994677
F2-F4 Hydrocarbons										
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	760	<100	<100	<100	100	2997784
F3 (C16-C34 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	<100	<100	100	2997784
F4 (C34-C50 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	<100	<100	100	2997784
Reached Baseline at C50	ug/L	YES	YES	YES	YES	YES	YES	YES		2997784
Surrogate Recovery (%)										
1,4-Difluorobenzene	%		93	91	90	94	94	90		2994677
4-Bromofluorobenzene	%		89	89	91	92	88	89		2994677
D10-Ethylbenzene	%		117	114	105	120	120	104		2994677
D4-1,2-Dichloroethane	%		116	114	116	116	114	116		2994677
o-Terphenyl	%	76	76	76	75	77	75	76		2997784

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B2F5323
Report Date: 2012/10/15

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

Test Summary

Maxxam ID PC5749 **Collected** 2012/10/02
Sample ID MW05-12 **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/10	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/07	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2995119	2012/10/09	2012/10/10	Lyndsey Hart
Dissolved Metals by ICPMS	ICP/MS	2996355	N/A	2012/10/10	Raigamage Perera
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller
Polychlorinated Biphenyl in Water	GC/ECD	2995937	2012/10/09	2012/10/10	Li Peng

Maxxam ID PC5749 Dup **Collected** 2012/10/02
Sample ID MW05-12 **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	2996355	N/A	2012/10/10	Raigamage Perera
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller

Maxxam ID PC5750 **Collected** 2012/10/02
Sample ID MW04-12 **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/07	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2995119	2012/10/09	2012/10/10	Lyndsey Hart
Dissolved Metals by ICPMS	ICP/MS	2996355	N/A	2012/10/10	Raigamage Perera
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller
Polychlorinated Biphenyl in Water	GC/ECD	2995937	2012/10/09	2012/10/10	Li Peng

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Maxxam Job #: B2F5323
Report Date: 2012/10/15

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

Test Summary

Maxxam ID PC5751 **Collected** 2012/10/02
Sample ID OQ122C-86 **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/07	Steve Roberts
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller

Maxxam ID PC5752 **Collected** 2012/10/03
Sample ID BH00-1 **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/07	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2995119	2012/10/09	2012/10/11	Lyndsey Hart
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller

Maxxam ID PC5753 **Collected** 2012/10/03
Sample ID OW122C-86 **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/07	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2995119	2012/10/09	2012/10/11	Lyndsey Hart
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller

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Report Date: 2012/10/15

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

Test Summary

Maxxam ID PC5754 **Collected** 2012/10/03
Sample ID OW506B **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/07	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2995119	2012/10/09	2012/10/11	Lyndsey Hart
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller

Maxxam ID PC5755 **Collected** 2012/10/03
Sample ID MW12-16 **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/08	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2997784	2012/10/11	2012/10/11	Lyndsey Hart
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller

Maxxam ID PC5756 **Collected** 2012/10/03
Sample ID OW506A **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/08	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2997784	2012/10/11	2012/10/11	Lyndsey Hart
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller

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Report Date: 2012/10/15

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

Test Summary

Maxxam ID PC5756 Dup
Sample ID OW506A
Matrix Water

Collected 2012/10/03
Shipped
Received 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2997784	2012/10/11	2012/10/11	Lyndsey Hart

Maxxam ID PC5757
Sample ID MW03-12
Matrix Water

Collected 2012/10/04
Shipped
Received 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/08	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2997784	2012/10/11	2012/10/11	Lyndsey Hart
Dissolved Metals by ICPMS	ICP/MS	2996355	N/A	2012/10/10	Raigamage Perera
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller
Polychlorinated Biphenyl in Water	GC/ECD	2995937	2012/10/09	2012/10/10	Li Peng

Maxxam ID PC5758
Sample ID MW02-12
Matrix Water

Collected 2012/10/04
Shipped
Received 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/08	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2997784	2012/10/11	2012/10/11	Lyndsey Hart
Dissolved Metals by ICPMS	ICP/MS	2996355	N/A	2012/10/10	Raigamage Perera
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller
Polychlorinated Biphenyl in Water	GC/ECD	2995937	2012/10/09	2012/10/10	Li Peng

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Maxxam Job #: B2F5323
Report Date: 2012/10/15

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

Test Summary

Maxxam ID PC5786 **Collected** 2012/10/04
Sample ID MW12-11 **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/08	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2997784	2012/10/11	2012/10/11	Lyndsey Hart
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller

Maxxam ID PC5787 **Collected** 2012/10/04
Sample ID MW12-12 **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/08	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2997784	2012/10/11	2012/10/11	Lyndsey Hart
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller

Maxxam ID PC5788 **Collected** 2012/10/04
Sample ID MW01-12 **Shipped**
Matrix Water **Received** 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/08	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2997784	2012/10/11	2012/10/11	Lyndsey Hart
Dissolved Metals by ICPMS	ICP/MS	2996355	N/A	2012/10/10	Raigamage Perera
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller
Polychlorinated Biphenyl in Water	GC/ECD	2995937	2012/10/09	2012/10/10	Li Peng

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Report Date: 2012/10/15

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Sampler Initials: PC

Test Summary

Maxxam ID PC5789
Sample ID DUP01-12
Matrix Water

Collected 2012/10/04
Shipped
Received 2012/10/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Methylnaphthalene Sum	CALC	2993462	N/A	2012/10/12	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2994677	N/A	2012/10/08	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2997784	2012/10/11	2012/10/11	Lyndsey Hart
PAH Compounds in Water by GC/MS (SIM)	GC/MS	2995892	2012/10/09	2012/10/10	Darryl Tiller

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Report Date: 2012/10/15

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

Package 1	18.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Sample PC5749-01: Metal Analysis:
Sample was diluted due to high concentrations of Sodium and Calcium. RDL's were adjusted accordingly.
RDL's of Vanadium, Nickel and Cobalt were adjusted due to high concentrations of Chloride and Calcium respectively.

Sample PC5750-01: Metal Analysis:
Sample was diluted due to high concentrations of Sodium. RDL was adjusted accordingly.
RDL's of Vanadium and Nickel were adjusted due to high concentrations of Chloride and Calcium respectively.

Sample PC5757-01: Metal Analysis:
Sample was diluted due to high concentrations of Sodium. RDL was adjusted accordingly.
RDL's of Vanadium and Nickel were adjusted due to high concentrations of Chloride and Calcium respectively.

Sample PC5788-01: Metal Analysis:
RDL of Nickel was adjusted due to high concentration of Calcium.

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Report Date: 2012/10/15

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

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
2994677	1,4-Difluorobenzene	2012/10/07	93	70 - 130	94	70 - 130	92	%		
2994677	4-Bromofluorobenzene	2012/10/07	90	70 - 130	89	70 - 130	88	%		
2994677	D10-Ethylbenzene	2012/10/07	107	70 - 130	115	70 - 130	112	%		
2994677	D4-1,2-Dichloroethane	2012/10/07	118	70 - 130	116	70 - 130	115	%		
2994677	Benzene	2012/10/07	120	70 - 130	130	70 - 130	<0.20	ug/L	NC	40
2994677	Toluene	2012/10/07	90	70 - 130	102	70 - 130	<0.20	ug/L	NC	40
2994677	Ethylbenzene	2012/10/07	90	70 - 130	108	70 - 130	<0.20	ug/L	NC	40
2994677	o-Xylene	2012/10/07	82	70 - 130	99	70 - 130	<0.20	ug/L	NC	40
2994677	p+m-Xylene	2012/10/07	77	70 - 130	93	70 - 130	<0.40	ug/L	NC	40
2994677	F1 (C6-C10)	2012/10/07	73	70 - 130	97	70 - 130	<25	ug/L	NC	40
2994677	Total Xylenes	2012/10/07					<0.40	ug/L	NC	40
2994677	F1 (C6-C10) - BTEX	2012/10/07					<25	ug/L	NC	40
2995119	o-Terphenyl	2012/10/10	81	30 - 130	80	30 - 130	80	%		
2995119	F2 (C10-C16 Hydrocarbons)	2012/10/10	84	50 - 130	85	70 - 130	<100	ug/L	NC	50
2995119	F3 (C16-C34 Hydrocarbons)	2012/10/10	84	50 - 130	85	70 - 130	<100	ug/L	NC	50
2995119	F4 (C34-C50 Hydrocarbons)	2012/10/10	84	50 - 130	85	70 - 130	<100	ug/L	NC	50
2995892	D10-Anthracene	2012/10/10	94	50 - 130	95	50 - 130	89	%		
2995892	D14-Terphenyl (FS)	2012/10/10	102	50 - 130	100	50 - 130	104	%		
2995892	D8-Acenaphthylene	2012/10/10	95	50 - 130	99	50 - 130	99	%		
2995892	Acenaphthene	2012/10/10	87	50 - 130	91	50 - 130	<0.050	ug/L	NC	30
2995892	Acenaphthylene	2012/10/10	91	50 - 130	95	50 - 130	<0.050	ug/L	NC	30
2995892	Anthracene	2012/10/10	91	50 - 130	93	50 - 130	<0.050	ug/L	NC	30
2995892	Benzo(a)anthracene	2012/10/10	92	50 - 130	91	50 - 130	<0.050	ug/L	NC	30
2995892	Benzo(a)pyrene	2012/10/10	89	50 - 130	84	50 - 130	<0.010	ug/L	NC	30
2995892	Benzo(b/j)fluoranthene	2012/10/10	88	50 - 130	81	50 - 130	<0.050	ug/L	NC	30
2995892	Benzo(g,h,i)perylene	2012/10/10	82	50 - 130	76	50 - 130	<0.050	ug/L	NC	30
2995892	Benzo(k)fluoranthene	2012/10/10	90	50 - 130	83	50 - 130	<0.050	ug/L	NC	30
2995892	Chrysene	2012/10/10	89	50 - 130	85	50 - 130	<0.050	ug/L	NC	30
2995892	Dibenz(a,h)anthracene	2012/10/10	85	50 - 130	77	50 - 130	<0.050	ug/L	NC	30
2995892	Fluoranthene	2012/10/10	96	50 - 130	96	50 - 130	<0.050	ug/L	NC	30
2995892	Fluorene	2012/10/10	105	50 - 130	98	50 - 130	<0.050	ug/L	NC	30
2995892	Indeno(1,2,3-cd)pyrene	2012/10/10	83	50 - 130	78	50 - 130	<0.050	ug/L	NC	30
2995892	1-Methylnaphthalene	2012/10/10	85	50 - 130	89	50 - 130	<0.050	ug/L	NC	30
2995892	2-Methylnaphthalene	2012/10/10	98	50 - 130	101	50 - 130	<0.050	ug/L	NC	30
2995892	Naphthalene	2012/10/10	83	50 - 130	88	50 - 130	<0.050	ug/L	NC	30
2995892	Phenanthrene	2012/10/10	91	50 - 130	93	50 - 130	<0.030	ug/L	NC	30
2995892	Pyrene	2012/10/10	100	50 - 130	99	50 - 130	<0.050	ug/L	NC	30
2995937	Decachlorobiphenyl	2012/10/10	91	60 - 130	92	60 - 130	95	%		
2995937	Aroclor 1260	2012/10/10	87	60 - 130	87	60 - 130	<0.05	ug/L	NC	30
2995937	Total PCB	2012/10/10	87	60 - 130	87	60 - 130	<0.05	ug/L	NC	40

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Report Date: 2012/10/15

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

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
2995937	Aroclor 1016	2012/10/10					<0.05	ug/L		
2995937	Aroclor 1221	2012/10/10					<0.05	ug/L		
2995937	Aroclor 1232	2012/10/10					<0.05	ug/L		
2995937	Aroclor 1242	2012/10/10					<0.05	ug/L	NC	30
2995937	Aroclor 1248	2012/10/10					<0.05	ug/L	NC	30
2995937	Aroclor 1254	2012/10/10					<0.05	ug/L	NC	30
2995937	Aroclor 1262	2012/10/10					<0.05	ug/L		
2995937	Aroclor 1268	2012/10/10					<0.05	ug/L		
2996355	Dissolved Antimony (Sb)	2012/10/10	108	80 - 120	104	80 - 120	<0.5	ug/L	NC	25
2996355	Dissolved Arsenic (As)	2012/10/10	105	80 - 120	103	80 - 120	<1	ug/L	NC	25
2996355	Dissolved Barium (Ba)	2012/10/10	99	80 - 120	103	80 - 120	<2	ug/L	0.07	25
2996355	Dissolved Beryllium (Be)	2012/10/10	99	80 - 120	102	80 - 120	<0.5	ug/L	NC	25
2996355	Dissolved Boron (B)	2012/10/10	NC	80 - 120	97	80 - 120	<10	ug/L	4.4	25
2996355	Dissolved Cadmium (Cd)	2012/10/10	101	80 - 120	104	80 - 120	<0.1	ug/L	NC	25
2996355	Dissolved Chromium (Cr)	2012/10/10	98	80 - 120	102	80 - 120	<5	ug/L	NC	25
2996355	Dissolved Cobalt (Co)	2012/10/10	98	80 - 120	103	80 - 120	<0.5	ug/L	NC	25
2996355	Dissolved Copper (Cu)	2012/10/10	91	80 - 120	101	80 - 120	<1	ug/L	NC	25
2996355	Dissolved Lead (Pb)	2012/10/10	94	80 - 120	103	80 - 120	<0.5	ug/L	NC	25
2996355	Dissolved Molybdenum (Mo)	2012/10/10	109	80 - 120	104	80 - 120	<0.5	ug/L	4.8	25
2996355	Dissolved Nickel (Ni)	2012/10/10	94	80 - 120	103	80 - 120	<1	ug/L	NC	25
2996355	Dissolved Selenium (Se)	2012/10/10	105	80 - 120	105	80 - 120	<2	ug/L	NC	25
2996355	Dissolved Silver (Ag)	2012/10/10	82	80 - 120	100	80 - 120	<0.1	ug/L	NC	25
2996355	Dissolved Sodium (Na)	2012/10/10	NC	80 - 120	105	80 - 120	<100	ug/L	3.4	25
2996355	Dissolved Thallium (Tl)	2012/10/10	93	80 - 120	102	80 - 120	<0.05	ug/L	NC	25
2996355	Dissolved Uranium (U)	2012/10/10	96	80 - 120	102	80 - 120	<0.1	ug/L	4.6	25
2996355	Dissolved Vanadium (V)	2012/10/10	102	80 - 120	105	80 - 120	<0.5	ug/L	NC	25
2996355	Dissolved Zinc (Zn)	2012/10/10	95	80 - 120	102	80 - 120	<5	ug/L	NC	25
2997784	o-Terphenyl	2012/10/11	88	30 - 130	80	30 - 130	77	%		
2997784	F2 (C10-C16 Hydrocarbons)	2012/10/11	85	50 - 130	88	70 - 130	<100	ug/L	NC	50
2997784	F3 (C16-C34 Hydrocarbons)	2012/10/11	85	50 - 130	88	70 - 130	<100	ug/L	NC	50
2997784	F4 (C34-C50 Hydrocarbons)	2012/10/11	85	50 - 130	88	70 - 130	<100	ug/L	NC	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.
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.

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxamanalytics.com

Maxxam Job #: B2F5323
Report Date: 2012/10/15

Franz Environmental Inc
Client Project #: 1329-1202

Sampler Initials: PC

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 relia
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.

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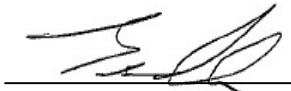
Validation Signature Page

Maxxam Job #: B2F5323

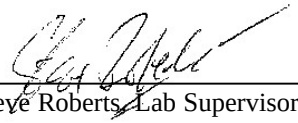
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Brad Newman, Scientific Specialist

Paul Rubinato, Analyst, Maxxam Analytics

Alina Segal, Manager Main Lab - Organics



Steve Roberts, Lab Supervisor, Ottawa

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Validation Signature Page

Maxxam Job #: B2F5323

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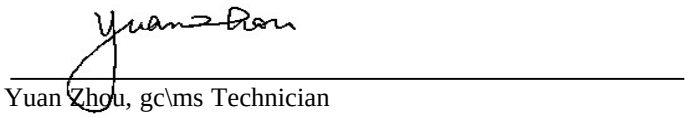

Yuan Zhou, gc\ms Technician

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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.

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APPENDIX D

Borehole Logs

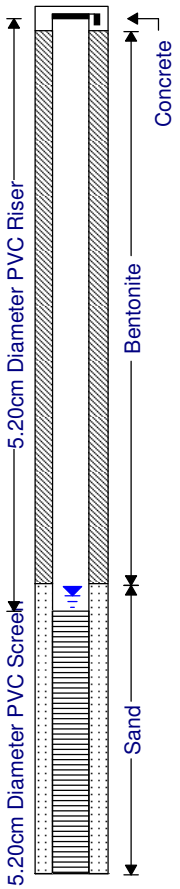
BOREHOLE/MONITORING WELL #: BH1-12

BOREHOLE LOG

Project No: 1329-1202
Project: UoO Remedial Planning
Client: UOttawa
Borehole Location: BH1-12

TOC Elevation: 62.19984 m asl
Water Level: 6.83 m btoc
Water Level Elevation: 55.37 m asl
Bottom of Well Depth: 9.96 m btoc

SUBSURFACE PROFILE				SAMPLE						
Depth (m)	Symbol	Description	Elevation (m) * / Depth (m bgs)	Sample ID	Sample Type	Sample Recovery	Organic Vapour Measurements (ppm)	Lab Analyses	Well Completion Details	Depth (m)
0.0		Ground Surface	62.200							0.0
0.5		***Sand***	0.000							0.5
1.0		Brownish sand		C1	C	30%	0			1.0
1.5			60.680							1.5
2.0		***Sand and Debris***	1.520							2.0
2.5		Sand/ash, glass, debris		C2	C	23%	0			2.5
3.0										3.0
3.5		Blackish sand/ash, plastic/fabric debris		C3	C	29%	0			3.5
4.0										4.0
4.5			57.200							4.5
5.0		***Sand***	5.000	C4	C	90%	0			5.0
5.5		Grey wet sand	56.500							5.5
6.0		***Sand and Gravel***	5.700							6.0
6.5		Brown sand and gravel, moist		C5	C	100%	0			6.5
7.0										7.0
7.5										7.5
8.0		Grey sand and gravel, moist		C6	C	59%	0			8.0
8.5										8.5
9.0										9.0
9.5		Grey sand, gravel and cobbles, moist		C7	C	100%	0			9.5
10.0										10.0
10.5			51.500							10.5
11.0		End of Borehole	10.700							11.0
11.5										11.5
12.0										12.0



Drilled By: Strata Soil Drilling
Drill Method: GEO Probe
Drill Date: September 30, 2012
Logged by: Kim Krug

Well Pipe Diameter: 5.20cm
Borehole Diameter: 10.92cm
Checked by: Julie Dittburner
Sheet: 1 of 1

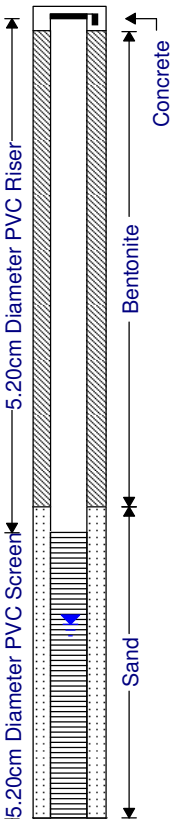
BOREHOLE/MONITORING WELL #: BH2-12

BOREHOLE LOG

Project No: 1329-1202
Project: UoO Remedial Planning
Client: UOttawa
Borehole Location: BH2-12

TOC Elevation: 61.78576 m asl
Water Level: 7.16 m btoc
Water Level Elevation: 54.63 m asl
Bottom of Well Depth: 9.26m btoc

SUBSURFACE PROFILE				SAMPLE					
Depth (m)	Symbol	Description	Elevation (m) * / Depth (m bgs)	Sample ID	Sample Type	Sample Recovery	Organic Vapour Measurements (ppm)	Lab Analyses	Well Completion Details
0.0		Ground Surface	61.786						
0.0		***Topsoil*** Black, dry	0.000						
0.5		***Ash*** Brown, dry ash		C1	C	40%	0		
1.0									
1.5			59.936	C2	C	22%	0		
2.0		***Brick/Concrete*** Used auger to get through brick/concrete	1.850						
2.5			59.046						
3.0		***Ash*** Brown, dry ash, residue brick	2.740	C3	C	21%	0		
3.5									
4.0		***Sand with Gravel*** Black staining, moist with cobbles	57.426	C4	C	41%	0		
4.5		***Sand and Gravel*** Brown, moist with cobbles	4.360						
5.0				C5	C	91%	0		
5.5									
6.0			55.376	C6	C	76%	0		
6.5			6.410						
7.0		No soil samples collected below 6.5 metres, auger used only.							
7.5									
8.0									
8.5									
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									



Drilled By: Strata Soil Drilling
Drill Method: GEO Probe
Drill Date: September 30, 2012
Logged by: Kim Krug

Well Pipe Diameter: 5.20cm
Borehole Diameter: 10.92cm
Checked by: Julie Dittburner
Sheet: 1 of 1

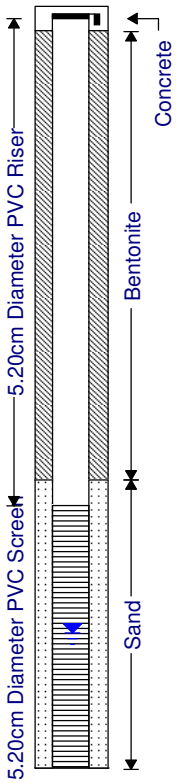
BOREHOLE/MONITORING WELL #: BH3-12

BOREHOLE LOG

Project No: 1329-1202
Project: UoO Remedial Planning
Client: UOttawa
Borehole Location: BH3-12

TOC Elevation: 62.02383 m asl
Water Level: 7.26 m btoc
Water Level Elevation: 54.76 m asl
Bottom of Well Depth: 8.60 m btoc

SUBSURFACE PROFILE				SAMPLE						
Depth (m)	Symbol	Description	Elevation (m) * / Depth (m bgs)	Sample ID	Sample Type	Sample Recovery	Organic Vapour Measurements (ppm)	Lab Analyses	Well Completion Details	Depth (m)
0.0		Ground Surface	62.024							0.0
0.0		***Topsoil*** Topsoil	0.000							0.0
0.5										0.5
1.0		Brownish sand		C1	C	33%	0			1.0
1.5		Darker sand	60.504 1.520							1.5
2.0		***Sand***								2.0
2.5		Blackish sand/ ash		C2	C	23%	0			2.5
3.0										3.0
3.5		Blackish sand/debris (brick pieces)		C3	C	13%	0			3.5
4.0										4.0
4.5										4.5
5.0										5.0
5.5			56.424	C4	C	41%	0			5.5
6.0		***Silty Sand*** Greenish silty sand, moist	5.600 55.924							6.0
6.5		***Sand***	6.100	C5	C	16%	0			6.5
7.0		Sand	54.624							7.0
7.5		***Sand and Gravel***	7.400							7.5
8.0		Dark sand and gravel		C6	C	14%	140			8.0
8.5										8.5
9.0										9.0
9.5										9.5
10.0			52.024							10.0
10.0		End of Borehole	10.000							10.0
10.5										10.5
11.0										11.0
11.5										11.5
12.0										12.0



Drilled By: Strata Soil Drilling
Drill Method: GEO Probe
Drill Date: September 30, 2012
Logged by: Kim Krug

Well Pipe Diameter: 5.20cm
Borehole Diameter: 10.92cm
Checked by: Julie Dittburner
Sheet: 1 of 1

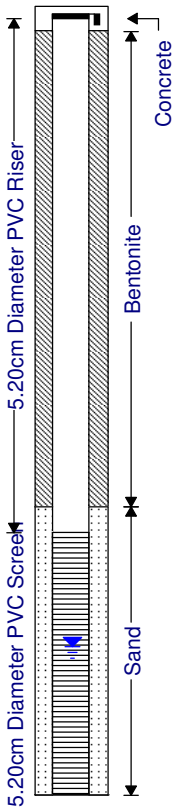
BOREHOLE/MONITORING WELL #: BH4-12

BOREHOLE LOG

Project No: 1329-1202
Project: UoO Remedial Planning
Client: UOttawa
Borehole Location: BH4-12

TOC Elevation: 61.88902 m asl
Water Level: 7.42 m btoc
Water Level Elevation: 54.47 m asl
Bottom of Well Depth: 9.10 m btoc

SUBSURFACE PROFILE				SAMPLE						
Depth (m)	Symbol	Description	Elevation (m) * / Depth (m bgs)	Sample ID	Sample Type	Sample Recovery	Organic Vapour Measurements (ppm)	Lab Analyses	Well Completion Details	Depth (m)
0.0		Ground Surface	61.889							0.0
0.0		***Sand and Gravel***	0.000							0.0
0.5		Dark borwn/blackish sand, some cobbles		C1	C	10%	0			0.5
1.0										1.0
1.5			60.369							1.5
1.5		***Sand***	1.520							1.5
2.0		Blackish sand/ash		C2	C	30%	0			2.0
2.5										2.5
3.0										3.0
3.5		Fine and coarse dark sand; debris (wood)		C3	C	33%	0			3.5
4.0										4.0
4.5			57.189							4.5
5.0		***Silty Sand***	4.700							5.0
5.5		Greenish silty sand		C4	C	100%	0			5.5
6.0										6.0
6.5				C5	C	100%	0			6.5
7.0										7.0
7.5			54.289							7.5
8.0		***Sand***	7.600							8.0
		Sand	53.789							
8.5		***Sand and Gravel***	8.100	C6	C	100%	10			8.5
9.0		Brownish sand, gravel, and cobbles								9.0
9.5			52.289	C7	C	62%	10			9.5
10.0		End of Borehole	9.600							10.0
10.5										10.5
11.0										11.0
11.5										11.5
12.0										12.0



Drilled By: Strata Soil Drilling
Drill Method: GEO Probe
Drill Date: September 30, 2012
Logged by: Kim Krug

Well Pipe Diameter: 5.20cm
Borehole Diameter: 10.92cm
Checked by: Julie Dittburner
Sheet: 1 of 1

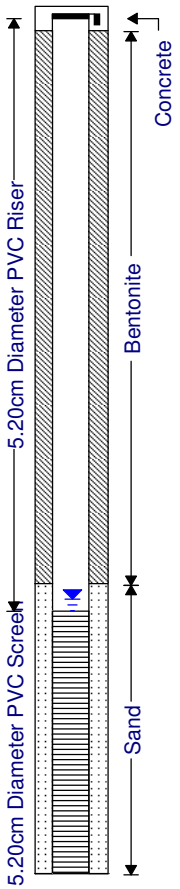
BOREHOLE/MONITORING WELL #: BH5-12

BOREHOLE LOG

Project No: 1329-1202
Project: UoO Remedial Planning
Client: UOttawa
Borehole Location: BH5-12

TOC Elevation: 61.86364 m asl
Water Level: 6.87 m btoc
Water Level Elevation: 54.99 m asl
Bottom of Well Depth: 10.04 m btoc

SUBSURFACE PROFILE				SAMPLE						
Depth (m)	Symbol	Description	Elevation (m) * / Depth (m bgs)	Sample ID	Sample Type	Sample Recovery	Organic Vapour Measurements (ppm)	Lab Analyses	Well Completion Details	Depth (m)
		Ground Surface	61.864							
0.0		***Sand***	0.000							0.0
0.5										0.5
1.0		Black sand, dry		C1	C	55%	0			1.0
1.5										1.5
2.0										2.0
2.5		Black sand containing ash, dry		C2	C	45%	0			2.5
3.0										3.0
3.5										3.5
4.0		Grey sand with ash, moist		C3	C	35%	0			4.0
4.5										4.5
5.0										5.0
5.5		Grey sand with ash, moist		C4	C	100%	0			5.5
6.0										6.0
6.5										6.5
7.0		Grey sand, moist		C5	C	100%	0			7.0
7.5										7.5
8.0										8.0
8.5		Grey sand, moist		C6	C	100%	10			8.5
			52.864							
9.0		***Sand and Gravel***	9.000							9.0
9.5		Brown cobbles, wet		C7	C	100%	10			9.5
10.0			51.764							10.0
		End of Borehole	10.100							
10.5										10.5
11.0										11.0
11.5										11.5
12.0										12.0



Drilled By: Strata Soil Drilling
Drill Method: GEO Probe
Drill Date: September 30, 2012
Logged by: Kim Krug

Well Pipe Diameter: 5.20cm
Borehole Diameter: 10.92cm
Checked by: Julie Dittburner
Sheet: 1 of 1