FRANZ ENVIRONMENTAL INC.
CONSULTING ENGINEERING TECHNOLOGIES
AN ARCADIS COMPANY

Long-Term Monitoring, 2014
CAM-D, Simpson Lake, Nunavut

FINAL REPORT

Prepared for:

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EXECUTIVE SUMMARY

ARCADIS Franz Canada Inc. (FRANZ) was retained by Aboriginal and Northern Affairs Canada - Nunavut Regional Office (AANDC) to conduct the second long-term monitoring site visit 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 4600000861, order number 4500319928 dated July 17, 2014.

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 identified additional potential environmental hazards. A full 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 completed the first year of monitoring activities in 2012.

FRANZ conducted the field activities for Year 3 of the CAM-D long-term monitoring program on August 23, 2014 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. Five minor erosion rills were observed on four berms 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 groundwater samples to assess the performance of the NHWL, and to establish a baseline chemical profile of the landfill. Concentrations of contaminants of concern in groundwater were compared to historical groundwater results from 2012. Concentrations of several metals in MW1 and its duplicate sample DUP-1 were greater than the upper limit of acceptability. Concentrations of nitrate and nitrate+nitrite also surpassed the upper limit of acceptability in MW2 and MW3. Additionally, several metals reported concentrations above the Canadian Council of Ministers of the Environment (CCME) Federal Interim Groundwater Quality Guidelines (FIGQGs) pathway

specific guidelines for protection of freshwater life. FRANZ believes that as the freshwater life pathway is not applicable to site conditions, these concentrations are not of a concern at this time.

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 Year 3 of long-term monitoring at CAM-D, FRANZ recommends continued monitoring of the areas of erosion on the berms 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.

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1.0 INTRODUCTION

ARCADIS Franz Canada Inc. (FRANZ) was retained by Aboriginal Affairs and Northern Development Canada– Nunavut Regional Office (AANDC) to complete the second monitoring event of the former CAM-D DEW Line site long-term monitoring plan. This project was completed under AANDC standing offer number 4600000861, order number 4500319928, dated July 17, 2014.

This report describes the monitoring activities completed in 2014 at the former CAM-D DEW Line site, 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 (Figure A-1, Appendix A). It was prepared in accordance with the AANDC Request for Proposal (RFP) dated May 29, 2014, FRANZ Proposal No. 5173b, dated June 23, 2014 and the Project Initiation Meeting held on August 15, 2014.

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

1.1 Project Objectives

The overall objective of the second year of the long-term monitoring program was to evaluate the performance of the non-hazardous waste landfill (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 Abandoned Military Site Remediation Protocol (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. 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;
6. Preparation of a report documenting the 2014 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 groundwater;
c) Obtaining groundwater samples from wells for chemical analysis;
d) Interpretation of analytical data;
e) Visual inspection and photo documentation of the site;
f) Observing and investigating land use and wildlife trends;
g) Interviewing local residents and officials to understand land use and wildlife trends; and
h) Reporting.

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, petroleum, oil and lubricants (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), the Department of National Defence (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 the 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

Prior to the field program, FRANZ reviewed the following reports pertaining to the CAM-D DEW Line site, some of which include previous site investigations and remedial activities:

- Franz Environmental Inc., November 2012, Long-Term Monitoring, 2012, CAM-D, Simpson Lake, Nunavut;
- 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.

The 2014 monitoring program was the second of seven scheduled over a 25 year period for the site. Information from previous investigations was incorporated into this year's sampling plan. Data collected in subsequent years will be combined with the complete data set, as well as that from pre-landfill construction, and analyzed.

As part of the investigation, information regarding land use by both humans and wildlife was gathered through interviews with a member of the Gjoa Haven Hunters and Trappers Association.

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

FRANZ has used historical data presented in a previous report to obtain mean and standard deviation of analytical results from monitoring activities conducted in 2012 in order to establish statistical upper limits of acceptability. These limits are calculated as mean plus three standard deviations, and are used for comparison with analytical results from the 2014 field program. This is a very limited data set and therefore standard deviations for some parameters are quite high;

additional data will help to create more realistic limits. Maximum acceptable values from these ranges are presented in groundwater analytical tables in Appendix B.

For some parameters, specifically PHCs, BTEX and PCBs sufficient data to support calculations of mean and standard deviation were not available. This is primarily due to the high frequency of not detected (nd) results for BTEX, PCBs and PHC compounds in collected samples.

In May 2010, Environment Canada (EC) under Federal Contaminated Sites Action Plan (FCSAP) released the *Federal Interim Groundwater Quality Guidelines* (FIGQG) for Federal Contaminated Sites. The guidelines were released based on the observed need for federal custodians and others to apply appropriate groundwater guidelines at federal sites. Previously, a mixture of provincial standards, federal surface water guidelines, and drinking water quality guidelines were applied to groundwater at federal sites. The FIGQGs remove the need for this patchwork of regulations, which were not consistently applied at federal sites. The FIGQGs were updated in November, 2012.

The FIGQGs were not developed with the scientific rigour associated with the Canadian Environmental Quality Guidelines (CEQGs). Instead, Environment Canada requested the development of guidelines based on a review and evaluation of existing approaches in other jurisdictions.

The FIGQGs follow a tiered framework, consistent with the Canadian Soil Quality Guidelines development through the CCME. The tiers are:

- Tier 1: direct application of the generic numerical guidelines; specifically, application of the lowest guideline for any pathway;
- Tier 2: allows for the development of site-specific remediation objectives through the consideration of site-specific conditions, by modifying (within limits) the numerical guidelines based on site-specific conditions and focusing on exposure pathways and receptors that are applicable to the site; and
- Tier 3: use of site-specific risk assessment to develop Site-Specific Remediation Objectives.

The FIGQGs are based on the consideration of a number of potential receptors and exposure pathways, including:

- Groundwater transport to surface water at least 10 m from the contamination and subsequent exposure of freshwater and marine life;
- Direct contact of soil organisms with contaminated groundwater;
- Use of groundwater for irrigation water;
- Use of groundwater for livestock watering;
- Groundwater transport to surface water at least 10 m from the contamination and subsequent ingestion by wildlife;

- Migration of contaminant vapours to indoor air and subsequent inhalation by humans; and
- Use of groundwater for human consumption (i.e., drinking water).

The generic guidelines are point estimates of a chemical concentration in groundwater associated with an approximate no- to low-effects level based on toxicological information about the chemical, along with a screening-level evaluation and environmental fate and transport and estimated intake rates, or exposure, by potential receptors.

As a result, the Table 1 *Federal Interim Groundwater Quality Guidelines*, *Generic Guidelines for Residential/Parkland Land Uses* Tier 1, Freshwater Life pathway for coarse grained soil (FIGQG Table 1 Tier 1) were referenced for comparison purposes.

4.0 INVESTIGATIVE METHODOLOGY

The monitoring program was carried out at the site on August 23, 2014. During the field investigations, weather conditions were cloudy with a gentle to moderate breeze and temperatures around 5˚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 from monitoring wells at the site;
- Measuring various physical parameters in the water samples; and
- Submission of 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 2014 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, and 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 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 MW1 to MW4. MW2 was frozen and unable to be sampled during the 2012 sampling round. During the 2014 sampling round, MW2 contained very little water and did not have adequate recharge to fill all of the laboratory supplied containers. Because of this, petroleum hydrocarbons F2-F4 could not be sampled.

A Geopump brand peristaltic 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, turbidity, 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
MW1	- total and dissolved metals - PCBs - petroleum hydrocarbon fractions F1-F4 and BTEX - inorganic parameters (major ions, TDS, TSS, colour, pH, conductivity)
MW3	
MW4	
DUP1*	
MW2	- total and dissolved metals - PCBs - petroleum hydrocarbon fractions F1 and BTEX - inorganic parameters (major ions, TDS, TSS, colour, pH, conductivity)

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.

4.5 Quality Assurance and Quality Control

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

4.5.1 Field

Groundwater samples were collected from monitoring wells and placed in a variety of appropriately sized and prepared laboratory containers. Sample numbers were clearly marked on the containers. The 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.

As a quality control measure, one groundwater field duplicate sample was collected and analyzed for PHC fractions F1-F4, BTEX, metals, PCBs, general chemistry, and inorganic parameters.

The samples were transported to the 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. One blind field duplicate was collected in the groundwater sampling program.

For the water sample duplicate, FRANZ personnel 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 groundwater sample MW1 (primary) and DUP-1 (water duplicate). Both samples were analyzed PHC fractions F1-F4, BTEX, metals, PCBs, general chemistry, and inorganic parameters.

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- below. When both concentrations are less than the MDL, no calculation/evaluation criterion is required.

Table 4-2: 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.

4.6 Laboratory Analytical Program

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 (MW3), southeast (MW1), northeast (MW2) and southwest (MW4) sides of the landfill.

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 work plan. 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 23, 2014. 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 F. 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	Occasional
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	Occasional
Debris Exposure	N	Not Observed	None
Monitoring Well Condition	Y	Good condition - Acceptable	
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. One small pothole was observed along the base of the east corner of the NHWL. This pothole was considered small in nature and does not impact the integrity of the landfill.

Erosion

Two small areas along the northwest and southwest sides of the landfill had evidence of erosion. Two small erosion rills were observed which are likely due to preferential drainage and associated down-slope washing of fine-grained fill between cobbles and boulders.

An additional four small erosion channels were observed on all four slopes of the berms of the NHWL. These appeared to be minor areas of erosional slumping of the surface fill material. All were minor in nature at this time. Additional 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	No change in 2014	53
Vegetation	B	Bottom of NHWL, 20 m northeast of MW4	---		---	<1%	Grass vegetation	No significant change in 2014, only one small patch observed	54

Checklist Item	Feature Letter	Relative Location	Length (m)	Width (m)	Depth (m)	Extent	Description (Change)	Additional Comments	Photo Reference
Ponded Water	C	5 m south of the south corner of the NHWL	100 m^2		0.2	<1%	Slight low area	Remains unchanged in 2014	33,34
Ponded Water	D	5 m west of the south corner of the NHWL	20 m^2		0.2	<1%	Settlement	Remains unchanged in 2014	33,34
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
Erosion	F	Southwest berm of NHWL	10 m	0.2 m	0.2 m	n/a	Small erosion channel, appears to be slight slump of surface fill material	Minor in nature	61
Erosion	G	Northwest berm of NHWL	15 m	0.2 m	0.15 m	n/a	Small erosion channel, appears to be slight slump of surface fill material	Minor in nature	60
Erosion	H	Northeast berm of NHWL	8 m	0.2 m	0.1 m	n/a	Small erosion rill	Minor in nature	59
Pothole	I	East corner of NHWL	1 m	0.5 m	0.25 m	n/a	Small pothole	Minor in nature	58
Erosion	J	Southeast berm of NHWL	10 m	0.2 m	0.15 m	n/a	Small erosion channel, appears to be slight slump of surface fill material	Minor in nature	57

5.4 Analytical Results – Groundwater Samples

As described in Section 4.4, a total of five groundwater samples (four 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.

FRANZ has used historical data presented in a previous report to obtain mean and standard deviation of analytical results from monitoring activities conducted in 2012 in order to establish statistical upper limits of acceptability. These limits are calculated as mean plus three standard deviations, and are used for comparison with analytical results from the 2014 field program. The calculated upper limit of acceptability values are included in surface water analytical tables presented in Appendix B. This is a very limited data set and therefore standard deviations for some parameters are quite high; additional data will help to create more realistic limits.

PHCs

Concentrations for all parameters were below laboratory reportable detection limits (see Table B-1; Appendix B). The range of the average ± three standard deviations could not be calculated as all parameters were below the detection limit for both the 2012 and 2014 sampling rounds.

PCBs

The PCBs concentrations for all samples were below the detection limit (see Table B-2; Appendix B). The range of the average ± three standard deviations could not be calculated as all parameters were below the detection limit for both the 2012 and 2014 sampling rounds.

Metals

Concentrations of dissolved cadmium, dissolved copper, total cadmium and total copper were reported above the CCME FIGQGs for freshwater life pathway in all five samples, however were below the upper limit of acceptability for each. Additionally, concentrations of total lead, total zinc and dissolved zinc were reported above the CCME FIGQGs for freshwater life pathway for MW1 and its duplicate. These concentrations were also below the upper limit of acceptability.

Concentrations of dissolved nickel and total nickel were reported greater than the upper limit of acceptability in MW1 and its duplicate sample, DUP-1 (see Table B-3; Appendix B). Concentrations of total cobalt were greater than the upper limit of acceptability in MW1 as were concentrations of total chromium in DUP-1.

Water sampled from MW2, MW3 and MW4 had concentrations below the detection limit for dissolved chromium and dissolved lead. The remaining metals concentrations were all below the upper limit of acceptability.

Inorganics

Concentrations of dissolved sulphate were greater than the upper limit of acceptability in MW1 and its duplicate sample, DUP-1 (see Table B-4; Appendix B). Conductivity was greater than the upper limit of acceptability in DUP-1. Concentrations of dissolved sulphate were also reported above the CCME FIGQG in all five samples collected.

Concentrations of nitrate and nitrate+nitrite were greater than the upper limit of acceptability in MW2 and MW3 (see Table B-4; Appendix B). All parameters in the water sample collected from MW-4 were below the upper limit of acceptability (see Table B-4; Appendix B).

Laboratory certificates of analyses for the 2014 groundwater samples are provided in Appendix E.

5.5 QA/QC Discussion

In order to obtain the required minimum of 20% duplicate samples, as stipulated in CAM-D LTM plan, one duplicate groundwater sample was collected at the site in 2014. 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.

Two metals, total chromium and total zinc, had unacceptable RPD concentrations at 22 percent and 24 percent, respectively. The high RPDs highlight the difficulty in obtaining true field duplicates. While every effort was made in the field to obtain good-quality duplicates, it is expected that a small amount of sediment might have been present in the samples that could cause these differences in concentrations between primary and duplicate samples.

The groundwater samples analyzed for the remaining PHCs, metals, PCBs and inorganics fell within limits of QA/QC acceptability. The internal laboratory quality control for analyses meets acceptability criteria; 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.

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 distant from the NHWL to be of no concern to the landfill integrity and showed very little change since the 2012 site visit, however 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 was 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, Adam Ukuqtunnuak, 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. Ukuqtunnuak reported that wildlife known to be present in the area of the site included wolves, wolverine, caribou, grizzly bear, ground squirrel, rabbits and snow geese.

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 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 23, 2014:

- Wolf tracks
- Caribou tracks and scat

- Canada geese tracks and scat
- During the mobilization to the site, muskox and caribou were observed near the site

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 2014. 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. Minor areas of erosion were identified on all four berms of the NHWL. Two areas of ponded water were observed near the south corner of the landfill and one small pothole at the east corner. The above noted features are considered to be of little consequence at the present time. While not considered significant enough to identify as a feature and map, some very minor erosion rills were observed along the northwest slope of the NHWL.

In addition to physical observations, FRANZ collected groundwater samples to assess the performance of the NHWL. Concentrations of contaminants of concern in groundwater were compared to historical groundwater results from 2012. Concentrations of several metals in MW1 and its duplicate samples DUP-1 were greater than the upper limit of acceptability. Concentrations of nitrate and nitrate+nitrite surpassed the upper limit of acceptability in MW2 and MW3. A number of total and dissolved metals in all five samples collected also reported concentrations above the CCME FIGQGs pathway specific guidelines for protection of freshwater life. Given the site conditions and location of the NHWL in relation to surface water bodies (none in the near vicinity), FRANZ believes that these concentrations are not of a concern at this time.

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 Year Three visit of long-term monitoring, FRANZ recommends continued monitoring of the features identified, especially the areas of erosion on all four banks of the NHWL (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 ARCADIS Franz Canada 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. ARCADIS Franz Canada 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, ARCADIS Franz Canada 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 23, 2014. 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, ARCADIS Franz Canada 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), ARCADIS Franz Canada 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.*

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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,

ARCADIS Franz Canada Inc.

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Steve Livingstone, M.Sc., P. Geo.
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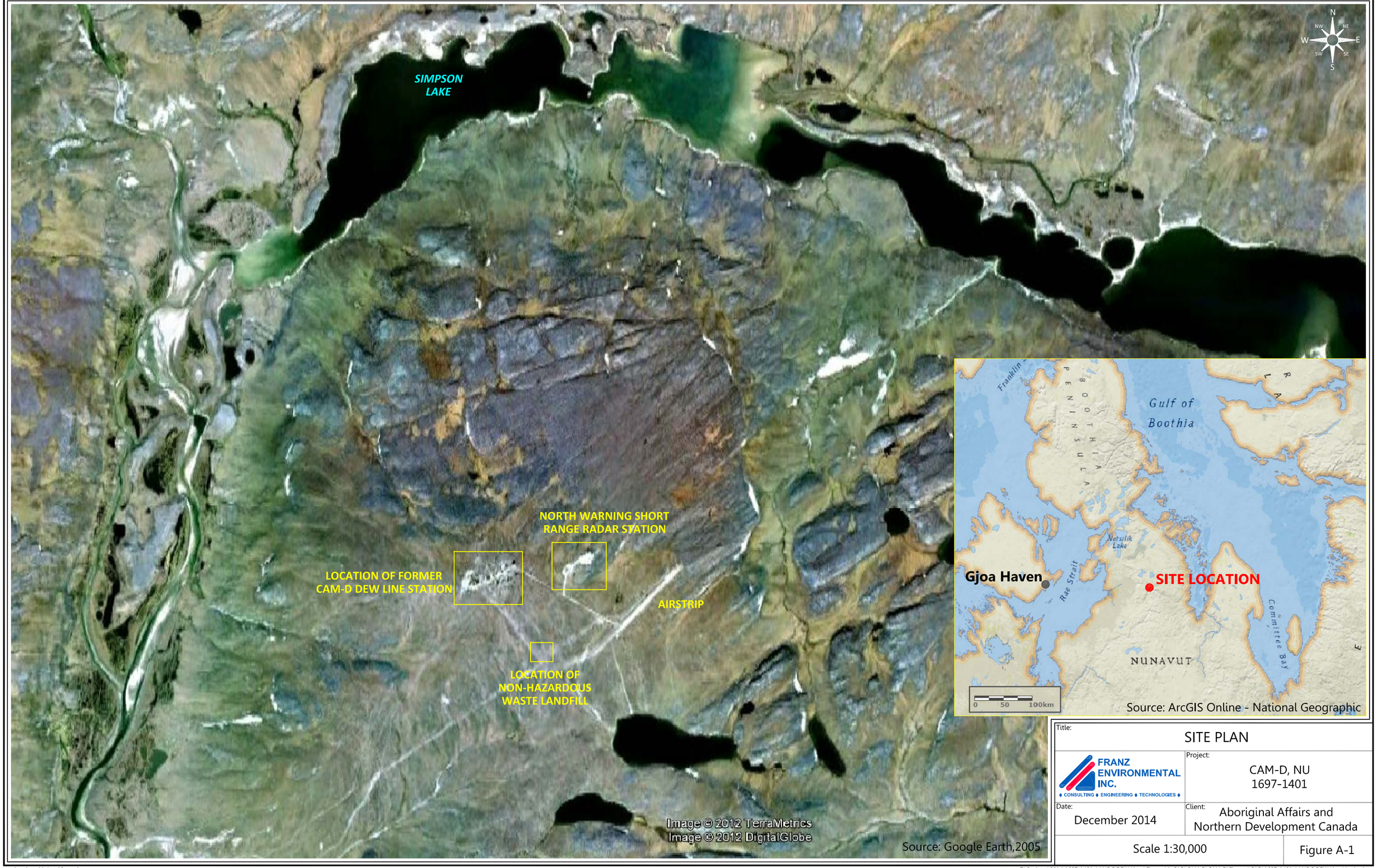
APPENDIX A

Figures



Title: SITE PLAN	
FRANZ ENVIRONMENTAL INC. ♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦	Project: CAM-D, NU 1697-1401
Date: December 2014	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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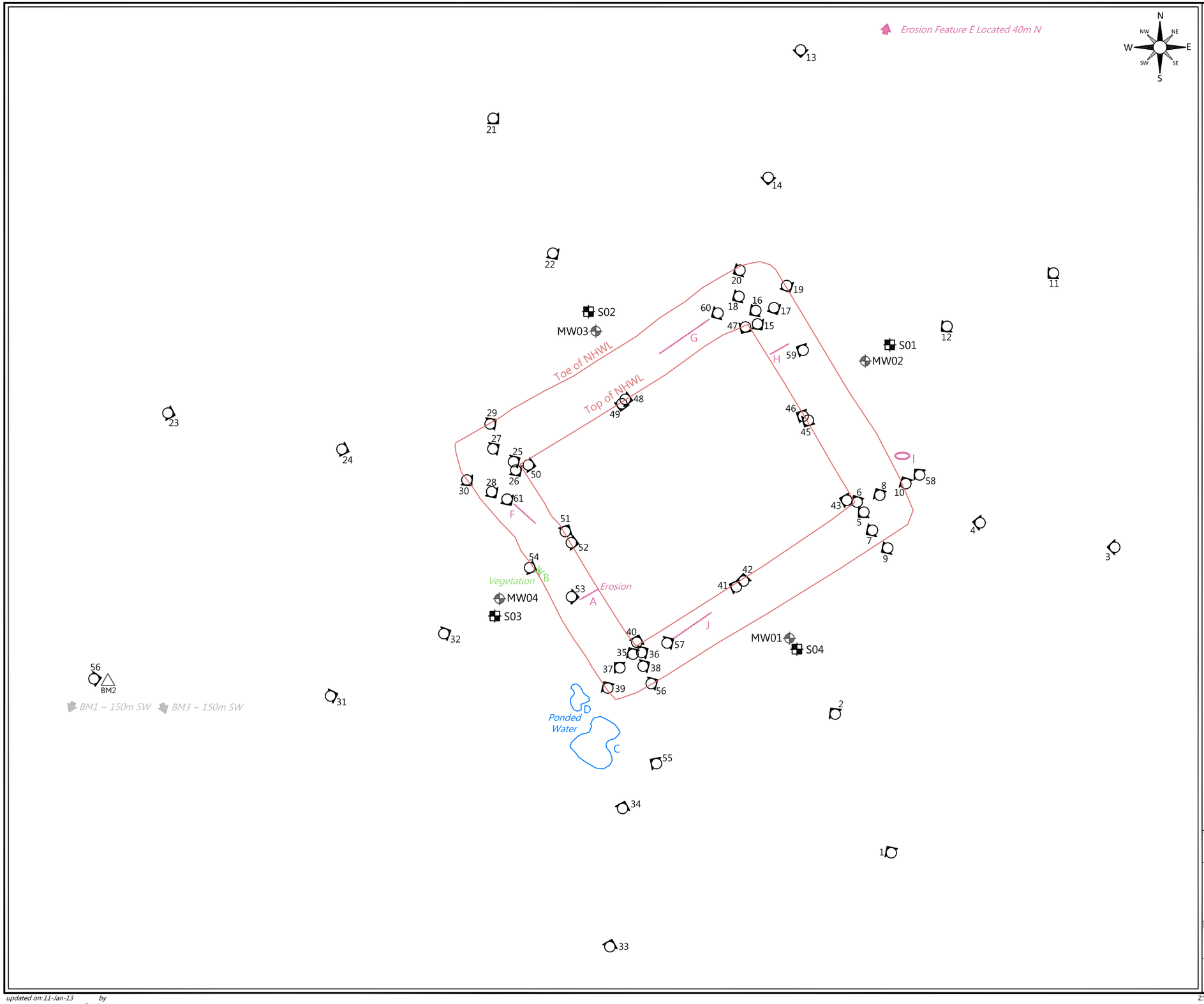

Legend

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

Title: Non-Hazardous Waste Landfill

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Project: CAM-D, NU 1697-1401

Date: December 2014

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 / Date	CCME FIGQGs[1]	Upper Limit of Acceptability[2]	RDL	MW1	DUP-1	Duplicate Evaluation			MW2	MW3	MW4
						Scenario*	RPD (%)	Acceptable			
Date				23/08/2014	23/08/2014				23/08/2014	23/08/2014	23/08/2014
BTEX & F1 Hydrocarbons (ug/L)											
Benzene	140	NC	0.2	<0.20	<0.20	A	---	Y	<0.20	<0.20	<0.20
Toluene	83	NC	0.2	<0.20	<0.20	A	---	Y	<0.20	<0.20	<0.20
Ethylbenzene	1100	NC	0.2	<0.20	<0.20	A	---	Y	<0.20	<0.20	<0.20
o-Xylene	NA	NC	0.2	<0.20	<0.20	A	---	Y	<0.20	<0.20	<0.20
p+m-Xylene	NA	NC	0.4	<0.40	<0.40	A	---	Y	<0.40	<0.40	<0.40
Total Xylenes	3900	NC	0.4	<0.40	<0.40	A	---	Y	<0.40	<0.40	<0.40
F1 (C6-C10)	810	NC	25	<25	<25	A	---	Y	<25	<25	<25
F1 (C6-C10) - BTEX	NA	NC	25	<25	<25	A	---	Y	<25	<25	<25
F2-F4 Hydrocarbons (ug/L)											
F2 (C10-C16 Hydrocarbons)	1300	NC	100	<100	<100	A	---	Y	-	<100	<100
F3 (C16-C34 Hydrocarbons)	NA	NC	100	<200	<200	A	---	Y	-	<200	<200
F4 (C34-C50 Hydrocarbons)	NA	NC	100	<200	<200	A	---	Y	-	<200	<200
Reached Baseline at C50	NA	NC	N/A	Yes	Yes	---	---	---	-	Yes	Yes

Notes:

1 = Table 1: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1, Freshwater Life pathway for coarse grained soils.

2 = Upper Limit of Acceptability is determined as described in Report Section 3.1. Upper limits of acceptability are calculated using mean of baseline data +3 standard deviations.

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

N/A = Not Applicable

NC = Not calculated. Where there are no values other than "non-detect," no standard deviation is calculated. The acceptable range for these samples should be close to the detection limit.

- = Not Analyzed

RDL= Reportable Detection Limit

20 = Exceeds CCME guideline

21 = Exceeds Upper Limit of Acceptability

Table B-2
Groundwater Chemical Concentrations - PCBs

PARAMETER / Sample ID	CCME FIGQGs[1]	Upper Limit of Acceptability[2]	MW1	DUP-1	Duplicate Evaluation			MW2	MW3	MW4
					Scenario*	RPD (%)	Acceptable			
Date			23/08/2014	23/08/2014				23/08/2014	23/08/2014	23/08/2014
PCBs (ug/L)										
Aroclor 1016	NA	NC	<0.05	<0.05	A	---	Y	<0.05	<0.05	<0.05
Aroclor 1221	NA	NC	<0.05	<0.05	A	---	Y	<0.05	<0.05	<0.05
Aroclor 1232	NA	NC	<0.05	<0.05	A	---	Y	<0.05	<0.05	<0.05
Aroclor 1242	NA	NC	<0.05	<0.05	A	---	Y	<0.05	<0.05	<0.05
Aroclor 1248	NA	NC	<0.05	<0.05	A	---	Y	<0.05	<0.05	<0.05
Aroclor 1254	NA	NC	<0.05	<0.05	A	---	Y	<0.05	<0.05	<0.05
Aroclor 1260	NA	NC	<0.05	<0.05	A	---	Y	<0.05	<0.05	<0.05
Aroclor 1262	NA	NC	<0.05	<0.05	A	---	Y	<0.05	<0.05	<0.05
Aroclor 1268	NA	NC	<0.05	<0.05	A	---	Y	<0.05	<0.05	<0.05
Total PCB	NA	NC	<0.05	<0.05	A	---	Y	<0.05	<0.05	<0.05

Notes:

1 = Table 1: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1, Lowest Guideline for coarse grained soils.

2 = Upper Limit of Acceptability is determined as described in Report Section 3.1. Upper limits of acceptability are calculated using mean of baseline data +3 standard deviations.

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

NC = Not calculated. Where there are no values other than "non-detect," no standard deviation is calculated. The acceptable range for these samples should be close to the detection limit.

NA= No Criteria

RDL= Reportable Detection Limit

20 = Exceeds Upper Limit of Acceptability

Table B-3
Groundwater Chemical Concentrations - Metals

PARAMETER / Sample ID / Date	CCME FIGQGs[1]	Upper Limit of Acceptability[2]	MW1	DUP-1	RPD		MW2	MW3	MW4
			23/08/2014	23/08/2014	RPD (%)	Acceptable	23/08/2014	23/08/2014	23/08/2014
Metals (ug/L)									
Dissolved Arsenic (As)	5	6	3.1	3.1	0%	Acceptable	0.35	0.82	0.55
Total Arsenic (As)	5	6	4.2	3.7	13%	Acceptable	0.52	1.1	0.72
Dissolved Cadmium (Cd)	0.017	0.2	**0.17**	**0.18**	6%	Acceptable	**0.026**	**0.046**	**0.023**
Total Cadmium (Cd)	0.017	2	**0.23**	**0.20**	14%	Acceptable	**0.030**	**0.053**	**0.024**
Dissolved Cobalt (Co)	NA	1	0.80	0.82	2%	Acceptable	0.31	0.42	<0.30
Total Cobalt (Co)	NA	1	1.2	1.0	18%	Acceptable	0.44	0.52	<0.30
Dissolved Chromium (Cr)	8.9	2	<1.0	<1.0	n/a	Acceptable	<1.0	<1.0	<1.0
Total Chromium (Cr)	8.9	3	2.9	3.6	22%	Unacceptable	1.1	1.2	1.1
Dissolved Copper (Cu)	2	59	**27**	**27**	0%	Acceptable	**20**	**10**	**6.9**
Total Copper (Cu)	2	70	**38**	**32**	17%	Acceptable	**32**	**17**	**13**
Dissolved Nickel (Ni)	83	19	33	32	3%	Acceptable	3.9	14	2.5
Total Nickel (Ni)	83	22	45	40	12%	Acceptable	5.8	18	3.8
Dissolved Lead (Pb)	2	5	2.0	1.9	5%	Acceptable	<0.20	<0.20	<0.20
Total Lead (Pb)	2	5	**2.9**	**2.5**	15%	Acceptable	0.73	0.40	<0.20
Dissolved Zinc (Zn)	10	17	9.2	**11**	18%	Acceptable	6.5 (1)	8.0 (1)	4.6 (1)
Total Zinc (Zn)	10	20	14	**11**	24%	Unacceptable	5.9	7.0	3.9

Notes:

1 = Table 1: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1, Freshwater Life pathway for coarse grained soils.

2 = Upper Limit of Acceptability is determined as described in Report Section 3.1. Upper limits of acceptability are calculated using mean of baseline data +3 standard deviations.

(1) Dissolved greater than total. Results are within limits of uncertainty(MU).

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

RDL= Reportable Detection Limit

20 = Exceeds CCME guideline

Table B-4
Groundwater Chemical Concentrations - Inorganics

PARAMETER		CCME FIGQGs[1]	Upper Limit of Acceptability[2]	RDL	MW-2	MW-3	MW-4	MW-1	DUP-1	RPD	
Sample ID											
Date					2014/08/23	2014/08/23	2014/08/23	2014/08/23	2014/08/23	RPD (%)	Acceptable
Inorganics	**Units**										
Colour	TCU	NC	25	20	11	9	7	14	14	0%	Acceptable
Conductivity	umho/cm	NC	NA	1.0	1200	2000	1500	4600	4700	2%	Acceptable
Total Dissolved Solids	mg/L	3000	3448	10	802	1350	956	3420	3410	0%	Acceptable
Fluoride (F-)	mg/L	0.12	2	0.10	0.41	0.67	0.34	0.70	0.71	1%	Acceptable
Orthophosphate (P)	mg/L	NC	NC	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	n/a	Acceptable
pH	pH	6.5-9	7-9	NC	7.91	7.93	7.90	8.16	8.22	1%	Acceptable
Total Suspended Solids	mg/L	NC	19	3.0	<10	<10	<10	14	15	7%	Acceptable
Dissolved Sulphate (SO4)	mg/L	100	1689	1.0	**190**	**430**	**380**	**1700**	**1800**	6%	Acceptable
Dissolved Chloride (Cl)	mg/L	NC	300	6.0	44	180	120	140	140	0%	Acceptable
Nitrite (N)	mg/L	0.060	0.000	0.010	<0.010	0.036	0.014	0.021	<0.010	0%	Acceptable
Nitrate (N)	mg/L	13.0	3	0.10	11.9	3.13	2.51	0.31	0.34	9%	Acceptable
Nitrate + Nitrite	mg/L	NC	3	0.10	11.9	3.17	2.53	0.33	0.34	3%	Acceptable

Notes:

1 = Table 1: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1, Freshwater life pathway for coarse grained soils.

2 = Upper Limit of Acceptability is determined as described in Report Section 3.1. Upper limits of acceptability are calculated using mean of baseline data +3 standard deviations.

NA = Not Available
NC = No Criteria
RDL= Reportable Detection Limit

APPENDIX C

Site Photographs

South side of the SSDF. Viewpoint 1 (Figure A-2; Appendix A). Photograph reference P8230001.
Direction photo taken: N

South side of the SSDF. Viewpoint 2 (Figure A-2; Appendix A). Photograph reference P8230002.
Direction photo taken: N

Southeast corner of the SSDF. Viewpoint 3 (Figure A-2; Appendix A). Photograph reference P8230003.
Direction photo taken: NW

Southeast corner of the SSDF. Viewpoint 4 (Figure A-2; Appendix A). Photograph reference P8230004.
Direction photo taken: NW

South side of the SSDF from the Southeast corner. Viewpoint 5 (Figure A-2; Appendix A). Photograph reference P8230005. Direction photo taken: W

East side of the SSDF from the Southeast corner. Viewpoint 6 (Figure A-2; Appendix A). Photograph reference P8230006. Direction photo taken: N

South side of the SSDF from the Southeast corner. Viewpoint 7 (Figure A-2; Appendix A). Photograph reference P8230007. Direction photo taken: W

East side of the SSDF from the Southeast corner. Viewpoint 8 (Figure A-2; Appendix A). Photograph reference P8230008. Direction photo taken: N

South side of the SSDF from the Southeast corner. Viewpoint 9 (Figure A-2; Appendix A). Photograph reference P8230009. Direction photo taken: W

East side of the SSDF from the Southeast corner. Viewpoint 10 (Figure A-2; Appendix A). Photograph reference P8230010. Direction photo taken: N

East side of the SSDF. Viewpoint 11 (Figure A-2; Appendix A). Photograph reference P8230011.
Direction photo taken: W

East side of the SSDF. Viewpoint 12 (Figure A-2; Appendix A). Photograph reference P8230012.
Direction photo taken: W

Northeast corner of the SSDF. Viewpoint 13 (Figure A-2; Appendix A). Photograph reference P8230013.
Direction photo taken: SW

Northeast corner of the SSDF. Viewpoint 14 (Figure A-2; Appendix A). Photograph reference P8230014.
Direction photo taken: SW

East side of the SSDF from the Northeast corner. Viewpoint 15 (Figure A-2; Appendix A). Photograph reference P8230015. Direction photo taken: S

North side of the SSDF from the Northeast corner. Viewpoint 16 (Figure A-2; Appendix A). Photograph reference P8230016. Direction photo taken: W

East side of the SSDF from the Northeast corner. Viewpoint 17 (Figure A-2; Appendix A). Photograph reference P8230017. Direction photo taken: S

North side of the SSDF from the Northeast corner. Viewpoint 18 (Figure A-2; Appendix A). Photograph reference P8230018. Direction photo taken: W

East side of the SSDF from the Northeast corner. Viewpoint 19 (Figure A-2; Appendix A). Photograph reference P8230019. Direction photo taken: S

North side of the SSDF from the Northeast corner. Viewpoint 20 (Figure A-2; Appendix A). Photograph reference P8230020. Direction photo taken: W

North side of the SSDF. Viewpoint 21 (Figure A-2; Appendix A). Photograph reference P8230021.
Direction photo taken: S

North side of the SSDF. Viewpoint 22 (Figure A-2; Appendix A). Photograph reference P8230022.
Direction photo taken: S

Northwest corner of the SSDF. Viewpoint 23 (Figure A-2; Appendix A). Photograph reference P8230023.
Direction photo taken: SE

Northwest corner of the SSDF. Viewpoint 24 (Figure A-2; Appendix A). Photograph reference P8230024.
Direction photo taken: SE

North side of the SSDF from the Northwest corner. Viewpoint 25 (Figure A-2; Appendix A). Photograph reference P8230025. Direction photo taken: E

West side of the SSDF from the Northwest corner. Viewpoint 26 (Figure A-2; Appendix A). Photograph reference P8230026. Direction photo taken: S

North side of the SSDF from the Northwest corner. Viewpoint 27 (Figure A-2; Appendix A). Photograph reference P8230027. Direction photo taken: E

West side of the SSDF from the Northwest corner. Viewpoint 28 (Figure A-2; Appendix A).Photograph reference P8230028. Direction photo taken: S

North side of the SSDF from the Northwest corner. Viewpoint 29 (Figure A-2; Appendix A). Photograph reference P8230029. Direction photo taken: E

West side of the SSDF from the Northwest corner. Viewpoint 30 (Figure A-2; Appendix A). Photograph reference P8230030. Direction photo taken: S

West side of the SSDF. Viewpoint 31 (Figure A-2; Appendix A). Photograph reference P8230031.
Direction photo taken: E

West side of the SSDF. Viewpoint 32 (Figure A-2; Appendix A). Photograph reference P8230032.
Direction photo taken: E

Southwest corner of the SSDF. Viewpoint 33 (Figure A-2; Appendix A). Photograph reference P8230033.
Direction photo taken: NE

Southwest corner of the SSDF. Viewpoint 34 (Figure A-2; Appendix A). Photograph reference P8230034.
Direction photo taken: NE

West side of the SSDF from the Southwest corner. Viewpoint 35 (Figure A-2; Appendix A). Photograph reference P8230035. Direction photo taken: N

South side of the SSDF from the Southwest corner. Viewpoint 36 (Figure A-2; Appendix A). Photograph reference P8230036. Direction photo taken: E

West side of the SSDF from the Southwest corner. Viewpoint 37 (Figure A-2; Appendix A). Photograph reference P8230037. Direction photo taken: N

South side of the SSDF from the Southwest corner. Viewpoint 38 (Figure A-2; Appendix A). Photograph reference P8230038. Direction photo taken: E

West side of the SSDF from the Southwest corner. Viewpoint 39 (Figure A-2; Appendix A). Photograph reference P8230039. Direction photo taken: N

Top of the SSDF from the Southwest corner. Viewpoint 41 (Figure A-2; Appendix A). Photograph reference P8230041. Direction photo taken: NE

Top of the SSDF from the Southeast corner. Viewpoint 42 (Figure A-2; Appendix A). Photograph reference P8230042. Direction photo taken: NW

Top of the SSDF from the Northeast corner. Viewpoint 43 (Figure A-2; Appendix A). Photograph reference P8230043. Direction photo taken: SW

Top of the SSDF from the Northwest corner. Viewpoint 44 (Figure A-2; Appendix A). Photograph reference P8230044. Direction photo taken: SE

Top of the SSDF from the West side. Viewpoint 45 (Figure A-2; Appendix A). Photograph reference P8230045. Direction photo taken: NE

Top of the SSDF from the West side. Viewpoint 46 (Figure A-2; Appendix A). Photograph reference P8230046.
Direction photo taken: SE

Top of the SSDF from the South side. Viewpoint 47 (Figure A-2; Appendix A). Photograph reference P8230047.
Direction photo taken: NW

Top of the SSDF from the South side. Viewpoint 48 (Figure A-2; Appendix A). Photograph reference P8230048.
Direction photo taken: NE

Top of the SSDF from the East side. Viewpoint 49 (Figure A-2; Appendix A). Photograph reference P8230049.
Direction photo taken: SW

Top of the SSDF from the East side. Viewpoint 50 (Figure A-2; Appendix A). Photograph reference P8230050.
Direction photo taken: NW

Top of the SSDF from the North side. Viewpoint 51 (Figure A-2; Appendix A). Photograph reference P8230051.
Direction photo taken: SE

Top of the SSDF from the North side. Viewpoint 52 (Figure A-2; Appendix A). Photograph reference P8230052.
Direction photo taken: SW

Cracking on West slope of SSDF. Viewpoint 53 (Figure A-2; Appendix A). Photograph reference P8230053.
Direction photo taken: E

Edge of West slope of SSDF. Viewpoint 54 (Figure A-2; Appendix A). Photograph reference P8230054.
Direction photo taken: SE

Ponding at Southwest corner. Viewpoint 55 (Figure A-2; Appendix A). Photograph reference P8230055.
Direction photo taken: NW

Erosion on southeast berm. Viewpoint 57 (Figure A-2; Appendix A). Photograph reference P8230057.
Direction photo taken: NA

Pothole on east corner of NHWL. Viewpoint 58 (Figure A-2; Appendix A). Photograph reference P8230058.
Direction photo taken: NA

Minor erosion at Feature H. Viewpoint 59 (Figure A-2; Appendix A). Photograph reference P8230059.
Direction photo taken: NA

Erosion on northwest berm. Viewpoint 60 (Figure A-2; Appendix A). Photograph reference P8230060.
Direction photo taken: SW

APPENDIX D

Monitoring Well Sampling Logs

Project: 1697-1401 Franz Personnel: K.Krug
Weather: Partly Sunny /~8°C

Sampling of Monitoring Wells

Name of Area: NHWL			Sector:
Date of Sampling:	Day: 23rd	Month: 08	Year: 2014
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):	~6L		
Sampling Equipment:	Geopump brand persistaltic pump and YSI 556 water quality meter		

Measured Data

Well Depth (mbgs):	1.95		**Sample Analysis**	**Y/N**	**# of Bottles**	**Duplicate Information**
Water Depth (mbgs):	0.86					
Stick Up (mags):	0.45					
Field Chemistry						
Name and # unit:	**Readings ***					
pH:	1	7.68	PHCs: F1/BTEX, F2-F4	Y	11	Duplicate collected at this well for all parametres
	2	7.70				
	3					
	4					
	5					
	6					
	7					
	8					
	9		PCB Total	Y		
	10					
	11					
Temperature (◦C):	1	0.81				
	2	1.09				
	3					
	4					
	5					
	6					
	7					
	8		Total Metals	Y		
	9					
	10					
	11					
Conductivity (mS/cm):	1	5.84				
	2	5.51				
	3					
	4					
	5					
	6					
	7		Dissolved Metals	Y		
	8					
	9					
	10					
	11					
DO:	1	7.6				
	2	5.3				
	3					
	4		General Chemistry	Y		
	5					
	6					
	7					
	8					
	9					
	10					
	11					

Comments/ Notes:

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

pumping at 100-200 ml/min

Project: 1697-1401

Franz Personnel: K.Krug
Weather: Partly Sunny /~8°C

Sampling of Monitoring Wells

Name of Area: NHWL			Sector:
Date of Sampling:	Day: 23	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):
Condition of Well:	**Good**		
Volume Purged (L):	~ 2 L		
Sampling Equipment:	Geopump brand persistaltic pump and YSI 556 water quality meter		

Measured Data

Well Depth (mbgs):	1.685
Water Depth (mbgs):	1.405
Stick Up (mags):	0.45

Field Chemistry

Name and # unit:		**Readings ***
pH:	1	6.70
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
Temperature (◦C):	1	1.28
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
Conductivity (mS/cm):	1	765.00
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
DO:	1	25.66
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	

Sample Analysis	**Y/N**	**# of Bottles**	**Duplicate Information**
PHCs: F1/BTEX, F2-F4	Y	8	
PCB Total	Y		
Total Metals	Y		
Dissolved Metals	Y		
General Chemistry	Y		

Comments/ Notes:

Very low recharge, didn't have steady flow to collect field chemistry

Project: 1697-1401

Franz Personnel: K.Krug
Weather: Partly Sunny /~8°C

Sampling of Monitoring Wells

Name of Area: NHWL			Sector:
Date of Sampling:	Day: 23	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):	~ 6 L		
Sampling Equipment:	Geopump brand persistaltic pump and YSI 556 water quality meter		

Measured Data

Well Depth (mbgs):	2.05
Water Depth (mbgs):	0.995
Stick Up (mags):	0.55

Field Chemistry

Name and # unit:		**Readings ***
pH:	1	7.87
	2	8.35
	3	8.33
	4	8.27
	5	
	6	
	7	
	8	
	9	
	10	
	11	
Temperature (◦C):	1	1.38
	2	1.48
	3	1.82
	4	1.98
	5	
	6	
	7	
	8	
	9	
	10	
	11	
Conductivity (mS/cm):	1	2.93
	2	2.77
	3	2.64
	4	2.57
	5	
	6	
	7	
	8	
	9	
	10	
	11	
DO:	1	7.87
	2	2.53
	3	2.27
	4	2.33
	5	
	6	
	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.

pumping at 100-200 ml/min

Project: 1697-1401

Franz Personnel: K.Krug
Weather: Partly Sunny /~8°C

Sampling of Monitoring Wells

Name of Area: NHWL			Sector:
Date of Sampling:	Day: 23	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):	~ 6 L		
Sampling Equipment:	Geopump brand persistaltic pump and YSI 556 water quality meter		

Measured Data

Well Depth (mbgs):	1.95
Water Depth (mbgs):	0.86
Stick Up (mags):	0.42

Field Chemistry

Name and # unit:		**Readings ***
pH:	1	6.59
	2	7.20
	3	7.37
	4	7.40
	5	
	6	
	7	
	8	
	9	
	10	
	11	
Temperature (◦C):	1	1.29
	2	1.49
	3	1.62
	4	1.60
	5	
	6	
	7	
	8	
	9	
	10	
	11	
Conductivity (mS/cm):	1	1.67
	2	1.53
	3	1.53
	4	1.53
	5	
	6	
	7	
	8	
	9	
	10	
	11	
DO:	1	8.18
	2	7.90
	3	4.80
	4	4.78
	5	
	6	
	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 water to collect sample

pumping at 100-200 ml/min

APPENDIX E

Laboratory Certificates of Analysis and Chain of Custody Forms

Your Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D
Your C.O.C. #: 480677-01-01

Attention:Julie Dittburner

Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2014/09/11
Report #: R3152534
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4F8729
Received: 2014/08/28, 10:40

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Chloride by Automated Colourimetry (1)	5	N/A	2014/09/03	CAM SOP-00463	EPA 325.2 m
Colour (1)	5	N/A	2014/09/03	CAM SOP-00412	SM 22 2120 m
Conductivity (1)	5	N/A	2014/09/02	CAM SOP-00414	SM 22 2510 m
Petroleum Hydro. CCME F1 & BTEX in Water (1)	2	N/A	2014/09/03	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydro. CCME F1 & BTEX in Water (1)	3	N/A	2014/09/04	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1)	2	2014/09/05	2014/09/05	CAM SOP-00316	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1)	2	2014/09/05	2014/09/06	CAM SOP-00316	CCME PHC-CWS m
Fluoride (1)	5	2014/08/30	2014/09/02	CAM SOP-00449	SM 22 4500-F C m
Nitrate (NO3) and Nitrite (NO2) in Water (1, 2)	5	N/A	2014/09/03	CAM SOP-00440	SM 22 4500-NO3I/NO2B
Polychlorinated Biphenyl in Water (1)	5	2014/09/02	2014/09/05	CAM SOP-00309	EPA 8082 m
pH (1)	5	N/A	2014/09/02	CAM SOP-00413	SM 4500H+ B
Orthophosphate (1)	5	N/A	2014/09/02	CAM SOP-00461	EPA 365.1 m
Sulphate by Automated Colourimetry (1)	5	N/A	2014/09/02	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (1)	5	N/A	2014/09/02	CAM SOP-00428	SM 22 2540C m
Total Suspended Solids (1)	5	N/A	2014/09/02	CAM SOP-00428	SM 22 2540D m

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited 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.

Your Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D
Your C.O.C. #: 480677-01-01

Attention:Julie Dittburner

Franz Environmental Inc
329 Churchill Ave N
Suite 200
Ottawa, ON
K1Z 5B8

Report Date: 2014/09/11
Report #: R3152534
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4F8729
Received: 2014/08/28, 10:40

(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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Parnian Baber, Project Manager
Email: pbaber@maxxam.ca
Phone# (613) 274-0573

==========

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

Maxxam Job #: B4F8729
Report Date: 2014/09/11

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D

RESULTS OF ANALYSES OF WATER

Maxxam ID		XJ0876		XJ0877		XJ0878		XJ0879		
Sampling Date		2014/08/23		2014/08/23		2014/08/23		2014/08/23		
COC Number		480677-01-01		480677-01-01		480677-01-01		480677-01-01		
	Units	**MW-2**	**RDL**	**MW-3**	**RDL**	**MW-4**	**RDL**	**MW-1**	**RDL**	**QC Batch**
Inorganics										
Colour	TCU	11	2	9	2	7	2	14	2	3731774
Conductivity	umho/cm	1200	1.0	2000	1.0	1500	1.0	4600	1.0	3731813
Total Dissolved Solids	mg/L	802	10	1350	10	956	10	3420	10	3732584
Fluoride (F-)	mg/L	0.41	0.10	0.67	0.10	0.34	0.10	0.70	0.10	3731815
Orthophosphate (P)	mg/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	3731783
pH	pH	7.91	N/A	7.93	N/A	7.90	N/A	8.16	N/A	3731816
Total Suspended Solids	mg/L	<10	10	<10	10	<10	10	14	10	3732580
Dissolved Sulphate (SO4)	mg/L	190	1	430	5	380	2	1700	5	3731784
Dissolved Chloride (Cl)	mg/L	44	1	180	2	120	1	140	1	3731782
Nitrite (N)	mg/L	<0.010	0.010	0.036	0.010	0.014	0.010	0.021	0.010	3731777
Nitrate (N)	mg/L	11.9	0.50	3.13	0.10	2.51	0.10	0.31	0.10	3731777
Nitrate + Nitrite	mg/L	11.9	0.50	3.17	0.10	2.53	0.10	0.33	0.10	3731777

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		XJ0880		
Sampling Date		2014/08/23		
COC Number		480677-01-01		
	Units	**DUP-1**	**RDL**	**QC Batch**
Inorganics				
Colour	TCU	14	2	3731774
Conductivity	umho/cm	4700	1.0	3731813
Total Dissolved Solids	mg/L	3410	10	3732584
Fluoride (F-)	mg/L	0.71	0.10	3731815
Orthophosphate (P)	mg/L	<0.010	0.010	3731783
pH	pH	8.22	N/A	3731816
Total Suspended Solids	mg/L	15	10	3732580
Dissolved Sulphate (SO4)	mg/L	1800	5	3731784
Dissolved Chloride (Cl)	mg/L	140	1	3731782
Nitrite (N)	mg/L	<0.010	0.010	3731777
Nitrate (N)	mg/L	0.34	0.10	3731777
Nitrate + Nitrite	mg/L	0.34	0.10	3731777

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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.maxxam.ca

Maxxam Job #: B4F8729
Report Date: 2014/09/11

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		XJ0876	XJ0877	XJ0877	XJ0878	XJ0879	XJ0880		
Sampling Date		2014/08/23	2014/08/23	2014/08/23	2014/08/23	2014/08/23	2014/08/23		
COC Number		480677-01-01	480677-01-01	480677-01-01	480677-01-01	480677-01-01	480677-01-01		
	Units	**MW-2**	**MW-3**	**MW-3 Lab-Dup**	**MW-4**	**MW-1**	**DUP-1**	**RDL**	**QC Batch**
PCBs									
Aroclor 1016	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	3732208
Aroclor 1221	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	3732208
Aroclor 1232	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	3732208
Aroclor 1242	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	3732208
Aroclor 1248	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	3732208
Aroclor 1254	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	3732208
Aroclor 1260	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	3732208
Aroclor 1262	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	3732208
Aroclor 1268	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	3732208
Total PCB	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	3732208
Surrogate Recovery (%)									
Decachlorobiphenyl	%	117	121	129	122	115	124		3732208

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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.maxxam.ca

Maxxam Job #: B4F8729
Report Date: 2014/09/11

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D

O.REG 153 PETROLEUM HYDROCARBONS (WATER)

Maxxam ID		XJ0876	XJ0877	XJ0878	XJ0878	XJ0879	XJ0880		
Sampling Date		2014/08/23	2014/08/23	2014/08/23	2014/08/23	2014/08/23	2014/08/23		
COC Number		480677-01-01	480677-01-01	480677-01-01	480677-01-01	480677-01-01	480677-01-01		
	Units	**MW-2**	**MW-3**	**MW-4**	**MW-4 Lab-Dup**	**MW-1**	**DUP-1**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons									
Benzene	ug/L	<0.20	<0.20	<0.20		<0.20	<0.20	0.20	3733994
Toluene	ug/L	<0.20	<0.20	<0.20		<0.20	<0.20	0.20	3733994
Ethylbenzene	ug/L	<0.20	<0.20	<0.20		<0.20	<0.20	0.20	3733994
o-Xylene	ug/L	<0.20	<0.20	<0.20		<0.20	<0.20	0.20	3733994
p+m-Xylene	ug/L	<0.40	<0.40	<0.40		<0.40	<0.40	0.40	3733994
Total Xylenes	ug/L	<0.40	<0.40	<0.40		<0.40	<0.40	0.40	3733994
F1 (C6-C10)	ug/L	<25	<25	<25		<25	<25	25	3733994
F1 (C6-C10) - BTEX	ug/L	<25	<25	<25		<25	<25	25	3733994
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/L		<100	<100	<100	<100	<100	100	3737029
F3 (C16-C34 Hydrocarbons)	ug/L		<200	<200	<200	<200	<200	200	3737029
F4 (C34-C50 Hydrocarbons)	ug/L		<200	<200	<200	<200	<200	200	3737029
Reached Baseline at C50	ug/L		Yes	Yes	Yes	Yes	Yes		3737029
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	100	101	100		100	99		3733994
4-Bromofluorobenzene	%	95	98	100		99	96		3733994
D10-Ethylbenzene	%	107	110	108		109	107		3733994
D4-1,2-Dichloroethane	%	102	104	103		103	102		3733994
o-Terphenyl	%		103	101	98	100	96		3737029

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B4F8729
Report Date: 2014/09/11

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D

TEST SUMMARY

Maxxam ID: XJ0876
Sample ID: MW-2
Matrix: Water

Collected: 2014/08/23
Shipped:
Received: 2014/08/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	AC	3731782	N/A	2014/09/03	Deonarine Ramnarine
Colour	SPEC	3731774	N/A	2014/09/03	Christine Pham
Conductivity	COND	3731813	N/A	2014/09/02	Surinder Rai
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	3733994	N/A	2014/09/03	Simon Xi
Fluoride	F	3731815	2014/08/30	2014/09/02	Surinder Rai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3731777	N/A	2014/09/03	Chandra Nandlal
Polychlorinated Biphenyl in Water	GC/ECD	3732208	2014/09/02	2014/09/05	Joy Zhang
pH	PH	3731816	N/A	2014/09/02	Surinder Rai
Orthophosphate	AC	3731783	N/A	2014/09/02	Alina Dobreanu
Sulphate by Automated Colourimetry	AC	3731784	N/A	2014/09/02	Alina Dobreanu
Total Dissolved Solids	SLDS	3732584	N/A	2014/09/02	Niki Shah
Total Suspended Solids	SLDS	3732580	N/A	2014/09/02	Niki Shah

Maxxam ID: XJ0877
Sample ID: MW-3
Matrix: Water

Collected: 2014/08/23
Shipped:
Received: 2014/08/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	AC	3731782	N/A	2014/09/03	Deonarine Ramnarine
Colour	SPEC	3731774	N/A	2014/09/03	Christine Pham
Conductivity	COND	3731813	N/A	2014/09/02	Surinder Rai
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	3733994	N/A	2014/09/03	Simon Xi
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	3737029	2014/09/05	2014/09/05	Zhiyue (Frank) Zhu
Fluoride	F	3731815	2014/08/30	2014/09/02	Surinder Rai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3731777	N/A	2014/09/03	Chandra Nandlal
Polychlorinated Biphenyl in Water	GC/ECD	3732208	2014/09/02	2014/09/05	Joy Zhang
pH	PH	3731816	N/A	2014/09/02	Surinder Rai
Orthophosphate	AC	3731783	N/A	2014/09/02	Alina Dobreanu
Sulphate by Automated Colourimetry	AC	3731784	N/A	2014/09/02	Alina Dobreanu
Total Dissolved Solids	SLDS	3732584	N/A	2014/09/02	Niki Shah
Total Suspended Solids	SLDS	3732580	N/A	2014/09/02	Niki Shah

Maxxam ID: XJ0877 Dup
Sample ID: MW-3
Matrix: Water

Collected: 2014/08/23
Shipped:
Received: 2014/08/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	3732208	2014/09/02	2014/09/05	Joy Zhang

Maxxam ID: XJ0878
Sample ID: MW-4
Matrix: Water

Collected: 2014/08/23
Shipped:
Received: 2014/08/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	AC	3731782	N/A	2014/09/03	Deonarine Ramnarine

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Maxxam Job #: B4F8729
Report Date: 2014/09/11

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D

TEST SUMMARY

Maxxam ID: XJ0878
Sample ID: MW-4
Matrix: Water

Collected: 2014/08/23
Shipped:
Received: 2014/08/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Colour	SPEC	3731774	N/A	2014/09/03	Christine Pham
Conductivity	COND	3731813	N/A	2014/09/02	Surinder Rai
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	3733994	N/A	2014/09/04	Simon Xi
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	3737029	2014/09/05	2014/09/05	Zhiyue (Frank) Zhu
Fluoride	F	3731815	2014/08/30	2014/09/02	Surinder Rai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3731777	N/A	2014/09/03	Chandra Nandlal
Polychlorinated Biphenyl in Water	GC/ECD	3732208	2014/09/02	2014/09/05	Joy Zhang
pH	PH	3731816	N/A	2014/09/02	Surinder Rai
Orthophosphate	AC	3731783	N/A	2014/09/02	Alina Dobreanu
Sulphate by Automated Colourimetry	AC	3731784	N/A	2014/09/02	Alina Dobreanu
Total Dissolved Solids	SLDS	3732584	N/A	2014/09/02	Niki Shah
Total Suspended Solids	SLDS	3732580	N/A	2014/09/02	Niki Shah

Maxxam ID: XJ0878 Dup
Sample ID: MW-4
Matrix: Water

Collected: 2014/08/23
Shipped:
Received: 2014/08/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	3737029	2014/09/05	2014/09/05	Zhiyue (Frank) Zhu

Maxxam ID: XJ0879
Sample ID: MW-1
Matrix: Water

Collected: 2014/08/23
Shipped:
Received: 2014/08/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	AC	3731782	N/A	2014/09/03	Deonarine Ramnarine
Colour	SPEC	3731774	N/A	2014/09/03	Christine Pham
Conductivity	COND	3731813	N/A	2014/09/02	Surinder Rai
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	3733994	N/A	2014/09/04	Simon Xi
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	3737029	2014/09/05	2014/09/06	Zhiyue (Frank) Zhu
Fluoride	F	3731815	2014/08/30	2014/09/02	Surinder Rai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3731777	N/A	2014/09/03	Chandra Nandlal
Polychlorinated Biphenyl in Water	GC/ECD	3732208	2014/09/02	2014/09/05	Joy Zhang
pH	PH	3731816	N/A	2014/09/02	Surinder Rai
Orthophosphate	AC	3731783	N/A	2014/09/02	Alina Dobreanu
Sulphate by Automated Colourimetry	AC	3731784	N/A	2014/09/02	Alina Dobreanu
Total Dissolved Solids	SLDS	3732584	N/A	2014/09/02	Niki Shah
Total Suspended Solids	SLDS	3732580	N/A	2014/09/02	Niki Shah

Maxxam ID: XJ0880
Sample ID: DUP-1
Matrix: Water

Collected: 2014/08/23
Shipped:
Received: 2014/08/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	AC	3731782	N/A	2014/09/03	Deonarine Ramnarine

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Maxxam Job #: B4F8729
Report Date: 2014/09/11

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D

TEST SUMMARY

Maxxam ID: XJ0880
Sample ID: DUP-1
Matrix: Water

Collected: 2014/08/23
Shipped:
Received: 2014/08/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Colour	SPEC	3731774	N/A	2014/09/03	Christine Pham
Conductivity	COND	3731813	N/A	2014/09/02	Surinder Rai
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	3733994	N/A	2014/09/04	Simon Xi
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	3737029	2014/09/05	2014/09/06	Zhiyue (Frank) Zhu
Fluoride	F	3731815	2014/08/30	2014/09/02	Surinder Rai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3731777	N/A	2014/09/03	Chandra Nandlal
Polychlorinated Biphenyl in Water	GC/ECD	3732208	2014/09/02	2014/09/05	Joy Zhang
pH	PH	3731816	N/A	2014/09/02	Surinder Rai
Orthophosphate	AC	3731783	N/A	2014/09/02	Alina Dobreanu
Sulphate by Automated Colourimetry	AC	3731784	N/A	2014/09/02	Alina Dobreanu
Total Dissolved Solids	SLDS	3732584	N/A	2014/09/02	Niki Shah
Total Suspended Solids	SLDS	3732580	N/A	2014/09/02	Niki Shah

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Maxxam Job #: B4F8729
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Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D

GENERAL COMMENTS

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

Package 1	4.7°C
Package 2	6.0°C
Package 3	2.3°C

Results relate only to the items tested.

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Maxxam Job #: B4F8729
Report Date: 2014/09/11

QUALITY ASSURANCE REPORT

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D

			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
3732208	Decachlorobiphenyl	2014/09/05	130	60 - 130	127	60 - 130	125	%				
3733994	1,4-Difluorobenzene	2014/09/03	101	70 - 130	101	70 - 130	103	%				
3733994	4-Bromofluorobenzene	2014/09/03	102	70 - 130	102	70 - 130	95	%				
3733994	D10-Ethylbenzene	2014/09/03	111	70 - 130	111	70 - 130	109	%				
3733994	D4-1,2-Dichloroethane	2014/09/03	101	70 - 130	104	70 - 130	105	%				
3737029	o-Terphenyl	2014/09/05	102	60 - 130	101	60 - 130	94	%				
3731774	Colour	2014/09/03			100	85 - 115	<2	TCU	NC	25		
3731777	Nitrate (N)	2014/09/03	104	80 - 120	102	80 - 120	<0.10	mg/L	NC	25		
3731777	Nitrite (N)	2014/09/03	109	80 - 120	108	80 - 120	<0.010	mg/L	NC	25		
3731782	Dissolved Chloride (Cl)	2014/09/03	NC	80 - 120	103	80 - 120	<1	mg/L	1.6	20		
3731783	Orthophosphate (P)	2014/09/02	99	75 - 125	101	80 - 120	<0.010	mg/L	NC	25		
3731784	Dissolved Sulphate (SO4)	2014/09/02	NC	75 - 125	99	80 - 120	<1	mg/L	NC	20		
3731813	Conductivity	2014/09/02			101	85 - 115	<1.0	umho/cm	0.87	25		
3731815	Fluoride (F-)	2014/09/02	102	80 - 120	96	80 - 120	<0.10	mg/L	5.2	20		
3731816	pH	2014/09/02			102	98 - 103			0.60	N/A		
3732208	Aroclor 1016	2014/09/05					<0.05	ug/L	NC	40		
3732208	Aroclor 1221	2014/09/05					<0.05	ug/L	NC	40		
3732208	Aroclor 1232	2014/09/05					<0.05	ug/L	NC	40		
3732208	Aroclor 1242	2014/09/05					<0.05	ug/L	NC	30		
3732208	Aroclor 1248	2014/09/05					<0.05	ug/L	NC	30		
3732208	Aroclor 1254	2014/09/05					<0.05	ug/L	NC	30		
3732208	Aroclor 1260	2014/09/05	102	60 - 130	108	60 - 130	<0.05	ug/L	NC	30		
3732208	Aroclor 1262	2014/09/05					<0.05	ug/L	NC	40		
3732208	Aroclor 1268	2014/09/05					<0.05	ug/L	NC	40		
3732208	Total PCB	2014/09/05	102	60 - 130	108	60 - 130	<0.05	ug/L	NC	40		
3732580	Total Suspended Solids	2014/09/02					<10	mg/L	NC	25	97	85 - 115
3732584	Total Dissolved Solids	2014/09/02					<10	mg/L	2.4	25	100	90 - 110
3733994	Benzene	2014/09/03	107	70 - 130	112	70 - 130	<0.20	ug/L	NC	30		
3733994	Ethylbenzene	2014/09/03	116	70 - 130	120	70 - 130	<0.20	ug/L	NC	30		
3733994	F1 (C6-C10) - BTEX	2014/09/03					<25	ug/L	NC	30		
3733994	F1 (C6-C10)	2014/09/03	107	70 - 130	104	70 - 130	<25	ug/L	NC	30		
3733994	o-Xylene	2014/09/03	115	70 - 130	119	70 - 130	<0.20	ug/L	NC	30		

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QUALITY ASSURANCE REPORT(CONT'D)

			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
3733994	p+m-Xylene	2014/09/03	111	70 - 130	112	70 - 130	<0.40	ug/L	NC	30		
3733994	Toluene	2014/09/03	110	70 - 130	112	70 - 130	<0.20	ug/L	NC	30		
3733994	Total Xylenes	2014/09/03					<0.40	ug/L	NC	30		
3737029	F2 (C10-C16 Hydrocarbons)	2014/09/05	113	50 - 130	111	60 - 130	<100	ug/L	NC	30		
3737029	F3 (C16-C34 Hydrocarbons)	2014/09/05	100	50 - 130	103	60 - 130	<200	ug/L	NC	30		
3737029	F4 (C34-C50 Hydrocarbons)	2014/09/05	106	50 - 130	103	60 - 130	<200	ug/L	NC	30		

N/A = Not Applicable

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 sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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 too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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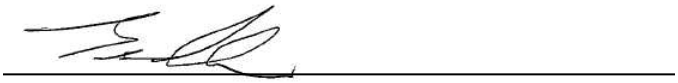
Maxxam Job #: B4F8729
Report Date: 2014/09/11

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Site Location: CAM-D

VALIDATION SIGNATURE PAGE

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



Brad Newman, Scientific Specialist

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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Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-Free 800-563-6266 Fax (905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 1

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

REPORT INFORMATION(if differs from invoice):
Company Name:
Contact Name: Julie Dittburner & Catherine
Address:
Phone: Fax:
Email: jdittburner@franzenvironmental.com, cleblanc@franzen

PROJECT INFORMATION:
Quotation #: B44130
P.O. #:
Project #: 1697-1401: AANDC DEW Line
Project Name: CAM-D
Site #:
Sampled By:

Laboratory Use Only:
Maxxam Job #:
Bottle Order #: 480677
Chain of Custody #: C#480677-01-01
Project Manager: Parnian Baber

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

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

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

Special Instructions:

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

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	Field Filtered (please circle): (Metals / Hg / Cr VI)	Polychlorinated Biphenyl in Water	O.Reg 153 Petroleum Hydrocarbons (Water)	Total Dissolved Solids	Total Suspended Solids	Nitrate (NO3) and Nitrite (NO2) in Water/pH/ Chloride	Orthophosphate/ Sulphate/ Colour	CCME Metals (low Level), dissolved	CCME Metals (low Level), total	Conductivity/ Fluoride	# of Bottles	Comments
1		MW-2	Aug 23 2014	pm	GW	Y	✓	✓	✓	✓	✓	✓	✓	✓	✓	8	-limited sample for PHCs PCBs, & gen. chem.
2		MW-3			GW	Y	✓	✓	✓	✓	✓	✓	✓	✓	✓	11	
3		MW-4			GW	Y	✓	✓	✓	✓	✓	✓	✓	✓	✓	11	
4		MW-1			GW	Y	✓	✓	✓	✓	✓	✓	✓	✓	✓	11	
5		DUP-1			GW	Y	✓	✓	✓	✓	✓	✓	✓	✓	✓	11	
6					GW												
7					GW												
8					GW												
9					GW												
10					GW												On ice

28-Aug-14 10:40
Parnian Baber
B4F8729
HP6 ENV-890

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
J. Dittburner	14/08/25	5:00pm	Kelsey Pilon Kelsey Pilon	14/08/28	10:40	
			RACHEL DELLIN	2014/08/29	11:00	

Laboratory Use Only: Time Sensitive; Temperature (°C) on Receipt: 5,5,4 6,6,6 4/7/8 9/8/7 6/6/5 3,1,3; 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

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

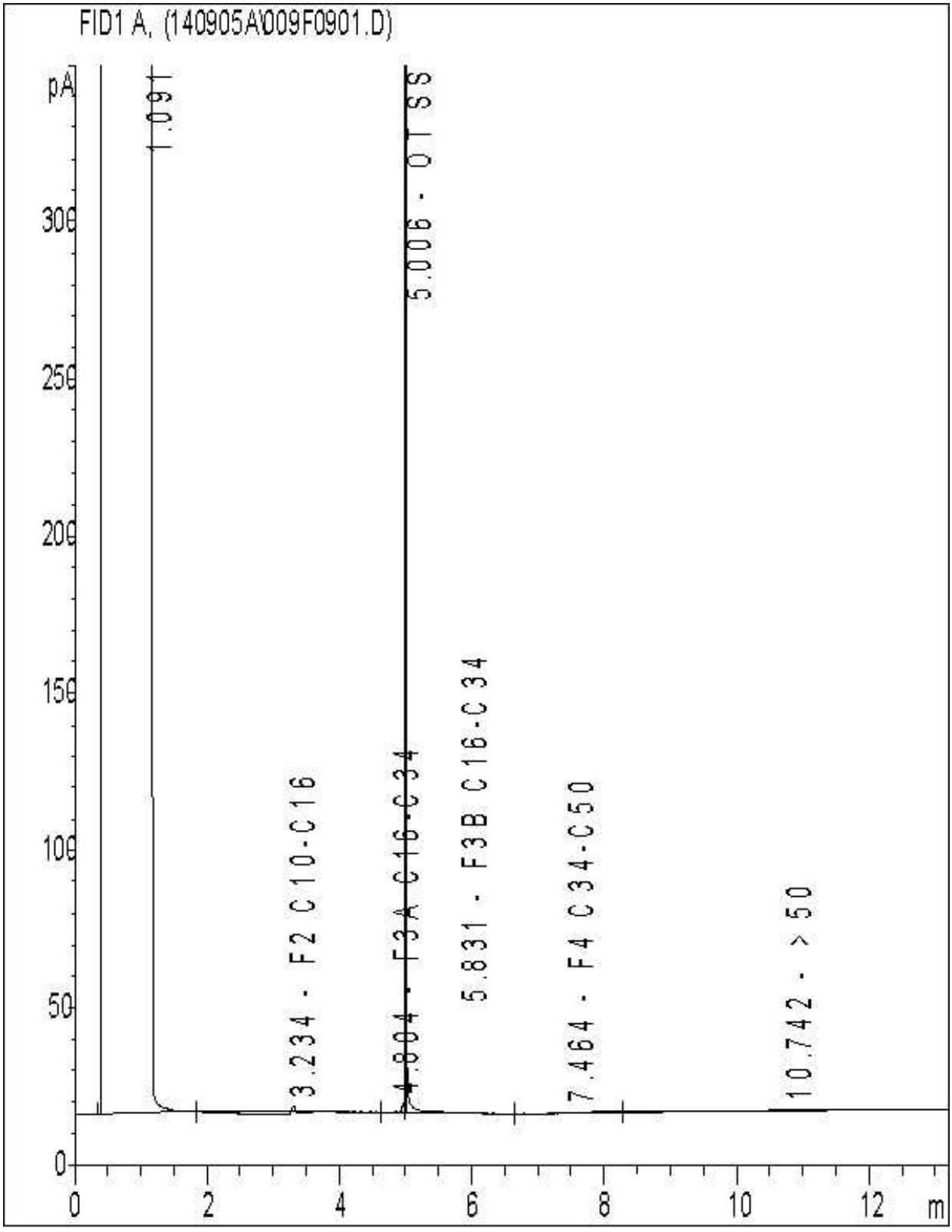
White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Job #: B4F8729
Report Date: 2014/09/11
Maxxam Sample: XJ0877

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Project name: CAM-D
Client ID: MW-3

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

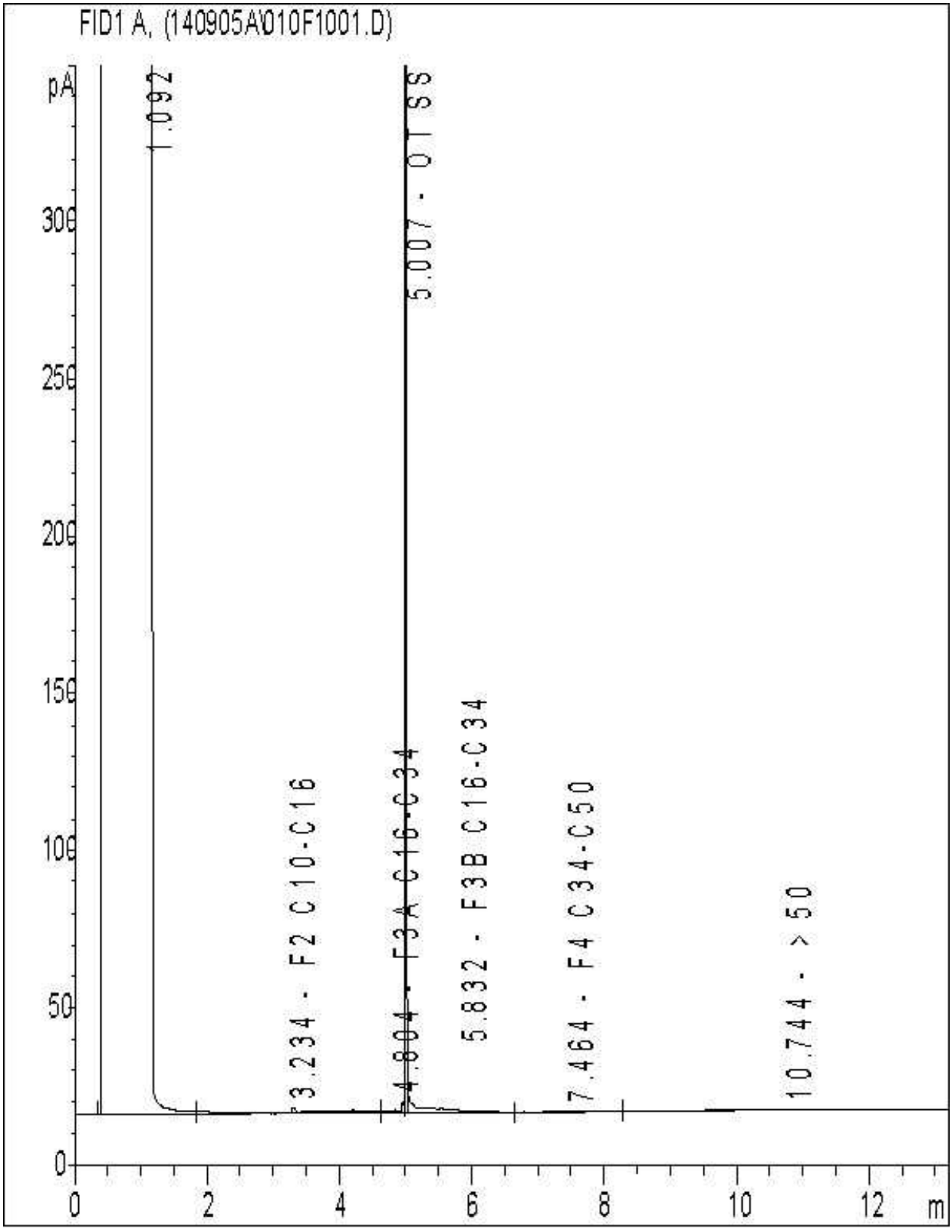


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4F8729
Report Date: 2014/09/11
Maxxam Sample: XJ0878

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Project name: CAM-D
Client ID: MW-4

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

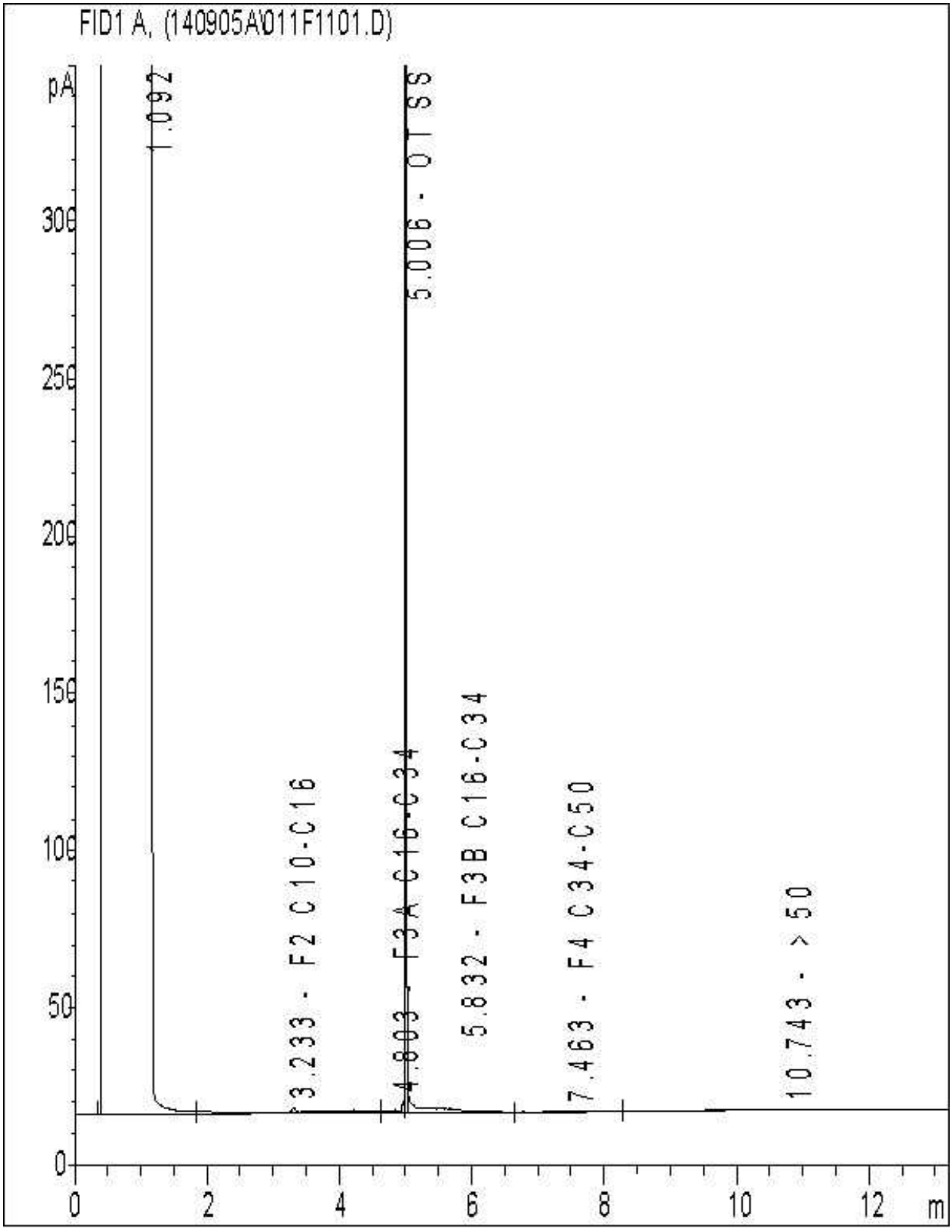


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4F8729
Report Date: 2014/09/11
Maxxam Sample: XJ0878 Lab-Dup

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Project name: CAM-D
Client ID: MW-4

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

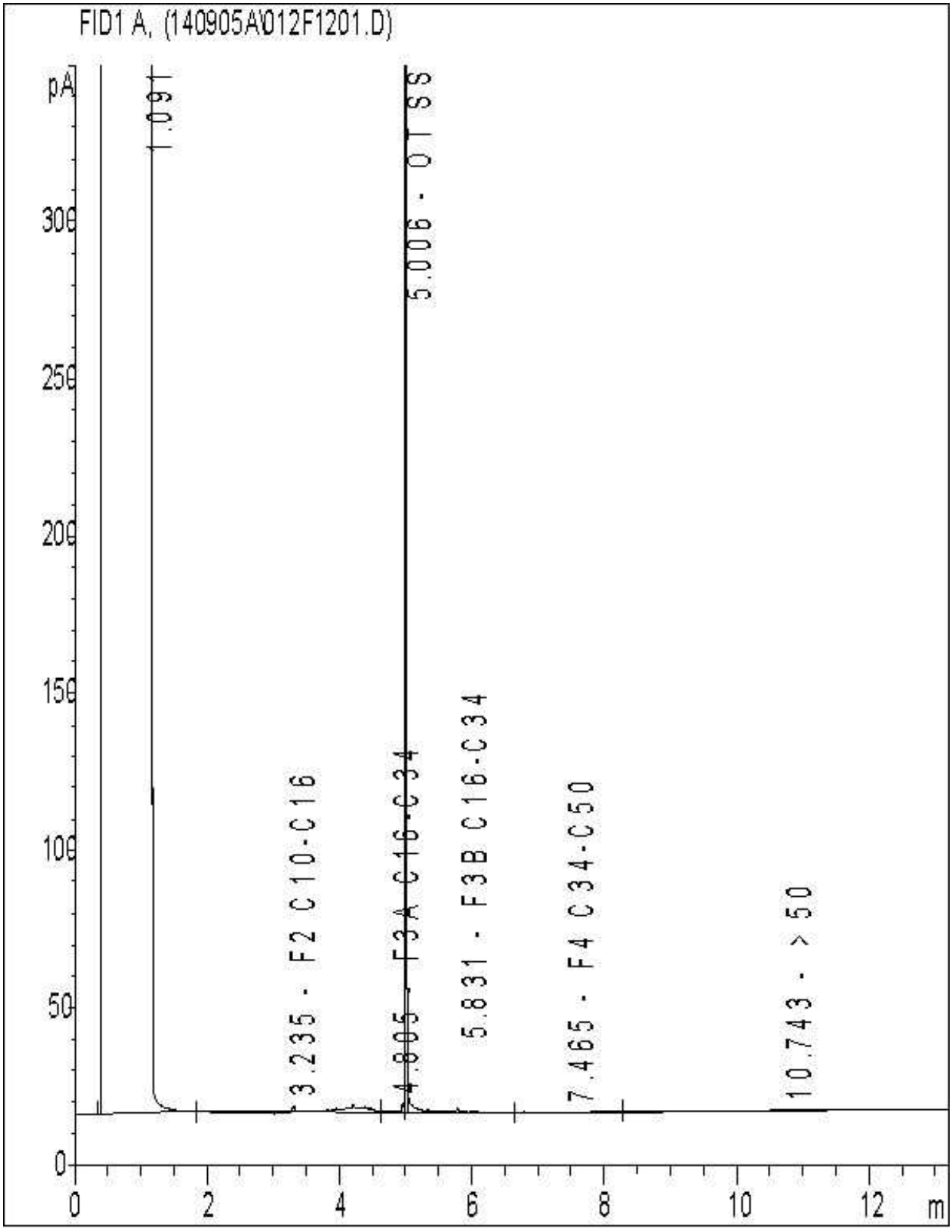


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4F8729
Report Date: 2014/09/11
Maxxam Sample: XJ0879

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Project name: CAM-D
Client ID: MW-1

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

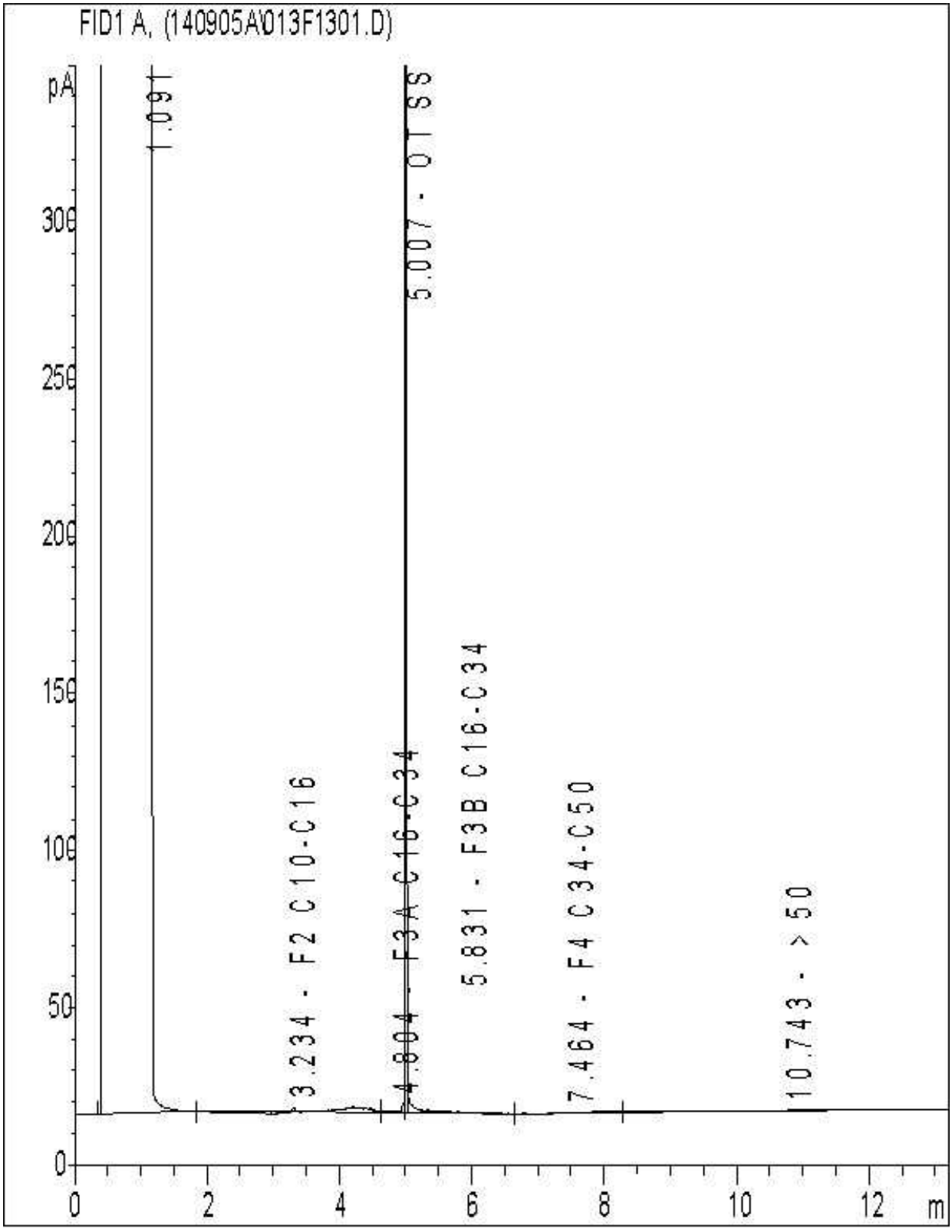


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4F8729
Report Date: 2014/09/11
Maxxam Sample: XJ0880

Franz Environmental Inc
Client Project #: 1697-1401: AANDC DEW Line
Project name: CAM-D
Client ID: DUP-1

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your Project #: MB4F8729
Site Location: 1697-1401:AANDC DEW LINE
Your C.O.C. #: B4F8729

Attention: SUB CONTRACTOR
MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2014/09/08
Report #: R1637753
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B477249
Received: 2014/09/03, 08:30

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Cadmium - low level CCME - Dissolved	5	N/A	2014/09/08	AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME (Total)	5	2014/09/03	2014/09/06	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICP - Dissolved	5	N/A	2014/09/05	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Total	5	2014/09/04	2014/09/05	AB SOP-00014 / AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS - Dissolved	5	N/A	2014/09/05	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total	5	2014/09/04	2014/09/05	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Cynny Hagen, Project Manager Assistant
Email: CHagen@maxxam.ca
Phone# (403) 735-2273

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

Total cover pages: 1

Maxxam Job #: B477249
Report Date: 2014/09/08

MAXXAM ANALYTICS
Client Project #: MB4F8729
Site Location: 1697-1401:AANDC DEW LINE

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		KM6642	KM6642	KM6644	KM6646		KM6648		
Sampling Date		2014/08/23	2014/08/23	2014/08/23	2014/08/23		2014/08/23		
COC Number		B4F8729	B4F8729	B4F8729	B4F8729		B4F8729		
	UNITS	**MW-2 (XJ0876-03R)**	**MW-2 (XJ0876-03R) Lab-Dup**	**MW-3 (XJ0877-05R)**	**MW-4 (XJ0878-05R)**	**RDL**	**MW-1 (XJ0879-05R)**	**RDL**	**QC Batch**
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	0.026		0.046	0.023	0.020	0.17	0.020	7624014
Elements									
Dissolved Aluminum (Al)	mg/L	0.016		0.037	0.16	0.0030	0.013	0.0030	7626033
Dissolved Antimony (Sb)	mg/L	0.00071		<0.00060	<0.00060	0.00060	0.0016	0.00060	7626033
Dissolved Arsenic (As)	mg/L	0.00035		0.00082	0.00055	0.00020	0.0031	0.00020	7626033
Dissolved Barium (Ba)	mg/L	0.030 (1)	0.029	0.026 (1)	0.022	0.010	<0.010	0.010	7625670
Dissolved Beryllium (Be)	mg/L	<0.0010		<0.0010	<0.0010	0.0010	<0.0010	0.0010	7626033
Dissolved Boron (B)	mg/L	0.039 (1)	0.033	0.033 (1)	0.044	0.020	0.051	0.020	7625670
Dissolved Calcium (Ca)	mg/L	100	100	110 (2)	60	0.30	67	0.30	7625670
Dissolved Chromium (Cr)	mg/L	<0.0010		<0.0010	<0.0010	0.0010	<0.0010	0.0010	7626033
Dissolved Cobalt (Co)	mg/L	0.00031		0.00042	<0.00030	0.00030	0.00080	0.00030	7626033
Dissolved Copper (Cu)	mg/L	0.020		0.010	0.0069	0.00020	0.027	0.00020	7626033
Dissolved Iron (Fe)	mg/L	<0.060	<0.060	<0.060	<0.060	0.060	<0.060	0.060	7625670
Dissolved Lead (Pb)	mg/L	0.00034		<0.00020	<0.00020	0.00020	0.0020	0.00020	7626033
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	0.028	<0.020	0.020	0.14	0.020	7625670
Dissolved Magnesium (Mg)	mg/L	68	68	85 (2)	20	0.20	65	0.20	7625670
Dissolved Manganese (Mn)	mg/L	0.17	0.17	0.042	0.022	0.0040	0.099	0.0040	7625670
Dissolved Molybdenum (Mo)	mg/L	0.0055		0.011	0.012	0.00020	0.079	0.00020	7626033
Dissolved Nickel (Ni)	mg/L	0.0039		0.014	0.0025	0.00050	0.033	0.00050	7626033
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	7625670
Dissolved Potassium (K)	mg/L	8.3 (2)	8.2	21	18	0.30	16	0.30	7625670
Dissolved Selenium (Se)	mg/L	<0.00020		0.00027	0.00034	0.00020	0.0086	0.00020	7626033
Dissolved Silicon (Si)	mg/L	2.5	2.5	2.2 (2)	1.4	0.10	5.0	0.10	7625670
Dissolved Silver (Ag)	mg/L	<0.00010		<0.00010	<0.00010	0.00010	<0.00010	0.00010	7626033
Dissolved Sodium (Na)	mg/L	63 (2)	62	190	200	0.50	900 (3)	2.5	7625670
Dissolved Strontium (Sr)	mg/L	0.26	0.26	0.43	0.29	0.020	0.65	0.020	7625670
Dissolved Sulphur (S)	mg/L	72	70	170	140	0.20	570 (3)	1.0	7625670
Dissolved Thallium (Tl)	mg/L	<0.00020		<0.00020	<0.00020	0.00020	<0.00020	0.00020	7626033
Dissolved Tin (Sn)	mg/L	<0.0010		<0.0010	<0.0010	0.0010	<0.0010	0.0010	7626033
Dissolved Titanium (Ti)	mg/L	<0.0010		<0.0010	<0.0010	0.0010	<0.0010	0.0010	7626033

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results are within limits of uncertainty(MU).
(2) Dissolved greater than total. Results within acceptable limits of precision.
(3) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B477249
Report Date: 2014/09/08

MAXXAM ANALYTICS
Client Project #: MB4F8729
Site Location: 1697-1401:AANDC DEW LINE

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		KM6642	KM6642	KM6644	KM6646		KM6648		
Sampling Date		2014/08/23	2014/08/23	2014/08/23	2014/08/23		2014/08/23		
COC Number		B4F8729	B4F8729	B4F8729	B4F8729		B4F8729		
	UNITS	**MW-2 (XJ0876-03R)**	**MW-2 (XJ0876-03R) Lab-Dup**	**MW-3 (XJ0877-05R)**	**MW-4 (XJ0878-05R)**	**RDL**	**MW-1 (XJ0879-05R)**	**RDL**	**QC Batch**
Dissolved Uranium (U)	mg/L	0.052		0.050	0.0047	0.00010	0.30	0.00010	7626033
Dissolved Vanadium (V)	mg/L	<0.0010		<0.0010	<0.0010	0.0010	<0.0010	0.0010	7626033
Dissolved Zinc (Zn)	mg/L	0.0065 (1)		0.0080 (1)	0.0046 (1)	0.0030	0.0092	0.0030	7626033

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results are within limits of uncertainty(MU).

Maxxam Job #: B477249
Report Date: 2014/09/08

MAXXAM ANALYTICS
Client Project #: MB4F8729
Site Location: 1697-1401:AANDC DEW LINE

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		KM6650		
Sampling Date		2014/08/23		
COC Number		B4F8729		
	UNITS	**DUP-1 (XJ0880-05R)**	**RDL**	**QC Batch**
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	0.18	0.020	7624014
Elements				
Dissolved Aluminum (Al)	mg/L	0.014	0.0030	7626033
Dissolved Antimony (Sb)	mg/L	0.0016	0.00060	7626033
Dissolved Arsenic (As)	mg/L	0.0031	0.00020	7626033
Dissolved Barium (Ba)	mg/L	0.011	0.010	7625670
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	7626033
Dissolved Boron (B)	mg/L	0.052	0.020	7625670
Dissolved Calcium (Ca)	mg/L	68	0.30	7625670
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	7626033
Dissolved Cobalt (Co)	mg/L	0.00082	0.00030	7626033
Dissolved Copper (Cu)	mg/L	0.027	0.00020	7626033
Dissolved Iron (Fe)	mg/L	<0.060	0.060	7625670
Dissolved Lead (Pb)	mg/L	0.0019	0.00020	7626033
Dissolved Lithium (Li)	mg/L	0.14	0.020	7625670
Dissolved Magnesium (Mg)	mg/L	65	0.20	7625670
Dissolved Manganese (Mn)	mg/L	0.10 (1)	0.0040	7625670
Dissolved Molybdenum (Mo)	mg/L	0.077	0.00020	7626033
Dissolved Nickel (Ni)	mg/L	0.032	0.00050	7626033
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	7625670
Dissolved Potassium (K)	mg/L	16	0.30	7625670
Dissolved Selenium (Se)	mg/L	0.0083	0.00020	7626033
Dissolved Silicon (Si)	mg/L	5.0	0.10	7625670
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	7626033
Dissolved Sodium (Na)	mg/L	880 (2)	2.5	7625670
Dissolved Strontium (Sr)	mg/L	0.66	0.020	7625670
Dissolved Sulphur (S)	mg/L	560 (2)	1.0	7625670
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	7626033
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	7626033
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	7626033

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results within acceptable limits of precision.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B477249
Report Date: 2014/09/08

MAXXAM ANALYTICS
Client Project #: MB4F8729
Site Location: 1697-1401:AANDC DEW LINE

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		KM6650		
Sampling Date		2014/08/23		
COC Number		B4F8729		
	UNITS	**DUP-1 (XJ0880-05R)**	**RDL**	**QC Batch**
Dissolved Uranium (U)	mg/L	0.30	0.00010	7626033
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	7626033
Dissolved Zinc (Zn)	mg/L	0.011	0.0030	7626033
RDL = Reportable Detection Limit				

Maxxam Job #: B477249
Report Date: 2014/09/08

MAXXAM ANALYTICS
Client Project #: MB4F8729
Site Location: 1697-1401:AANDC DEW LINE

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		KM6642	KM6644	KM6646		KM6648		
Sampling Date		2014/08/23	2014/08/23	2014/08/23		2014/08/23		
COC Number		B4F8729	B4F8729	B4F8729		B4F8729		
	UNITS	**MW-2 (XJ0876-03R)**	**MW-3 (XJ0877-05R)**	**MW-4 (XJ0878-05R)**	**RDL**	**MW-1 (XJ0879-05R)**	**RDL**	**QC Batch**
Low Level Elements								
Total Cadmium (Cd)	ug/L	0.030	0.053	0.024	0.020	0.23	0.020	7623688
Elements								
Total Aluminum (Al)	mg/L	0.020	0.048	0.55	0.0030	0.044	0.0030	7625399
Total Antimony (Sb)	mg/L	0.00089	<0.00060	<0.00060	0.00060	0.0021	0.00060	7625399
Total Arsenic (As)	mg/L	0.00052	0.0011	0.00072	0.00020	0.0042	0.00020	7625399
Total Barium (Ba)	mg/L	0.029	0.025	0.023	0.010	0.011	0.010	7625408
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	7625399
Total Boron (B)	mg/L	0.027	0.031	0.044	0.020	0.052	0.020	7625408
Total Calcium (Ca)	mg/L	110	100	62	0.30	68	0.30	7625408
Total Chromium (Cr)	mg/L	0.0011	0.0012	0.0011	0.0010	0.0029	0.0010	7625399
Total Cobalt (Co)	mg/L	0.00044	0.00052	<0.00030	0.00030	0.0012	0.00030	7625399
Total Copper (Cu)	mg/L	0.032	0.017	0.013	0.00020	0.038	0.00020	7625399
Total Iron (Fe)	mg/L	<0.060	0.080	<0.060	0.060	<0.060	0.060	7625408
Total Lead (Pb)	mg/L	0.00073	0.00040	<0.00020	0.00020	0.0029	0.00020	7625399
Total Lithium (Li)	mg/L	<0.020	0.032	<0.020	0.020	0.16	0.020	7625408
Total Magnesium (Mg)	mg/L	68	83	21	0.20	67	0.20	7625408
Total Manganese (Mn)	mg/L	0.22	0.042	0.022	0.0040	0.099	0.0040	7625408
Total Molybdenum (Mo)	mg/L	0.0084	0.015	0.016	0.00020	0.11	0.00020	7625399
Total Nickel (Ni)	mg/L	0.0058	0.018	0.0038	0.00050	0.045	0.00050	7625399
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	0.10	<0.10	0.10	7625408
Total Potassium (K)	mg/L	8.2	21	19	0.30	17	0.30	7625408
Total Selenium (Se)	mg/L	0.00020	0.00032	0.00048	0.00020	0.011	0.00020	7625399
Total Silicon (Si)	mg/L	2.5	2.1	1.5	0.10	5.4	0.10	7625408
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	0.00010	7625399
Total Sodium (Na)	mg/L	61	200	200	0.50	970 (1)	2.5	7625408
Total Strontium (Sr)	mg/L	0.26	0.43	0.30	0.020	0.71	0.020	7625408
Total Sulphur (S)	mg/L	72	170	150	0.20	610 (1)	1.0	7625408
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	<0.00020	0.00020	7625399
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	7625399
Total Titanium (Ti)	mg/L	0.0010	<0.0010	0.0010	0.0010	0.0022	0.0010	7625399
Total Uranium (U)	mg/L	0.068	0.062	0.0066	0.00010	0.39	0.00010	7625399
Total Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	0.0012	0.0010	7625399

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B477249
Report Date: 2014/09/08

MAXXAM ANALYTICS
Client Project #: MB4F8729
Site Location: 1697-1401:AANDC DEW LINE

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		KM6642	KM6644	KM6646		KM6648		
Sampling Date		2014/08/23	2014/08/23	2014/08/23		2014/08/23		
COC Number		B4F8729	B4F8729	B4F8729		B4F8729		
	UNITS	**MW-2 (XJ0876-03R)**	**MW-3 (XJ0877-05R)**	**MW-4 (XJ0878-05R)**	**RDL**	**MW-1 (XJ0879-05R)**	**RDL**	**QC Batch**
Total Zinc (Zn)	mg/L	0.0043	0.0073	<0.0030	0.0030	0.014	0.0030	7625399

RDL = Reportable Detection Limit

Maxxam Job #: B477249
Report Date: 2014/09/08

MAXXAM ANALYTICS
Client Project #: MB4F8729
Site Location: 1697-1401:AANDC DEW LINE

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		KM6650		
Sampling Date		2014/08/23		
COC Number		B4F8729		
	UNITS	**DUP-1 (XJ0880-05R)**	**RDL**	**QC Batch**
Low Level Elements				
Total Cadmium (Cd)	ug/L	0.20	0.020	7624134
Elements				
Total Aluminum (Al)	mg/L	0.038	0.0030	7625399
Total Antimony (Sb)	mg/L	0.0019	0.00060	7625399
Total Arsenic (As)	mg/L	0.0037	0.00020	7625399
Total Barium (Ba)	mg/L	0.011	0.010	7625408
Total Beryllium (Be)	mg/L	<0.0010	0.0010	7625399
Total Boron (B)	mg/L	0.052	0.020	7625408
Total Calcium (Ca)	mg/L	69	0.30	7625408
Total Chromium (Cr)	mg/L	0.0036	0.0010	7625399
Total Cobalt (Co)	mg/L	0.0010	0.00030	7625399
Total Copper (Cu)	mg/L	0.032	0.00020	7625399
Total Iron (Fe)	mg/L	<0.060	0.060	7625408
Total Lead (Pb)	mg/L	0.0025	0.00020	7625399
Total Lithium (Li)	mg/L	0.16	0.020	7625408
Total Magnesium (Mg)	mg/L	68	0.20	7625408
Total Manganese (Mn)	mg/L	0.099	0.0040	7625408
Total Molybdenum (Mo)	mg/L	0.097	0.00020	7625399
Total Nickel (Ni)	mg/L	0.040	0.00050	7625399
Total Phosphorus (P)	mg/L	<0.10	0.10	7625408
Total Potassium (K)	mg/L	17	0.30	7625408
Total Selenium (Se)	mg/L	0.0097	0.00020	7625399
Total Silicon (Si)	mg/L	5.5	0.10	7625408
Total Silver (Ag)	mg/L	<0.00010	0.00010	7625399
Total Sodium (Na)	mg/L	970 (1)	2.5	7625408
Total Strontium (Sr)	mg/L	0.73	0.020	7625408
Total Sulphur (S)	mg/L	610 (1)	1.0	7625408
Total Thallium (Tl)	mg/L	<0.00020	0.00020	7625399
Total Tin (Sn)	mg/L	<0.0010	0.0010	7625399
Total Titanium (Ti)	mg/L	0.0022	0.0010	7625399
Total Uranium (U)	mg/L	0.34	0.00010	7625399

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B477249
Report Date: 2014/09/08

MAXXAM ANALYTICS
Client Project #: MB4F8729
Site Location: 1697-1401:AANDC DEW LINE

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		KM6650		
Sampling Date		2014/08/23		
COC Number		B4F8729		
	UNITS	**DUP-1 (XJ0880-05R)**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.0010	0.0010	7625399
Total Zinc (Zn)	mg/L	0.011	0.0030	7625399
RDL = Reportable Detection Limit				

Maxxam Job #: B477249
Report Date: 2014/09/08

MAXXAM ANALYTICS
Client Project #: MB4F8729
Site Location: 1697-1401:AANDC DEW LINE

Package 1	-0.3°C

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

General Comments

Results relate only to the items tested.

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB4F8729
P.O. #:
Site Location: 1697-1401:AANDC DEW LINE

Quality Assurance Report

Maxxam Job Number: CB477249

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7625399	HC7	Matrix Spike	Total Aluminum (Al)	2014/09/05		90	%	80 - 120
			Total Antimony (Sb)	2014/09/05		101	%	80 - 120
			Total Arsenic (As)	2014/09/05		102	%	80 - 120
			Total Beryllium (Be)	2014/09/05		109	%	80 - 120
			Total Chromium (Cr)	2014/09/05		102	%	80 - 120
			Total Cobalt (Co)	2014/09/05		99	%	80 - 120
			Total Copper (Cu)	2014/09/05		95	%	80 - 120
			Total Lead (Pb)	2014/09/05		100	%	80 - 120
			Total Molybdenum (Mo)	2014/09/05		109	%	80 - 120
			Total Nickel (Ni)	2014/09/05		98	%	80 - 120
			Total Selenium (Se)	2014/09/05		104	%	80 - 120
			Total Silver (Ag)	2014/09/05		97	%	80 - 120
			Total Thallium (Tl)	2014/09/05		103	%	80 - 120
			Total Tin (Sn)	2014/09/05		105	%	80 - 120
			Total Titanium (Ti)	2014/09/05		97	%	80 - 120
			Total Uranium (U)	2014/09/05		104	%	80 - 120
			Total Vanadium (V)	2014/09/05		107	%	80 - 120
			Total Zinc (Zn)	2014/09/05		98	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2014/09/05		96	%	80 - 120
			Total Antimony (Sb)	2014/09/05		98	%	80 - 120
			Total Arsenic (As)	2014/09/05		98	%	80 - 120
			Total Beryllium (Be)	2014/09/05		104	%	80 - 120
			Total Chromium (Cr)	2014/09/05		99	%	80 - 120
			Total Cobalt (Co)	2014/09/05		99	%	80 - 120
			Total Copper (Cu)	2014/09/05		94	%	80 - 120
			Total Lead (Pb)	2014/09/05		99	%	80 - 120
			Total Molybdenum (Mo)	2014/09/05		102	%	80 - 120
			Total Nickel (Ni)	2014/09/05		97	%	80 - 120
			Total Selenium (Se)	2014/09/05		99	%	80 - 120
			Total Silver (Ag)	2014/09/05		94	%	80 - 120
			Total Thallium (Tl)	2014/09/05		99	%	80 - 120
			Total Tin (Sn)	2014/09/05		100	%	80 - 120
			Total Titanium (Ti)	2014/09/05		92	%	80 - 120
			Total Uranium (U)	2014/09/05		100	%	80 - 120
			Total Vanadium (V)	2014/09/05		103	%	80 - 120
			Total Zinc (Zn)	2014/09/05		98	%	80 - 120
		Method Blank	Total Aluminum (Al)	2014/09/05	<0.0030		mg/L	
			Total Antimony (Sb)	2014/09/05	<0.00060		mg/L	
			Total Arsenic (As)	2014/09/05	<0.00020		mg/L	
			Total Beryllium (Be)	2014/09/05	<0.0010		mg/L	
			Total Chromium (Cr)	2014/09/05	<0.0010		mg/L	
			Total Cobalt (Co)	2014/09/05	<0.00030		mg/L	
			Total Copper (Cu)	2014/09/05	<0.00020		mg/L	
			Total Lead (Pb)	2014/09/05	<0.00020		mg/L	
			Total Molybdenum (Mo)	2014/09/05	<0.00020		mg/L	
			Total Nickel (Ni)	2014/09/05	<0.00050		mg/L	
			Total Selenium (Se)	2014/09/05	<0.00020		mg/L	
			Total Silver (Ag)	2014/09/05	<0.00010		mg/L	
			Total Thallium (Tl)	2014/09/05	<0.00020		mg/L	
			Total Tin (Sn)	2014/09/05	<0.0010		mg/L	
			Total Titanium (Ti)	2014/09/05	<0.0010		mg/L	
			Total Uranium (U)	2014/09/05	<0.00010		mg/L	
			Total Vanadium (V)	2014/09/05	<0.0010		mg/L	
			Total Zinc (Zn)	2014/09/05	<0.0030		mg/L	
		RPD	Total Aluminum (Al)	2014/09/05	NC		%	20

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB4F8729
P.O. #:
Site Location: 1697-1401:AANDC DEW LINE

Quality Assurance Report (Continued)

Maxxam Job Number: CB477249

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7625399	HC7	RPD	Total Antimony (Sb)	2014/09/05	NC		%	20
			Total Arsenic (As)	2014/09/05	NC		%	20
			Total Beryllium (Be)	2014/09/05	NC		%	20
			Total Chromium (Cr)	2014/09/05	NC		%	20
			Total Cobalt (Co)	2014/09/05	NC		%	20
			Total Copper (Cu)	2014/09/05	NC		%	20
			Total Lead (Pb)	2014/09/05	NC		%	20
			Total Molybdenum (Mo)	2014/09/05	3.7		%	20
			Total Nickel (Ni)	2014/09/05	NC		%	20
			Total Selenium (Se)	2014/09/05	NC		%	20
			Total Silver (Ag)	2014/09/05	NC		%	20
			Total Thallium (Tl)	2014/09/05	NC		%	20
			Total Tin (Sn)	2014/09/05	NC		%	20
			Total Titanium (Ti)	2014/09/05	NC		%	20
			Total Uranium (U)	2014/09/05	1.6		%	20
			Total Vanadium (V)	2014/09/05	NC		%	20
			Total Zinc (Zn)	2014/09/05	NC		%	20
7625408	SRT	Matrix Spike	Total Barium (Ba)	2014/09/08		110	%	80 - 120
			Total Boron (B)	2014/09/08		111	%	80 - 120
			Total Calcium (Ca)	2014/09/08		NC	%	80 - 120
			Total Iron (Fe)	2014/09/08		NC	%	80 - 120
			Total Lithium (Li)	2014/09/08		110	%	80 - 120
			Total Magnesium (Mg)	2014/09/08		NC	%	80 - 120
			Total Manganese (Mn)	2014/09/08		111	%	80 - 120
			Total Phosphorus (P)	2014/09/08		104	%	80 - 120
			Total Potassium (K)	2014/09/08		105	%	80 - 120
			Total Silicon (Si)	2014/09/08		113	%	80 - 120
			Total Sodium (Na)	2014/09/08		NC	%	80 - 120
			Total Strontium (Sr)	2014/09/08		113	%	80 - 120
		Spiked Blank	Total Barium (Ba)	2014/09/08		104	%	80 - 120
			Total Boron (B)	2014/09/08		106	%	80 - 120
			Total Calcium (Ca)	2014/09/08		106	%	80 - 120
			Total Iron (Fe)	2014/09/08		109	%	80 - 120
			Total Lithium (Li)	2014/09/08		106	%	80 - 120
			Total Magnesium (Mg)	2014/09/08		99	%	80 - 120
			Total Manganese (Mn)	2014/09/08		105	%	80 - 120
			Total Phosphorus (P)	2014/09/08		99	%	80 - 120
			Total Potassium (K)	2014/09/08		99	%	80 - 120
			Total Silicon (Si)	2014/09/08		102	%	80 - 120
			Total Sodium (Na)	2014/09/08		103	%	80 - 120
			Total Strontium (Sr)	2014/09/08		107	%	80 - 120
		Method Blank	Total Barium (Ba)	2014/09/05	<0.010		mg/L	
			Total Boron (B)	2014/09/05	<0.020		mg/L	
			Total Calcium (Ca)	2014/09/05	<0.30		mg/L	
			Total Iron (Fe)	2014/09/05	<0.060		mg/L	
			Total Lithium (Li)	2014/09/05	<0.020		mg/L	
			Total Magnesium (Mg)	2014/09/05	<0.20		mg/L	
			Total Manganese (Mn)	2014/09/05	<0.0040		mg/L	
			Total Phosphorus (P)	2014/09/05	<0.10		mg/L	
			Total Potassium (K)	2014/09/05	<0.30		mg/L	
			Total Silicon (Si)	2014/09/05	<0.10		mg/L	
			Total Sodium (Na)	2014/09/05	<0.50		mg/L	
			Total Strontium (Sr)	2014/09/05	<0.020		mg/L	
			Total Sulphur (S)	2014/09/05	<0.20		mg/L	
		RPD	Total Barium (Ba)	2014/09/05	5.3		%	20

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB4F8729
P.O. #:
Site Location: 1697-1401:AANDC DEW LINE

Quality Assurance Report (Continued)

Maxxam Job Number: CB477249

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7625408	SRT	RPD	Total Boron (B)	2014/09/05	NC		%	20
			Total Calcium (Ca)	2014/09/05	6.4		%	20
			Total Iron (Fe)	2014/09/05	6.4		%	20
			Total Lithium (Li)	2014/09/05	NC		%	20
			Total Magnesium (Mg)	2014/09/05	5.9		%	20
			Total Manganese (Mn)	2014/09/05	6.6		%	20
			Total Phosphorus (P)	2014/09/05	NC		%	20
			Total Potassium (K)	2014/09/05	3.2		%	20
			Total Silicon (Si)	2014/09/05	5.2		%	20
			Total Sodium (Na)	2014/09/05	3.4		%	20
			Total Strontium (Sr)	2014/09/05	5.5		%	20
			Total Sulphur (S)	2014/09/05	2.7		%	20
7625670	SRT	Matrix Spike [KM6642-02]	Dissolved Barium (Ba)	2014/09/05		93	%	80 - 120
			Dissolved Boron (B)	2014/09/05		98	%	80 - 120
			Dissolved Calcium (Ca)	2014/09/05		NC	%	80 - 120
			Dissolved Iron (Fe)	2014/09/05		99	%	80 - 120
			Dissolved Lithium (Li)	2014/09/05		90	%	80 - 120
			Dissolved Magnesium (Mg)	2014/09/05		NC	%	80 - 120
			Dissolved Manganese (Mn)	2014/09/05		96	%	80 - 120
			Dissolved Phosphorus (P)	2014/09/05		100	%	80 - 120
			Dissolved Potassium (K)	2014/09/05		102	%	80 - 120
			Dissolved Silicon (Si)	2014/09/05		93	%	80 - 120
			Dissolved Sodium (Na)	2014/09/05		NC	%	80 - 120
			Dissolved Strontium (Sr)	2014/09/05		91	%	80 - 120
		Spiked Blank	Dissolved Barium (Ba)	2014/09/05		93	%	80 - 120
			Dissolved Boron (B)	2014/09/05		98	%	80 - 120
			Dissolved Calcium (Ca)	2014/09/05		106	%	80 - 120
			Dissolved Iron (Fe)	2014/09/05		100	%	80 - 120
			Dissolved Lithium (Li)	2014/09/05		91	%	80 - 120
			Dissolved Magnesium (Mg)	2014/09/05		103	%	80 - 120
			Dissolved Manganese (Mn)	2014/09/05		100	%	80 - 120
			Dissolved Phosphorus (P)	2014/09/05		99	%	80 - 120
			Dissolved Potassium (K)	2014/09/05		103	%	80 - 120
			Dissolved Silicon (Si)	2014/09/05		96	%	80 - 120
			Dissolved Sodium (Na)	2014/09/05		95	%	80 - 120
			Dissolved Strontium (Sr)	2014/09/05		95	%	80 - 120
		Method Blank	Dissolved Barium (Ba)	2014/09/05	<0.010		mg/L	
			Dissolved Boron (B)	2014/09/05	<0.020		mg/L	
			Dissolved Calcium (Ca)	2014/09/05	<0.30		mg/L	
			Dissolved Iron (Fe)	2014/09/05	<0.060		mg/L	
			Dissolved Lithium (Li)	2014/09/05	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2014/09/05	<0.20		mg/L	
			Dissolved Manganese (Mn)	2014/09/05	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2014/09/05	<0.10		mg/L	
			Dissolved Potassium (K)	2014/09/05	<0.30		mg/L	
			Dissolved Silicon (Si)	2014/09/05	<0.10		mg/L	
			Dissolved Sodium (Na)	2014/09/05	<0.50		mg/L	
			Dissolved Strontium (Sr)	2014/09/05	<0.020		mg/L	
			Dissolved Sulphur (S)	2014/09/05	<0.20		mg/L	
		RPD [KM6642-02]	Dissolved Barium (Ba)	2014/09/05	NC		%	20
			Dissolved Boron (B)	2014/09/05	NC		%	20
			Dissolved Calcium (Ca)	2014/09/05	1		%	20
			Dissolved Iron (Fe)	2014/09/05	NC		%	20
			Dissolved Lithium (Li)	2014/09/05	NC		%	20

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB4F8729
P.O. #:
Site Location: 1697-1401:AANDC DEW LINE

Quality Assurance Report (Continued)

Maxxam Job Number: CB477249

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7625670	SRT	RPD [KM6642-02]	Dissolved Magnesium (Mg)	2014/09/05	1.3		%	20
			Dissolved Manganese (Mn)	2014/09/05	0.6		%	20
			Dissolved Phosphorus (P)	2014/09/05	NC		%	20
			Dissolved Potassium (K)	2014/09/05	1.7		%	20
			Dissolved Silicon (Si)	2014/09/05	1.1		%	20
			Dissolved Sodium (Na)	2014/09/05	1.6		%	20
			Dissolved Strontium (Sr)	2014/09/05	1.4		%	20
			Dissolved Sulphur (S)	2014/09/05	1.8		%	20
7626033	HC7	Matrix Spike	Dissolved Aluminum (Al)	2014/09/05		107	%	80 - 120
			Dissolved Antimony (Sb)	2014/09/05		55 (1)	%	80 - 120
			Dissolved Arsenic (As)	2014/09/05		101	%	80 - 120
			Dissolved Beryllium (Be)	2014/09/05		101	%	80 - 120
			Dissolved Chromium (Cr)	2014/09/05		97	%	80 - 120
			Dissolved Cobalt (Co)	2014/09/05		92	%	80 - 120
			Dissolved Copper (Cu)	2014/09/05		94	%	80 - 120
			Dissolved Lead (Pb)	2014/09/05		90	%	80 - 120
			Dissolved Molybdenum (Mo)	2014/09/05		102	%	80 - 120
			Dissolved Nickel (Ni)	2014/09/05		89	%	80 - 120
			Dissolved Selenium (Se)	2014/09/05		93	%	80 - 120
			Dissolved Silver (Ag)	2014/09/05		95	%	80 - 120
			Dissolved Thallium (Tl)	2014/09/05		95	%	80 - 120
			Dissolved Tin (Sn)	2014/09/05		90	%	80 - 120
			Dissolved Titanium (Ti)	2014/09/05		98	%	80 - 120
			Dissolved Uranium (U)	2014/09/05		NC	%	80 - 120
			Dissolved Vanadium (V)	2014/09/05		103	%	80 - 120
			Dissolved Zinc (Zn)	2014/09/05		91	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2014/09/05		125 (1)	%	80 - 120
			Dissolved Antimony (Sb)	2014/09/05		109	%	80 - 120
			Dissolved Arsenic (As)	2014/09/05		111	%	80 - 120
			Dissolved Beryllium (Be)	2014/09/05		110	%	80 - 120
			Dissolved Chromium (Cr)	2014/09/05		110	%	80 - 120
			Dissolved Cobalt (Co)	2014/09/05		111	%	80 - 120
			Dissolved Copper (Cu)	2014/09/05		104	%	80 - 120
			Dissolved Lead (Pb)	2014/09/05		111	%	80 - 120
			Dissolved Molybdenum (Mo)	2014/09/05		109	%	80 - 120
			Dissolved Nickel (Ni)	2014/09/05		110	%	80 - 120
			Dissolved Selenium (Se)	2014/09/05		112	%	80 - 120
			Dissolved Silver (Ag)	2014/09/05		110	%	80 - 120
			Dissolved Thallium (Tl)	2014/09/05		110	%	80 - 120
			Dissolved Tin (Sn)	2014/09/05		105	%	80 - 120
			Dissolved Titanium (Ti)	2014/09/05		114	%	80 - 120
			Dissolved Uranium (U)	2014/09/05		105	%	80 - 120
			Dissolved Vanadium (V)	2014/09/05		113	%	80 - 120
			Dissolved Zinc (Zn)	2014/09/05		117	%	80 - 120
		Method Blank	Dissolved Aluminum (Al)	2014/09/05	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2014/09/05	<0.00060		mg/L	
			Dissolved Arsenic (As)	2014/09/05	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2014/09/05	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2014/09/05	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2014/09/05	<0.00030		mg/L	
			Dissolved Copper (Cu)	2014/09/05	<0.00020		mg/L	
			Dissolved Lead (Pb)	2014/09/05	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2014/09/05	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2014/09/05	<0.00050		mg/L	
			Dissolved Selenium (Se)	2014/09/05	<0.00020		mg/L	

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB4F8729
P.O. #:
Site Location: 1697-1401:AANDC DEW LINE

Quality Assurance Report (Continued)

Maxxam Job Number: CB477249

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7626033	HC7	Method Blank	Dissolved Silver (Ag)	2014/09/05	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2014/09/05	<0.00020		mg/L	
			Dissolved Tin (Sn)	2014/09/05	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2014/09/05	<0.0010		mg/L	
			Dissolved Uranium (U)	2014/09/05	<0.00010		mg/L	
			Dissolved Vanadium (V)	2014/09/05	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2014/09/05	<0.0030		mg/L	
		RPD	Dissolved Aluminum (Al)	2014/09/05	NC		%	20
			Dissolved Antimony (Sb)	2014/09/05	NC		%	20
			Dissolved Arsenic (As)	2014/09/05	NC		%	20
			Dissolved Beryllium (Be)	2014/09/05	NC		%	20
			Dissolved Chromium (Cr)	2014/09/05	NC		%	20
			Dissolved Cobalt (Co)	2014/09/05	NC		%	20
			Dissolved Copper (Cu)	2014/09/05	NC		%	20
			Dissolved Lead (Pb)	2014/09/05	NC		%	20
			Dissolved Molybdenum (Mo)	2014/09/05	8.0		%	20
			Dissolved Nickel (Ni)	2014/09/05	3.1		%	20
			Dissolved Selenium (Se)	2014/09/05	2.9		%	20
			Dissolved Silver (Ag)	2014/09/05	NC		%	20
			Dissolved Thallium (Tl)	2014/09/05	NC		%	20
			Dissolved Tin (Sn)	2014/09/05	NC		%	20
			Dissolved Titanium (Ti)	2014/09/05	NC		%	20
			Dissolved Uranium (U)	2014/09/05	2.3		%	20
			Dissolved Vanadium (V)	2014/09/05	NC		%	20
			Dissolved Zinc (Zn)	2014/09/05	NC		%	20

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 sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
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 too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Validation Signature Page

Maxxam Job #: B477249

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

Peng Liang, Analyst II

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

APPENDIX F

Field Notes

CAM-D

1697-1401 DEW Lines Aug 23/14

8:00: met with pilots - weather is foggy and can't go anywhere yet - will check on weather for updates.

12:00 weather still bad, can't go yet.

2:00: Kenn Borek says we can try but still unsure if we can land - we will try.

3:00pm: Lift off from Gjoa Haven to site.

Franz (J.D, Hounen, IC Krug)
Kenn Borek (Phil + Kurtis) + Adam (B.M)

3:45pm: arrive at CAM-D
- far walk to NHWL.

- Kam will begin GW monitoring & Julie will DGPS + photo log equipment: peristaltic pump + MP1 556.

- Due to limited time - we will purge 3 well volumes + sample - will take multi-parameter reading but not wait to stabilize.

Rite in the Rain

11697-1401 CAM-D Aug 23, 2014

MW-2

DTW = 1.405m TTP ≈ 1.5L
DTB = 1.685m

MW-3

DTW = 0.995m TTP ≈ 6.1L
DTB = 2.050m
- well plug not on - does not fit on under well cap

MW-4

DTW = 0.860m TTP ≈ 6.6L
DTB = 1.950m

MW-1

DTW = 0.665m TTP ≈ 7.2L
DTB = 1.835m

11697-1401 CAM-D Aug 23, 2014

MW-2

- began purging at 4:44 PM
- purging slowly but doesn't seem to be recharging very quickly - water level slowly decreasing
- @ 4:49 PM DTW = 1.505m

YSI reading (in bucket) @ 4:50

1.28°C	25.66 DO mg/L
1.407 mS/cm	6.70 pH
765 µS/cm	165.4 ORP
260.8 % DO	

- purged ~2L & began sampling @ 5:05 PM
- finished sampling at 5:30 PM - well dried - was able to fill 8 of 11 bottles (3 left all doubles) - will go back to fill later if time - insufficient recharge to sample - only could fill 8 bottles

Rite in the Rain

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MW-3

- began purging at 5:35PM

5:40PM YSI reading (in bucket)

1.38°C	7.87 DO mg/L
2.931 mS/cm*	8.19 pH
1610 µS/cm	100.7 ORP
60.1 DO%	DTW = 1.015m

- purging ~1.5L/5 min - slowed pump rate down

5:45PM YSI (in bucket)

1.48°C	2.53 DO mg/L
2.771 mS/cm*	8.35 pH
1524 µS/cm	75.7 ORP
18.3 DO%	DTW = 1.019m

*on top of water already in bucket

5:50PM

1.82°C	2.27 DO mg/L
2.636 mS/cm*	8.33 pH
1466 µS/cm	67.4 ORP
16.5 DO%	1.210m (DTW)

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MW-3 (cont'd)

5:55PM YSI

1.98°C	2.33 DO mg/L
2.571 mS/cm*	8.27 pH
1440 µS/cm	63.8 ORP
16.9 DO%	DTW = 1.240L

- purged ~6.5L
- began sampling at 6:00PM
- finished sampling at 6:25PM & was able to fill all bottles

MW-4

6:35PM YSI

1.29°C	8.18 DO mg/L
1.672 mS/cm*	6.59 pH
913 µS/cm	167.2 ORP
60.1 DO%	0.990m (DTW)

6:40PM

1.49°C	39.0 DO%
1.532 mS/cm*	7.20 pH
844 µS/cm	134.0 ORP
5.47 DO mg/L	DTW = 1.030m

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MW-4 (cont'd)

6:45 PM YSI

1.62°C
1.526 mS/cm°
845 µS/cm
34.7 DO%
4.80 DO mg/L
7.37 pH
118.3 ORP
DTW = 1.050m

6:50PM YSI

1.60°C
1.508 mS/cm°
845 µS/cm
34.4 DO%
4.78 DO mg/L
7.40 pH
113.3 ORP

- purged ~6L
- began sampling at 6:53PM
- finished sampling at 7:05 PM

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MW-1 & DUP-1

- started purging at 7:08 PM

7:14 PM YSI

0.81°C
5.840 mS/cm°
3143 µS/cm
55.8 DO%
7.63 DO mg/L
7.68 pH
143.8 ORP
DTW = 1.14m

7:18 PM YSI

1.09°C
5.516 mS/cm°
2999 µS/cm
38.5 DO%
5.34 DO mg/L
7.70 pH
135.5 ORP
DTW = 1.14m

- start sampling at 7:20pm
- purged 6L
- sample clear, no odours, no sheen.

- geotechnical Assessment
- addition of a couple erosion channels, along slopes - some areas of ~~step~~ slump have occured.
- one pothole observed

→ see map for locations.

Rite in the Rain

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Wildlife

- saw: tracks → wolf (fresh in 20 days old), caribou, Canada Goose (fresh today)

Scat → caribou, Canada Goose.

- Kim saw muskox + pilot caribou near site.

- Adam says - site not hunted on often however - they do pass through as hunting grounds in winter

8:20pm: wheels up at site to Gjoa Haven.

9:00pm: arrive at Gjoa Haven - walked back to hotel.

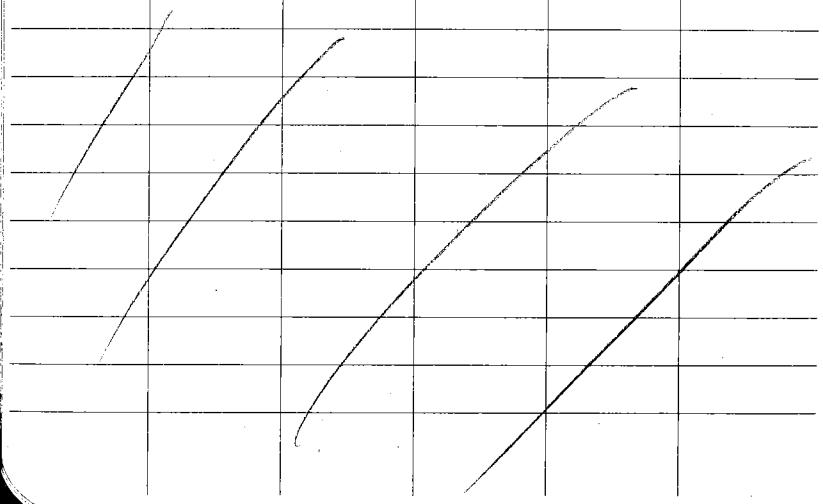

Table 5-3: CAM-D Simpson Lake – NHWL Landfill Visual Inspection

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
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

- erosion features to add - see map.

Erosion Feature E Located 40m N

N NW NE W E SW SE S

13 21 14 22 20 19 18 16 17 47 15 11 12 23 24 29 27 25 50 26 30 28 49 48 46 45 10 6 8 43 5 7 9 4 3 51 52 54 53 42 41 40 35 36 37 38 39 32 31 2 1 34 33 56

S02 MW03 S01 MW02 MW04 S03 MW01 S04 BM2

Toe of NHWL

Top of NHWL

minor erosion

Erosion A

Vegetation B

57 erosion

Ponded Water C D

55

BM1 ~ 150m SW BM3 ~ 150m SW

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: October 2012

Client: Aboriginal Affairs and Northern Development Canada

Scale 1:850

Metres 20 15 10 5 0 10 20

Figure A-2

updated on:25-Oct-12 by caio

C:\Users\Caio\Dropbox\Franz - Kevin\1697-1201 AANDC DEW Line Monitoring\CAM-D\Drawing1.dwg (layout)