FRANZ ENVIRONMENTAL INC.

◆ CONSULTING ◆ ENGINEERING ◆ TECHNOLOGIES ◆

Long-Term Monitoring, 2012
CAM-D, Simpson Lake, Nunavut

FINAL REPORT

Prepared for:

Aboriginal Affairs and Northern Development Canada
Contaminated Sites Directorate
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EXECUTIVE SUMMARY

Franz Environmental Inc. (FRANZ) was retained by Aboriginal and Northern Affairs Canada - Nunavut Regional Office (AANDC) to conduct the first year of long-term monitoring activities at the former CAM-D Distant Early Warning (DEW) Line site at Simpson Lake, Nunavut as prescribed by AANDC's CAM-D Simpson Lake Long-Term Monitoring Plan. This project was completed under AANDC standing offer number 01-11-6001/5, call-up number 02; file number 1632-11/01-011-6001/5.

The CAM-D Simpson Lake site (the Site) is centrally located on the Boothia Peninsula, approximately 80 km west of Kugaaruk, 120 km southeast of Taloyoak, and 160 km east of Gjoa Haven within the Kitikmeot Region, Nunavut, at the general latitude of 68°35'N and general longitude 91°57'W. CAM-D was an Intermediate DEW line site and was operated from 1957 until 1963, when it was vacated and abandoned.

In 1985, AANDC (then INAC), the Department of National Defence (DND) and Environment Canada (EC) conducted a partial clean up of the Site and other potential environmental hazards were identified. Between 1992 and 1995, a Short Range Radar (SRR) facility, part of the North Warning System was constructed approximately one kilometre east of the Site. The SRR is automated and currently operational; it was not part of the CAM-D remediation project. A remediation project led by AANDC was conducted at the Site between 2008 and 2011. All hazardous waste materials were shipped off site for disposal. All non-hazardous debris, demolition waste and impacted soils were placed in a non-hazardous waste landfill (NHWL) constructed on-site. In 2011, four groundwater monitoring wells were installed around the perimeter of the NHWL and the landfill was closed.

FRANZ conducted the field activities for the first year of the CAM-D long-term monitoring program on August 7, 2012 while based in the nearby community of Gjoa Haven, NU. Overall, physical observations indicate that the NHWL is in excellent condition and is performing as designed to contain the enclosed waste. A single, minor erosion rill was observed at the top of southwest berm of the NHWL and two areas of ponded water were observed near the south corner of the landfill. These features, while noted, are not considered to be of any consequence to the landfill integrity at the present time.

In addition to physical observations, FRANZ collected soil and groundwater samples to assess the performance of the NHWL, and to establish a "year-one" baseline chemical profile of the landfill. Of the four groundwater monitoring wells installed around the NHWL, three were sampled. The monitoring well along the northwest side of the NHWL was frozen; no sample was collected from this well. Four soil monitoring points were established adjacent to, and

within a two to four metre radius of the existing monitoring wells. Two soil samples were collected from each of the four soil monitoring locations; one near the surface (0-0.15 m) at one at depth (0.4-0.5 m). Analytical results for soil samples collected around the NHWL satisfy applicable guidelines for contaminants of potential concern at the site. As no historical groundwater data was available, the average concentration and the range (minimum and maximum) for each parameter are presented for the metals and inorganic parameters for reference purposes. The duplicate sample was not included in the calculations. No anomalous concentrations of contaminants of concern were noted.

The road from the airstrip to the NHWL had evidence of erosion and one culvert was deteriorating. The airstrip remains in good condition.

Based on the results of the first year of long-term monitoring, FRANZ recommends continued monitoring of the erosion rill along the southwest side of NHWL and the road from the airstrip to the NHWL.

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

TABLE OF CONTENTS

LIST OF FIGURES (Appendix A)

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

Franz Environmental Inc. (FRANZ) was retained by Aboriginal Affairs and Northern Development Canada– Nunavut Regional Office (AANDC) to conduct long-term monitoring activities at the former CAM-D DEW Line site. This project was completed under AANDC standing offer number 01-11-6001/5, call-up number 02; file number 1632-11/01-011-6001/5.

This report describes the monitoring activities completed for AANDC at CAM-D and was prepared in accordance with the AANDC Request for Proposal (RFP). It was prepared in accordance with the FRANZ Proposal No. P-4178, dated June 7, 2012, the Call-up details, dated June 18, 2012 and the July 12, 2012 Project Initiating Meeting.

Throughout this report the CAM-D DEW Line site will be referred to as "the Site".

1.1 Project Objectives

The principal objective of the first year of the long-term monitoring program was to evaluate the performance of the NHWL to ensure that it is performing as intended. To achieve this objective, visual observation, chemical analyses (where warranted and possible), and groundwater and soil sampling activities were conducted at the Site as well as interviews with members of the nearby community knowledgeable of local activities at the Site.

1.2 Scope of Work

The scope of work as described in the Long-Term Monitoring (LTM) Plan was as follows:

1. Visual monitoring of the general site conditions including borrow areas, excavation areas, regrades etc.;
2. Natural environmental monitoring as detailed in the AMSRP;
3. Visual monitoring of the NHWL including:
    - Checking the physical integrity of the NHWL and observing any evidence of erosion, ponding, frost action, settlement and lateral movement and completing a visual monitoring checklist.
    - Taking photographs to document the condition of NHWL, and substantiate the recorded observations.
4. Active layer water (groundwater) monitoring of the NHWL, including:
    - Collection of samples from the four monitoring wells installed around the NHWL.
    - Examination and analysis of the samples for colour, hardness, pH, conductivity, temperature, total and dissolved metals (arsenic, cadmium, chromium, cobalt, copper, lead, nickel, and zinc), polychlorinated biphenyls (PCBs), petroleum hydrocarbons (PHCs), major ions (fluoride, orthophosphate, dissolved sulphate,

dissolved chloride, nitrite, nitrate), total dissolved solids (TDS), and total suspended solids (TSS).

5. Soil monitoring in the area around the NHWL, including:
   - Establishment of four soil monitoring points associated with the existing groundwater monitoring wells around the perimeter of the NHWL.
   - Collection of baseline soil samples from the established soil monitoring points.
   - Collection of soil samples in areas of seepage and/or staining identified during the visual monitoring:
   - Analysis of the soil samples for metals (arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, and zinc), PCBs and PHCs.
6. Natural environment monitoring:
   - Documentation of observations of wildlife and evidence of wildlife present at the Site.
   - Interview with member(s) of the local Hunters and Trappers Organization or other persons knowledgeable of the Site; collection of anecdotal information relevant to the use of the Site by humans.
7. Preparation of a report documenting the 2012 monitoring program.

To fulfill the scope of work as described above, FRANZ along with AANDC, devised a work plan that included the following tasks:

a) Preparation of a health and safety plan;
b) Preparation of a sampling plan for soil and groundwater;
c) Excavation of test pits;
d) Collection of soil samples for chemical analysis;
e) Obtaining groundwater samples from wells for chemical analysis;
f) Interpretation of analytical data;
g) Visual inspection, measurement and photo documentation of the Site;
h) Interviewing local residents and officials to understand land use and wildlife trends; and
i) Reporting.

The work plan for the 2012 field work was primarily based on the following documents:

- CAM-D Simpson Lake Long-Term Monitoring Plan, 2010. Indian and Northern Affairs Canada; and
- CAM-D Water Licence No 1BR-SIM0813, 2008. Nunavut Water Board.

1.3 Report Format

The long-term monitoring report presented herein is structured as follows:

Section 1 – *Introduction:* Provides general background information and outlines the scope and objectives of this study.

Section 2 – *Background Information:* Describes the history, the regional and physical setting and the general characteristics of the Site.

Section 3 – *Regulatory Guidelines:* Presents the evaluation guidelines used for the assessment of chemical impacts and provides context for the use of certain environmental quality guidelines to assess impacts and screen chemicals of concern.

Section 4 – *Investigative Methodology:* Presents the methodology, level of effort and details of the field investigations.

Section 5 – *Summary of NHWL Conditions:* Describes the physical characteristics of the NHWL and the results of chemical analysis of soil and groundwater samples collected at the NHWL.

Section 6 – *Surrounding Area and the Natural Environment:* Describes observations of the physical conditions of the remainder of the Site infrastructure and describes the physical observations of flora and fauna present at the Site

Section 7 – *Conclusions and Recommendations:* Presents main findings and conclusions as well as recommendations for the next visit to the Site.

Section 8 – *Limitations*

Section 9 – *References*

Section 10 – *Closure*

2.0 BACKGROUND INFORMATION

2.1 Site Description

The CAM-D Simpson Lake site (the Site) is within the Kitikmeot Region of Nunavut and is centrally located on the Boothia Peninsula, approximately 80 km west of Kugaaruk, 120 km southeast of Taloyoak, and 160 km east of Gjoa Haven at the general latitude of 68°35'N and general longitude 91°57'W.

CAM-D Simpson Lake, Nunavut was an Intermediate DEW Line site constructed in 1957 and abandoned in 1963. The custody of the site was assumed by AANDC (then INAC) in 1965. Between 1992 and 1995 the Department of National Defence (DND) constructed an automated Short Range Radar (SRR) facility, part of the North Warning System, approximately one kilometre east of the former the CAM-D DEW Line site. The SRR facility is currently operational and was not included as part of the CAM-D remediation program.

Historic Site infrastructure consisted of a module train, warehouse, garage, Inuit house, POL tanks, Quonset huts, storage pads, a radar tower and a 750 m airstrip. The main station buildings were located at Ross Hills at an elevation of 370 m. In 1985 AANDC (then INAC), DND and Environment Canada (EC) conducted a partial clean up of the Site; some hazardous materials were removed from the Site and other potential environmental hazards were identified.

The Environmental Sciences Group of Royal Roads Military College conducted a scientific investigation of the CAM-D Site in 1994 during which soil sampling took place that identified Tier I and Tier II contaminated soils, as defined by the Abandoned Military Site Remediation Protocol (AMSRP). The impacts were predominantly associated with the five dumps or debris areas identified at the Site (Main Dump, POL Area Dump, Vehicle Dump, Large Barrel Dump and the Pallet Line Area). As has been the practice at similar DEW line facilities, a detailed site investigation was undertaken prior to the commencement of remediation activities. The CAM-D site remediation activities took place between 2008 and 2011 including construction of a non-hazardous waste landfill (NHWL).

The NHWL was designed to contain non-hazardous materials only. The NHWL was constructed on native ground, with all organic matter removed, and consists of four perimeter berms constructed of granular material. The following material is contained within the NHWL at CAM-D:

- Tier I contaminated soil (Lead concentration between 200 and 500 ppm and PCB concentrations between 1 and 5 ppm);
- PHC F3 and F4 contaminated soil;
- Non-hazardous demolition debris, such as timbers, plywood, and sheet metal;

- Non-hazardous site debris, such as scrap metal and wood;
- Non-hazardous debris/soil excavated from landfills;
- Creosote timbers; and
- Double-bagged asbestos.

Groundwater at the Site is not considered to be used for water supply purposes as the Site is not inhabited, nor is the area reported to be used by hunters and fishermen with any frequency.

2.2 Previous Monitoring Programs

The 2012 monitoring program was the first of seven scheduled over a 25 year period for the Site.

The post construction landfill monitoring frequency will follow the schedule recommended in the INAC AMSRP (2009). The three phases recommended by the protocol are:

- Phase I: years 1, 3 and 5
- Phase II (*if required*): Years 7, 10, 15 and 25
- Phase III (*if required*): beyond 25 years

The monitoring program will conclude if, after Phase I monitoring (5 years post remediation) an evaluation of the program confirms that there are no stability or environmental issues. Otherwise, monitoring will continue into Phase II. (i.e., up to 25 years post remediation). Another evaluation will be conducted at the end of 25 years to determine if monitoring should be concluded or enter Phase III. If required, the Phase III monitoring requirements will be determined based on results of the previous monitoring program evaluations.

To become familiar with the site, FRANZ reviewed the following reports pertaining to the DEW Lines sites:

- CAM-D Simpson Lake Long-Term Monitoring Plan, February 22, 2010, AANDC (Formerly INAC);
- CAM-D Long Term Monitoring NWB Water License 1BR-SIM0813, 2008, Nunavut Water Board; and
- Abandoned Military Site Remediation Protocol, March 2009, Indian and Northern Affairs Canada (now AANDC), Contaminated Sites Program.

3.0 REGULATORY AND OTHER GUIDELINES

3.1 Guideline Review

Where guidelines were developed, criteria presented in the CAM-D Simpson Lake Long-Term Monitoring Plan (INAC, 2010) were used to compare both soil and groundwater analytical results.

3.2 Groundwater

There are no groundwater guidelines provided in the CAM-D LTM plan. In the absence of site-specific guidelines, the AMSRP guidance on post-construction monitoring indicates that "comparison to background and baseline values is recommended." The AMSRP provides the following table for the assessment of analytical data in groundwater.

Table 3-1: Groundwater Chemical Assessment Approach

Geochemical Assessment	Acceptable	Marginal	Significant	Unacceptable
Groundwater concentrations within average ± three standard deviations or within analytical variability	Performing as expected			
Increasing trend in contaminant data over 2 or more successive monitoring events (variation in excess of average ± three standard deviations or analytical variability)		Low risk of failure		
Groundwater concentrations in excess of three times average baseline concentrations in more than one monitoring event			Moderate risk of failure	
Where applicable, surface water concentrations in excess of surface water quality guidelines for the protection of aquatic life				Failure
Required Actions	Monitor as per schedule	Increase monitoring frequency. Monitor surface water quality, if applicable, in downgradient water bodies within 300 m.	Assess causes of increasing contaminant concentrations. Evaluate whether remediation is required.	Assess cause of contaminant concentrations. Develop remedial plan. Implement remedial plan.

This table is reproduced from AMSRP Chapter 11, Table 4.2

Since this is the first year for the long-term monitoring plan to be implemented at CAM-D, FRANZ does not have any historical or baseline data to obtain the mean and standard deviations for comparison to the analytical results obtained in during the 2012 monitoring activities presented in this report. Instead, the average concentration of each parameter was calculated using the

results from all of the wells sampled, as has been done at other DEW line sites lacking post construction baseline data. The duplicate was not included in the average calculation. If the result was a non-detect, it was converted to the detection limit for the purpose of the average calculation.

3.3 Soil

The soil standards or guidelines adopted for this evaluation are as follows:

- Abandoned Military Sites Remediation Protocol (AMSRP), Volume I – Main Report (INAC, 2009).
- *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health* (CCME, 1999, with updates) for residential/parkland use, including fact sheets for benzene, toluene, ethylbenzene, and xylenes. Non-potable groundwater is stipulated and coarse grain material is assumed based on field observation (generally sandy material) as well as for conservative reasons – being that coarse grain criteria are more stringent than those applied to fine grain.
- *Canada-Wide Standards for Petroleum Hydrocarbons in Soil* (CCME, 2008a) - Tier 1 residential/parkland use, coarse-grained soil, non-potable groundwater.

Soil analytical results were compared to the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines, specifically the *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health* (CSQGs) and the *Canada-Wide Standards for Petroleum Hydrocarbons in Soil* (CWS-PHC). These guidelines are applied to most federal contaminated sites. The guidelines are numerical limits intended to maintain, improve or protect environmental quality and human health at contaminated sites. They are derived using toxicological data and aesthetic considerations.

The CSQGs (CCME, 1999) are a subsection of the Canadian Environmental Quality Guidelines. The CSQGs are derived to approximate a no- to low- effect level (or threshold level) based only on scientific data, including toxicology, fate, and behaviour. The CSQGs are based on direct contact, ingestion, and inhalation toxicity data, and were developed to protect receptors exposed indirectly to contaminants of concern. Fact sheets are provided for 32 compounds. The benzene, toluene, ethylbenzene and xylenes fact sheets were used to obtain regulatory criteria for this report.

The CWS-PHC (CCME, 2008a) present criteria for petroleum hydrocarbons in soil. These numerical standards are based on the assessment and consistent management of risks posed to humans, plants, animals and environmental processes under four common land uses (agricultural, residential/parkland, commercial and industrial). Under Tier 1 of the CWS, specific numerical levels are presented for the four land uses, two soil textures (coarse and fine) and the

four defined petroleum hydrocarbon fractions (F1 (nC_6-nC_{10}); F2 (nC_{10}-nC_{16}); F3 (nC_{16}-nC_{34}) and F4 (nC_{34}+)).

The CWS-PHC also include the option to generate Tier 2 levels where site-specific information indicates that site conditions exist that modify human or ecological exposure to PHC contamination. Such conditions may alter risks significantly relative to the generic conditions that were used to derive Tier 1 levels. A third tier in the CWS-PHC involves developing site-specific cleanup levels and management options using general and site-specific information in conducting a risk assessment.

The CAM-F former DEW Line site is a federal site, and is exempt from territorial regulation; however, future disposition of the Site may make it subject to territorial environmental guidelines. Because the Nunavut environmental guidelines are based on the work of the CCME, the federal and territorial guidelines expected to coincide.

The governing guideline for soil at contaminated sites in Nunavut is the *Environmental Guideline for Contaminated Site Remediation* (EGCSR), published by the Government of Nunavut in March, 2009. The criteria for PHCs in soil are found in Section 2.4, and are adapted from the CWS-PHC. The criteria for other compounds in soil are found in Table A-4 of Appendix 4 of the EGCSR, and are obtained from the CSQGs, published in the *Canadian Environmental Quality Guidelines* (CCME, 1999, updated 2007). The criteria are numerical limits intended to maintain, improve or protect environmental quality and human health at contaminated sites. Because the EGCSR is based on federal standards and has been updated recently, FRANZ does not expect that there are any discrepancies between the federal standards applied to the Site and the Nunavut guidelines.

As a preliminary and conservative determination of protection of human health and the environment at the Site, Tier 1 levels of the CWS are applied to all analytical results where site specific values are not specified. The appropriate levels are presented with the laboratory analytical data in tables. The rationale for the selection of the appropriate criteria is discussed below.

BTEX Compounds

For benzene, toluene, ethylbenzene and xylenes (BTEX) compounds, the CSQGs were used to determine the appropriate pathway-specific guidelines. For benzene, for example, the 2004 update was used, with the following assumptions:

- Residential/Parkland land use
- Coarse-grained soils
- 10^{-5} acceptable incremental risk

- With applicable guidelines the most conservative of:
  - Soil dermal contact guideline
  - Soil ingestion guideline
  - Eco soil contact

The groundwater check (drinking water) pathway was excluded, at 0.03 mg/kg, as groundwater in the area of Simpson Lake is not used as a source of potable water. With its exclusion, the most conservative guideline for benzene applicable at the Site is related to the protection of the pathway for the inhalation of indoor air (slab on grade), at 0.095 mg/kg; however, there are no buildings near the NHWL. The most conservative remaining guideline is the ecological soil contact guideline, at 31 mg/kg. A similar process was used to determine the most conservative applicable guideline value for toluene, ethylbenzene and xylenes.

Petroleum Hydrocarbons

For petroleum hydrocarbons, the CWS-PHC was used to determine the appropriate pathway-specific guidelines. Pathway-specific guidelines can be found in the CWS-PHC Technical Supplement (CCME, 2008c).

4.0 INVESTIGATIVE METHODOLOGY

The monitoring program was carried out at the Site on August 7, 2012. During the field investigations, weather conditions were sunny with a gentle to moderate breeze and temperatures around 8°C. The monitoring program included the following tasks:

- Completing a health and safety kick-off meeting;
- Visually observing and photographically documenting the physical integrity of the landfill and the reporting on the observable conditions over the rest of the site;
- Natural environment monitoring and gathering information from knowledgeable persons regarding local wildlife and human activity;
- Sampling of groundwater and soil from designated locations at the site;
- Measuring headspace vapour concentrations in the soil samples and various physical parameters in the water samples; and
- Submission of soil and groundwater samples, including duplicates, for applicable laboratory analysis.

The field investigation procedures are described below.

4.1 Health and Safety Plan

Before commencing with site activities, a site-specific health and safety plan (HASP) was developed. The HASP identified and provided mitigative actions for potential physical and chemical hazards associated with the work involved in the site assessment. The HASP also contained a listing of emergency contact numbers and provided protocols to follow in the event of an emergency.

A copy of the plan was presented to AANDC for their review and agreement before site activities began. Prior to conducting any work on-site, the plan was distributed and discussed with all personnel involved in the investigative program. A copy of the HASP has been retained on file at FRANZ and at AANDC.

4.2 Visual Inspections

The NHWL and surrounding area were visually observed to assess the landfill's physical integrity, including evidence for erosion, ponding, frost action, settlement and lateral movement. Photographs were systematically taken to document the condition of the NHWL and substantiate the recorded observations (Appendix C). A visual monitoring checklist, presented in the CAM-D LTM plan, was completed for the landfill and is included in section 5.3.

The 2012 visual inspection was conducted with the aid of a Trimble Pro XRT GPS unit to map features of note and to collect GIS information to be used in report preparation. A detailed data dictionary file was created prior to the site visit to facilitate capture all required information as

outlined in the long-term monitoring plan. Spatial data gathered at the Site is contained in an .SSF format file, it and the data dictionary are included in the appended CD ROM; these files are to be used in future Site monitoring visits to facilitate observation and documentation of any changes to the condition of the NHWL.

4.3 Wildlife Survey

FRANZ recorded observations of the natural environment made during the site visit including direct sightings of wildlife; other evidence of wildlife (e.g., droppings, tracks, feathers/fur); wildlife activities (migrating, nesting, etc.); numerical estimates of wildlife; and vegetation.

As part of the investigation, information was gathered from the wildlife monitor, a member of the Gjoa Haven Hunters and Trappers Association. Land use by both humans and wildlife were discussed.

A discussion of the recorded observations and information obtained is presented in Section 6.0 of this report.

4.4 Groundwater and Soil Sampling

The groundwater and soil sampling methodology conformed to guidance provided in the following documents:

- CCME EPC-NCS62E Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume I: Main Report, Dec 93 (CCME catalogue - http://www.ccme.ca/assets/pdf/pn_1101_e.pdf);
- CCME EPC-NCS66E Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume II: Analytical Method Summaries, Dec 93 (CCME catalogue – (http://www.ccme.ca/assets/pdf/pn_1103_e.pdf);
- INAC CAM-D Simpson Lake Long-Term Monitoring Plan (INAC, 2010); and
- INAC Abandoned Military Site Remediation Protocol, Contaminated Sites Program (INAC, 2008).

4.4.1 Groundwater Sampling

The ground water sampling methodology conformed to guidance provided in the following Canadian Council of Ministers of the Environment (CCME) documents:

- CCME EPC-NCS62E Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume I: Main Report, Dec 93 (CCME catalogue - http://www.ccme.ca/assets/pdf/pn_1101_e.pdf); and
- CCME EPC-NCS66E Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume II: Analytical Method Summaries, Dec 93 (CCME catalogue - http://www.ccme.ca/assets/pdf/pn_1103_e.pdf).

Groundwater was sampled at four predetermined locations MW01 to MW04. Samples could not be collected from MW02 as the well was frozen. A Geopump brand persistaltic pump was used to purge the designated monitoring wells. Wells were purged until stabilization of the *in situ* field parameters or until three well volumes had been removed. A Horiba U-52 water quality meter was calibrated and used to measure *in situ* field parameters including temperature, conductivity, dissolved oxygen, pH and oxidation-reduction potential. Sampling took place when these parameters stabilized. Water samples submitted for total metals analyses were not field-filtered. Water samples submitted for dissolved metals were filtered in the field.

A summary of the samples that were collected and submitted for laboratory analysis during the groundwater sampling activities is provided in Table 4-1 below. Groundwater sampling logs are included in Appendix D.

Table 4-1: Summary of groundwater sample collection near the NHWL

Sample	Analytical Parameters
MW-1	- total and dissolved metals - PCBs - petroleum hydrocarbon fractions F1-F4 and BTEX - inorganic parameters (major ions, TDS, TSS, colour, pH, conductivity)
MW-3	
MW-4	
DUP-1	

Note: * indicates a blind field duplicate of the sample listed directly above.

All samples were stored immediately in laboratory prepared sample jars for subsequent laboratory analysis. Water samples were stored in laboratory supplied coolers and were placed on ice for delivery to the laboratory.

4.4.2 Test Pitting and Soil Sampling

Soil sampling was completed by manual test pitting using a shovel. Four test pits, identified as CAM-D S1, CAM-D S2, CAM-D S3 and CAM-D S4 were advanced in the vicinity of the NHWL at the locations specified in the long-term monitoring plan. Samples were collected within a two to four metre radius of the existing monitoring wells.

Two composite soil samples were collected from the side wall of each test pit at two discrete intervals: 0 – 15 cm and 35 to 50 cm below ground surface. Discrete soil samples and blind duplicates were collected from each test pit as grab samples using fresh disposable nitrile gloves and a trowel which was decontaminated with Alconox between sample collections. Samples were placed into laboratory prepared jars for chemical analyses. Soil stratigraphy was

logged at each test pit prior to being backfilled with the excavated soil; test pit logs are provided in Appendix D.

A summary of the samples that were collected and submitted for laboratory analysis during the test pitting activities is provided in Table 4-2 below.

Table 4-2: Summary of soil sample collection near the NHWL.

Sample	Depth (mbgs)	Analytical Parameters
CAM-D S1 0-0.15	0 – 0.15	- metals - PCBs - PHCs F1-F4 and BTEX
DUP-1 0-0.15*	0 – 0.15	
CAM-D S1 0.35-0.5	0.35-0.5	
DUP-2 0.35-0.5*	0.35-0.5	
CAM-D S2 0-0.15	0 – 0.15	
CAM-D S2 0.35-0.5	0.35-0.5	
CAM-D S3 0-0.153	0 – 0.15	
CAM-D S3 0.35-0.5	0.35-0.5	
CAM-D S4 0-0.15	0 – 0.15	
CAM-D S4 0.35-0.5	0.35-0.5	

Note: * indicates a blind field duplicate of the sample listed above.
mbgs = metres below ground surface.

Test pit locations for the NHWL area are indicated on Figure A-2, Appendix A and additional details on the soil samples collected are presented in the test pit logs provided in Appendix D. Eight soil samples were collected and submitted for laboratory analysis for PHCs fractions F1-F4 and BTEX as well as metals and PCBs. Additionally, two field duplicate samples were also submitted for analysis for QA/QC purposes. Samples submitted for laboratory analysis were stored in laboratory supplied coolers and were packed on ice, as was available, for delivery to the laboratory.

4.5 Quality Assurance and Quality Control

Field personnel employed FRANZ's Quality Assurance/Quality Control (QA/QC) protocols, including appropriate techniques for soil sampling, sample storage, shipping and handling, as well as collection of duplicates.

4.5.1 Field

Soil samples collected for laboratory analysis were placed in polyethylene bags and laboratory prepared 60 mL and 125 mL glass jars fitted with screw-tight Teflon-lined lids. Groundwater samples were collected from monitoring wells and placed in a variety of appropriately sized and

prepared laboratory vessels. Sample numbers were clearly marked on the containers. The soil jars and water bottles were filled to capacity with minimum headspace and stored in coolers to moderate temperature fluctuations during transport to the laboratory. To prevent cross contamination, samples were collected with fresh nitrile gloves. Soil samples were collected by hand with the aid of a stainless steel trowel, which was decontaminated between samples.

As a quality control measure, two soil field duplicate samples were collected and analyzed for PHC fractions F1-F4, BTEX, metals and PCBs. One groundwater field duplicate sample was collected and analyzed for the parameters listed above as well as general chemistry inorganic parameters. Further quality control measure included the submission of a field blank and a travel blank,

The samples were transported to the project laboratory accompanied by a Chain of Custody form. Copies of the Chain of Custody forms are provided in Appendix E.

4.5.2 Laboratory

To assess the reliability of the laboratory data, duplicate samples were taken for approximately every five samples collected by FRANZ. Two blind field duplicates were collected in the soil sampling program, and one blind field duplicate was collected in the groundwater sampling program.

For soil duplicates, FRANZ personnel generated the duplicate samples by alternately placing approximately 50 percent of the sample volume into the primary sample container and then placing the same amount into the duplicate container. For water sample duplicates the field staff placed aliquots of approximately 50 percent of the container volume into each container until both containers were filled.

Analytical data quality was assessed by submission of the following:

- Soil samples CAM-D S1 (0-0.15) (primary) and CAM-D DUP1 (0-0.15) (soil duplicate), and CAM-D S1 (0.35-0.50) (primary) and DUP1 (0.35-0.50) (soil duplicate) were analyzed for PHCs, PCBs, and metals.
- Groundwater sample MW4 (primary) and DUP-1 (water duplicate) were analyzed PHC, PCBs, metals, conductivity, pH, colour and temperature.

Sampling procedures and laboratory analytical precision are evaluated by calculating the relative percent difference (RPD) for a sample and duplicate pair according the following equation:

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

where: X_1 and X_2 are the duplicate concentrations and X_{avg} 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 only be calculated when the compound is detected in both the original and the duplicate sample at a concentration five times above the reportable detection limit (or method detection limit - MDL). Alternative criteria are used to evaluate duplicate pairs where one or both of the results are less than five times the MDL, or where one or both of the results is less than the MDL (i.e. nd or 'not-detected'). The alternative criteria used for the evaluation of the data, adapted from Zeiner (1994), are presented in Table 4-3 below. When both concentrations are less than the MDL, no calculation/evaluation criterion is required.

Table 4-3: Criteria for the Evaluation of Blind and Duplicate Sample Results

Scenario	Result A	Result B	Criteria for Acceptance	
			Aqueous (water)	Soil (Soil)
A	nd	nd	Acceptable precision; no evaluation required	
B	nd	positive	result B – 0.5 x MDL < MDL	result B – 0.5 x MDL < 2 x MDL
C	positive and > 5 x MDL	positive and > 5 x MDL	RPD < 20%	RPD < 40%
D	positive and < or = 5 x MDL	positive	|result B – result A| < MDL[1]	|result B – result A| < 2 x MDL[1]

Source: 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. – modified to use Method Detection Limit (MDL) or Reportable Detection Limit (RDL) in lieu of the Quantitation Limit (QL), the Instrument Detection Limit (IDL) and/or Laboratory Reporting Limit (LRL).

Notes:

nd – not detected

RPD – relative percent difference, |result A - result B| / |(result A + result B)/2|

1. When result reported was less than half the quantitation limit, half the limit was used in the equation.

The precision is considered acceptable when the evaluation criteria are met or when both results are below the MDL. When the evaluation criteria are not satisfied, the following apply:

- nd vs. positive – unacceptable precision: the positive result is considered an estimate and the nd result is considered inconclusive.
- Positive vs. positive – unacceptable precision: the results are considered an estimate.

Refer to Appendix F for a discussion on QA/QC results.

4.6 Laboratory Analytical Program

Soil and groundwater samples were sent to Maxxam Analytics in Ottawa, ON, via Iqaluit, NU for chemical analyses of the target compounds previously identified. Maxxam is certified by the Canadian Association for Laboratory Accreditation, Inc. (CALA) and has an internal QA/QC protocol. 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 certificates of analysis and chain of custody forms are presented in Appendix E.

5.0 SUMMARY OF NHWL CONDITIONS

5.1 Area Summary

The NHWL is located to the south of the former station and southwest of the airstrip. The monitoring of the NHWL landfill included visual observations to assess its physical integrity, including evidence for erosion, ponding, frost action, settlement and lateral movement. Groundwater samples were collected from the wells located on the northwest (MW03), southeast (MW01), and southwest (MW04) sides of the landfill. No groundwater samples could be collected from the well along the northeast side of the landfill (MW02) as it was frozen. Four soil samples were collected from the soil monitoring points established within a two to four metre radius of the existing monitoring wells.

A plan view of the NHWL indicating photographic viewpoints can be seen in Figure A-2, Appendix A. The visual inspection report, including supporting photo references and drawing, is presented in the following sections, and in Table 5-1 and Table 5-2 below.

5.2 Photographic Record

The photographic record of the NHWL was completed as per the Statement of Work. Prints of the photographs are provided in Appendix C, where photograph captions provide the landfill viewpoint number (as seen on Figure A-2; Appendix A), where applicable. Full resolution digital copies of the photographs are provided on the accompanying CD-ROM.

5.3 Visual Inspection Report

The visual inspection of the NHWL and surrounding area was conducted on August 7, 2012. The visual monitoring checklist was completed using the format requested by AANDC and is presented as Table 5-3 of this report. Field notes relating to the visual inspection are included in Appendix G. Table 5-1 and Table 5-2 present the preliminary visual inspection results for 2012 monitoring of the NHWL at CAM-D.

Table 5-1: Preliminary Visual Inspection Report NHWL

Feature	Presence (Y/N)	Severity Rating	Extent
Settlement	N	Not Observed	None
Erosion	Y	Acceptable	Isolated
Frost Action	N	Not Observed	None
Animal Borrows	N	Not Observed	None
Vegetation	Y	Acceptable	Isolated
Staining	N	Not Observed	None
Vegetation Stress	N	Not Observed	None
Seepage / Ponded Water	Y	Acceptable	Isolated
Debris Exposure	N	Not Observed	None
Monitoring Well Condition	Y	Good condition - Acceptable	

Feature	Presence (Y/N)	Severity Rating	Extent
Overall Landfill Performance	**Acceptable**		

Table 5-2: Preliminary Visual Inspection Report NHWL - Definitions

Performance / Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

Settlement

Areas of settlement were not observed.

Erosion

One small area along the west side of the landfill had evidence of erosion, a small erosion rill was observed and is likely due to preferential drainage and associated down-slope washing of fine-grained fill between cobbles and boulders. The south toe of the landfill remains unaffected.

Very small erosion rills were observed along much of the northeast slope of the NHWL; however, these rills were considered too small at the present time to be identified as features and mapped.

Frost Action

No evidence of heaving or cracking was observed on the top or sides of the NHWL.

Evidence of Burrowing Animals

Indications of burrowing animals were not observed.

Vegetation

One area of vegetation growth was observed along the west edge of the landfill.

Staining

Indications of staining on or around the NHWL were not observed.

Seepage / Ponded Water

Two areas of ponded water were observed 5 m from southwest toe of the landfill; they did not contain any evidence of staining or product seepage from the landfill. Conditions at the site were generally wet due to recent rainfall, and many areas of saturated soil were observed around the NHWL at the ground surface.

Debris

No debris within the vicinity of the NHWL was observed.

Discussion

Based on the very minimal erosion, and ponded water observed, the performance of the NHWL, with respect to containment, was rated as satisfactory. The visual inspection report, including supporting photos and drawing, is presented in the following Table 5-3.

Table 5-3: CAM-D Simpson Lake – NHWL Landfill Visual Inspection

Checklist Item	Feature Letter	Relative Location	Length (m)	Width (m)	Depth (m)	Extent	Description (Change)	Additional Comments	Photo Reference
Erosion	A	Top of NHWL, 16 m northwest from the south top corner	0.5 m^2		0.1	<1%	Small erosion rill		53
Vegetation	B	Bottom of NHWL, 20 m northeast of MW4	---		---	<1%	Grass vegetation		54
Ponded Water	C	5 m south of the south corner of the NHWL	74 m^2		0.2	<1%	Slight low area		33,34
Ponded Water	D	5 m west of the south corner of the NHWL	15 m^2		0.2	<1%	Settlement		33,34

Checklist Item	Feature Letter	Relative Location	Length (m)	Width (m)	Depth (m)	Extent	Description (Change)	Additional Comments	Photo Reference
Erosion	E	100 m northeast of north corner of NHWL	57 m	1-2 m	0.2-0.5 m	n/a	Area of preferential drainage coupled with fine grained silts, resulting in solufluction erosion	Significant distance from NHWL; extent not applicable	57,58

5.4 Analytical Results – Groundwater Samples

As described in Section 4.4.1, a total of four groundwater samples (three samples plus one blind duplicate) were submitted to Maxxam Analytics in Ottawa, Ontario for analyses of PHCs, metals, PCBs and inorganic parameters. Analytical results are discussed below. The AMSRP Chapter 11 "Post-Construction Monitoring," suggests that analytical results be compared to the mean of previous data. The AMSRP indicates that where groundwater concentrations are within the range of the average ± three standard deviations, the landfill is performing acceptably. Historical analytical information was not available as this was the first year of long-term monitoring data collection. The average concentration and the range (minimum and maximum) for each parameter are presented for the metals and inorganic parameters for reference purposes. The duplicate sample was not included in the calculations. Should AANDC make additional (baseline) analytical data for the monitoring wells at CAM-D available, FRANZ will include such data in future statistical analyses to increase the robustness of ground water monitoring analytical results interpretation.

PHCs

Concentrations for all parameters were below laboratory reportable detection limits (see Table B-1; Appendix B). The average concentrations were not calculated as all parameters were below the detection limit.

PCBs

The PCBs concentrations for all samples were below the detection limit (see Table B-2; Appendix B). Average concentrations and standard deviations were not calculated as all parameters were below the detection limit.

Metals

The average and range of concentrations are presented in Table B-3; Appendix B. All total and dissolved metals concentrations in water sampled from MW-1 were above the detection limit and MW1 has the highest concentrations of most metals recorded at the site except:

- Total cadmium, and dissolved and total copper (MW3); and
- Total cobalt and nickel (MW4).

Inorganics

The average and range of concentrations of the inorganic parameters are presented in Table B-4; Appendix B.

Water sampled from MW-1 had the highest concentrations of hardness, colour, conductivity, total dissolved solids (TDS), pH, dissolved sulphate (SO_4), and nitrite (see Table B-4; Appendix B).

Water sampled from MW-3 had the highest concentration of fluoride (F^-), total suspended solids (TSS), chloride (Cl^-), nitrate, and nitrite + nitrate compared with the other two wells at the site (see Table B-4; Appendix B).

All parameters in the water sample collected from MW-4 were below the maximum concentration observed at the site (see Table B-4; Appendix B).

Laboratory certificates of analyses for the 2012 groundwater samples are provided in Appendix E.

5.5 Analytical Results – Soil Samples

As described in Section 4.4.2, a total of 10 soil samples (eight samples plus two blind duplicates) were submitted to Maxxam Analytics in Ottawa, Ontario for analyses of PHCs, metals and PCBs. Analytical results are discussed below.

PHCs

Laboratory analytical results and selected federal guidelines for PHCs are shown in Table B-5; Appendix B. As shown in the table, all PHC F1, F2 and BTEX concentrations were below the reportable detection limit. PHCs which were detected in samples were limited to the F3 and F4 fractions, with concentrations well below the selected standards and guidelines applied to the site.

PCBs

Laboratory analytical results and selected federal guidelines for PCBs are shown in Table B-6; Appendix B. CCME federal guidelines provide a criterion for total PCBs and the AMSRP defines Tier II clean up criteria for PCBs. With the exception of samples collected from soil monitoring point CAM-D S1, concentrations of total PCBs were below the laboratory method detection limit in all cases. As shown in the table, all detected concentrations were below both guidelines applied to the site.

Metals

Laboratory analytical results and selected federal and site specific criteria for metals are shown in Table B-7; Appendix B. As shown in the table, concentrations satisfied the guideline criteria applied to the site.

Laboratory certificates of analyses for the 2012 soil samples are provided in Appendix E.

6.0 SURROUNDING AREAS AND THE NATURAL ENVIRONMENT

The area surrounding the NHWL at the Site was also inspected, including the air strip and road leading to the NHWL. Based on field observations, the airstrip remains in good condition. It was noted that the first culvert in the road on the way to the NHWL was deteriorating and there was evidence of erosion on the road. The North Warning SRR Station was not approached during the Site visit. An area of solifluction and erosion was observed approximately 100 m north east of the NHWL; see Photos 57 and 58 in Appendix C. This area of erosion is sufficiently removed from the NHWL to be of no concern to the landfill integrity, but should be monitored in subsequent Site visits.

Long-Term Monitoring plans for other, similarly managed AANDC sites recommend monitoring the following parameters to better understand the presence and temporal changes to wildlife and the natural environment:

- Wildlife sightings
- Other evidence of recent presence of wildlife (e.g. droppings, tracks)
- Wildlife activity (e.g. nesting, migration)
- Qualitative assessment of relative numbers versus previous years
- Revegetation of disturbed areas versus previous years

Information regarding these parameters were either gathered directly, through personal observation while on site or indirectly, and through our wildlife monitor, a member of the Gjoa Haven Hunters and Trappers Association.

Wildlife and Human Activity

Information gathered from the wildlife monitor, James Qitsualik, a member of the Hunter and Trappers Organization in Gjoa Haven, indicated that the site is not frequently used by people for hunting or fishing. The Site may be infrequently visited by muskox hunting parties from Kugaaruk, but not very often, and the Site is rarely visited by residents of Gjoa Haven. Mr. Qitsualik reported that wildlife known to be present in the area of the Site includes wolves, wolverine, caribou, grizzly bear, ground squirrel, rabbits and snow geese. Mr. Qitsualik commented that there were not as many birds present at the site as he would have expected, but added that this may be due to the Site's high elevation.

A soapstone quarry was reported to be located approximately 30-50 km west northwest of the Site, though it is unlikely that persons gathering soapstone would visit the Site. The Site may also be visited infrequently by individuals travelling between Kugluktuk and Gjoa Haven during the winter.

During the Site visit, the following wildlife sightings and evidence of wildlife were observed between late morning and late afternoon of August 7, 2012:

- Two caribou, one near the NHWL and one near the old camp area
- One arctic fox was observed on site
- A pair of swallow-like birds were observed near the NHWL
- During the demobilization back to Gjoa Haven, two white wolves were observed from the air close to Sheppard's Bay (CAM-3), approximately 40 km west of the Site
- Snow geese tracks and scat all over site
- Caribou tracks and scat all over the site

Based on information provided by Mr. Qitsualik, the Site is not used frequently by humans as there is limited hunting or fishing done in the area and would occur mostly during the winter months.

Re-establishment of Vegetation

Major site remedial work, comprised of excavation and construction activities, was completed in the summer of 2011, one year prior to the site monitoring visit. Little evidence of revegetation was observed in August 2012. Given the regional setting and elevation of the CAM-D DEW Line site and re-growth observed at other, similar sites in the Nunavut region, it is reasonable to assume that it will take several years to decades for native vegetation to fully re-established at the Site.

A lone area of vegetation (sedge grass) was observed to be taking root at the southwest toe of the NHWL; it is identified as feature B in Figure A-2, Appendix A, see Photo 54.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Overall, physical observations suggest that the NHWL is in excellent condition and performing as designed to contain the enclosed waste. One minor area of erosion was identified at the top of southwest side of the NHWL. Two areas of ponded water were observed near the south corner of the landfill. An area of solifluction and erosion was identified approximately 100 m northeast of the NHWL (Feature E); this erosion is considered to be too distant from the NHWL to have any potential for negative impact on the landfill integrity. The above noted features are considered to be of little consequence at the present time. While not considered significant enough to be identified as a feature and mapped, some very minor erosion rills were observed along the northwest slope of the NHWL.

In addition to physical observations, FRANZ collected soil and groundwater samples to assess the performance of the NHWL. One of the four wells was frozen; therefore, no sample was collected from the well along the northwest side of the NHWL. Analytical results for soil samples collected in the vicinity of the NHWL satisfy applicable guidelines for contaminants of potential concern at the site. As no historical groundwater data was available, the average concentration and the range (minimum and maximum) for each parameter are presented for the metals and inorganic parameters for reference purposes. The duplicate sample was not included in the calculations. No anomalous concentrations of contaminants of concern were noted.

The road from the airstrip to the NHWL had evidence of erosion and one culvert was deteriorating. The airstrip remains in good condition.

Based on the results of the first year of long-term monitoring, FRANZ recommends continued monitoring of the features identified, especially the small erosion rill along the southwest slope of NHWL (Feature A, Figure A-2, Appendix A) and the road from the airstrip to the NHWL.

8.0 LIMITATIONS

This report has been prepared exclusively for Aboriginal Affairs and Northern Development Canada. Any other person or entity may not rely upon the report without the express written consent from Franz Environmental Inc. and Aboriginal Affairs and Northern Development Canada.

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. 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 Environmental Inc., 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 and on the site conditions observed on August 7, 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 Environmental Inc. 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 Environmental Inc. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

9.0 REFERENCES

Canadian Council of Ministers of the Environment. 2007. *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health.*

Canadian Council of Ministers of the Environment. 2008a. *Canada-Wide Standards for Petroleum Hydrocarbons in Soil.*

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Nunavut Water Board. December 2, 2008. *CAM-D Long Term Monitoring NWB Water License 1BR-SIM0813.*

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.

Yours truly,

Franz Environmental Inc.

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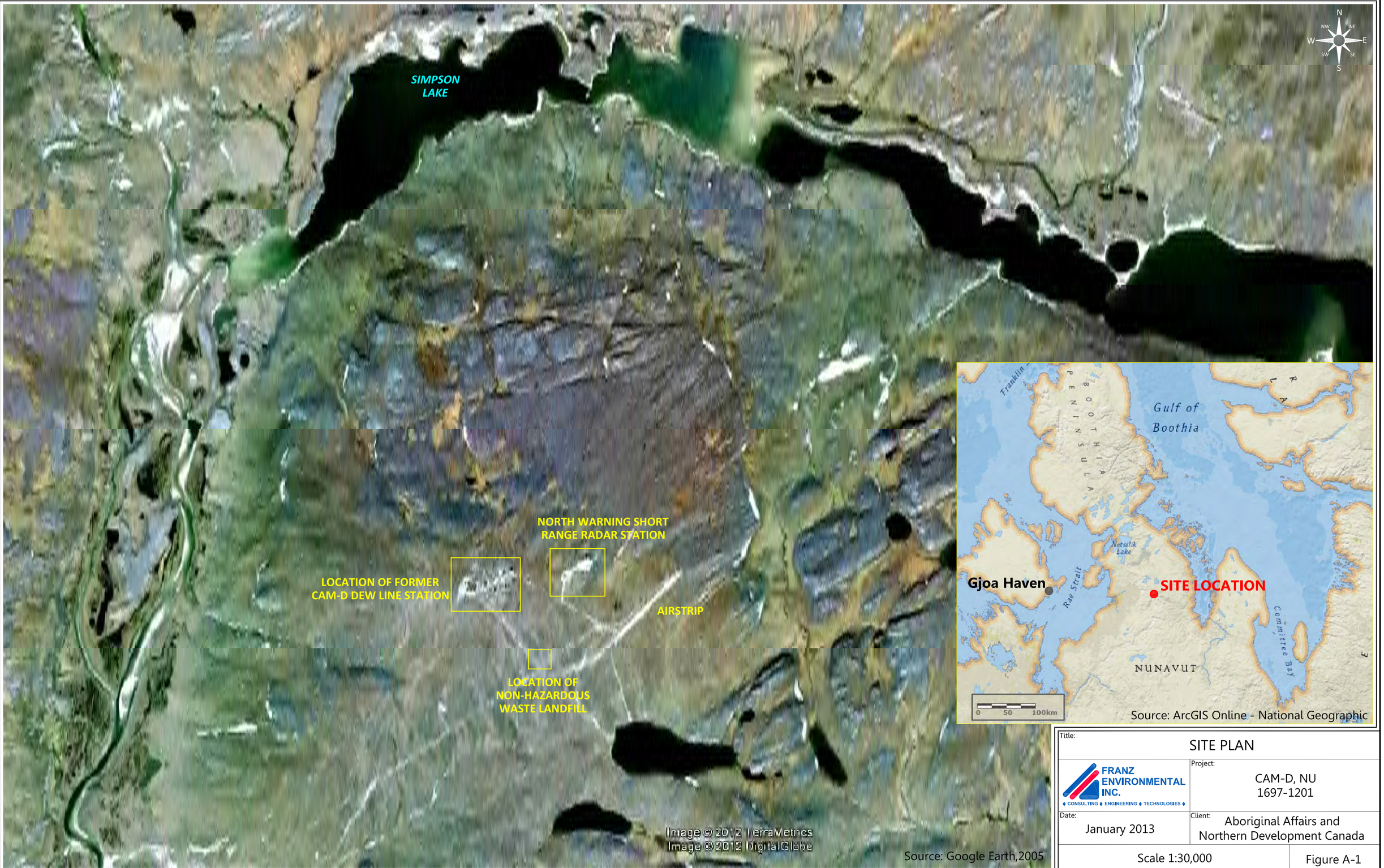
APPENDIX A

Figures



Title: SITE PLAN

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project: CAM-D, NU 1697-1201

Date: January 2013

Client: Aboriginal Affairs and Northern Development Canada

Scale 1:30,000

Figure A-1

updated on:11-Jan-13 by rfletcher

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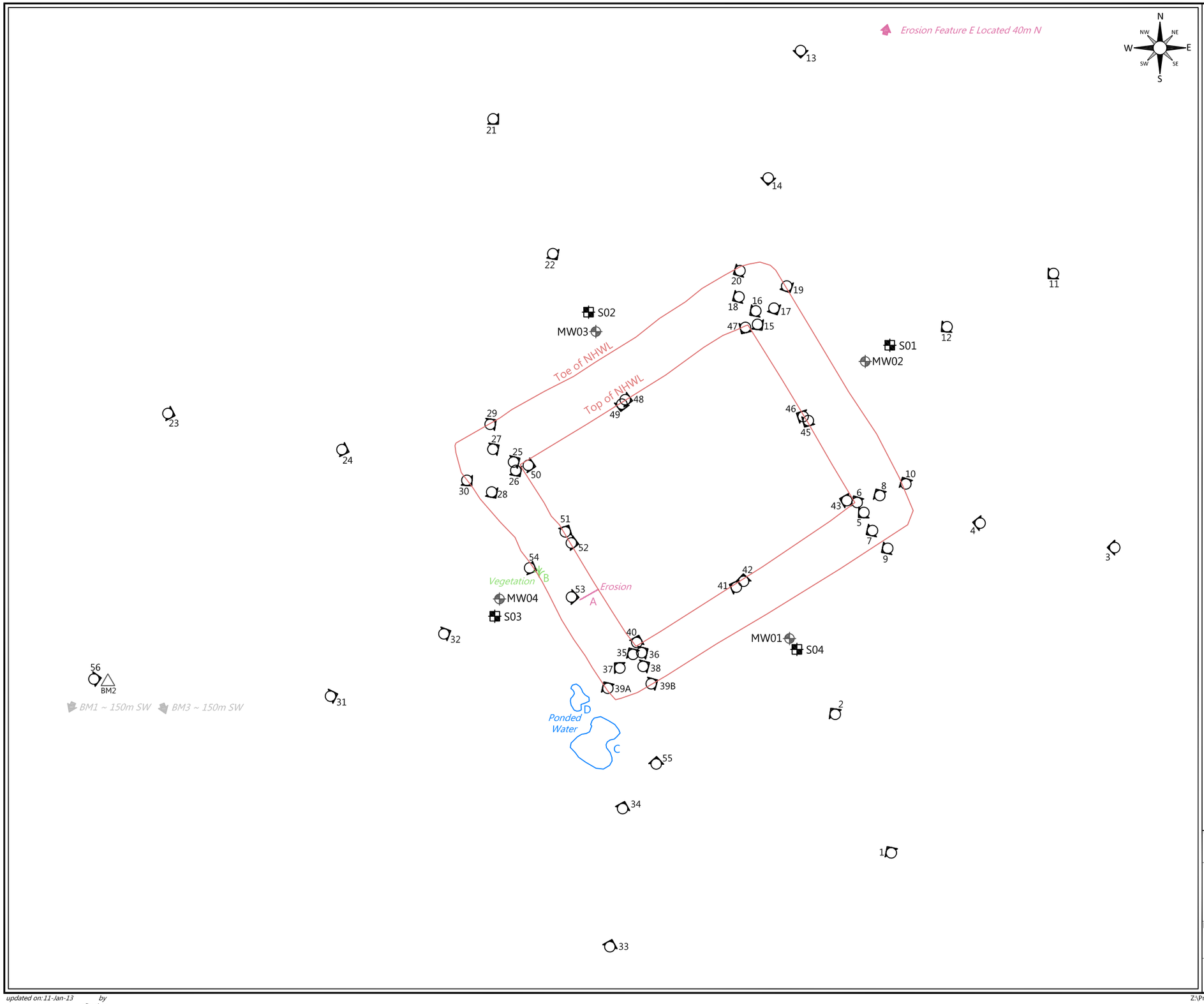

Legend

- MW — Monitoring Well Locations
- TP — Test Pit Locations
- 25 — Picture Viewpoint Number
- Ponded Water
- Erosion
- Vegetation
- Benchmark

Title: Non-Hazardous Waste Landfill

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project: CAM-D, NU 1697-1201

Date: January 2013

Client: Aboriginal Affairs and Northern Development Canada

Scale 1:850

Metres 20 15 10 5 0 10 20

Figure A-2

updated on:11-Jan-13 by rfletcher

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APPENDIX B

Analytical Results Tables

Table B-1
Groundwater Chemical Concentrations - PHCs

PARAMETER / Sample ID	Upper Limit of Acceptability[1]	RDL	MW1	MW1 Lab-Dup	MW3	MW3 Lab-Dup	MW4	DUP-1	Duplicate Evaluation		
									Scenario*	RPD (%)	Acceptable
Date			8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012			
BTEX & F1 Hydrocarbons (ug/L)											
Benzene	Not Available	0.2	<0.20	<0.20	<0.20	-	<0.20	<0.20	A	---	Y
Toluene	Not Available	0.2	<0.20	<0.20	<0.20	-	<0.20	<0.20	A	---	Y
Ethylbenzene	Not Available	0.2	<0.20	<0.20	<0.20	-	<0.20	<0.20	A	---	Y
o-Xylene	Not Available	0.2	<0.20	<0.20	<0.20	-	<0.20	<0.20	A	---	Y
p+m-Xylene	Not Available	0.4	<0.40	<0.40	<0.40	-	<0.40	<0.40	A	---	Y
Total Xylenes	Not Available	0.4	<0.40	<0.40	<0.40	-	<0.40	<0.40	A	---	Y
F1 (C6-C10)	Not Available	25	<25	<25	<25	-	<25	<25	A	---	Y
F1 (C6-C10) - BTEX	Not Available	25	<25	<25	<25	-	<25	<25	A	---	Y
F2-F4 Hydrocarbons (ug/L)											
F2 (C10-C16 Hydrocarbons)	Not Available	100	<100	-	<100	<100	<100	<100	A	---	Y
F3 (C16-C34 Hydrocarbons)	Not Available	100	<100	-	<100	<100	<100	<100	A	---	Y
F4 (C34-C50 Hydrocarbons)	Not Available	100	<100	-	<100	<100	<100	<100	A	---	Y
Reached Baseline at C50	Not Available	N/A	Yes	-	Yes	Yes	Yes	Yes	NC	NC	NC

Notes:

1 = Upper Limit of Acceptability is calculated as the value three standard deviations greater than the mean (calculation does not include duplicate analyses)

* = See Quality Assurance and Quality Control section for scenario rationale.

N/A = Not Applicable

NC = No Criteria

- = Not Analyzed

RDL= Reportable Detection Limit

20 = Guideline selected for CAM-F DEW Line landfills.

20 = Exceeds selected guideline.

Table B-2
Groundwater Chemical Concentrations - PCBs

PARAMETER / Sample ID	Upper Limit of Acceptability[1]	RDL	MW1	MW3	MW3 Lab-Dup	MW4	DUP-1	Duplicate Evaluation		
								Scenario*	RPD (%)	Acceptable
Date			8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012			
PCBs (ug/L)										
Aroclor 1016	Not Available	0.05	<0.05	<0.05	<0.05	<0.3	<0.05	A	---	Y
Aroclor 1221	Not Available	0.05	<0.05	<0.05	<0.05	<0.3	<0.05	A	---	Y
Aroclor 1232	Not Available	0.05	<0.05	<0.05	<0.05	<0.3	<0.05	A	---	Y
Aroclor 1242	Not Available	0.05	<0.05	<0.05	<0.05	<0.3	<0.05	A	---	Y
Aroclor 1248	Not Available	0.05	<0.05	<0.05	<0.05	<0.3	<0.05	A	---	Y
Aroclor 1254	Not Available	0.05	<0.05	<0.05	<0.05	<0.3	<0.05	A	---	Y
Aroclor 1260	Not Available	0.05	<0.05	<0.05	<0.05	<0.3	<0.05	A	---	Y
Aroclor 1262	Not Available	0.05	<0.05	<0.05	<0.05	<0.3	<0.05	A	---	Y
Aroclor 1268	Not Available	0.05	<0.05	<0.05	<0.05	<0.3	<0.05	A	---	Y
Total PCB	Not Available	0.05	<0.05	<0.05	<0.05	<0.3	<0.05	A	---	Y

Notes:

1 = Upper Limit of Acceptability is calculated as the value three standard deviations greater than the mean (calculation does not include duplicate analyses)

* = See Quality Assurance and Quality Control section for scenario rationale.

NC = No Criteria

RDL= Reportable Detection Limit

20 = Exceeds selected guideline.

Table B-3
Groundwater Chemical Concentrations - Metals

PARAMETER / Sample ID / Date	Upper Limit of Acceptability[1]	Lowest RDL	MW1	MW3	MW4	DUP-1	Duplicate Evaluation			Average Concentration	Concentration Range
			8/7/2012	8/7/2012	8/7/2012	8/7/2012	Scenario*	RPD (%)	Acceptable		
Metals (ug/L)											
Dissolved Arsenic (As)	Not Available	0.20	3.9	1.6	0.45	0.36	D	---	Y	1.98	0.45 - 3.9
Total Arsenic (As)	Not Available	0.20	3.7	1.6	0.44	0.42	D	---	Y	1.91	0.44 - 3.7
Dissolved Cadmium (Cd)	Not Available	0.0050	0.130	0.061	0.042	0.039	C	7	Y	0.08	0.042 - 0.13
Total Cadmium (Cd)	Not Available	0.0050	0.18	1.1	0.075	0.064	C	16	Y	0.45	0.075 - 1.1
Dissolved Cobalt (Co)	Not Available	0.30	0.42	<0.3	0.41	0.42	D	---	Y	0.4	<0.3 - 0.42
Total Cobalt (Co)	Not Available	0.30	0.44	0.44	0.50	0.49	D	---	Y	0.5	0.44 -0.50
Dissolved Chromium (Cr)	Not Available	1.0	1.6	<1.0	<1.0	<1.0	A	---	Y	1.2	<1.0 - 1.6
Total Chromium (Cr)	Not Available	1.0	1.8	<1.0	<1.0	<1.0	A	---	Y	1.3	<1.0 - 1.8
Dissolved Copper (Cu)	Not Available	0.20	11	41	21	20	C	5	Y	24	11 - 41
Total Copper (Cu)	Not Available	0.20	12	46	24	25	C	4	Y	27	12 - 46
Dissolved Nickel (Ni)	Not Available	0.50	9.4	3.1	6.6	6.3	C	5	Y	6.4	3.1 - 9.4
Total Nickel (Ni)	Not Available	0.50	1.0	3.6	7.5	7.6	C	1	Y	4	1.0 - 7.5
Dissolved Lead (Pb)	Not Available	0.20	2.9	0.55	<0.2	<0.2	A	---	Y	1.7	<0.2 - 2.9
Total Lead (Pb)	Not Available	0.20	3.1	1.0	<0.2	<0.2	A	---	Y	2.1	<0.2 - 3.1
Dissolved Zinc (Zn)	Not Available	3.0	9.7	8.0	3.3	<3.0	B	---	Y	7.0	<3.0 - 9.7
Total Zinc (Zn)	Not Available	3.0	12	11	5.6	3.8	D	---	Y	9.5	5.6 - 12

Notes:

1 = Upper LImit of Acceptability is determined as described in Report Section 3.2. Upper limits of acceptability are calculated from Table B-9, using mean of previous sampling rounds +3 standard deviations.

* = See Quality Assurance and Quality Control section for scenario rationale.

NC = No Criteria

RDL= Reportable Detection Limit

20 = Exceeds selected guideline.

Table B-4
Groundwater Chemical Concentrations - Inorganics

PARAMETER		Upper Limit of Acceptability[1]	Lowest RDL	MW1	MW3	MW4	DUP-1	Duplicate Evaluation				Average Concentration	Concentration Range
Sample ID								Scenario*	RPD (%)	Value (ug/g)	Acceptable		
Date				8/7/2012	8/7/2012	8/7/2012	8/7/2012						
Inorganics	**Units**												
Hardness	mg/L	Not Available	0.5	630	560	380	380	C	0	---	Y	523	360 - 630
Colour	TCU	Not Available	2	16	8	5	5	D	---	0.000	Y	10	5 -16
Conductivity	umho/cm	Not Available	1	3000	2100	1300	1300	C	0	---	Y	2133	1300 - 3000
Total Dissolved Solids	mg/L	Not Available	10	2210	1410	888	876	C	1	---	Y	1503	888 - 2210
Fluoride (F-)	mg/L	Not Available	0.1	1.07	1.29	0.31	0.32	D	---	0.010	Y	0.9	0.31 - 1.29
Orthophosphate (P)	mg/L	Not Available	0.01	<0.010	<0.010	<0.010	<0.010	A	---	---	Y	<0.010	NA
pH	pH	Not Available	N/A	7.98	7.85	7.43	7.50	NC	NC	NC	NC	7.75	7.43 - 7.98
Total Suspended Solids	mg/L	Not Available	10	<10	15	<10	<10	A	---	---	Y	12	<10 - 15
Dissolved Sulphate (SO4)	mg/L	Not Available	2	1100	550	390	390	C	0	---	Y	680	390 - 1100
Dissolved Chloride (Cl)	mg/L	Not Available	1	160	170	59	59	C	0	---	Y	130	59 - 170
Nitrite (N)	mg/L	Not Available	0.01	0.10	0.054	<0.010	<0.010	A	---	---	Y	0.055	<0.010 - 0.10
Nitrate (N)	mg/L	Not Available	0.1	0.48	0.57	0.44	0.45	D	---	0.010	Y	0.50	0.44 - 0.57
Nitrate + Nitrite	mg/L	Not Available	0.1	0.59	0.63	0.44	0.45	D	---	0.010	Y	0.55	0.44 - 0.63

Notes:

1 = Upper Limit of Acceptability is calculated as the value three standard deviations greater than the mean (calculation does not include duplicate analyses)

* = See Quality Assurance and Quality Control section for scenario rationale.

NC = No Criteria

N/A = Not Applicable

- = Not Analyzed

RDL= Reportable Detection Limit

20 = Exceeds selected guideline.

Table B-5
Soil Chemical Concentrations - PHCs

PARAMETER	Federal		RDL										
Sample ID	**CCME [1] Residential/ Parkland**	**CWS for PHC in Soil (<1.5m)[2]**		**CAM-D S1**	**CAM-D DUP1**	**Duplicate Evaluation**			**CAM-D S1**	**CAM-D DUP1**	**Duplicate Evaluation**		
Date				8/7/2012	8/7/2012	Scenario*	RPD (%)	Acceptable	8/7/2012	8/7/2012	Scenario*	RPD (%)	Acceptable
Depth (m)				0 - 0.15	0.-0.15				0.35-0.5	0.35-0.5			
BTEX & F1 Hydrocarbons (ug/g)													
Benzene	**31**	NC	0.02	<0.005	<0.005	A	---	Y	<0.005	<0.005	A	---	Y
Toluene	**75**	NC	0.02	<0.02	<0.02	A	---	Y	<0.02	<0.02	A	---	Y
Ethylbenzene	**55**	NC	0.02	<0.01	<0.01	A	---	Y	<0.01	<0.01	A	---	Y
o-Xylene	NC	NC	0.02	<0.02	<0.02	A	---	Y	<0.02	<0.02	A	---	Y
p+m-Xylene	NC	NC	0.04	<0.04	<0.04	A	---	Y	<0.04	<0.04	A	---	Y
Total Xylenes	**95**	NC	0.04	<0.04	<0.04	A	---	Y	<0.04	<0.04	A	---	Y
F1 (C6-C10)	NC	NC	10	<10	<10	A	---	Y	<10	<10	A	---	Y
F1 (C6-C10) - BTEX	NC	**30** (210)	10	<10	<10	A	---	Y	<10	<10	A	---	Y
F2-F4 Hydrocarbons (ug/g)													
F2 (C10-C16 Hydrocarbons)	NC	**150** (150)	10	<10	<10	A	---	Y	<10	<10	A	---	Y
F3 (C16-C34 Hydrocarbons)	NC	**300** (300)	10	54	61	C	12	Y	<10	<10	A	---	Y
F4 (C34-C50 Hydrocarbons)	NC	**2800** (2800)	10	13	22	D	---	Y	<10	<10	A	---	Y
Reached Baseline at C50	N/A	N/A	N/A	Yes	Yes	NC	NC	NC	Yes	Yes	NC	NC	NC

Notes:

1 = CCME (2007), Canadian Soil Quality Guidelines, Update 7.0, Table 2. Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.

2 = CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - Table 1, Tier 1 levels for PHCs, Residential / Parkland Use in coarse-grained surface soils. (Brackets) Protection of Eco Soil Contact from Table 1 - Technical Supplement.

*= See Quality Assurance and Quality Control section for scenario rationale.

N/A = Not applicable

- = Not Analyzed

NC = No Criteria

RDL= Reportable Detection Limit

20 = Guideline selected

20 = Exceeds selected guideline.

Table B-5
Soil Chemical Concentrations - PHCs

PARAMETER	Federal		RDL						
Sample ID	**CCME [1] Residential/ Parkland**	**CWS for PHC in Soil (<1.5m)[2]**		**CAM-D S2**	**CAM-D S2**	**CAM-D S3**	**CAM-D S3**	**CAM-D S4**	**CAM-D S4**
Date				8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012
Depth (m)				0-0.15	0.35-0.5	0-0.15	0.35-0.5	0-0.15	0.35-0.5
BTEX & F1 Hydrocarbons (ug/g)									
Benzene	**31**	NC	0.02	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	**75**	NC	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	**55**	NC	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o-Xylene	NC	NC	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
p+m-Xylene	NC	NC	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Total Xylenes	**95**	NC	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
F1 (C6-C10)	NC	NC	10	<10	<10	<10	<10	<10	<10
F1 (C6-C10) - BTEX	NC	**30** (210)	10	<10	<10	<10	<10	<10	<10
F2-F4 Hydrocarbons (ug/g)									
F2 (C10-C16 Hydrocarbons)	NC	**150** (150)	10	<10	<10	<10	<10	<10	<10
F3 (C16-C34 Hydrocarbons)	NC	**300** (300)	10	64	18	100	14	43	20
F4 (C34-C50 Hydrocarbons)	NC	**2800** (2800)	10	<10	<10	96	<10	<10	<10
Reached Baseline at C50	N/A	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

1 = CCME (2007), Canadian Soil Quality Guidelines, Update 7.0, Table 2. Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.

2 = CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - Table 1, Tier 1 levels for PHCs, Residential / Parkland Use in coarse-grained surface soils. (Brackets) Protection of Eco Soil Contact from Table 1 - Technical Supplement.

*= See Quality Assurance and Quality Control section for scenario rationale.

N/A = Not applicable

- = Not Analyzed

NC = No Criteria

RDL= Reportable Detection Limit

20 = Guideline selected

20 = Exceeds selected guideline.

Table B-6
Soil Chemical Concentrations - PCBs

PARAMETER	Federal	INAC DEW Line Cleanup Criteria, Tier II[2]	RDL										
Sample ID	CCME[1] Residential/ Parkland			CAM-D S1	CAM-D DUP1	Duplicate Evaluation			CAM-D S1	CAM-D DUP1	Duplicate Evaluation		
Date				8/7/2012	8/7/2012	Scenario*	RPD (%)	Acceptable	8/7/2012	8/7/2012	Scenario*	RPD (%)	Acceptable
Depth (m)				0-0.15	0.-0.15				0.35-0.5	0.35-0.5			
Polychlorinated Biphenyls (ug/g)													
Aroclor 1016	NC	NC	0.010	<0.010	<0.010	A	---	Y	<0.010	<0.010	A	---	Y
Aroclor 1221	NC	NC	0.010	<0.010	<0.010	A	---	Y	<0.010	<0.010	A	---	Y
Aroclor 1232	NC	NC	0.010	<0.010	<0.010	A	---	Y	<0.010	<0.010	A	---	Y
Aroclor 1242	NC	NC	0.010	<0.010	<0.010	A	---	Y	<0.010	<0.010	A	---	Y
Aroclor 1248	NC	NC	0.010	<0.010	<0.010	A	---	Y	<0.010	<0.010	A	---	Y
Aroclor 1254	NC	NC	0.010	0.01	0.022	D	---	Y	0.01	<0.010	B	---	Y
Aroclor 1260	NC	NC	0.010	<0.010	<0.010	A	---	Y	<0.010	<0.010	A	---	Y
Aroclor 1262	NC	NC	0.010	<0.010	<0.010	A	---	Y	<0.010	<0.010	A	---	Y
Aroclor 1268	NC	NC	0.010	<0.010	<0.010	A	---	Y	<0.010	<0.010	A	---	Y
Total PCB	1.3	5	0.010	0.01	0.022	D	---	Y	0.01	<0.010	B	---	Y

Notes:

1 = CCME (2007), Canadian Soil Quality Guidelines, Update 7.0, Table 1. Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.

2 = Abandoned Military Site Remediation Protocol. Table 1. DEW Line Cleaup Criteria (DCC) for soil. DCC Tier II.

*= See Quality Assurance and Quality Control section for scenario rationale.

NC = No Criteria

RDL= Reportable Detection Limit

20 = Exceeds selected guideline.

Table B-6
Soil Chemical Concentrations - PCBs

PARAMETER	Federal	INAC DEW Line Cleanup Criteria, Tier II[2]	RDL						
Sample ID	CCME[1] Residential/ Parkland			CAM-D S2	CAM-D S2	CAM-D S3	CAM-D S3	CAM-D S4	CAM-D S4
Date				8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012
Depth (m)				0-0.15	0.35-0.5	0-0.15	0.35-0.5	0-0.15	0.35-0.5
Polychlorinated Biphenyls (ug/g)									
Aroclor 1016	NC	NC	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1221	NC	NC	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1232	NC	NC	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1242	NC	NC	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1248	NC	NC	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1254	NC	NC	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1260	NC	NC	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1262	NC	NC	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1268	NC	NC	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Total PCB	1.3	5	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

Notes:

1 = CCME (2007), Canadian Soil Quality Guidelines, Update 7.0, Table 1. Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.

2 = Abandoned Military Site Remediation Protocol. Table 1. DEW Line Cleaup Criteria (DCC) for soil. DCC Tier II.

*= See Quality Assurance and Quality Control section for scenario rationale.

NC = No Criteria

RDL= Reportable Detection Limit

20 = Exceeds selected guideline.

Table B-7
Soil Chemical Concentrations - Metals

PARAMETER	Federal	INAC DEW Line Cleanup Criteria, Tier II[2]	RDL										
Sample ID	CCME[1] Residential/ Parkland			CAM-D S1	CAM-D DUP1	Duplicate Evaluation			CAM-D S1	CAM-D DUP1	Duplicate Evaluation		
Date				8/7/2012	8/7/2012	Scenario*	RPD (%)	Acceptable	8/7/2012	8/7/2012	Scenario*	RPD (%)	Acceptable
Depth (m)				0 - 0.15	0.-0.15				0.35-0.5	0.35-0.5			
Metals (ug/g)													
Acid Extractable Arsenic (As)	12	30	1	1.4	1.3	D	---	Y	1.4	1.9	D	---	Y
Acid Extractable Cadmium (Cd)	10	5	0.1	0.14	0.17	D	---	Y	<0.10	0.1	B	---	Y
Acid Extractable Chromium (Cr)	64	250	1	19	18	D	---	Y	20	21.0	D	---	Y
Acid Extractable Cobalt (Co)	50	50	0.1	6.4	6.2	D	---	Y	6.9	7.4	D	---	Y
Acid Extractable Copper (Cu)	63	100	0.5	11	11	D	---	Y	11	12	D	---	Y
Acid Extractable Lead (Pb)	140	500	1	8.2	8.5	D	---	Y	8.5	7.5	D	---	Y
Acid Extractable Nickel (Ni)	50	100	0.5	10	9.8	D	---	Y	11	12	D	---	Y
Acid Extractable Zinc (Zn)	200	500	5	42	42	D	---	Y	39	42	D	---	Y
Acid Extractable Mercury (Hg)	6.6	2	0.05	<0.050	<0.050	NC	NC	NC	<0.050	<0.050	NC	NC	NC
Physical Properties													
Moisture (%)	NC	NC	1.0	7.1	7.7	D	---	Y	7.1	1.0	D	---	Y

Notes:

1 = CCME (2007), Canadian Soil Quality Guidelines, Update 7.0, Table 1. Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.

2 = Abandoned Military Site Remediation Protocol. Table 1. DEW Line Cleaup Criteria (DCC) for soil. DCC Tier II.

* = See Quality Assurance and Quality Control section for scenario rationale.

N/A = Not applicable

NC = No Criteria

RDL= Reportable Detection Limit

20 = Guideline selected

20 = Exceeds selected guideline.

Table B-7
Soil Chemical Concentrations - Metals

PARAMETER	Federal	INAC DEW Line Cleanup Criteria, Tier II[2]	RDL							
Sample ID	**CCME[1] Residential/ Parkland**			**CAM-D S2**	**CAM-D S2**	**CAM-D S3**	**CAM-D S3**	**CAM-D S4**	**CAM-D S4**	**CAM-D S4 Lab-Dup**
Date				8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012
Depth (m)				0-0.15	0.35-0.5	0-0.15	0.35-0.5	0-0.15	0.35-0.5	0.35-0.5
Metals (ug/g)										
Acid Extractable Arsenic (As)	12	30	1	1.3	1.1	<1.0	1.2	1.2	<1.0	1
Acid Extractable Cadmium (Cd)	10	5	0.1	0.18	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Acid Extractable Chromium (Cr)	64	250	1	19.0	14.0	12.0	18.0	16	14	14
Acid Extractable Cobalt (Co)	50	50	0.1	6.6	5.1	4.5	6.1	5.8	5	4.5
Acid Extractable Copper (Cu)	63	100	0.5	13	8.3	5	8	8.1	7	6.7
Acid Extractable Lead (Pb)	140	500	1	7.9	5.8	4.9	5.7	6.5	5	5.2
Acid Extractable Nickel (Ni)	50	100	0.5	10	7.4	5.9	9.5	8.3	7	7.4
Acid Extractable Zinc (Zn)	200	500	5	41	27	21	35	38	28	29
Acid Extractable Mercury (Hg)	6.6	2	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Physical Properties										
Moisture (%)	NC	NC	1.0	12	10	10	9.6	7.9	10	8.5

Notes:

1 = CCME (2007), Canadian Soil Quality Guidelines, Update 7.0, Table 1. Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.

2 = Abandoned Military Site Remediation Protocol. Table 1. DEW Line Cleaup Criteria (DCC) for soil. DCC Tier II.

* = See Quality Assurance and Quality Control section for scenario rationale.

N/A = Not applicable

NC = No Criteria

RDL= Reportable Detection Limit

20 = Guideline selected

20 = Exceeds selected guideline.

APPENDIX C

Site Photographs

South side of the SSDF. Viewpoint 1 (Figure A-2; Appendix A). Photograph reference RIMG0001.
Direction photo taken: N

South side of the SSDF. Viewpoint 2 (Figure A-2; Appendix A). Photograph reference RIMG0002.
Direction photo taken: N

Southeast corner of the SSDF. Viewpoint 3 (Figure A-2; Appendix A). Photograph reference RIMG0003.
Direction photo taken: NW

Southeast corner of the SSDF. Viewpoint 4 (Figure A-2; Appendix A). Photograph reference RIMG0004.
Direction photo taken: NW

South side of the SSDF from the Southeast corner. Viewpoint 5 (Figure A-2; Appendix A). Photograph reference RIMG0005. Direction photo taken: W

East side of the SSDF from the Southeast corner. Viewpoint 6 (Figure A-2; Appendix A). Photograph reference RIMG0006. Direction photo taken: N

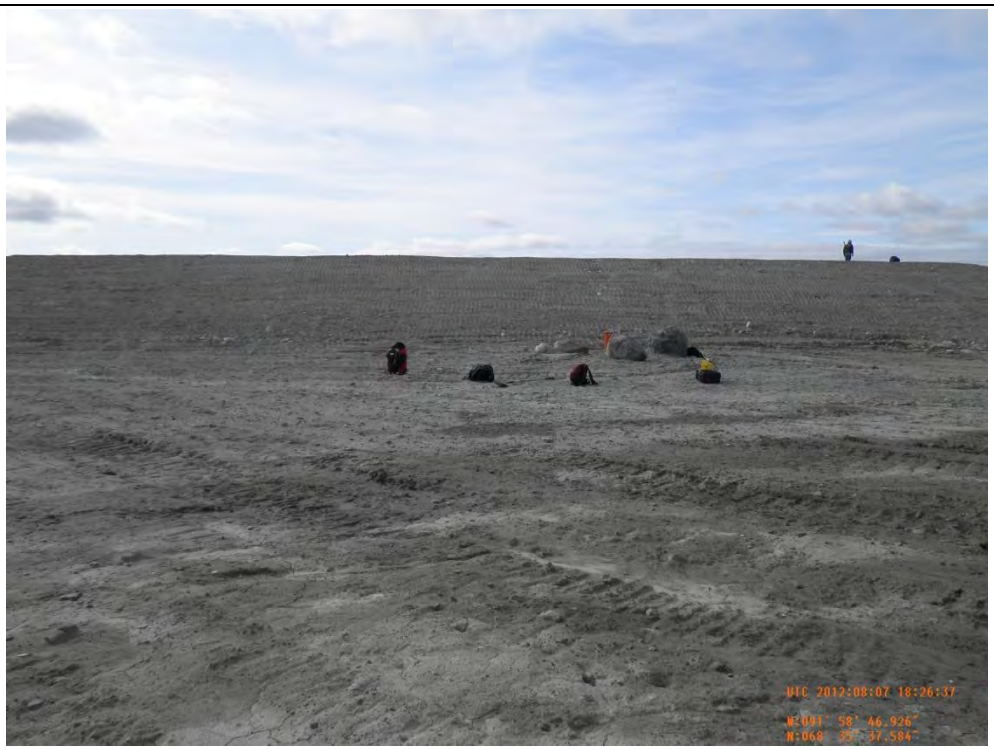
South side of the SSDF from the Southeast corner. Viewpoint 7 (Figure A-2; Appendix A). Photograph reference RIMG0007. Direction photo taken: W

East side of the SSDF from the Southeast corner. Viewpoint 8 (Figure A-2; Appendix A). Photograph reference RIMG0008. Direction photo taken: N

South side of the SSDF from the Southeast corner. Viewpoint 9 (Figure A-2; Appendix A). Photograph reference RIMG0009. Direction photo taken: W

East side of the SSDF from the Southeast corner. Viewpoint 10 (Figure A-2; Appendix A). Photograph reference RIMG0010. Direction photo taken: N

East side of the SSDF. Viewpoint 11 (Figure A-2; Appendix A). Photograph reference RIMG0011.
Direction photo taken: W



East side of the SSDF. Viewpoint 12 (Figure A-2; Appendix A). Photograph reference RIMG0012.
Direction photo taken: W

Northeast corner of the SSDF. Viewpoint 13 (Figure A-2; Appendix A). Photograph reference RIMG0013.
Direction photo taken: SW

Northeast corner of the SSDF. Viewpoint 14 (Figure A-2; Appendix A). Photograph reference RIMG0014.
Direction photo taken: SW

East side of the SSDF from the Northeast corner. Viewpoint 15 (Figure A-2; Appendix A). Photograph reference RIMG0015. Direction photo taken: S

North side of the SSDF from the Northeast corner. Viewpoint 16 (Figure A-2; Appendix A). Photograph reference RIMG0016. Direction photo taken: W

East side of the SSDF from the Northeast corner. Viewpoint 17 (Figure A-2; Appendix A). Photograph reference RIMG0017. Direction photo taken: S

North side of the SSDF from the Northeast corner. Viewpoint 18 (Figure A-2; Appendix A). Photograph reference RIMG0018. Direction photo taken: W

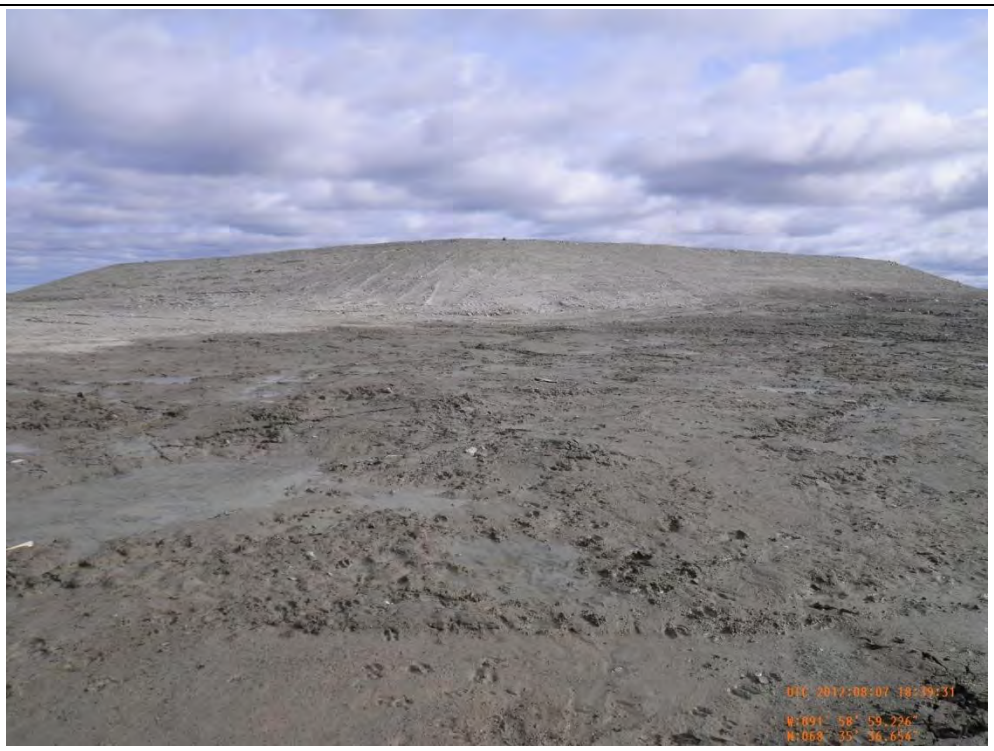
East side of the SSDF from the Northeast corner. Viewpoint 19 (Figure A-2; Appendix A). Photograph reference RIMG0019. Direction photo taken: S

North side of the SSDF from the Northeast corner. Viewpoint 20 (Figure A-2; Appendix A). Photograph reference RIMG0020. Direction photo taken: W

North side of the SSDF. Viewpoint 21 (Figure A-2; Appendix A). Photograph reference RIMG0021.
Direction photo taken: S

North side of the SSDF. Viewpoint 22 (Figure A-2; Appendix A). Photograph reference RIMG0022.
Direction photo taken: S

Northwest corner of the SSDF. Viewpoint 23 (Figure A-2; Appendix A). Photograph reference RIMG0023.
Direction photo taken: SE



Northwest corner of the SSDF. Viewpoint 24 (Figure A-2; Appendix A). Photograph reference RIMG0024.
Direction photo taken: SE

North side of the SSDF from the Northwest corner. Viewpoint 25 (Figure A-2; Appendix A). Photograph reference RIMG0025. Direction photo taken: E

West side of the SSDF from the Northwest corner. Viewpoint 26 (Figure A-2; Appendix A). Photograph reference RIMG0026. Direction photo taken: S

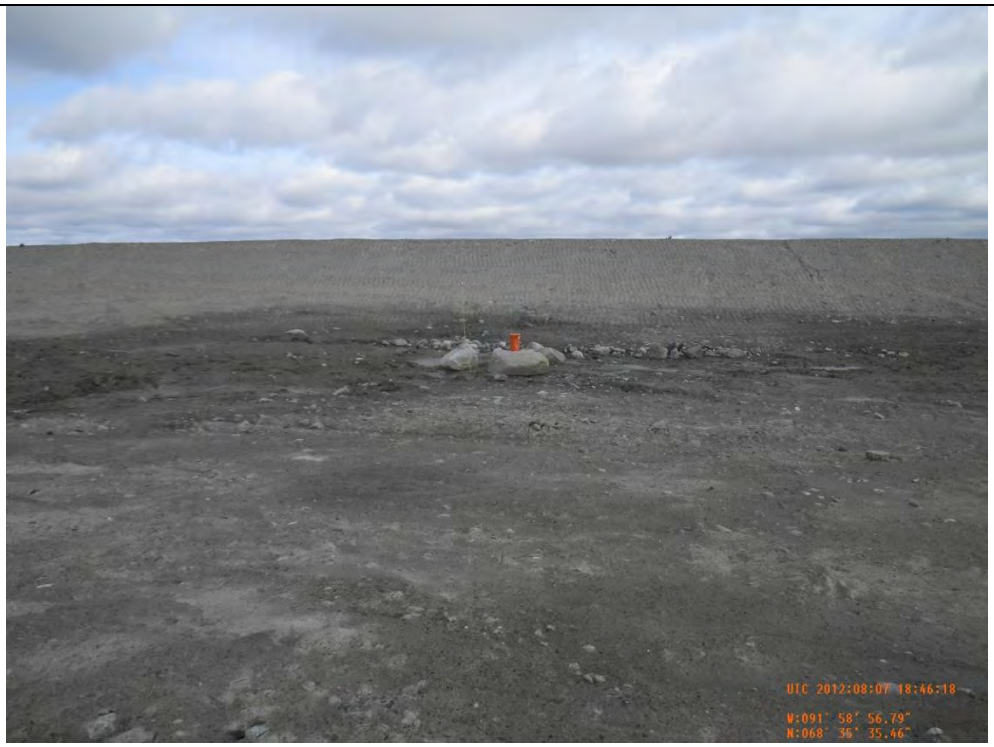
North side of the SSDF from the Northwest corner. Viewpoint 27 (Figure A-2; Appendix A). Photograph reference RIMG0027. Direction photo taken: E

West side of the SSDF from the Northwest corner. Viewpoint 28 (Figure A-2; Appendix A).Photograph reference RIMG0028. Direction photo taken: S

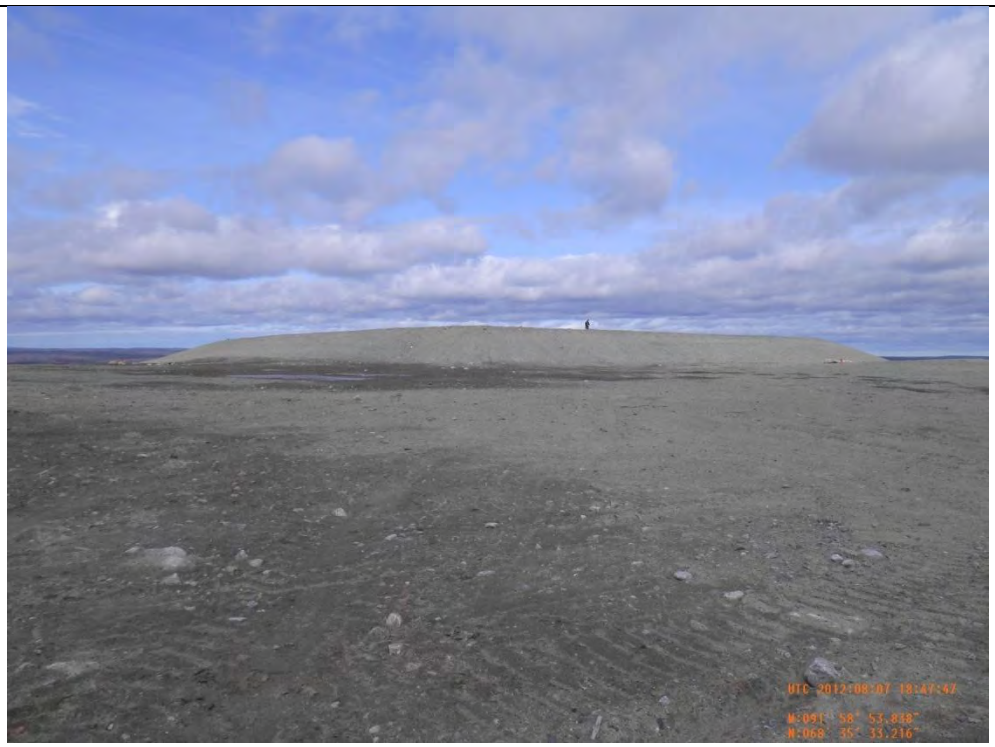
North side of the SSDF from the Northwest corner. Viewpoint 29 (Figure A-2; Appendix A). Photograph reference RIMG0029. Direction photo taken: E

West side of the SSDF from the Northwest corner. Viewpoint 30 (Figure A-2; Appendix A). Photograph reference RIMG0030. Direction photo taken: S

West side of the SSDF. Viewpoint 31 (Figure A-2; Appendix A). Photograph reference RIMG0031.
Direction photo taken: E



West side of the SSDF. Viewpoint 32 (Figure A-2; Appendix A). Photograph reference RIMG0032.
Direction photo taken: E



Southwest corner of the SSDF. Viewpoint 33 (Figure A-2; Appendix A). Photograph reference RIMG0033.
Direction photo taken: NE

Southwest corner of the SSDF. Viewpoint 34 (Figure A-2; Appendix A). Photograph reference RIMG0034.
Direction photo taken: NE

West side of the SSDF from the Southwest corner. Viewpoint 35 (Figure A-2; Appendix A). Photograph reference RIMG0035. Direction photo taken: N

South side of the SSDF from the Southwest corner. Viewpoint 36 (Figure A-2; Appendix A). Photograph reference RIMG0036. Direction photo taken: E

West side of the SSDF from the Southwest corner. Viewpoint 37 (Figure A-2; Appendix A). Photograph reference RIMG0037. Direction photo taken: N

South side of the SSDF from the Southwest corner. Viewpoint 38 (Figure A-2; Appendix A). Photograph reference RIMG0038. Direction photo taken: E

West side of the SSDF from the Southwest corner. Viewpoint 39 (Figure A-2; Appendix A). Photograph reference RIMG0039. Direction photo taken: N

South side of the SSDF from the Southwest corner. Viewpoint 40 (Figure A-2; Appendix A). Photograph reference RIMG0040. Direction photo taken: E

Top of the SSDF from the Southwest corner. Viewpoint 41 (Figure A-2; Appendix A). Photograph reference RIMG0041. Direction photo taken: NE

Top of the SSDF from the Southeast corner. Viewpoint 42 (Figure A-2; Appendix A). Photograph reference RIMG0042. Direction photo taken: NW

Top of the SSDF from the Northeast corner. Viewpoint 43 (Figure A-2; Appendix A). Photograph reference RIMG0043. Direction photo taken: SW

Top of the SSDF from the Northwest corner. Viewpoint 44 (Figure A-2; Appendix A). Photograph reference RIMG0044. Direction photo taken: SE

Top of the SSDF from the West side. Viewpoint 45 (Figure A-2; Appendix A). Photograph reference RIMG0045.
Direction photo taken: NE

Top of the SSDF from the West side. Viewpoint 46 (Figure A-2; Appendix A). Photograph reference RIMG0046.
Direction photo taken: SE

Top of the SSDF from the South side. Viewpoint 47 (Figure A-2; Appendix A). Photograph reference RIMG0047.
Direction photo taken: NW

Top of the SSDF from the South side. Viewpoint 48 (Figure A-2; Appendix A). Photograph reference RIMG0048.
Direction photo taken: NE

Top of the SSDF from the East side. Viewpoint 49 (Figure A-2; Appendix A). Photograph reference RIMG0049.
Direction photo taken: SW

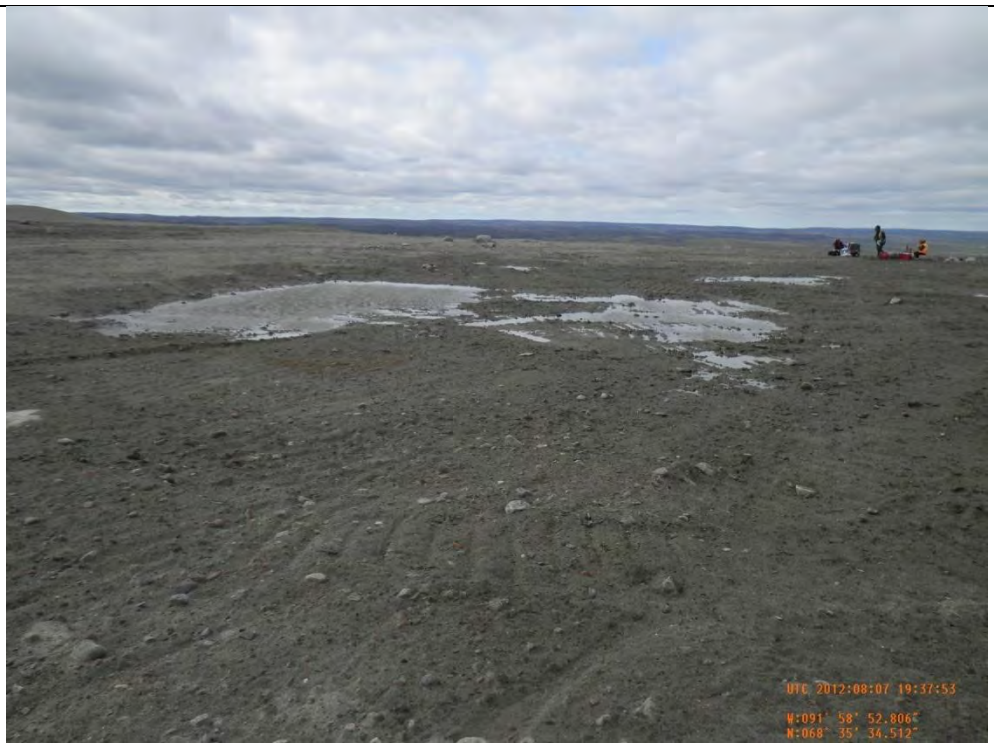
Top of the SSDF from the East side. Viewpoint 50 (Figure A-2; Appendix A). Photograph reference RIMG0050.
Direction photo taken: NW

Top of the SSDF from the North side. Viewpoint 51 (Figure A-2; Appendix A). Photograph reference RIMG0051.
Direction photo taken: SE

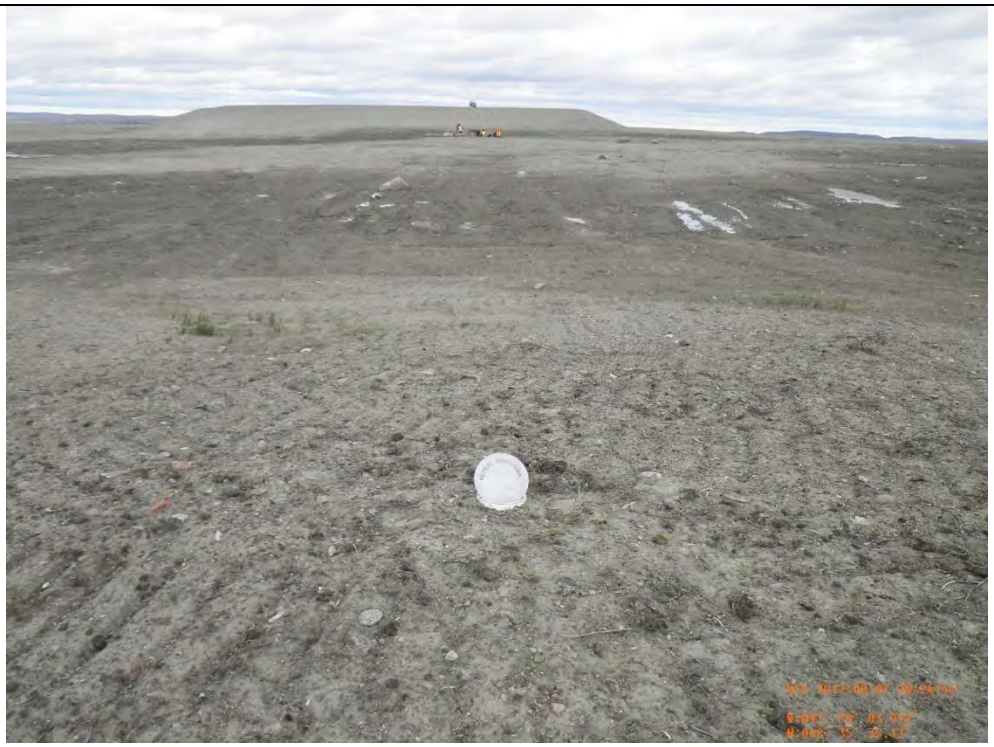
Top of the SSDF from the North side. Viewpoint 52 (Figure A-2; Appendix A). Photograph reference RIMG0052.
Direction photo taken: SW

Cracking on West slope of SSDF. Viewpoint 53 (Figure A-2; Appendix A). Photograph reference RIMG0053.
Direction photo taken: E

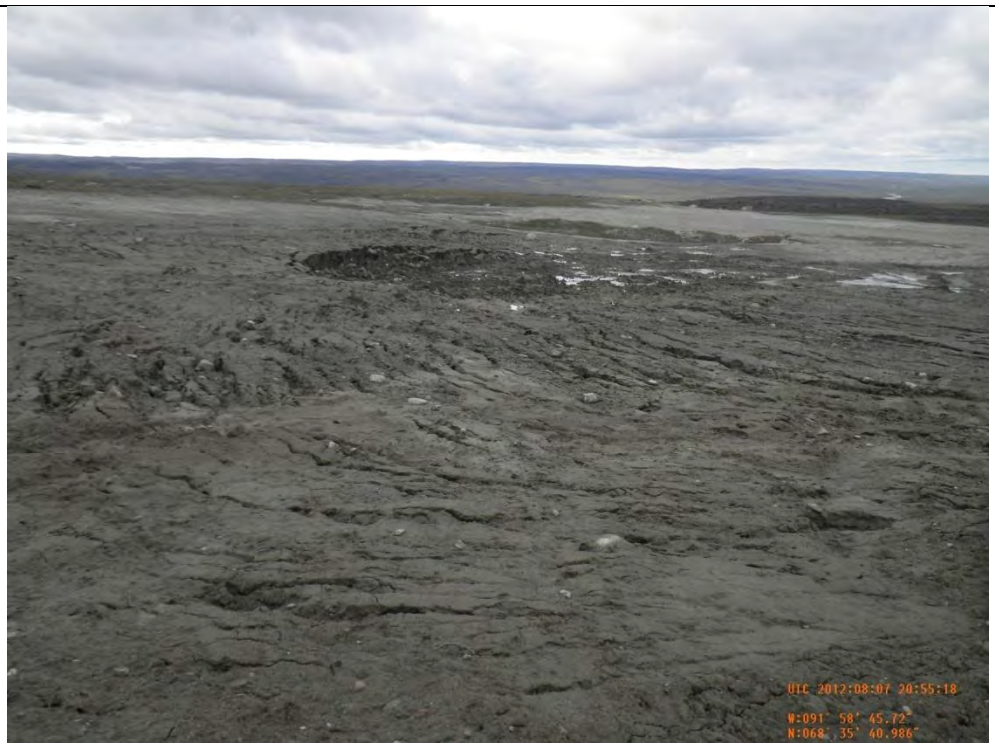
Edge of West slope of SSDF. Viewpoint 54 (Figure A-2; Appendix A). Photograph reference RIMG0054.
Direction photo taken: SE



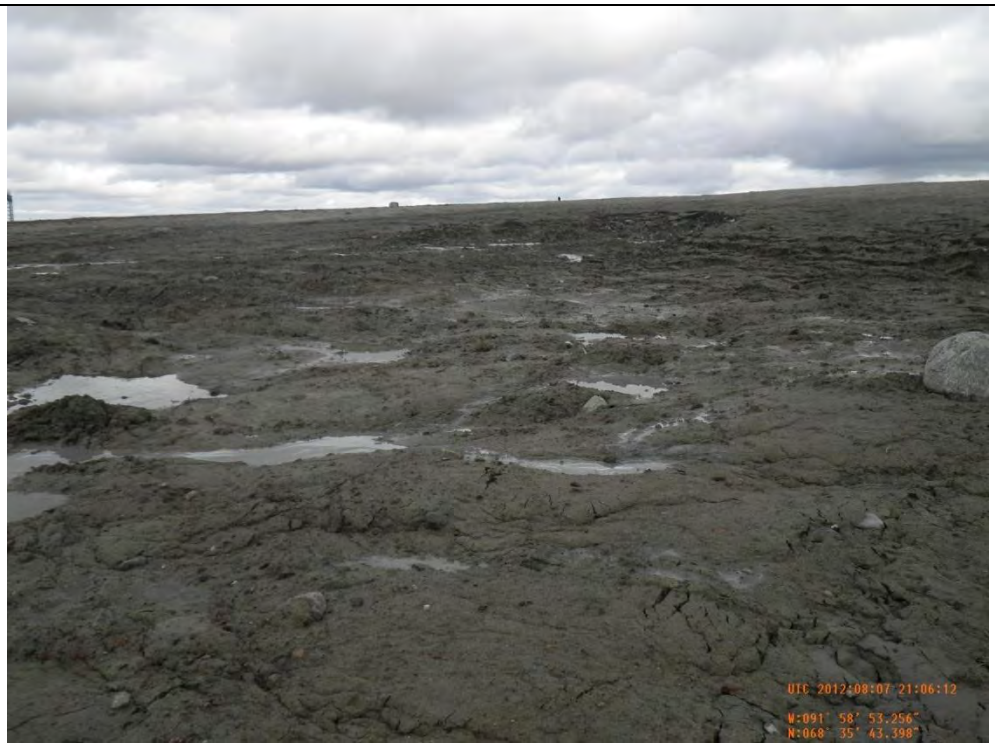
Ponding at Southwest corner. Viewpoint 55 (Figure A-2; Appendix A). Photograph reference RIMG0055.
Direction photo taken: NW



Monument. Viewpoint 56 (Figure A-2; Appendix A). Photograph reference RIMG0056.
Direction photo taken: E



Erosion feature. Viewpoint 57 (Figure A-2; Appendix A). Photograph reference RIMG0057.
Direction photo taken: SE



Erosion feature. Viewpoint 58 (Figure A-2; Appendix A). Photograph reference RIMG0058.
Direction photo taken: NW

Monument. Viewpoint 59 (Figure A-2; Appendix A). Photograph reference RIMG0059.
Direction photo taken: E

Monument. Viewpoint 60 (Figure A-2; Appendix A). Photograph reference RIMG0060.
Direction photo taken: E

APPENDIX D

Monitoring Well and Test Pit Sampling Logs

Project: 1697-1201

Franz Personnel: D. Kiar
Weather: Partly Sunny /~8°C

Sampling of Monitoring Wells

Name of Area: NHWL			Sector:
Date of Sampling:	Day: 7th	Month: 08	Year: 2012
Monitoring Well ID:	**MW-1**		
Coordinates of Well	Easting: 54748.959		Northing: 7648874.939
	GPS unit: Trimble XRT Pro		WP #:
Type of Well:	**Stick Up**		OVM (ppm): 0
Condition of Well:	**Good**		
Volume Purged (L):	> 3 L		
Sampling Equipment:	Geopump brand persistaltic pump and Horiba U-52 water quality meter		

Measured Data

Well Depth (mbgs):	1.068
Water Depth (mbgs):	0.528
Stick Up (mags):	0.45

Field Chemistry

Name and # unit:		**Readings ***
pH:	1	7.77
	2	7.89
	3	7.90
	4	7.87
	5	7.82
	6	7.78
	7	
	8	
	9	
	10	
	11	
Temperature (◦C):	1	11.12
	2	10.66
	3	8.04
	4	7.74
	5	8.04
	6	8.56
	7	
	8	
	9	
	10	
	11	
Conductivity (mS/cm):	1	2.94
	2	2.94
	3	3.14
	4	3.14
	5	3.16
	6	3.15
	7	
	8	
	9	
	10	
	11	
DO:	1	1.6
	2	0.0
	3	0.0
	4	0.0
	5	0.0
	6	0.0
	7	
	8	
	9	
	10	
	11	

Sample Analysis	**Y/N**	**# of Bottles**	**Duplicate Information**
PHCs: F1/BTEX, F2-F4	Y	11	
PCB Total	Y		
Total Metals	Y		
Dissolved Metals	Y		
General Chemistry	Y		

Comments/ Notes:

Well in good condition with good recharge. New lock installed.

pumping at 100-200 ml/min

Project: 1697-1201

Franz Personnel: D. Kiar
Weather: Partly Sunny /~8°C

Sampling of Monitoring Wells

Name of Area: NHWL			Sector:
Date of Sampling:	Day: 7th	Month: 08	Year: 2012
Monitoring Well ID:	**MW-2**		
Coordinates of Well	Easting: 54778.074		Northing: 7648933.086
	GPS unit: Trimble XRT Pro		WP #:
Type of Well:	**Stick Up**		OVM (ppm): 5
Condition of Well:	**Good**		
Volume Purged (L):	n/a		
Sampling Equipment:	Geopump brand persistaltic pump and Horiba U-52 water quality meter		

Measured Data

Well Depth (mbgs):	n/a
Water Depth (mbgs):	Frozen at 0.982
Stick Up (mags):	0.45

Field Chemistry

Name and # unit:		**Readings ***
pH:	1	n/a
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
Temperature (◦C):	1	n/a
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
Conductivity (mS/cm):	1	n/a
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
DO:	1	n/a
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	

Sample Analysis	**Y/N**	**# of Bottles**	**Duplicate Information**
PHCs: F1/BTEX, F2-F4	N	0	
PCB Total	N		
Total Metals	N		
Dissolved Metals	N		
General Chemistry	N		

Comments/ Notes:

Well was frozen; no samples were collected. Lock was replaced on casing.

Project: 1697-1201

Franz Personnel: D. Kiar
Weather: Partly Sunny /~8°C

Sampling of Monitoring Wells

Name of Area: NHWL			Sector:
Date of Sampling:	Day: 7th	Month: 08	Year: 2012
Monitoring Well ID:	**MW-3**		
Coordinates of Well	Easting: 54719.778		Northing: 7648950.765
	GPS unit: Trimble XRT Pro		WP #:
Type of Well:	**Stick Up**		OVM (ppm): 0
Condition of Well:	**Good**		
Volume Purged (L):	> 2.5 L		
Sampling Equipment:	Geopump brand persistaltic pump and Horiba U-52 water quality meter		

Measured Data

Well Depth (mbgs):	1.335
Water Depth (mbgs):	0.428
Stick Up (mags):	0.55

Field Chemistry

Name and # unit:		**Readings ***
pH:	1	7.90
	2	7.92
	3	7.94
	4	7.93
	5	7.92
	6	7.91
	7	
	8	
	9	
	10	
	11	
Temperature (◦C):	1	5.95
	2	5.73
	3	5.58
	4	5.58
	5	5.60
	6	5.48
	7	
	8	
	9	
	10	
	11	
Conductivity (mS/cm):	1	3.08
	2	2.78
	3	2.52
	4	2.42
	5	2.37
	6	2.34
	7	
	8	
	9	
	10	
	11	
DO:	1	1.62
	2	0.00
	3	0.00
	4	0.00
	5	0.00
	6	0.00
	7	
	8	
	9	
	10	
	11	

Sample Analysis	**Y/N**	**# of Bottles**	**Duplicate Information**
PHCs: F1/BTEX, F2-F4	Y	11	
PCB Total	Y		
Total Metals	Y		
Dissolved Metals	Y		
General Chemistry	Y		

Comments/ Notes:

well in good condition; sufficient recharge to collect samples. Lock on well replaced.

pumping at 100-200 ml/min

Project: 1697-1201

Franz Personnel: D. Kiar
Weather: Partly Sunny /~8°C

Sampling of Monitoring Wells

Name of Area: NHWL			Sector:
Date of Sampling:	Day: 7th	Month: 08	Year: 2012
Monitoring Well ID:	**MW-4**		
Coordinates of Well	Easting: 54687.631		Northing: 7648894.900
	GPS unit: Trimble XRT Pro		WP #:
Type of Well:	**Stick Up**		OVM (ppm): 0
Condition of Well:	**Good**		
Volume Purged (L):	> 5.25 L		
Sampling Equipment:	Geopump brand persistaltic pump and Horiba U-52 water quality meter		

Measured Data

Well Depth (mbgs):	1.705
Water Depth (mbgs):	0.131
Stick Up (mags):	0.42

Field Chemistry

Name and # unit:		**Readings ***
pH:	1	7.83
	2	7.52
	3	7.44
	4	7.36
	5	7.29
	6	7.22
	7	7.17
	8	7.13
	9	
	10	
	11	
Temperature (◦C):	1	5.70
	2	5.03
	3	4.95
	4	4.79
	5	4.61
	6	4.45
	7	4.56
	8	4.54
	9	
	10	
	11	
Conductivity (mS/cm):	1	1.32
	2	1.32
	3	1.32
	4	1.31
	5	1.31
	6	1.31
	7	1.31
	8	1.31
	9	
	10	
	11	
DO:	1	2.02
	2	8.89
	3	7.77
	4	6.71
	5	5.81
	6	5.02
	7	4.32
	8	3.79
	9	
	10	
	11	

Sample Analysis	**Y/N**	**# of Bottles**	**Duplicate Information**
PHCs: F1/BTEX, F2-F4	Y	22	DUP-1
PCB Total	Y		DUP-1
Total Metals	Y		DUP-1
Dissolved Metals	Y		DUP-1
General Chemistry	Y		DUP-1

Comments/ Notes:

Well in good condition; sufficient water to collect sample and duplicate. Lock on casing replaced.

pumping at 100-200 ml/min

Date:	7-Aug-12	**Test Pit: CAM-D S1**	SAMPLES				COMMENTS
Logged by:	D.Kiar						
Method:	Manual shovel						
Location:	CAM-D Simpson Lake Non-Hazardous Waste Landfill (NHWL)		Type	Sample I.D.	OVM (ppm or % LEL)	Analyses	
Issue	Depth (m)	Description					
Establish year one long-term monitoring baseline concentrations of contaminants of concern in soil surrounding the NHWL	0-0.15	Silty sand, some gravel and cobble, trace organics.	Grab	CAM-D S1 0-0.15	0	-PHCs F1-F4 / BTEX -Metals -PCBs	Relative location is approximately 4 m east of MW2; duplicate samples collected
	0.35-0.5	Silty sand, trace clay, trace gravel, trace organics.	Grab	CAM-D S1 0.35-0.5	0	-PHCs F1-F4 / BTEX -Metals -PCBs	

Date:	7-Aug-12	**Test Pit: CAM-D S2**	SAMPLES				COMMENTS
Logged by:	D.Kiar						
Method:	Manual shovel						
Location:	CAM-D Simpson Lake Non-Hazardous Waste Landfill (NHWL)		Type	Sample I.D.	OVM (ppm or % LEL)	Analyses	
Issue	Depth (m)	Description					
Establish year one long-term monitoring baseline concentrations of contaminants of concern in soil surrounding the NHWL	0-0.15	Silty sand, some gravel and trace organics	Grab	CAM-D S1 0-0.15 DUP-1 0-0.15	0	-PHCs F1-F4 / BTEX -Metals -PCBs	Located approximately 7 m north of MW3
	0.35-0.5	silty sand, trace clay trace gravel, moist	Grab	CAM-D S1 0.35-0.5 DUP-2 0.35-0.5	10	-PHCs F1-F4 / BTEX -Metals -PCBs	

Date:	7-Aug-12	**Test Pit: CAM-D S3**	SAMPLES				COMMENTS
Logged by:	D.Kiar						
Method:	Manual shovel						
Location:	CAM-D Simpson Lake Non-Hazardous Waste Landfill (NHWL)		Type	Sample I.D.	OVM (ppm or % LEL)	Analyses	
Issue	Depth (m)	Description					
Establish year one long-term monitoring baseline concentrations of contaminants of concern in soil surrounding the NHWL	0-0.15	Silty sand trace organics, trace gravel	Grab	CAM-D S2 0-0.15	5	-PHCs F1-F4 / BTEX -Metals -PCBs	Located approximately 6 m west of MW4
	0.35-0.5	Silty sand, trace gravel	Grab	CAM-D S2 0.35-0.5	0	-PHCs F1-F4 / BTEX -Metals -PCBs	

Date:	7-Aug-12	**Test Pit: CAM-D S4**	SAMPLES				COMMENTS
Logged by:	D.Kiar						
Method:	Manual shovel						
Location:	CAM-D Simpson Lake Non-Hazardous Waste Landfill (NHWL)		Type	Sample I.D.	OVM (ppm or % LEL)	Analyses	
Issue	Depth (m)	Description					
Establish year one long-term monitoring baseline concentrations of contaminants of concern in soil surrounding the NHWL	0-0.15	Silty sand, trace organics and gravel	Grab	CAM-D S2 0-0.15	0	-PHCs F1-F4 / BTEX -Metals -PCBs	located approximately 4 m south of MW1
	0.35-0.5	Silty sand trace gravel and cobble	Grab	CAM-D S2 0.35-0.5	0	-PHCs F1-F4 / BTEX -Metals -PCBs	

APPENDIX E

Laboratory Certificates of Analysis and Chain of Custody Forms

Your Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Your C.O.C. #: 36564501, 365645-01-02

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

Report Date: 2012/08/16

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2C1150
Received: 2012/08/10, 10:30

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Chloride by Automated Colourimetry (1)	4	N/A	2012/08/14	CAM SOP-00463	EPA 325.2
Colour (1)	4	N/A	2012/08/13	CAM SOP-00412	APHA 2120
Conductivity (1)	4	N/A	2012/08/13	CAM SOP-00448	SM 2510
Petroleum Hydro. CCME F1 & BTEX in Water	4	N/A	2012/08/13	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water	4	2012/08/13	2012/08/13	OTT SOP-00001	CCME Hydrocarbons
Fluoride (1)	4	2012/08/11	2012/08/13	CAM SOP-00448	APHA 4500FC
Nitrate (NO3) and Nitrite (NO2) in Water (1,2)	4	N/A	2012/08/16	CAM SOP-00440	SM 4500 NO3I/NO2B
Polychlorinated Biphenyl in Water (1)	1	2012/08/13	2012/08/13	CAM SOP-00309	SW846 8082
Polychlorinated Biphenyl in Water (1)	3	2012/08/13	2012/08/14	CAM SOP-00309	SW846 8082
pH (1)	4	N/A	2012/08/13	CAM SOP-00448	SM 4500H+ B
Orthophosphate (1)	4	N/A	2012/08/14	CAM SOP-00461	EPA 365.1
Sulphate by Automated Colourimetry (1)	4	N/A	2012/08/14	CAM SOP-00464	EPA 375.4
Total Dissolved Solids (1)	4	N/A	2012/08/14	CAM SOP-00428	APHA 2540C
Total Suspended Solids (1)	4	N/A	2012/08/13	CAM SOP-00428	SM 2540D

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) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

../2

Maxxam Job #: B2C1150
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Sampler Initials: DK

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 #: B2C1150
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Sampler Initials: DK

RESULTS OF ANALYSES OF WATER

Maxxam ID		OL3285		OL3286		OL3287	OL3287	OL3288		
Sampling Date		2012/08/07		2012/08/07		2012/08/07	2012/08/07	2012/08/07		
	Units	**MW1**	**RDL**	**MW3**	**RDL**	**MW4**	**MW4 Lab-Dup**	**DUP-1**	**RDL**	**QC Batch**
Inorganics										
Colour	TCU	16	4	8	2	5		5	2	2935917
Conductivity	umho/cm	3000	1.0	2100	1.0	1300	1300	1300	1.0	2935938
Total Dissolved Solids	mg/L	2210	10	1410	10	888		876	10	2936131
Fluoride (F-)	mg/L	1.07	0.10	1.29	0.10	0.31	0.31	0.32	0.10	2935939
Orthophosphate (P)	mg/L	<0.010	0.010	<0.010	0.010	<0.010		<0.010	0.010	2936375
pH	pH	7.98		7.85		7.43	7.46	7.50		2935940
Total Suspended Solids	mg/L	<10	10	15	10	<10		<10	10	2935916
Dissolved Sulphate (SO4)	mg/L	1100	5	550	5	390		390	2	2936376
Dissolved Chloride (Cl)	mg/L	160	2	170	2	59		59	1	2936373
Nitrite (N)	mg/L	0.10	0.010	0.054	0.010	<0.010		<0.010	0.010	2936526
Nitrate (N)	mg/L	0.48	0.10	0.57	0.10	0.44		0.45	0.10	2936526
Nitrate + Nitrite	mg/L	0.59	0.10	0.63	0.10	0.44		0.45	0.10	2936526

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

Maxxam Job #: B2C1150
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Sampler Initials: DK

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		OL3285	OL3286	OL3286		OL3287		OL3288		
Sampling Date		2012/08/07	2012/08/07	2012/08/07		2012/08/07		2012/08/07		
	Units	**MW1**	**MW3**	**MW3 Lab-Dup**	**RDL**	**MW4**	**RDL**	**DUP-1**	**RDL**	**QC Batch**
PCBs										
Aroclor 1016	ug/L	<0.05	<0.05	<0.05	0.05	<0.3	0.3	<0.05	0.05	2936138
Aroclor 1221	ug/L	<0.05	<0.05	<0.05	0.05	<0.3	0.3	<0.05	0.05	2936138
Aroclor 1232	ug/L	<0.05	<0.05	<0.05	0.05	<0.3	0.3	<0.05	0.05	2936138
Aroclor 1242	ug/L	<0.05	<0.05	<0.05	0.05	<0.3	0.3	<0.05	0.05	2936138
Aroclor 1248	ug/L	<0.05	<0.05	<0.05	0.05	<0.3	0.3	<0.05	0.05	2936138
Aroclor 1254	ug/L	<0.05	<0.05	<0.05	0.05	<0.3	0.3	<0.05	0.05	2936138
Aroclor 1260	ug/L	<0.05	<0.05	<0.05	0.05	<0.3	0.3	<0.05	0.05	2936138
Aroclor 1262	ug/L	<0.05	<0.05	<0.05	0.05	<0.3	0.3	<0.05	0.05	2936138
Aroclor 1268	ug/L	<0.05	<0.05	<0.05	0.05	<0.3	0.3	<0.05	0.05	2936138
Total PCB	ug/L	<0.05	<0.05	<0.05	0.05	<0.3	0.3	<0.05	0.05	2936138
Surrogate Recovery (%)										
Decachlorobiphenyl	%	108	91	91		119		92		2936138

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

Maxxam Job #: B2C1150
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Sampler Initials: DK

O'REG 153 PETROLEUM HYDROCARBONS (WATER)

Maxxam ID		OL3285	OL3285	OL3286	OL3286	OL3287	OL3288		
Sampling Date		2012/08/07	2012/08/07	2012/08/07	2012/08/07	2012/08/07	2012/08/07		
	Units	**MW1**	**MW1 Lab-Dup**	**MW3**	**MW3 Lab-Dup**	**MW4**	**DUP-1**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons									
Benzene	ug/L	<0.20	<0.20	<0.20		<0.20	<0.20	0.20	2936396
Toluene	ug/L	<0.20	<0.20	<0.20		<0.20	<0.20	0.20	2936396
Ethylbenzene	ug/L	<0.20	<0.20	<0.20		<0.20	<0.20	0.20	2936396
o-Xylene	ug/L	<0.20	<0.20	<0.20		<0.20	<0.20	0.20	2936396
p+m-Xylene	ug/L	<0.40	<0.40	<0.40		<0.40	<0.40	0.40	2936396
Total Xylenes	ug/L	<0.40	<0.40	<0.40		<0.40	<0.40	0.40	2936396
F1 (C6-C10)	ug/L	<25	<25	<25		<25	<25	25	2936396
F1 (C6-C10) - BTEX	ug/L	<25	<25	<25		<25	<25	25	2936396
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/L	<100		<100	<100	<100	<100	100	2936322
F3 (C16-C34 Hydrocarbons)	ug/L	<100		<100	<100	<100	<100	100	2936322
F4 (C34-C50 Hydrocarbons)	ug/L	<100		<100	<100	<100	<100	100	2936322
Reached Baseline at C50	ug/L	YES		YES	YES	YES	YES		2936322
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	107	110	107		103	105		2936396
4-Bromofluorobenzene	%	104	104	104		99	102		2936396
D10-Ethylbenzene	%	109	108	105		96	104		2936396
D4-1,2-Dichloroethane	%	101	100	101		97	96		2936396
o-Terphenyl	%	73		75	70	76	76		2936322

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B2C1150
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Sampler Initials: DK

Test Summary

Maxxam ID OL3285 **Collected** 2012/08/07
Sample ID MW1 **Shipped**
Matrix Water **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chloride by Automated Colourimetry	AC	2936373	N/A	2012/08/14	Deonarine Ramnarine
Colour	SPEC	2935917	N/A	2012/08/13	Charles Opoku-Ware
Conductivity	COND	2935938	N/A	2012/08/13	Surinder Rai
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2936396	N/A	2012/08/13	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2936322	2012/08/13	2012/08/13	Lyndsey Hart
Fluoride	F	2935939	2012/08/11	2012/08/13	Surinder Rai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2936526	N/A	2012/08/16	Chris Li
Polychlorinated Biphenyl in Water	GC/ECD	2936138	2012/08/13	2012/08/14	Joy Zhang
pH	PH	2935940	N/A	2012/08/13	Surinder Rai
Orthophosphate	AC	2936375	N/A	2012/08/14	Birenkumar Patel
Sulphate by Automated Colourimetry	AC	2936376	N/A	2012/08/14	Deonarine Ramnarine
Total Dissolved Solids	SLDS	2936131	N/A	2012/08/14	Gurpreet Kaur
Total Suspended Solids	SLDS	2935916	N/A	2012/08/13	Bansari Ray

Maxxam ID OL3285 Dup **Collected** 2012/08/07
Sample ID MW1 **Shipped**
Matrix Water **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2936396	N/A	2012/08/13	Steve Roberts

Maxxam ID OL3286 **Collected** 2012/08/07
Sample ID MW3 **Shipped**
Matrix Water **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chloride by Automated Colourimetry	AC	2936373	N/A	2012/08/14	Deonarine Ramnarine
Colour	SPEC	2935917	N/A	2012/08/13	Charles Opoku-Ware
Conductivity	COND	2935938	N/A	2012/08/13	Surinder Rai
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2936396	N/A	2012/08/13	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2936322	2012/08/13	2012/08/13	Lyndsey Hart
Fluoride	F	2935939	2012/08/11	2012/08/13	Surinder Rai

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Maxxam Job #: B2C1150
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Sampler Initials: DK

Test Summary

Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2936526	N/A	2012/08/16	Chris Li
Polychlorinated Biphenyl in Water	GC/ECD	2936138	2012/08/13	2012/08/13	Joy Zhang
pH	PH	2935940	N/A	2012/08/13	Surinder Rai
Orthophosphate	AC	2936375	N/A	2012/08/14	Birenkumar Patel
Sulphate by Automated Colourimetry	AC	2936376	N/A	2012/08/14	Deonarine Ramnarine
Total Dissolved Solids	SLDS	2936131	N/A	2012/08/14	Gurpreet Kaur
Total Suspended Solids	SLDS	2935916	N/A	2012/08/13	Bansari Ray

Maxxam ID OL3286 Dup
Sample ID MW3
Matrix Water

Collected 2012/08/07
Shipped
Received 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2936322	2012/08/13	2012/08/13	Lyndsey Hart
Polychlorinated Biphenyl in Water	GC/ECD	2936138	2012/08/13	2012/08/13	Joy Zhang

Maxxam ID OL3287
Sample ID MW4
Matrix Water

Collected 2012/08/07
Shipped
Received 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chloride by Automated Colourimetry	AC	2936373	N/A	2012/08/14	Deonarine Ramnarine
Colour	SPEC	2935917	N/A	2012/08/13	Charles Opoku-Ware
Conductivity	COND	2935938	N/A	2012/08/13	Surinder Rai
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2936396	N/A	2012/08/13	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2936322	2012/08/13	2012/08/13	Lyndsey Hart
Fluoride	F	2935939	2012/08/11	2012/08/13	Surinder Rai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2936526	N/A	2012/08/16	Chris Li
Polychlorinated Biphenyl in Water	GC/ECD	2936138	2012/08/13	2012/08/14	Joy Zhang
pH	PH	2935940	N/A	2012/08/13	Surinder Rai
Orthophosphate	AC	2936375	N/A	2012/08/14	Birenkumar Patel
Sulphate by Automated Colourimetry	AC	2936376	N/A	2012/08/14	Deonarine Ramnarine
Total Dissolved Solids	SLDS	2936131	N/A	2012/08/14	Gurpreet Kaur
Total Suspended Solids	SLDS	2935916	N/A	2012/08/13	Bansari Ray

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Maxxam Job #: B2C1150
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Sampler Initials: DK

Test Summary

Maxxam ID OL3287 Dup
Sample ID MW4
Matrix Water

Collected 2012/08/07
Shipped
Received 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2935938	N/A	2012/08/13	Surinder Rai
Fluoride	F	2935939	2012/08/11	2012/08/13	Surinder Rai
pH	PH	2935940	N/A	2012/08/13	Surinder Rai

Maxxam ID OL3288
Sample ID DUP-1
Matrix Water

Collected 2012/08/07
Shipped
Received 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Chloride by Automated Colourimetry	AC	2936373	N/A	2012/08/14	Deonarine Ramnarine
Colour	SPEC	2935917	N/A	2012/08/13	Charles Opoku-Ware
Conductivity	COND	2935938	N/A	2012/08/13	Surinder Rai
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2936396	N/A	2012/08/13	Steve Roberts
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2936322	2012/08/13	2012/08/13	Lyndsey Hart
Fluoride	F	2935939	2012/08/11	2012/08/13	Surinder Rai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2936526	N/A	2012/08/16	Chris Li
Polychlorinated Biphenyl in Water	GC/ECD	2936138	2012/08/13	2012/08/14	Joy Zhang
pH	PH	2935940	N/A	2012/08/13	Surinder Rai
Orthophosphate	AC	2936375	N/A	2012/08/14	Birenkumar Patel
Sulphate by Automated Colourimetry	AC	2936376	N/A	2012/08/14	Deonarine Ramnarine
Total Dissolved Solids	SLDS	2936131	N/A	2012/08/14	Gurpreet Kaur
Total Suspended Solids	SLDS	2935916	N/A	2012/08/13	Bansari Ray

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Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Sampler Initials: DK

Package 1	3.3°C

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

GENERAL COMMENTS

Sample OL3287-01: PCB Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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Maxxam Job #: B2C1150
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Sampler Initials: DK

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2935916	Total Suspended Solids	2012/08/13					<10	mg/L	NC	25	98	85 - 115
2935917	Colour	2012/08/13			99	85 - 115	<2	TCU	NC	25		
2935938	Conductivity	2012/08/13					<1.0	umho/cm	0.08	25	101	85 - 115
2935939	Fluoride (F-)	2012/08/13	100	80 - 120	98	80 - 120	<0.10	mg/L	NC	20		
2936131	Total Dissolved Solids	2012/08/14					<10	mg/L	8.4	25	101	90 - 110
2936138	Decachlorobiphenyl	2012/08/13	119	60 - 130	83	60 - 130	83	%				
2936138	Aroclor 1260	2012/08/13	91	60 - 130	76	60 - 130	<0.05	ug/L	NC	30		
2936138	Total PCB	2012/08/13	91	60 - 130	76	60 - 130	<0.05	ug/L	NC	40		
2936138	Aroclor 1016	2012/08/13					<0.05	ug/L	NC	40		
2936138	Aroclor 1221	2012/08/13					<0.05	ug/L	NC	40		
2936138	Aroclor 1232	2012/08/13					<0.05	ug/L	NC	40		
2936138	Aroclor 1242	2012/08/13					<0.05	ug/L	NC	30		
2936138	Aroclor 1248	2012/08/13					<0.05	ug/L	NC	30		
2936138	Aroclor 1254	2012/08/13					<0.05	ug/L	NC	30		
2936138	Aroclor 1262	2012/08/13					<0.05	ug/L	NC	40		
2936138	Aroclor 1268	2012/08/13					<0.05	ug/L	NC	40		
2936322	o-Terphenyl	2012/08/13	71	30 - 130	73	30 - 130	75	%				
2936322	F2 (C10-C16 Hydrocarbons)	2012/08/13	73	50 - 130	81	70 - 130	<100	ug/L	NC	50		
2936322	F3 (C16-C34 Hydrocarbons)	2012/08/13	73	50 - 130	81	70 - 130	<100	ug/L	NC	50		
2936322	F4 (C34-C50 Hydrocarbons)	2012/08/13	73	50 - 130	81	70 - 130	<100	ug/L	NC	50		
2936373	Dissolved Chloride (Cl)	2012/08/14	NC	80 - 120	103	80 - 120	<1	mg/L	0.9	20		
2936375	Orthophosphate (P)	2012/08/14	99	75 - 125	101	80 - 120	<0.010	mg/L	NC	25		
2936376	Dissolved Sulphate (SO4)	2012/08/14	42	75 - 125	97	80 - 120	<1	mg/L	0.5	20		
2936396	1,4-Difluorobenzene	2012/08/13	106	70 - 130	107	70 - 130	108	%				
2936396	4-Bromofluorobenzene	2012/08/13	101	70 - 130	102	70 - 130	103	%				
2936396	D10-Ethylbenzene	2012/08/13	106	70 - 130	113	70 - 130	105	%				
2936396	D4-1,2-Dichloroethane	2012/08/13	101	70 - 130	101	70 - 130	98	%				
2936396	Benzene	2012/08/13	89	70 - 130	88	70 - 130	<0.20	ug/L	NC	40		
2936396	Toluene	2012/08/13	86	70 - 130	84	70 - 130	<0.20	ug/L	NC	40		
2936396	Ethylbenzene	2012/08/13	90	70 - 130	93	70 - 130	<0.20	ug/L	NC	40		
2936396	o-Xylene	2012/08/13	93	70 - 130	93	70 - 130	<0.20	ug/L	NC	40		
2936396	p+m-Xylene	2012/08/13	83	70 - 130	84	70 - 130	<0.40	ug/L	NC	40		
2936396	F1 (C6-C10)	2012/08/13	90	70 - 130	98	70 - 130	<25	ug/L	NC	40		
2936396	Total Xylenes	2012/08/13					<0.40	ug/L	NC	40		
2936396	F1 (C6-C10) - BTEX	2012/08/13					<25	ug/L	NC	40		

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Maxxam Job #: B2C1150
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201 (D)
Site Location: CAM-D DEW LINE
Sampler Initials: DK

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2936526	Nitrite (N)	2012/08/16	103	80 - 120	100	85 - 115	<0.010	mg/L	7.7	25		
2936526	Nitrate (N)	2012/08/16	NC	80 - 120	95	85 - 115	<0.10	mg/L	0.2	25		

N/A = Not Applicable
RPD = Relative Percent Difference
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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Validation Signature Page

Maxxam Job #: B2C1150

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

Charles Ancker, B.Sc., M.Sc., C.Chem, Senior Analyst

Cristina Carriere, Scientific Services

Paul Rubinato, Analyst, Maxxam Analytics

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Your Project #: 1697-1201
Site Location: CAM-D LTM
Your C.O.C. #: 36565304, 365653-04-01

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

Report Date: 2012/08/16

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2C1114
Received: 2012/08/10, 10:30

Sample Matrix: Soil
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydro. CCME F1 & BTEX in Soil (1)	10	2012/08/11	2012/08/16	CAM SOP-00315	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil (1)	10	2012/08/14	2012/08/16	CAM SOP-00316	CCME CWS
Acid Extr. Metals (aqua regia) by ICPMS (1)	10	2012/08/15	2012/08/15	CAM SOP-00447	EPA 6020
Moisture (1)	10	N/A	2012/08/14	CAM SOP-00445	R.Carter,1993
Polychlorinated Biphenyl in Soil (1)	4	2012/08/13	2012/08/14	CAM SOP-00309	SW846 8082
Polychlorinated Biphenyl in Soil (1)	6	2012/08/13	2012/08/15	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 #: B2C1114
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201
Site Location: CAM-D LTM
Sampler Initials: KM

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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Total cover pages: 2

Maxxam Job #: B2C1114
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201
Site Location: CAM-D LTM
Sampler Initials: KM

CCME PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OL3120	OL3120	OL3121	OL3122	OL3123	OL3124		
Sampling Date		2012/08/07	2012/08/07	2012/08/07	2012/08/07	2012/08/07	2012/08/07		
	Units	**CAM-D S1 0-0.15**	**CAM-D S1 0-0.15 Lab-Dup**	**CAM-D S1 0.35-0.5**	**CAM-D S2 0-0.15**	**CAM-D S2 0.35-0.5**	**CAM-D S3 0-0.15**	**RDL**	**QC Batch**
Inorganics									
Moisture	%	7.1		7.1	12	10	10	1.0	2938330
BTEX & F1 Hydrocarbons									
Benzene	ug/g	<0.005		<0.005	<0.005	<0.005	<0.005	0.005	2938364
Toluene	ug/g	<0.02		<0.02	<0.02	<0.02	<0.02	0.02	2938364
Ethylbenzene	ug/g	<0.01		<0.01	<0.01	<0.01	<0.01	0.01	2938364
o-Xylene	ug/g	<0.02		<0.02	<0.02	<0.02	<0.02	0.02	2938364
p+m-Xylene	ug/g	<0.04		<0.04	<0.04	<0.04	<0.04	0.04	2938364
Total Xylenes	ug/g	<0.04		<0.04	<0.04	<0.04	<0.04	0.04	2938364
F1 (C6-C10)	ug/g	<10		<10	<10	<10	<10	10	2938364
F1 (C6-C10) - BTEX	ug/g	<10		<10	<10	<10	<10	10	2938364
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	<10	<10	<10	10	2938214
F3 (C16-C34 Hydrocarbons)	ug/g	54	57	<10	64	18	100	10	2938214
F4 (C34-C50 Hydrocarbons)	ug/g	13	15	<10	<10	<10	96	10	2938214
Reached Baseline at C50	ug/g	YES	YES	YES	YES	YES	YES		2938214
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	95		95	93	96	97		2938364
4-Bromofluorobenzene	%	95		96	95	95	95		2938364
D10-Ethylbenzene	%	84		80	77	84	79		2938364
D4-1,2-Dichloroethane	%	94		95	91	94	92		2938364
o-Terphenyl	%	98	100	101	99	99	98		2938214

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201
Site Location: CAM-D LTM
Sampler Initials: KM

CCME PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OL3125	OL3126	OL3127	OL3128	OL3129		
Sampling Date		2012/08/07	2012/08/07	2012/08/07	2012/08/07	2012/08/07		
	Units	**CAM-D S3 0.35-0.5**	**CAM-D S4 0-0.15**	**CAM-D S4 0.35-0.5**	**CAM-D DUP1 0.-0.15**	**CAM-D DUP1 0.35-0.5**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	9.6	7.9	10	8.5	7.7	1.0	2938330
BTEX & F1 Hydrocarbons								
Benzene	ug/g	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	2938364
Toluene	ug/g	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	2938364
Ethylbenzene	ug/g	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	2938364
o-Xylene	ug/g	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	2938364
p+m-Xylene	ug/g	<0.04	<0.04	<0.04	<0.04	<0.04	0.04	2938364
Total Xylenes	ug/g	<0.04	<0.04	<0.04	<0.04	<0.04	0.04	2938364
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	10	2938364
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	10	2938364
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	<10	<10	10	2938214
F3 (C16-C34 Hydrocarbons)	ug/g	14	43	20	61	<10	10	2938214
F4 (C34-C50 Hydrocarbons)	ug/g	<10	<10	<10	22	<10	10	2938214
Reached Baseline at C50	ug/g	YES	YES	YES	YES	YES		2938214
Surrogate Recovery (%)								
1,4-Difluorobenzene	%	108	95	93	96	94		2938364
4-Bromofluorobenzene	%	99	96	96	95	96		2938364
D10-Ethylbenzene	%	74	80	77	78	79		2938364
D4-1,2-Dichloroethane	%	109	93	94	95	93		2938364
o-Terphenyl	%	99	99	99	98	97		2938214

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B2C1114
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201
Site Location: CAM-D LTM
Sampler Initials: KM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		OL3120	OL3121	OL3122	OL3123	OL3124	OL3125		
Sampling Date		2012/08/07	2012/08/07	2012/08/07	2012/08/07	2012/08/07	2012/08/07		
	Units	**CAM-D S1 0-0.15**	**CAM-D S1 0.35-0.5**	**CAM-D S2 0-0.15**	**CAM-D S2 0.35-0.5**	**CAM-D S3 0-0.15**	**CAM-D S3 0.35-0.5**	**RDL**	**QC Batch**
Metals									
Acid Extractable Arsenic (As)	ug/g	1.4	1.4	1.3	1.1	<1.0	1.2	1.0	2938773
Acid Extractable Cadmium (Cd)	ug/g	0.14	<0.10	0.18	<0.10	<0.10	<0.10	0.10	2938773
Acid Extractable Chromium (Cr)	ug/g	19	20	19	14	12	18	1.0	2938773
Acid Extractable Cobalt (Co)	ug/g	6.4	6.9	6.6	5.1	4.5	6.1	0.10	2938773
Acid Extractable Copper (Cu)	ug/g	11	11	13	8.3	5.0	8.0	0.50	2938773
Acid Extractable Lead (Pb)	ug/g	8.2	8.5	7.9	5.8	4.9	5.7	1.0	2938773
Acid Extractable Nickel (Ni)	ug/g	10	11	10	7.4	5.9	9.5	0.50	2938773
Acid Extractable Zinc (Zn)	ug/g	42	39	41	27	21	35	5.0	2938773
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2938773

Maxxam ID		OL3126	OL3127	OL3127	OL3128	OL3129		
Sampling Date		2012/08/07	2012/08/07	2012/08/07	2012/08/07	2012/08/07		
	Units	**CAM-D S4 0-0.15**	**CAM-D S4 0.35-0.5**	**CAM-D S4 0.35-0.5 Lab-Dup**	**CAM-D DUP1 0.-0.15**	**CAM-D DUP1 0.35-0.5**	**RDL**	**QC Batch**
Metals								
Acid Extractable Arsenic (As)	ug/g	1.2	<1.0	1.0	1.3	1.9	1.0	2938773
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	<0.10	0.17	0.10	0.10	2938773
Acid Extractable Chromium (Cr)	ug/g	16	14	14	18	21	1.0	2938773
Acid Extractable Cobalt (Co)	ug/g	5.8	4.7	4.5	6.2	7.4	0.10	2938773
Acid Extractable Copper (Cu)	ug/g	8.1	6.6	6.7	11	12	0.50	2938773
Acid Extractable Lead (Pb)	ug/g	6.5	5.2	5.2	8.5	7.5	1.0	2938773
Acid Extractable Nickel (Ni)	ug/g	8.3	7.1	7.4	9.8	12	0.50	2938773
Acid Extractable Zinc (Zn)	ug/g	38	28	29	42	42	5.0	2938773
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	2938773

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B2C1114
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Site Location: CAM-D LTM
Sampler Initials: KM

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		OL3120	OL3121	OL3122	OL3123	OL3124		
Sampling Date		2012/08/07	2012/08/07	2012/08/07	2012/08/07	2012/08/07		
	Units	**CAM-D S1 0-0.15**	**CAM-D S1 0.35-0.5**	**CAM-D S2 0-0.15**	**CAM-D S2 0.35-0.5**	**CAM-D S3 0-0.15**	**RDL**	**QC Batch**
PCBs								
Aroclor 1016	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1221	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1232	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1254	ug/g	0.010	0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1260	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1262	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1268	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Total PCB	ug/g	0.010	0.010	<0.010	<0.010	<0.010	0.010	2936746
Surrogate Recovery (%)								
Decachlorobiphenyl	%	87	91	90	101	96		2936746

Maxxam ID		OL3125	OL3126	OL3127	OL3128	OL3129		
Sampling Date		2012/08/07	2012/08/07	2012/08/07	2012/08/07	2012/08/07		
	Units	**CAM-D S3 0.35-0.5**	**CAM-D S4 0-0.15**	**CAM-D S4 0.35-0.5**	**CAM-D DUP1 0.-0.15**	**CAM-D DUP1 0.35-0.5**	**RDL**	**QC Batch**
PCBs								
Aroclor 1016	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1221	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1232	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1254	ug/g	<0.010	<0.010	<0.010	0.022	<0.010	0.010	2936746
Aroclor 1260	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1262	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Aroclor 1268	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	2936746
Total PCB	ug/g	<0.010	<0.010	<0.010	0.022	<0.010	0.010	2936746
Surrogate Recovery (%)								
Decachlorobiphenyl	%	103	99	99	110	96		2936746

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B2C1114
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201
Site Location: CAM-D LTM
Sampler Initials: KM

Test Summary

Maxxam ID OL3120 **Collected** 2012/08/07
Sample ID CAM-D S1 0-0.15 **Shipped**
Matrix Soil **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2938364	2012/08/11	2012/08/16	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri
Moisture	BAL	2938330	N/A	2012/08/14	Valentina Kaftani
Polychlorinated Biphenyl in Soil	GC/ECD	2936746	2012/08/13	2012/08/15	Li Peng

Maxxam ID OL3120 Dup **Collected** 2012/08/07
Sample ID CAM-D S1 0-0.15 **Shipped**
Matrix Soil **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li

Maxxam ID OL3121 **Collected** 2012/08/07
Sample ID CAM-D S1 0.35-0.5 **Shipped**
Matrix Soil **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2938364	2012/08/11	2012/08/16	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri
Moisture	BAL	2938330	N/A	2012/08/14	Valentina Kaftani
Polychlorinated Biphenyl in Soil	GC/ECD	2936746	2012/08/13	2012/08/15	Li Peng

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Maxxam Job #: B2C1114
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201
Site Location: CAM-D LTM
Sampler Initials: KM

Test Summary

Maxxam ID OL3122 **Collected** 2012/08/07
Sample ID CAM-D S2 0-0.15 **Shipped**
Matrix Soil **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2938364	2012/08/11	2012/08/16	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri
Moisture	BAL	2938330	N/A	2012/08/14	Valentina Kaftani
Polychlorinated Biphenyl in Soil	GC/ECD	2936746	2012/08/13	2012/08/15	Li Peng

Maxxam ID OL3123 **Collected** 2012/08/07
Sample ID CAM-D S2 0.35-0.5 **Shipped**
Matrix Soil **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2938364	2012/08/11	2012/08/16	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri
Moisture	BAL	2938330	N/A	2012/08/14	Valentina Kaftani
Polychlorinated Biphenyl in Soil	GC/ECD	2936746	2012/08/13	2012/08/14	Li Peng

Maxxam ID OL3124 **Collected** 2012/08/07
Sample ID CAM-D S3 0-0.15 **Shipped**
Matrix Soil **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2938364	2012/08/11	2012/08/16	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri
Moisture	BAL	2938330	N/A	2012/08/14	Valentina Kaftani
Polychlorinated Biphenyl in Soil	GC/ECD	2936746	2012/08/13	2012/08/14	Li Peng

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Report Date: 2012/08/16

Franz Environmental Inc
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Sampler Initials: KM

Test Summary

Maxxam ID OL3125 **Collected** 2012/08/07
Sample ID CAM-D S3 0.35-0.5 **Shipped**
Matrix Soil **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2938364	2012/08/11	2012/08/16	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri
Moisture	BAL	2938330	N/A	2012/08/14	Valentina Kaftani
Polychlorinated Biphenyl in Soil	GC/ECD	2936746	2012/08/13	2012/08/14	Li Peng

Maxxam ID OL3126 **Collected** 2012/08/07
Sample ID CAM-D S4 0-0.15 **Shipped**
Matrix Soil **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2938364	2012/08/11	2012/08/16	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri
Moisture	BAL	2938330	N/A	2012/08/14	Valentina Kaftani
Polychlorinated Biphenyl in Soil	GC/ECD	2936746	2012/08/13	2012/08/15	Li Peng

Maxxam ID OL3127 **Collected** 2012/08/07
Sample ID CAM-D S4 0.35-0.5 **Shipped**
Matrix Soil **Received** 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2938364	2012/08/11	2012/08/16	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri
Moisture	BAL	2938330	N/A	2012/08/14	Valentina Kaftani
Polychlorinated Biphenyl in Soil	GC/ECD	2936746	2012/08/13	2012/08/15	Li Peng

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Franz Environmental Inc
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Site Location: CAM-D LTM
Sampler Initials: KM

Test Summary

Maxxam ID OL3127 Dup
Sample ID CAM-D S4 0.35-0.5
Matrix Soil

Collected 2012/08/07
Shipped
Received 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri

Maxxam ID OL3128
Sample ID CAM-D DUP1 0.-0.15
Matrix Soil

Collected 2012/08/07
Shipped
Received 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2938364	2012/08/11	2012/08/16	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri
Moisture	BAL	2938330	N/A	2012/08/14	Valentina Kaftani
Polychlorinated Biphenyl in Soil	GC/ECD	2936746	2012/08/13	2012/08/15	Li Peng

Maxxam ID OL3129
Sample ID CAM-D DUP1 0.35-0.5
Matrix Soil

Collected 2012/08/07
Shipped
Received 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2938364	2012/08/11	2012/08/16	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2938214	2012/08/14	2012/08/16	(Kent) Maolin Li
Acid Extr. Metals (aqua regia) by ICPMS	ICP/MS	2938773	2012/08/15	2012/08/15	Viviana Canzonieri
Moisture	BAL	2938330	N/A	2012/08/14	Valentina Kaftani
Polychlorinated Biphenyl in Soil	GC/ECD	2936746	2012/08/13	2012/08/14	Li Peng

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Package 1	1.7°C

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

GENERAL COMMENTS

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Report Date: 2012/08/16

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Site Location: CAM-D LTM
Sampler Initials: KM

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
2936746	Decachlorobiphenyl	2012/08/13	102	60 - 130	99	60 - 130	103	%		
2936746	Aroclor 1260	2012/08/14	107	60 - 130	109	60 - 130	<0.010	ug/g	NC	50
2936746	Total PCB	2012/08/14	107	60 - 130	109	60 - 130	<0.010	ug/g	NC	50
2936746	Aroclor 1016	2012/08/14					<0.010	ug/g	NC	50
2936746	Aroclor 1221	2012/08/14					<0.010	ug/g	NC	50
2936746	Aroclor 1232	2012/08/14					<0.010	ug/g	NC	50
2936746	Aroclor 1242	2012/08/14					<0.010	ug/g	NC	50
2936746	Aroclor 1248	2012/08/14					<0.010	ug/g	NC	50
2936746	Aroclor 1254	2012/08/14					<0.010	ug/g	NC	50
2936746	Aroclor 1262	2012/08/14					<0.010	ug/g	NC	50
2936746	Aroclor 1268	2012/08/14					<0.010	ug/g	NC	50
2938214	o-Terphenyl	2012/08/16	108	50 - 130	102	50 - 130	104	%		
2938214	F2 (C10-C16 Hydrocarbons)	2012/08/16	106	50 - 130	98	70 - 130	<10	ug/g	NC	30
2938214	F3 (C16-C34 Hydrocarbons)	2012/08/16	111	50 - 130	100	70 - 130	<10	ug/g	6.1	30
2938214	F4 (C34-C50 Hydrocarbons)	2012/08/16	113	50 - 130	101	70 - 130	<10	ug/g	NC	30
2938330	Moisture	2012/08/14							0	20
2938364	1,4-Difluorobenzene	2012/08/15	94	60 - 140	102	60 - 140	99	%		
2938364	4-Bromofluorobenzene	2012/08/15	95	60 - 140	93	60 - 140	92	%		
2938364	D10-Ethylbenzene	2012/08/15	78	60 - 140	85	60 - 140	76	%		
2938364	D4-1,2-Dichloroethane	2012/08/15	92	60 - 140	97	60 - 140	98	%		
2938364	Benzene	2012/08/15	79	60 - 140	94	60 - 140	<0.005	ug/g	NC	50
2938364	Toluene	2012/08/15	69	60 - 140	81	60 - 140	<0.02	ug/g	NC	50
2938364	Ethylbenzene	2012/08/15	74	60 - 140	79	60 - 140	<0.01	ug/g	NC	50
2938364	o-Xylene	2012/08/15	68	60 - 140	80	60 - 140	<0.02	ug/g	NC	50
2938364	p+m-Xylene	2012/08/15	68	60 - 140	71	60 - 140	<0.04	ug/g	NC	50
2938364	F1 (C6-C10)	2012/08/15	82	60 - 140	84	60 - 140	<10	ug/g	NC	50
2938364	Total Xylenes	2012/08/15					<0.04	ug/g	NC	50
2938364	F1 (C6-C10) - BTEX	2012/08/15					<10	ug/g	NC	50
2938773	Acid Extractable Arsenic (As)	2012/08/15	102	75 - 125	101	80 - 120	<1.0	ug/g	NC	30
2938773	Acid Extractable Cadmium (Cd)	2012/08/15	104	75 - 125	99	80 - 120	<0.10	ug/g	NC	30
2938773	Acid Extractable Chromium (Cr)	2012/08/15	106	75 - 125	106	80 - 120	<1.0	ug/g	4.5	30
2938773	Acid Extractable Cobalt (Co)	2012/08/15	107	75 - 125	108	80 - 120	<0.10	ug/g	2.8	30
2938773	Acid Extractable Copper (Cu)	2012/08/15	99	75 - 125	103	80 - 120	<0.50	ug/g	2.0	30
2938773	Acid Extractable Lead (Pb)	2012/08/15	106	75 - 125	103	80 - 120	<1.0	ug/g	0.7	30
2938773	Acid Extractable Nickel (Ni)	2012/08/15	103	75 - 125	103	80 - 120	<0.50	ug/g	3.8	30

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Maxxam Job #: B2C1114
Report Date: 2012/08/16

Franz Environmental Inc
Client Project #: 1697-1201
Site Location: CAM-D LTM
Sampler Initials: KM

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
2938773	Acid Extractable Zinc (Zn)	2012/08/15	NC	75 - 125	107	80 - 120	<5.0	ug/g	6.3	30
2938773	Acid Extractable Mercury (Hg)	2012/08/15	103	75 - 125	92	80 - 120	<0.050	ug/g	NC	30

N/A = Not Applicable
RPD = Relative Percent Difference
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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Validation Signature Page

Maxxam Job #: B2C1114

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

Charles Ancker, B.Sc., M.Sc., C.Chem, Senior Analyst

Cristina Carriere, Scientific Services

Medhat Riskallah, Manager, Hydrocarbon Department

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#10988 Franz Environmental Inc	Company Name:		Quotation #:	B23655	MAXXAM JOB #:	BOTTLE ORDER #: 365645
Contact Name:	Invoices, Lillian & Kevin	Contact Name:	Kevin McKenna	P.O. #:			
Address:	329 Churchill Ave N Suite 200 Ottawa ON K1Z 5B8	Address:		Project #:	1697-1201 (D)		
Phone:	(613)721-0555 Fax: (613)721-0029	Phone:	Fax:	Project Name:	CAM-D DEW Line	CHAIN OF CUSTODY #: C#365645-01-02	PROJECT MANAGER: Julie Clement
Email:	lellis@franzenvironmental.com, invoicesottawa@fra	Email:	kmckenna@franzenvironmental.com	Site #:			
				Sampled By:	D.Kiar / K. McKenna		

Regulation 153 (2011): ☐ Table 1 ☐ Table 2 ☐ Table 3 ☐ Table ___ ☐ Res/Park ☐ Ind/Comm ☐ Agri/Other ☐ Medium/Fine ☐ Coarse ☐ For RSC

Other Regulations: ☒ CCME ☐ Reg. 558 ☐ MISA ☐ PWQO ☐ Other ___ ☐ Sanitary Sewer Bylaw ☐ Storm Sewer Bylaw Municipality ___

SPECIAL INSTRUCTIONS: Samples contained in cooler #2 and cooler #3

Include Criteria on Certificate of Analysis (Y/N)? ___

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____ ☐
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Major Ions: NO2, NO3, Cl, PO4, SO4, F	F2-F4	PCB's	Dissolved Metals	Total Metals	pH, colour, conductivity, Hardness	Major Ions NO2, NO3, Cl, PO4, SO4, F	Total suspended solids, Total Dissolved solids			# of Bottles	Comments
1		MW1	12/08/07	PM	GW	N	Y	X	X	X	X	X	X	X	X			11	
2		MW3	12/08/07	PM	GW	N	Y	X	X	X	X	X	X	X	X			11	
3		MW4	12/08/07	PM	GW	N	Y	X	X	X	X	X	X	X	X			11	
4		Dup-1	12/08/07	PM	GW	N	Y	X	X	X	X	X	X	X	X			11	
5																			
6																			
7																			
8																			
9																			
10																			

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
[signature] / Kevin McKenna	12/08/08	8:17	Simon Nowaling S.N.	12/08/09	8:17	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Receipt	Custody Seal Present / Intact	Yes	No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION:

Company Name: #10988 Franz Environmental Inc
Contact Name: Invoices, Lillian & Kevin
Address: 329 Churchill Ave N Suite 200, Ottawa ON K1Z 5B8
Phone: (613)721-0555 Fax: (613)721-0029
Email: lellis@franzenvironmental.com, invoicesottawa@fra

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name: Kevin McKenna
Address:
Phone: Fax:
Email: kmckenna@franzenvironmental.com

PROJECT INFORMATION:

Quotation #: B23655
P.O. #:
Project #: 1697-1201
Project Name: CAM-D LTM
Site #:
Sampled By: K. McKenna / D. Kiar

Laboratory Use Only:

MAXXAM JOB #:
BOTTLE ORDER #: 365653
CHAIN OF CUSTODY #: C#365653-04-01
PROJECT MANAGER: Julie Clement

Regulation 153 (2011): ☐ Table 1 ☐ Table 2 ☐ Table 3 ☐ Table ___ ☐ Res/Park ☐ Ind/Comm ☐ Agri/Other ☐ Medium/Fine ☐ Coarse ☐ For RSC

Other Regulations: ☒ CCME ☐ Reg. 558 ☐ MISA ☐ PWQO ☐ Other ___ ☐ Sanitary Sewer Bylaw ☐ Storm Sewer Bylaw Municipality ___

SPECIAL INSTRUCTIONS: Samples contained in Cooler #7

Include Criteria on Certificate of Analysis (Y/N)? ___

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	F1 & BTEX in Soil	F2-F4 in Soil	Polychlorinated Biphenyl in Soil	Acid Extr. Metals (aqua regia) by ICPMS	# of Bottles	Comments
1		CAM-DS1 0-0.15	Aug 7, 2012	PM	Soil			X	X	X	X	4	
2		CAM-DS1 0.35-0.5											
3		CAM-DS2 0-0.15											
4		CAM-DS2 0.35-0.5											
5		CAM-DS3 0-0.15											
6		CAM-DS3 0.35-0.5											
7		CAM-DS4 0-0.15											
8		CAM-DS4 0.35-0.5											
9	CAM-D	Dup1 0-0.15											
10	CAM-D	Dup1 0.35-0.5	Aug 7 2012	PM	Soil			X	X	X	X		

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
K. McK. / Kevin McKenna	12/08/08	8:16	Simon Novalinga S.N.	12/08/08	9:55	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
		Present		
		Intact		

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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CHAIN OF CUSTODY RECORD

INVOICE INFORMATION:

Company Name:	#10988 Franz Environmental Inc
Contact Name:	Invoices, Lillian & Kevin
Address:	329 Churchill Ave N Suite 200
	Ottawa ON K1Z 5B8
Phone:	(613)721-0555 Fax: (613)721-0029
Email:	lellis@franzenvironmental.com, invoicesottawa@fra

REPORT INFORMATION (if differs from invoice):

Company Name:	
Contact Name:	Kevin McKenna
Address:	
Phone:	Fax:
Email:	kmckenna@franzenvironmental.com

PROJECT INFORMATION:

Quotation #:	B23655
P.O. #:	
Project #:	1697-1201
Project Name:	CAM-F, CAM-D, Roberts Bay DEW Line
Site #:	
Sampled By:	D. Kuc / K. McKenna

Laboratory Use Only:

MAXXAM JOB #:

BOTTLE ORDER #: 365645

CHAIN OF CUSTODY #: C#365645-02-02

PROJECT MANAGER: Julie Clement

Regulation 153 (2011)

- [ ] Table 1
- [ ] Table 2
- [ ] Table 3
- [ ] Table ___
- [ ] Res/Park
- [ ] Ind/Comm
- [ ] Agri/Other
- [ ] Medium/Fine
- [ ] Coarse
- [ ] For RSC

Other Regulations

- [X] CCME
- [ ] Reg. 558
- [ ] MISA
- [ ] PWQO
- [ ] Other ___
- [ ] Sanitary Sewer Bylaw
- [ ] Storm Sewer Bylaw
- Municipality ___

SPECIAL INSTRUCTIONS

SAMPLES contained in cooler-1

Include Criteria on Certificate of Analysis (Y/N)? ___

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified): [X]
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ [ ]
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Major Ions: NO2, NO3, Cl, PO4, SO4, E	F1 / BTEX	F2-F4	PCB's	Dissolved Metals	Total Metals	# of Bottles	Comments
1		Field Blank	12/08/07	PM	H_2O		N	X	X	X	X	X	X	9	
2		TRIP BLANK	*See Note	/	H_2O		N	X	X	X	X	X	X	9	
3															
4															
5															
6															
7															
8															
9															
10															

Note:
* TRIP BLANK DATES:
F1/BTEX: 2012/07/17
F2-F4: 2012/07/25
PCBs: 2012/07/25
Dissolved Metals: 2012/07/25
Total Metals: 2012/07/25

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
Kevin McKenna / K McK	12/08/08	8:15	Simon Novalinga S.N.	12/08/08	9:15	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
		Present		
		Intact		

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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APPENDIX F

QA/QC Discussion

In order to obtain the required minimum of 20% duplicate samples, as stipulated in CAM-D long term monitoring plan, two duplicate soil sample and one duplicate groundwater sample were collected at the site in 2012. Analytical results for submitted samples and their duplicate pairs were compared to provide an indication of the precision of both the field sampling and laboratory analyzing methods. Results are presented along with chemical data in Appendix B, while the methodology is discussed in Section 4.5.

All groundwater and soil samples analyzed for PHCs, metals, PCBs and inorganics fell within limits of QA/QC acceptability. The internal laboratory quality control for analyses meets acceptability criteria (see Table F-1 and F-2 below); therefore, based on both laboratory and field QA/QC results, the data is reliable for its intended use. Laboratory QA/QC results are included in the laboratory certificates of analyses provided in Appendix E.

Table F-1
QA/QC Groundwater Chemical Concentrations - PHCs

PARAMETER / Sample ID	Upper Limit of Acceptability[1]	RDL	FIELD BLANK	TRIP BLANK
Date			8/7/2012	8/7/2012
BTEX & F1 Hydrocarbons (ug/L)				
Benzene	NC	0.2	<0.20	<0.20
Toluene	NC	0.2	<0.20	<0.20
Ethylbenzene	NC	0.2	<0.20	<0.20
o-Xylene	NC	0.2	<0.20	<0.20
p+m-Xylene	NC	0.4	<0.40	<0.40
Total Xylenes	NC	0.4	<0.40	<0.40
F1 (C6-C10)	NC	25	<25	<25
F1 (C6-C10) - BTEX	NC	25	<25	<25
F2-F4 Hydrocarbons (ug/L)				
F2 (C10-C16 Hydrocarbons)	NC	100	<100	<100
F3 (C16-C34 Hydrocarbons)	NC	100	<100	<100
F4 (C34-C50 Hydrocarbons)	NC	100	<100	<100
Reached Baseline at C50	N/A	N/A	Yes	Yes

Notes:

1 = Upper Limit of Acceptability is calculated as the value three standard deviations greater than the mean (calculation does not include duplicate analyses)

N/A = Not Applicable

NC = No Criteria

RDL= Reportable Detection Limit

20 = Exceeds selected guideline.

Table F-2
QA/QC Groundwater Chemical Concentrations - PCBs

PARAMETER / Sample ID	Upper Limit of Acceptability[1]	RDL	FIELD BLANK	TRIP BLANK
Date			8/7/2012	8/7/2012
PCBs (ug/L)				
Aroclor 1016	NC	0.05	<0.05	<0.05
Aroclor 1221	NC	0.05	<0.05	<0.05
Aroclor 1232	NC	0.05	<0.05	<0.05
Aroclor 1242	NC	0.05	<0.05	<0.05
Aroclor 1248	NC	0.05	<0.05	<0.05
Aroclor 1254	NC	0.05	<0.05	<0.05
Aroclor 1260	NC	0.05	<0.05	<0.05
Aroclor 1262	NC	0.05	<0.05	<0.05
Aroclor 1268	NC	0.05	<0.05	<0.05
Total PCB	NC	0.05	<0.05	<0.05

Notes:

1 = Upper Limit of Acceptability is calculated as the value three standard deviations greater than the mean (calculation does not include duplicate analyses)

NC = No Criteria

RDL= Reportable Detection Limit

20 = Exceeds selected guideline.

APPENDIX G

Field Notes

CAM-D 1697-1201

Land Gjoa Haven @ 6:30 pm
Loads for BM, Unwin Sort Gear For tomorrow

Aug 7 2012

Gjoa haven Breakfast @ 8:00AM
- Contact North Wright. Need Barrels of Fuel to pick us up here. id sched flight is time.

Wheels up from Gjoa haven @ 9:48 to CAM-D
- C Lamontagne - D. Riar - S. Nalinga
- A Dunn - K. McKenna - James Q.

Wheels down @ CAM-D 10:37

- Wolves, Wolverine, Caribou Grizzly Ground squirrels Snow Geese, Rabbits
- Site not frequented by hunter. Maybe frequent for Muskox, but not very often. Soap stone Quarry 20-30 mls to North West or West

CAM-D 1697-1201

11:11 am Driving from Airstrip to NAWL
- Noted 1st culvert on road from airstrip deteriorating. Erosion on Road 1/2 way to crest of hill.
- Caribou tracks observed on road to NAWL - Fresh 1 to 2 days.

Survey Monument CAM-D CM-2

BM Noted that not as many animals as expected. Especially birds, likely due to high elevation

Animals observed:
2 caribou observed; 1 upon NAWL to south. 1 by C Lamontagne along road to old camp.
1 fox observed also.

Evidence of animals observed:
- Snow geese much droppings & some tracks
- Caribou tracks all over site.
- Caribou droppings all over site

LEVEL

1697-1201 CAM-D Aug 7 2012

Depart Site @ 6:45 PM.

Two white wolves spotted from the air @ Steppards Bay (Cam-3) about 25 mins. from CAM-D.

Back to Gjoa @ 7:30
Refuel and back to hotel
COCs Check & Park bottles.
(13hrs)

Aug 8 2012

Melissen @ AGAT Labs sent weigh bill for Pin-1 bottles (01/2C)... Weigh bill # picked up by Moe.

Emails Re. DCC & AAM DC 1.5 0.5

Pac Program CDM-E spare Oxygen for Installation @ Roberts bay

Aug 7/2012
1697-1201(D)

CAM-D Landfill Monitorig
Non Hazardous Landfill

- GW monitoring and sampling via low flow sampling w/ peristaltic pump, Horriba water quality multi parameter instrument and Heron instrument oil/water interface probe.

sampling Parameters:
PHCs f2-f4 (2x 500mLs)
BTEX PHCs f1 (3x 40mLs)
PCBs - (2x 500 mLs)
General chemistry (1x 500 mL)
solids (TSS, TDS, etc) (1x 500mL)
Total metals (1x 200mL)
Dissolved metals (1x 200mL, field filtered)

Aug 7/2012
1697-1201 (D)

CAM-D monitoring

MW2
OVM: 5 ppm
Stickup: 0.45m
WL: Frozen @ 1.432m btoc
PL: /
Bow: ?
Comments: well in good condition; could not collect GW sample due to frozen water table. lock on well changed to franz lock.

MW1
OVM: 0 ppm
stickup: 0.45m
WL: 0.978m btoc
PL: /
BOW: 1.518m btoc
Comments: Well in good condition; will apply pump and check recharge to try and collect sample; lock on well changed to franz lock.

Aug 7/2012
1697-1201 (D)

CAM-D monitoring

MW4
OVM: 0 ppm
stickup:
WL: 0.551m btoc
PL: —
Bow: 2.125m btoc
Comments: well is in good condition; should be sufficient water to collect sample. lock on well changed to franz lock

MW3
OVM: 0 ppm
Stickup: 0.55 m
WL: 0.978 mbtoc
PL: /
Bow: 1.885 mbtoc
Comments: Well is in good condition; should be sufficient water to collect sample. lock on well changed to Franz lock.

Aug 7/2012
1697-1201 (D)

CAM-D monitoring
GW SAMPLING

MW3

- started pumping @ 12:15
- pumping @ ~ 100-200 mL/min

Time	Temp	pH	cond	DO	salinity ~~EC~~	WL
12:20	5.95	7.90	3.08	1.62	1.6	1.044
12:24	5.73	7.92	2.78	0	1.4	1.082
12:28	5.58	7.94	2.52	0	1.3	1.117
12:32	5.58	7.93	2.42	0	1.2	1.142
12:35	5.60	7.92	2.37	0	1.2	1.162
12:38	5.48	7.91	2.34	0	1.2	1.173

- parameters sufficiently stabilised; sampled well @ 12:40 (same parameters as described on front page of Aug 7 Notes)

Aug 7/2012
1697-1201 (D)

CAM-D Monitoring
GW Sampling

MW4

- started pumping @ 1:30
- pumping @ ~ 100-200 mL/min

Time	Temp	pH	cond	DO	salinity	WL
1:33	5.70	7.83	1.32	2.02	0.6	②.601
1:38	5.03	7.52	1.32	8.29	0.6	②.649
1:42	4.95	7.44	1.32	7.77	0.6	②.673
1:46	4.79	7.36	1.31	6.71	0.6	0.699
1:50	4.61	7.29	1.31	5.81	0.6	0.717
1:54	4.45	7.22	1.31	5.02	0.6	0.739
1:58	4.56	7.17	1.31	4.32	0.6	0.755
2:02	4.54	7.13	1.31	3.79	0.6	0.767

Parameters sufficiently stabilized; sampled well @ 2:05 (same parameters as described on front page of Aug 7 Notes)
- also collected Duplicate Sample "Dup-1"

Rite in the Rain

Aug 7/2012
1697-1201 (D)

CAM-D monitoring
GW sampling

QA/QC samples

Field Blank:
filled bottle set for field blank
2x 500 mL F2-F4 PHCs (Organics free DI H_2O)
2x 500 mL PCBs (organics free DI H_2O)
3x 40 mL Btex F1 (VOC free DI H_2O)
2x 200 mL metals/Dissolved metals (inorganics free DI H_2O)
labelled as "Field Blank"

TRIP BLANK:
PHC F2-F4 (2x500mL; 2012/07/25)
BTEX F1 (3x40 mL; 2012/07/17)
metals Total (1x200mL; 2012/07/25)
metals Dissolved (1x200mL; 2012/07/25)
PCBs (2x500mL; 2012/07/25)

Aug 7/2012
1697-1201 (D)

CAM-D monitoring
GW sampling

MW1
- started pumping @ 3:36
- pumping @ ~ 100-200 mL/min

Time	Temp	pH	cond	DO	salinity	WL
3:42	11.42	7.77	2.94	1.60	1.5	0.852
3:46	10.66	7.89	2.94	0.0	1.5	1.056
3:50	8.04	7.90	3.14	0	1.6	1.111
3:54	7.74	7.87	3.17	0	1.6	1.111
3:58	8.04	7.82	3.16	0	1.6	1.117
4:02	8.56	7.72	3.15	0	1.6	1.145

- parameters sufficiently stabilized
sampled well @ 4:05
(same parameters as described on front page of Aug 7 notes)

Rite in the Rain

Aug 7/2012
1697-1201(D)

CAM-D
Soil sampling

Test Hole Location 1 (S1)
- Located approx. 4 m east of MW2.
test hole advanced to ~0.5 m via shovel
SAMPLES:
CAM-D S1 0-0.15 m; Silty sand, some gravel and cobble, trace organics.
CAM-D S1 0.35-0.5; silty sand, trace clay, trace gravel, trace organics.
* collected Duplicate from each interval

Test Hole Location 2 (S2)
- Located approx. 4m North of MW3.
test hole advanced to ~0.5 m via shovel
Samples:
CAM-D S2 0-0.15m; silty sand, some gravel and trace organics
CAM-D S2 0.35-0.5; silty sand, trace clay, trace gravel, moist

Aug 7/2012
1697-1201(D)

CAM-D
Soil Sampling

Test Hole Location 3 (S3)
Located approx. 6 m west of MW4.
test hole advanced to ~0.5 via shovel
SAMPLES:
CAM-D S3 0-0.15 m; silty sand trace organics, trace gravel
CAM-D S3 0.35-0.5; silty sand, trace gravel

Test Hole location 4 (S4)
- located Approx. 4m south of MW1
test hole advanced to ~0.5m via shovel
SAMPLES:
CAM-D S4 0-0.15m; silty sand, trace organics and gravel
CAM-D S4 0.35-0.5; silty sand, trace gravel and cobble.

Rite in the Rain

Aug 7/2012
1697 - 1209 (D)

CAM-D soil sampling

OVMs

S1
0.0-0.15 - 0 ppm
0.35-0.5 - 0 ppm

S2
0.0-0.15 - 0 ppm
0.35-0.5 - 10 ppm

S3
0.0-0.15 - 5 ppm
0.35-0.5 - 0 ppm

S4
0.0-0.15 - 0 ppm
0.35-0.5 - 0 ppm