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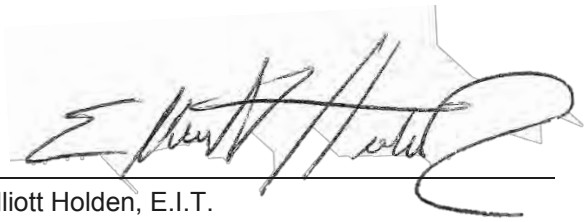
Indigenous and Northern Affairs Canada – Nunavut Regional Office

LONG TERM MONITORING, 2016

Ennadai Lake Former Weather Station, Nunavut

February 3, 2017



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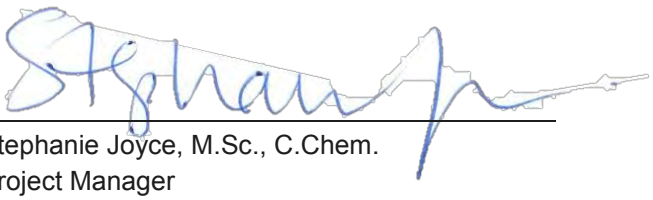

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LONG TERM MONITORING, 2016

Ennadai Lake Former Weather Station, Nunavut

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ATTACHMENT

DVD Labelled “2016 Long Term Monitoring – Ennadai Lake”

ACRONYMS AND ABBREVIATIONS

AMSRP	Abandoned Military Site Remediation Protocol
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CALA	Canadian Association for Laboratory Accreditation
CCME	Canadian Council of Ministers of the Environment
CEQG	Canadian Environmental Quality Guidelines
DEW	Distant Early Warning
EC	Environment Canada
FCSAP	Federal Contaminated Sites Action Plan
FIGQG	Federal Interim Groundwater Quality Guidelines
GIS	Geographic Information System
GPS	Global Positioning System
HASP	Health and Safety Plan
INAC	Indigenous and Northern Affairs Canada
LTM	Long Term Monitoring
NHWL	Non-Hazardous Waste Landfill
PCBs	Polychlorinated Biphenyls
PHCs	Petroleum Hydrocarbons
POL	Petroleum, Oil and Lubricants
QA/QC	Quality Assurance/Quality Control
RDL	Reportable Detection Limit
RPD	Relative Percent Difference
ULA	Upper Limit of Acceptability

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Indigenous and Northern Affairs Canada - Nunavut Regional Office (INAC) to conduct long-term monitoring (LTM) activities in 2016 at the former weather station near Ennadai Lake, Nunavut. The former weather station is located approximately 370 kilometres west of Arviat and 500 kilometres southwest of Rankin Inlet, Nunavut.

The former weather station at Ennadai Lake was developed in the 1950s and was abandoned in the late 1980s to early 1990s. In 2014 and 2015, remediation activities were undertaken. Remediation activities included the construction of the non-hazardous waste landfill (NHWL), demolition and disposal of on-site structures, and clean-up of hazardous materials and contaminated soil.

The 2016 site visit by Arcadis is the first long-term monitoring event to take place since the completion of remediation activities. Overall, physical observations suggest that the NHWL is performing as designed to contain the enclosed waste. One area of erosion and two potholes were identified on or near the NHWL. All-terrain vehicles (ATV) tracks were also observed in the vicinity of the NHWL, with several tracks observed on the berms themselves.

In addition to physical observations, Arcadis collected groundwater samples to assess the performance of the NHWL. Concentrations of contaminants of concern in groundwater were compared to background samples collected in 2015. Concentrations of several metals in groundwater collected from monitoring well MWLF-3 and its duplicate sample DUP-1 were greater than the Federal Interim Groundwater Quality Guidelines. Upper limits of acceptability (ULAs) for total metals were calculated based on the 2015 groundwater samples; no exceedances were reported amongst the 2016 results. Reported concentrations of conductivity and total dissolved solids were greater than the ULA in the groundwater sample and duplicate collected from monitoring well MWLF-3. These parameters were quite low in the background (2015) samples, with relatively low means and standard deviations. With more data collected in future years, the means and standard deviations will become more representative of the range of values present at the site. No concerns are noted at this time.

The road from the airstrip to the NHWL showed evidence of erosion, with one area of washout present. In general, the surface material of the airstrip observed by Arcadis consists of loose sand and showed no extensive signs of deterioration during the 2016 site visit. Two parallel erosion channels were observed on the road from the NHWL to the Weather Station. These areas should be inspected in future years.

Based on the results of Year One LTM, Arcadis recommends continued monitoring of the features identified, especially the ATV tracks on the NHWL berms and the roads from the airstrip to the NHWL and

from the NHWL to the Weather Station. In addition, the locks on the three groundwater wells should be replaced with the standard Guard locks (40 mm universal-key padlocks, No. 834, key number 102) during the next scheduled monitoring event.

1 INTRODUCTION

Arcadis Canada Inc. was retained by Indigenous and Northern Affairs Canada (INAC) – Nunavut Regional Office to conduct long term monitoring (LTM) activities at the former weather station located near Ennadai Lake. This project was completed under INAC Standing Offer Number 4600000861, Order Number 4500352890.

This report describes the monitoring activities completed for INAC at Ennadai Lake and was prepared in accordance with the Arcadis proposal Number 566661-000, dated June 23, 2016.

Throughout this report at the former weather station near Ennadai Lake including the non-hazardous waste landfill (NHWL), borrow areas and airstrip will be referred to as "the site."

1.1 Project Objectives

The objective of the 2016 LTM program was to complete Year 1 monitoring activities as described in the *Ennadai Lake Long-Term Monitoring Plan* (INAC, 2016; referred to as the LTM Plan). The program included visual observations, chemical analyses (where useful and possible) and interviews with members of the nearby community knowledgeable about local activities at the site. The purpose of the program was to assess the condition of the natural environment and whether the site infrastructure is performing as designed.

1.2 Scope of Work

The scope of work undertaken at the site in 2016 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 to substantiate the recorded observations;
4. Active layer water (groundwater) monitoring of the NHWL, including:

- Collection of groundwater samples from the three monitoring wells installed around the NHWL;
- Examination and analysis of the groundwater 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 2016 monitoring program.

To fulfill the scope of work as described above, Arcadis along with INAC, 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.

2 BACKGROUND INFORMATION

2.1 Site Description

The Ennadai Lake Remediation Project site is located approximately 370 km west of Arviat (the nearest community) and 500 km southwest of Rankin Inlet, Nunavut, at approximately 61° 07' 51" N latitude and 100° 53' 14" W longitude. The location of the site is shown in Figure 1 located at the end of this report. There are two small footprints of Inuit Owned Land (IOL) within the site. These were previously Crown Lands, leased by Indigenous and Northern Affairs Canada (INAC) to a private company called Tundra Adventures (1983), and were later transferred to Nunavut Tunngavik Inc. (NTI) through the Nunavut Land Claim Agreement (1993). The Crown portions of this land are administered by INAC with the IOL portions administered by Kivalliq Inuit Association.

Ennadai Lake was a former weather station operated as such since the 1950s. It was operated both as a manned and unmanned station, at different times since its construction and was abandoned in the late 1980s to early 1990s. Remediation activities, including construction of the NHWL were undertaken in 2014 and 2015. Other remediation activities included the demolition and disposal of buildings, structures and other debris and clean-up of hazardous materials and contaminated soil.

The NHWL is located approximately 240 m east of the airstrip. The location is shown in Figure 2 located at the end of this report. The footprint of the NHWL occupies an area of approximately 1,500 m^2 (38 m x 40 m). This landfill area is well-drained, and slopes gently to the east. The surface consists of exposed sand and gravel with patches of vegetation.

2.2 Previous Monitoring Programs

The post construction landfill monitoring frequency will follow the schedule recommended in the *Abandoned Military Site Remediation Protocol* (INAC, 2009). The three phases recommended by the protocol are:

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

The 2016 monitoring program was the first of seven scheduled over a 25-year period for the site. Prior to the field program, Arcadis reviewed the following reports pertaining to the Ennadai Lake former weather station, some of which include previous site investigations and remedial activities:

- Ennadai Lake Long-Term Monitoring Plan, January 22, 2016, INAC; and
- Site Supervision at Ennadai Lake Former Weather Station, NU, Final Remediation Report. July 2015. Prepared by Stantec Consulting Ltd. For Public Works and Government Services Canada.
- Abandoned Military Site Remediation Protocol, March 2009, Indian and Northern Affairs Canada, Contaminated Sites Program.

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 Rankin Inlet Hunters and Trappers Association.

3 REGULATORY REVIEW

3.1 Guideline Review

Arcadis reviewed the Ennadai Lake LTM Plan and AMSRP for mention of specific guidelines to use for comparison purposes. Federal guidelines were used where site-specific criteria were absent and/or were less strict than federal standards.

3.2 Groundwater

3.2.1 Comparison to Background Concentrations

There are no groundwater guidelines provided in the Ennadai Lake 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.”

Arcadis has used historical data presented in the Final Remediation Report (Stantec, 2015) to obtain mean and standard deviation of analytical results for groundwater results (e.g. inorganic parameters and metals) 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 2016 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 at the end of this report.

For some parameters, specifically petroleum hydrocarbons (PHCs) and benzene, toluene, ethylbenzene and xylenes (BTEX), 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 PHCs and BTEX compounds in collected and analyzed groundwater samples. In addition, no analyses for PCBs were conducted at this time.

The AMSRP provides the following table for the assessment of analytical data in groundwater.

Table 3-1: Groundwater Assessment

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.

Note: This table is reproduced from AMSRP Chapter 11, Table 4.2

3.2.2 Federal Interim Groundwater Quality Guidelines

In May 2010, Environment Canada under the 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. 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-effects 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 2 *Federal Interim Groundwater Quality Guidelines*, *Generic Guidelines for Residential/Parkland Land Uses"* Tier 1, Freshwater Life pathway for coarse-grained soil (FIGQG Table 2 Tier 1) were referenced for comparison purposes.

3.3 Soil

Similar to groundwater, historical baseline soil data collected during site remediation activities is available in the Final Remediation report (Stantec, 2015). As no soil samples were collected in 2016, means and standard deviations of these analytical results have not been calculated. The data are available for future comparison, if needed.

The soil standards or guidelines referenced in similar monitoring reports were inclusive of the following:

- AMSRP, Volume I – Main Report (INAC, 2009).
- *CSQGs for the Protection of Environmental and Human Health* (CCME, updated online) for residential/parkland use, including fact sheets for BTEX. Non-potable groundwater is stipulated and coarse-grain material is assumed based on a 2009 grain-size analysis, field observation (generally sandy material) as well as for conservative reasons – being that coarse-grain criteria are more stringent than those applied to fine grain.
- *Canada-Wide Standard (CWS) for Petroleum Hydrocarbons in Soil* (CCME, 2008a) - Tier 1 Residential/Parkland, coarse-grained soil, non-potable groundwater.

These can be referenced in future monitoring events, should soil samples be collected.

4 INVESTIGATIVE METHODOLOGY

The monitoring program was carried out at the site on August 24, 2016. During the field activities, weather conditions were fair (partly cloudy skies, gentle to moderate breeze, and temperatures around 17˚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 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 monitoring work. The HASP also contained a listing of emergency contact numbers and provided protocols to follow in the event of an emergency. Appendix E contains a copy of the HASP.

A copy of the HASP was presented to INAC for review and approval before site activities began. This plan was reviewed, discussed and signed off by all personnel involved in the investigative program prior to conducting any work on-site. A copy of the HASP has been retained on file at Arcadis and at the INAC Nunavut Regional Office.

4.2 Visual Inspection

The physical integrity of the NHWL and surrounding areas were assessed using systematic visual observations and empirical measurements to record evidence of erosion, ponding, frost action, settlement and lateral movement of the landfills. Definitions for completing the checklist are found in Table 4-2 (below). A visual monitoring checklist, presented in the Ennadai Lake LTM Plan, was completed for the landfill and is found in Tables 5-1 and 5-2 in Section 5.3. A photographic record was completed to

document the condition of the structures and substantiate the visual observations (Appendix A and the attached DVD).

The 2016 visual inspection was conducted with the aid of a Trimble Pro XRT GPS unit (real-time accuracy of 1-2 m and corrected accuracy of 10-30 cm while connected to OmniSTAR). The Trimble Pro XRT GPS unit was used to map features of note and to collect GIS information to be used in report preparation and to track changes to the site in the future. Spatial data gathered at the site is contained in an SSF format file, included in the appended DVD. This file is to be used in future site monitoring visits to facilitate observation and documentation of any changes to the condition of the NHWL. In order to increase the clarity of the features being captured on the GPS unit, a site -specific data dictionary file should be created prior to the next monitoring event.

Table 4-1: 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

4.3 Wildlife Survey

Arcadis 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 Rankin Inlet 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 Sample Collection

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).

Collection of groundwater samples was attempted at three predetermined locations: monitoring well MWLF-1 through MWLF-3. Groundwater in monitoring well MWLF-1 and MWLF-2 was frozen and samples were not collected during the 2016 LTM event. A groundwater sample and duplicate were collected from monitoring well MWLF-3.

The monitoring well was purged by bailer. A YSI 556 MPS water quality meter was calibrated and used to measure *in situ* field parameters including temperature, conductivity, dissolved oxygen, turbidity, pH and oxidation-reduction potential. Groundwater samples were collected by bailer. Water samples submitted for total metals analyses were preserved and not field-filtered. Water samples submitted for dissolved metals were not preserved and were not filtered in the field. Filtration of these samples was conducted in the lab prior to analysis.

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

In order to access the wells, Arcadis had to cut the locks securing the lid of each well's casing. These locks were not of the same make as typical Guard locks (40 mm universal-key padlocks, No. 834, key number 102) found at other INAC sites, as such, Arcadis field personnel did not have the necessary keys. After completing well monitoring and sampling activities, each well was secured with a new Master VLINE lock. The locks should be replaced by the standardized Guard locks during the next monitoring event.

4.5 Soil Sample Collection

Because there were no indications of seepage or staining as part of the visual inspection, no soil samples were collected during the 2016 monitoring activities, as per the LTM Plan for the site.

4.6 Quality Assurance/Quality Control

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

4.6.1 Field

Groundwater samples were collected from one monitoring well (MWLF-3) and placed in appropriately sized and prepared laboratory containers. Sample numbers were clearly marked on the containers. The water bottles were filled to capacity with minimum headspace and stored in coolers with ice to moderate temperature fluctuations during transport to the laboratory.

As a quality control measure, one groundwater blind field duplicate sample was collected and analyzed for identical parameters (total and dissolved metals, PCBs, PHCs, BTEX, suspended and dissolved solids, major ions, hardness, pH and conductivity).

The samples, accompanied by a Chain of Custody form, were shipped via Canadian North to Maxxam in Yellowknife. There, the samples were re-packaged and shipped by Maxxam to the appropriate analytical laboratory in either Edmonton or Calgary (as a function of the analysis to be performed). Copies of the Chain of Custody forms are provided in Appendix B.

Analytical results from these samples were compared with the analytical results from previous annual monitoring events.

4.6.2 Laboratory

The selected laboratory, Maxxam Analytics (Maxxam), is certified by the Canadian Association for Laboratory Accreditation, Inc. (CALA) and has an internal QA/QC protocol. The internal QA/QC protocol

includes the analysis of matrix spikes, spike blanks and method blanks. The laboratory QA/QC documentation is provided with the analytical report and was reviewed by Arcadis as part of the QA/QC protocol.

4.7 Analytical Program

A summary of the samples that were collected and submitted for laboratory analysis during the groundwater sampling activities is provided in

Table 4-2. Groundwater monitoring and sampling logs are included in Appendix C.

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

Sample	Analytical Parameters
MW-LF1	No sample collected (frozen groundwater)
MW-LF2	No sample collected (frozen groundwater)
MW-LF3	- Total and Dissolved Metals - PCBs - Petroleum Hydrocarbon Fractions F1-F4 and BTEX - Inorganic Parameters (Major Ions, TDS, TSS, Colour, pH, Conductivity)
DUP1*	

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

5 NON-HAZARDOUS WASTE LANDFILL

5.1 Area Summary

The NHWL is located southwest of the airstrip. The current weather station is located on a crest of land to the south of the NHWL. An access road leads from the southwest corner of the NHWL, to the current weather station. 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 wells are located at the northeast, southeast and southwest corners of the NHWL. Groundwater samples were collected only from monitoring well MWLF-3, as groundwater was frozen in the other two wells.

A plan view of the NHWL indicating photographic viewpoints can be seen in Figure 2, located at the end of this report. 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. Photograph locations were selected to obtain a thorough description of the site. Locations were captured on the Trimble Pro XRT GPS unit to facilitate future use. Viewpoint locations and directions are illustrated on Figure 2. Selected photographs are provided in Appendix A, where photograph captions provide the landfill viewpoint number (as seen on Figure 2), where applicable. Full resolution digital copies of the photographs are provided on the accompanying DVD. Note that in this report, Photo numbers refer to the selected photos in Appendix A and Viewpoint numbers refer to the photos on the DVD.

5.3 Visual Inspection Report

The visual inspection of the NHWL and surrounding area was conducted on August 24, 2016. The visual monitoring checklist was completed using the format requested by INAC and is presented as Table 5-1 of this report. Field notes relating to the visual inspection are included in Appendix D. Table 5-1 and Table 5-2 present the preliminary visual inspection results for the first monitoring event of the NHWL at Ennadai Lake.

Table 5-1: Preliminary Visual Inspection Report NHWL

Feature	Presence (Y/N)	Severity Rating	Extent
Settlement	Y	Acceptable	Occasional
Erosion	Y	Acceptable	Occasional
Frost Action	N	Not Observed	None
Animal Borrows	N	Not Observed	None
Vegetation	N	Not Observed	None
Seepage Points	N	Not Observed	None
Debris Exposure	N	Not Observed	None
Monitoring Well Condition	Y	Good condition - Acceptable	
Overall Landfill Performance		**Acceptable**	

Settlement

Two areas of settlement were observed. Two small potholes were observed in the northeast corner of the NHWL, one on the cap (Feature G, Viewpoint 22) and one near the toe of the berm (Feature C, Viewpoint 12). These potholes are considered small in nature (≤ 0.5 m across) and do not appear to impact the integrity of the landfill.

Erosion

Two erosion channels were observed near the NHWL. The first, Feature A, is located near the southeast corner, at the base of the NHWL (Viewpoint 6). It is not considered to impact landfill integrity. The second area of erosion, Feature D, is approximately 30 m from the NHWL, along the road to the Weather Station. Although it doesn't affect NHWL integrity, the road could washout and affect access to the Weather Station.

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. Numerous caribou tracks were observed on and around the NHWL (Viewpoint 17).

Vegetation

No vegetation was observed on the NHWL.

Staining

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

Seepage / Ponded Water

No seepage or ponded water in or around the NHWL were observed.

Debris

No exposed debris within the footprint of NHWL was observed.

Other

Numerous ATV tracks were observed on and around the NHWL. Those noted as Features (Features B, E and F, Viewpoints 19, 33, 20 and 21) were located on the slopes of the berms and could develop into drainage/erosion channels. They should be monitoring during future LTM events.

Discussion

Based on the minor features noted, the performance of the NHWL, with respect to containment, was rated as satisfactory. A summary of the visual inspection report, including photo references, is presented in Table 5-2.

Table 5-2: Visual Monitoring Checklist – Ennadai Lake

Checklist Item	Feature Letter	Relative Location	Length (m)	Width (m)	Depth (m)	Extent	Description (Change)	Additional Comments	Photo Reference
Erosion	A	Southeast corner of NHWL, at toe of berm	4.0	0.1	0.05	<1%	Minor erosion channel	Observed in 2016	VPs 6A and 6B, Photo 11
Other	B	Descending west berm	10	0.1	0.03	<1%	ATV tracks	Observed in 2016; located on slope of berm and may develop into erosion channel	VPs 29 and 33, Photo 9
Settlement	C	Northeast corner of NHWL, near toe of berm	0.3	0.45	0.08	<1%	Pothole on slope of berm	Observed in 2016	VP 3, Photo 7
Erosion	D	Access road between NHWL and weather station	15 m and 10 m	0.15	0.05	NA	Two parallel erosion channels, could restrict access to weather station in future	Observed in 2016	VP 17
Other	E	Descending east berm, near SE corner	20	0.2	0.04	<1%	ATV tracks	Observed in 2016; located on slope of berm and may develop into erosion channel	VP 26, Photo 14
Other	F	Descending north berm, near middle	10	0.2	0.03	<1%	ATV tracks	Observed in 2016; located on slope of berm and may develop into erosion channel	VP 18, Photo 10
Settlement	G	On cap of NHWL, near NE corner	0.5	0.3	0.09		Pothole; minor depression on cap	Observed in 2016	Photo 13

5.4 Analytical Results

As described in Section 4.4, a total of two groundwater samples (one sample plus one blind duplicate) were submitted to Maxxam Analytics in Yellowknife 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.

Due to the limited number of samples collected to date, Arcadis did not compare the 2016 groundwater analytical results to statistical upper limits of acceptability. An upper limit of acceptability is calculated as the mean of a groundwater parameter plus three standard deviations. In general, the data set available for statistical calculations includes the analytical results from three samples collected in 2014 and the one sample collected in 2016. This is a limited dataset; therefore, the upper limit of acceptability calculated for any groundwater parameter measured would likely have not represented a realistic limit. Upper limits of acceptability will be calculated for the site once sufficient data has been collected to produce more realistic values.

PHCs

Concentrations for all parameters, with the exception of F1, were below laboratory reportable detection limits (see Table 1). F1 was detected in both the sample and the duplicate, but reported concentrations were below the FIGQG of 810 mg/L. Notably, the range of the average ± three standard deviations cannot be calculated (even if sufficient data was available) as all parameters were below the detection limits for the 2015 results. Historical results are presented in Table 6.

PCBs

The PCBs concentrations for all samples were below detection limits (see Table 2). The range of the average ± three standard deviations cannot be calculated (even if sufficient data was available) as all parameters were below detection limits for background samples as well.

Metals

Results for both total and dissolved metal concentrations are presented in Table 3. Historical results (are presented in Table 5. Samples collected from monitoring well MWLF-3 had low concentrations of several total and dissolved metals. The following exceedances of the FIGQGs were noted:

- Total aluminum concentrations exceeded the FIGQG concentration of 0.1 mg/L in the samples collected from monitoring well MWLF-3. Dissolved concentrations did not exceed the FIGQGs, indicating that aluminium ions are likely associated with sediment particles;
- Total and dissolved cadmium concentrations in the sample and duplicate exceeded the FIGQG of 0.017 µg/L;
- Total chromium concentrations exceeded the FIGQG concentration of 0.0089 mg/L in the sample and duplicate collected from MWLF-3. Dissolved concentrations were not detected, indicating that chromium ions are likely associated with sediment particles;
- Total and dissolved copper concentrations in the sample and duplicate exceeded the FIGQG (individual guidelines were calculated for each sample, based on hardness);
- Total iron concentrations exceeded the FIGQG concentration of 0.3 mg/L in the sample and duplicate collected from MWLF-3. Dissolved concentrations did not exceed the FIGQGs, indicating that iron ions are likely associated with sediment particles;
- The total silver concentration reported in the duplicate sample slightly exceeded the FIGQG of 0.0001 mg/L. The reported total silver concentration in the parent sample was less than the RDL of 0.0001 mg/L;
- Total titanium concentrations exceeded the FIGQG concentration of 0.1 mg/L in the sample and duplicate collected from MWLF-3. Dissolved concentrations did not exceed the FIGQGs, indicating that titanium ions are likely associated with sediment particles; and
- Total zinc concentrations exceeded the FIGQG concentration of 0.01 mg/L in the sample and duplicate collected from MWLF-3. Dissolved concentrations did not exceed the FIGQGs, indicating that zinc ions are likely associated with sediment particles.

Note that dissolved metal analyses were not conducted on the background samples collected in 2014.

Inorganics

As shown in Table 4, no exceedances of the FIGQGs were measured for inorganic parameters where guidelines exist. Historical results are presented in Table 6.

Laboratory certificates of analyses for the 2016 groundwater samples are provided in Appendix B.

5.5 QA/QC Discussion

In order to obtain the required minimum of 20% duplicate samples, as stipulated in the Ennadai Lake LTM plan, one duplicate groundwater sample was collected from monitoring well MWLF-3 in 2016. Analytical results for the analysed sample and its duplicate pair were compared to provide an indication of the precision of both the field sampling and laboratory analyzing methods.

As a quality control check, a Relative Percent Difference (RPD) was calculated when analytical results from both the sample and its duplicate were greater than five times the reportable detection limit (RDL). Results are presented along with chemical data in Tables 1 through 4. As per CCME Guidance (Guidance Manual for Environmental Site Characterization in Support of Human and Health Risk Assessment, Volume I Guidance Manual, CCME, 2016), the RPDs for parameters of duplicate groundwater samples should not exceed 40%.

The groundwater samples analyzed for all parameters 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 B.

6 SURROUNDING AREAS

The area surrounding the NHWL at the site was also inspected, including the airstrip and road leading to the NHWL and the road up to the weather station. The airstrip consists of loose sands and appears in good condition. A sandy open area exists between the west end of the airstrip and the road to the NHWL, refer to Figure 2. This area is littered with small pieces of metal and broken glass. Aircrafts should avoid this area. An area of significant erosion (i.e. washout) was observed on the road from the airstrip to the NHWL (Photo 12, Viewpoint 15). This may affect NHWL access in future years and continued monitoring is recommended.

Arcadis personnel also observed the road from the NHWL to the current weather station, located on a crest south of the NHWL. Two parallel erosion channels were observed on this road (Viewpoint 17), which could deteriorate over time and affect access to the Weather Station. Numerous caribou tracks were also observed in this area.

7 NATURAL ENVIRONMENT

LTM plans for other, similarly managed INAC 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, Mr. John Ell, a member of the Rankin Inlet Hunters and Trappers Association.

Wildlife and Human Activity

Information gathered from Mr. Ell indicated that the site is not frequently used by people for hunting or fishing.

During the site visit, the following wildlife sightings and evidence of wildlife were observed between late morning and late afternoon of August 24, 2016:

- Numerous fresh caribou tracks were observed around the NHWL, borrow area, and west end of the airstrip
- Caribous scat was observed on the road to the NHWL from the airstrip
- Nine caribou (three bulls and six cows) spotted around the site
- Two eagles and multiple seagulls spotted

Re-establishment of Vegetation

Major site remedial work, comprised of excavation and construction activities, was completed in the summer of 2015, one year prior to the site monitoring visit. Little evidence of revegetation was observed in August 2016. Given the regional setting and elevation of the 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.

8 CONCLUSIONS

Overall, physical observations suggest that the NHWL is performing as designed to contain the enclosed waste. One area of erosion and two potholes were identified on or near the NHWL. ATV tracks were also observed in the vicinity of the NHWL, with several tracks observed on the berms themselves. Erosion was noted on both access road from the airstrip and the access road to the Weather Station.

In addition to physical observations, Arcadis collected groundwater samples to assess the performance of the NHWL. Concentrations of contaminants of concern in groundwater were compared to background samples collected in 2014. Concentrations of several metals in monitoring well MWLF3 and its duplicate sample DUP-1 were greater than the FIGQGs. ULAs for total metals were calculated based on the 2015 samples; no exceedances were reported amongst the 2016 results. Reported concentrations of conductivity and TDS were greater than the ULA in the sample and duplicate collected from MWLF-3. These parameters were quite low in the background (2015) samples, with relatively low means and standard deviations. With more data collected in future years, the means and standard deviations will become more representative of the range of values present at the site. No concerns are noted at this time.

The road from the airstrip to the NHWL had evidence of erosion, with one area of washout present. The airstrip appears in good condition. Two parallel erosions channels were observed on the road from the NHWL to the Weather Station. These areas should be inspected in future years.

Based on the results of Year One LTM, Arcadis recommends continued monitoring of the features identified, especially the ATV tracks on the NHWL berms and the roads from the airstrip to the NHWL and from the NHWL to the Weather Station. In addition, the locks on the three groundwater wells should be replaced with the standard Guard locks (40 mm universal-key padlocks, No. 834, key number 102) during the next scheduled monitoring event.

9 LIMITATIONS

This report has been prepared exclusively for Indigenous and Northern Affairs Canada. Any other person or entity may not rely upon the report without the express written consent from Indigenous and Northern Affairs 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 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 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 24, 2016. 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 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 Canada Inc. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

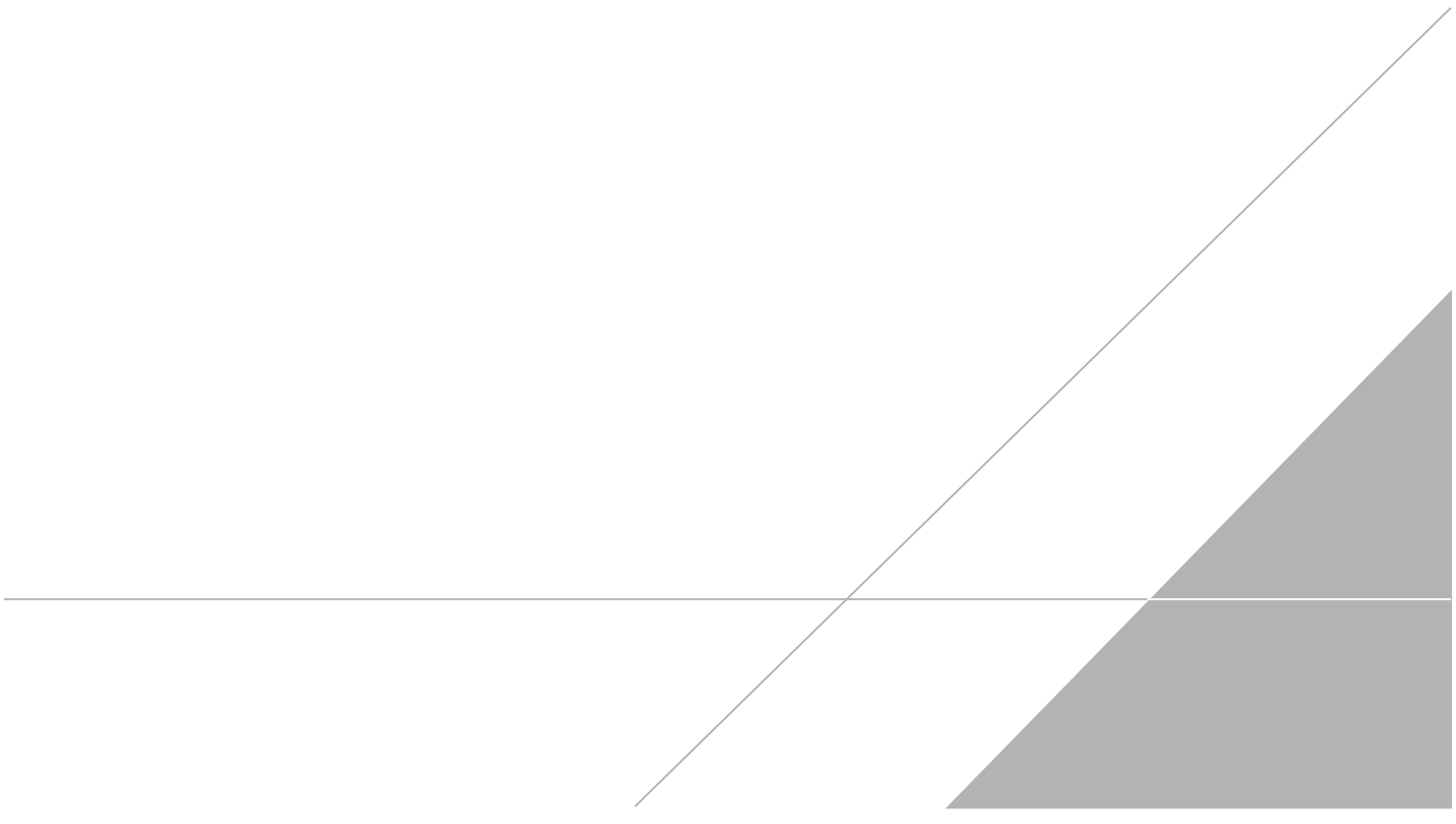
10 REFERENCES

Indian and Northern Affairs Canada, January 22, 2016. *Ennadai Lake Long-Term Monitoring Plan.*

Indian and Northern Affairs Canada. March 2009. *Abandoned Military Site Remediation Protocol*, Contaminated Sites Program.

Stantec Consulting Ltd, July 2015. *Site Supervision at Ennadai Lake Former Weather Station, NU*, *Final Remediation Report*. Prepared for Public Works and Government Services Canada.

TABLES



ARCADIS Design & Consultancy for natural and built assets

PARAMETER / Sample ID / Date	FIGQGs[1]	Upper Limit of Acceptability[2]	RDL	MWLF-3		
				2016-08-24	2016-08-24	RPD
BTEX & F1 Hydrocarbons (ug/L)					Duplicate	
Benzene	140	NC	0.40	<0.40	<0.40	NC
Toluene	83	NC	0.40	<0.40	<0.40	NC
Ethylbenzene	11000	NC	0.40	<0.40	<0.40	NC
o-Xylene	NA	NC	0.40	<0.40	<0.40	NC
p+m-Xylene	NA	NC	0.80	<0.80	<0.80	NC
Total Xylenes	3900	NC	0.80	<0.80	<0.80	NC
F1 (C6-C10)	810	NC	100	260	340	NC
F1 (C6-C10) - BTEX	NA	NC	100	260	340	NC
F2-F4 Hydrocarbons (mg/L)						
F2 (C10-C16 Hydrocarbons)	1300	NC	0.10	<0.10	<0.10	NC
F3 (C16-C34 Hydrocarbons)	NA	NC	0.20	<0.20	<0.20	NC
F4 (C34-C50 Hydrocarbons)	NA	NC	0.20	<0.20	<0.20	NC
Reached Baseline at C50	NA	NC	N/A	Yes	Yes	NC

Notes:

1 = Table 2: 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.

N/A = Not Applicable

NC = Not calculated.

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

PARAMETER / Sample ID / Date	CCME FIGQGs[1]	Upper Limit of Acceptability[2]	MWLF-3		
			2016-08-24	2016-08-24	RPD
PCBs (ug/L)				Duplicate	
Aroclor 1016	NG	NC	<0.05	<0.05	NC
Aroclor 1221	NG	NC	<0.05	<0.05	NC
Aroclor 1232	NG	NC	<0.05	<0.05	NC
Aroclor 1242	NG	NC	<0.05	<0.05	NC
Aroclor 1248	NG	NC	<0.05	<0.05	NC
Aroclor 1254	NG	NC	<0.05	<0.05	NC
Aroclor 1260	NG	NC	<0.05	<0.05	NC
Aroclor 1262	NG	NC	<0.05	<0.05	NC
Aroclor 1268	NG	NC	<0.05	<0.05	NC
Total PCB	NG	NC	<0.05	<0.05	NC

Notes:

1 = Table 2: 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.

NC = Not calculated.

NG = No Guideline

Table 3
Metal Analytical Results for Groundwater Samples
Indigenous and Northern Affairs Canada

ARCADIS Design & Consultancy for natural and built assets

PARAMETER		Guidelines			Lowest RDL	MWLF-3					
Sample ID		FIGQGs[1]	Upper Limit of Acceptability[2]								
Date						2016-08-24	2016-08-24	RPD	2016-08-24	2016-08-24	RPD
Metals	**Units**	**Total**	**Total**	**Dissolved**		**Total**	**Duplicate**		**Dissolved**	**Duplicate**	
Aluminum (Al)	mg/L	0.1	NC	NC	0.003	**3.1**	**3.9**	23%	0.1	0.092	8%
Antimony (Sb)	mg/L	2.0	NC	NC	0.00060	<0.00060	<0.00060	NC	<0.00060	<0.00060	NC
Arsenic (As)	mg/L	0.005	NC	NC	0.0002	0.00094	0.0012	NC	0.00044	0.00051	NC
Barium (Ba)	mg/L	0.5	NC	NC	0.01	0.24	0.24	0%	0.22	0.22	0%
Beryllium (Be)	mg/L	0.0053	NC	NC	0.001	<0.0010	<0.0010	NC	<0.0010	<0.0010	NC
Boron (B)	mg/L	5	NC	NC	0.02	<0.020	<0.020	NC	<0.020	<0.020	NC
Cadmium	ug/L	0.017	NC	NC	0.02	**0.15**	**0.15**	0%	**0.12**	**0.12**	0%
Calcium (Ca)	mg/L	NG	NC	NC	0.3	37	37	0%	40	39	3%
Chromium (Cr)	mg/L	0.0089	NC	NC	0.0010	**0.012**	**0.014**	15%	<0.0010	<0.0010	NC
Chromium VI (6+)	mg/L	NG	NC	NC	0.0010	<0.0010	<0.0010	NC	NA	NA	NC
Cobalt (Co)	mg/L	NG	NC	NC	0.0003	0.015	0.016	6%	0.014	0.013	7%
Copper (Cu)	mg/L	0.002-0.004 [3]	NC	NC	0.0002	**0.015**	**0.016**	6%	**0.0065**	**0.0059**	10%
Iron (Fe)	mg/L	0.3	NC	NC	0.060	**4.8**	**5.6**	15%	0.088	0.095	NC
Lead (Pb)	mg/L	0.001-0.007 [3]	NC	NC	0.0002	0.0026	0.0033	24%	<0.00020	<0.00020	NC
Lithium (Li)	mg/L	NG	NC	NC	0.02	<0.020	<0.020	NC	<0.020	<0.020	NC
Magnesium (Mg)	mg/L	NG	NC	NC	0.2	17	17	0%	17	17	0%
Manganese (Mn)	mg/L	NG	NC	NC	0.004	1.4	1.4	0%	1.5	1.5	0%
Mercury (Hg)	ug/L	0.026	NC	NC	0.002	0.014	0.014	0%	0.0067	0.0067	NC
Molybdenum (Mo)	mg/L	0.073	NC	NC	0.0002	0.00093	0.00091	NC	0.00082	0.00075	NC
Nickel (Ni)	mg/L	0.025-0.15 [3]	NC	NC	0.0005	0.028	0.03	7%	0.022	0.02	10%
Phosphorus (P)	mg/L	NG	NC	NC	0.1	0.33	0.49	NC	<0.10	<0.10	NC
Potassium (K)	mg/L	NG	NC	NC	0.3	8.3	8.5	2%	8.3	8.1	2%
Selenium (Se)	mg/L	0.001	NC	NC	0.0002	0.00022	0.00035	NC	<0.00020	<0.00020	NC
Silicon (Si)	mg/L	NG	NC	NC	0.1	14	15	7%	9.1	9	1%
Silver (Ag)	mg/L	0.0001	NC	NC	0.0001	<0.00010	**0.00011**	NC	<0.00010	<0.00010	NC
Sodium (Na)	mg/L	NG	NC	NC	0.50	5.6	5.6	0%	6.2	6.0	3%
Strontium (Sr)	mg/L	NG	NC	NC	0.020	0.35	0.36	3%	0.38	0.38	0%
Sulphur (S)	mg/L	NG	NC	NC	0.20	0.53	0.56	NC	0.62	0.56	NC
Thallium (Tl)	mg/L	0.0008	NC	NC	0.0002	<0.00020	<0.00020	NC	<0.00020	<0.00020	NC
Tin (Sn)	mg/L	NG	NC	NC	0.0010	<0.0010	<0.0010	NC	<0.0010	<0.0010	NC
Titanium (Ti)	mg/L	0.1	NC	NC	0.0010	**0.34**	**0.4**	16%	0.0015	0.001	NC
Uranium (U)	mg/L	0.015	NC	NC	0.0001	0.0021	0.0022	5%	0.00084	0.00078	7%
Vanadium (V)	mg/L	NG	NC	NC	0.0010	0.0098	0.011	12%	<0.0010	<0.0010	NC
Zinc (Zn)	mg/L	0.01	NC	NC	0.0030	**0.016**	**0.018**	12%	0.004	<0.0030	NC

Notes:

1 = Table 2: 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 3.2. Upper limits of acceptability are calculated using mean of previous sampling rounds +3 standard deviations.

3 = Guideline depends on hardness, guideline calcuated for each sample and compared to result

NC = Not calculated

NG = No guideline

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

20 Exceeds FIGQG guideline.

20 Result exceeds ULA

ARCADIS Design & Consultancy for natural and built assets

PARAMETER		FIGQGs[1]	Upper Limit of Acceptability[2]	RDL	MWLF-3		
Sample ID							
Date					2016-08-24	2016-08-24	RPD
Calculated Parameters						Duplicate	
Anion Sum	meq/L	NG	NC	N/A	3.1	3	3%
Cation Sum	meq/L	NG	NC	N/A	3.9	3.9	0%
Hardness ($CaCO_3$)	mg/L	NG	NC	0.50	170	170	0%
Ion Balance	N/A	NG	NC	0.010	1.3	1.3	0%
Dissolved Nitrate (NO_3)	mg/L	13	NC	0.044	<0.044	<0.044	NC
Nitrate plus Nitrite (N)	mg/L	NG	NC	0.020	<0.020	<0.020	NC
Dissolved Nitrite (NO_2)	mg/L	0.06	NC	0.033	<0.033	<0.033	NC
Misc. Inorganics							
Conductivity	uS/cm	NG	NC	1.0	330	320	3%
pH	pH	6.5 to 9.0	NC	N/A	6.42	6.39	0%
Total Dissolved Solids	mg/L	NG	NC	50	220	200	NC
Total Suspended Solids	mg/L	NG	NC	1.0	110	110	0%
Anions							
Alkalinity (PP as $CaCO_3$)	mg/L	NG	NC	0.50	<0.50	<0.50	NC
Alkalinity (Total as $CaCO_3$)	mg/L	NG	NC	0.50	150	140	7%
Bicarbonate (HCO_3)	mg/L	NG	NC	0.50	180	180	0%
Carbonate (CO_3)	mg/L	NG	NC	0.50	<0.50	<0.50	NC
Hydroxide (OH)	mg/L	NG	NC	0.50	<0.50	<0.50	NC
Dissolved Sulphate (SO_4)	mg/L	NG	NC	1.0	<1.0	<1.0	NC
Dissolved Chloride (Cl)	mg/L	120	NC	1.0	4.2	4.2	NC
Nutrients							
Dissolved Nitrite (N)	mg/L	0.06	NC	0.010	<0.010	<0.010	NC
Dissolved Nitrate (N)	mg/L	13	NC	0.010	<0.010	<0.010	NC

Notes:

1 = Table 1: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1,

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.

NG = No guideline

NC = Not calculated

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

20 Exceeds CCME guideline

21 Exceeds Upper Limit of Acceptability

Table 5
Historical Metal Parameters
Indigenous and Northern Affairs Canada

Sample #	Date	Total Aluminum (Al)	Dissolved Aluminum (Al)	Total Arsenic (As)	Dissolved Arsenic (As)	Total Cadmium (Cd)	Dissolved Cadmium (Cd)	Total Cobalt (Co)	Dissolved Cobalt (Co)	Total Chromium (Cr)	Dissolved Chromium (Cr)	Total Copper (Cu)	Dissolved Copper (Cu)	Total Iron	Dissolved Iron (Fe)
Groundwater Samples															
MW13-2	2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LF3-WS-01	2014	21.4	-	0.00381	-	0.000113	-	0.0122	-	0.0321	-	0.0442	-	18.2	-
MW-LF3-WS-02	2014	1.78	-	0.0005	-	0.000035	-	0.00501	-	0.00276	-	0.00605	-	1.6	-
MWLF-3	2016	3.1	0.1	0.00094	0.00044	0.00015	0.00012	0.015	0.014	0.012	<0.0010	0.015	0.0065	4.8	0.088
DUP	2016	3.9	0.092	0.0012	0.00051	0.00015	0.00012	0.016	0.013	0.014	<0.0010	0.016	0.0059	5.6	0.095

Sample #	Date	Total Mercury	Dissolved Mercury (Hg)	Total Nickel (Ni)	Dissolved Nickel (Ni)	Total Lead (Pb)	Dissolved Lead (Pb)	Total Silver	Dissolved Silver (Ag)	Total Zinc (Zn)	Dissolved Zinc (Zn)
Groundwater Samples											
MW13-2	2014	-	-	-	-	-	-	-	-	-	-
LF3-WS-01	2014	<0.00010	-	0.0247	-	0.0194	-	0.000208	-	0.0373	-
MW-LF3-WS-02	2014	0.00004	-	0.00339	-	0.0023	-	<0.000020	-	0.0059	-
MWLF-3	2016	0.000014	0.0000067	0.028	0.022	0.0026	<0.00020	<0.00010	<0.00010	0.016	0.004
DUP	2016	0.000014	0.0000067	0.03	0.02	0.0033	<0.00020	0.00011	<0.00010	0.018	<0.0030

Sample #	Date	PCBs [ug/L]	PHC								Inorganic Parameters (mg/L)											
			Benzene [ug/L]	Toluene [ug/L]	Ethyl-benzene [ug/L]	Total Xylene [ug/L]	F1 [ug/L]	F2 [mg/L]	F3 [mg/L]	F4 [mg/L]	Colour	Con-ductivity	Total Dissolved Solids	Fluoride (F-)	Ortho-phosphate (P)	pH	Total Suspended Solids	Dissolved Sulphate (SO4)	Dissolved Chloride (Cl)	Nitrite (N)	Nitrate (N)	Nitrate + Nitrite
Groundwater Samples																						
MW13-2	2014	-	<0.50	<0.50	<0.50	<2	<200	<0.20	<0.30	<0.30	-	23	12.5	-	-	6.22	-	<3.0	9.2	<0.050	<0.50	<0.50
LF3-WS-01	2014	-	<0.50	<0.50	<0.50	<2	<200	<0.20	<0.30	<0.30	-	99	58.9	-	-	6.66	-	15	4.8	0.06	<0.50	<0.50
MW-LF3-WS-02	2014	-	<0.50	<0.50	<0.50	<2	<200	<0.40	-	-	-	79	54.5	-	-	6.68	-	3.1	9.8	0.089	<0.50	<0.50
MWLF-3	2016	<0.05	<0.40	<0.40	<0.40	<0.80	260	<0.10	<0.20	<0.20	-	330	220	-	-	6.42	110	<1.0	4.2	<0.010	<0.010	<0.020
DUP	2016	<0.05	<0.40	<0.40	<0.40	<0.80	340	<0.10	<0.20	<0.20	-	320	200	-	-	6.39	110	<1.0	4.2	<0.010	<0.010	<0.020

FIGURES

Legend

Approximate Site Boundary

REFERENCES:

1. IMAGE: DEPARTMENT OF NATURAL RESOURCES CANADA.

Metres
250 0 250 500
1:25000

Title: **SITE LOCATION**

Project: **LONG TERM MONITORING, 2016 ENNADAI LAKE FORMER WEATHER STATION, NUNAVUT**

Client: **INAC**

ARCADIS

Date: November 2016

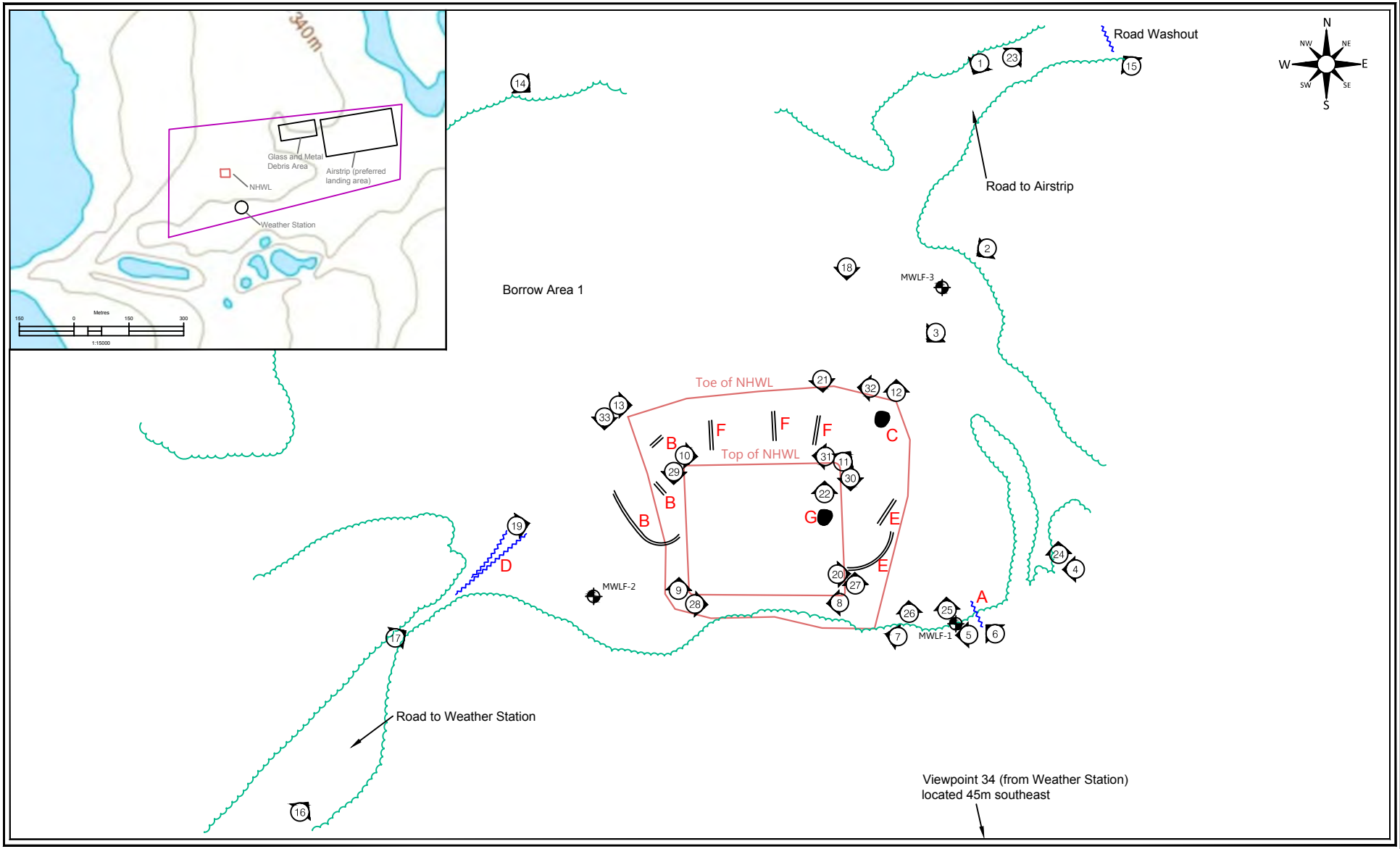
Updated:

FIGURE 1

TO BE PRINTED IN COLOUR ON 8.5"X11" PAPER ONLY - DO NOT SCALE

updated on:29-Nov-16 by dlogan

Z:\Projects\2016\100347-001 INAC DEW Line LTM\Individual Sites\Ennadai Lake\Figures\1-CAD\100347-001 Ennadai Lake NU.dwg(layout)



Legend

- Approximate Site Boundary
- Non Hazardous Waste Landfill (NHWL)
- Viewpoint Location
- Edge of Brush
- ATV Tracks
- Area of Settlement/Pothole
- Erosion Channel
- Monitoring Well

NOTE:

1. SEE ATTACHED CD-ROM FOR VIEWPOINT PICTURES
2. NHWL - NON HAZARDOUS WASTE LANDFILL

Metres
10 0 10 20
1:900

Title: **PLAN OF THE NHWL**

Project: **LONG TERM MONITORING PROGRAM ENNADAI LAKE FORMER WEATHER STATION, NUNAVUT**

Client: **INAC**

ARCADIS

Date: November 2016

Updated:

FIGURE 2

TO BE PRINTED IN COLOUR ON 8.5"X11" PAPER ONLY - DO NOT SCALE

updated on:29-Nov-16 by dlogan

Z:\Projects\2016\100347-001 INAC DEW Line LTM\Individual Sites\Ennadai Lake\Figures\1-CAD\100347-001 Ennadai Lake NU.dwg(layout)

APPENDIX A

Site Photographs

Project Photographs

Long Term Monitoring
Ennadai Lake Former Weather Station, Nunavut

Photo: 1

Date:
August 24, 2016

Description:
Aerial View of NHWL; Weather Station is located in top left corner of the photo.

Location:
Ennadai Lake

Photo: 2

Date:
August 24, 2016

Description:
View of NHWL from Weather Station (looking north)

Location:
Viewpoint 34

Project Photographs

Long Term Monitoring
Ennadai Lake Former Weather Station, Nunavut

Photo: 3

Date:
August 24, 2016

Description:
View from the northeast, at the northeast corner

Location:
Viewpoint 1

Photo: 4

Date:
August 24, 2016

Description:
View to the west, along south side of the NHWL. Boulders surround MWLF1.

Location:
Viewpoint 4

Project Photographs

Long Term Monitoring
Ennadai Lake Former Weather Station, Nunavut

Photo: 5

Date:
August 24, 2016

Description:
View of the west side of the NHWL, from the road to the Weather Station

Location:
Viewpoint 19

Photo: 6

Date:
August 24, 2016

Description:
View from the northwest, at the northwest corner of the NHWL. Boulders on left side of photo surround MWLF3.

Location:
Viewpoint 14

Project Photographs

Long Term Monitoring
Ennadai Lake Former Weather Station, Nunavut

Photo: 7

Date:
August 24, 2016

Description:
Looking south along the east berm. Feature C is marked with the tape measure.

Location:
Viewpoint 12

Photo: 8

Date:
August 24, 2016

Description:
Looking west along south berm. MWLF2 is surrounded by boulders at far end of berm.

Location:
Viewpoint 8

Project Photographs

Long Term Monitoring
Ennadai Lake Former Weather Station, Nunavut

Photo: 9

Date:
August 24, 2016

Description:
Looking south, along west berm. ATV tracks (Feature B) are visible.

Location:
Viewpoint 33

Photo: 10

Date:
August 24, 2016

Description:
Looking east, along north berm. ATV tracks (Feature F) are visible.

Location:
Viewpoint 13

Project Photographs

Long Term Monitoring
Ennadai Lake Former Weather Station, Nunavut

Photo: 11

Date:
August 24, 2016

Description:
Feature A

Location:
Viewpoint 6

Photo: 12

Date:
August 24, 2016

Description:
Washout along road to airstrip

Location:
Viewpoint 15

Project Photographs

Long Term Monitoring
Ennadai Lake Former Weather Station, Nunavut

Photo: 13

Date:
August 24, 2016

Description:
Feature G

Location:
Viewpoint 22

Photo: 14

Date:
August 24, 2016

Description:
ATV tracks on east berm (Feature E)

Location:
Viewpoint 20

APPENDIX B

Certificates of Analysis

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: 100347-001
Your Project #: ENNADAI LAKE
Your C.O.C. #: 501422-03-01

Attention:Elliott Holden

ARCADIS Canada
121 GRANTON DRIVE, UNIT 12
RICHMOND HILL, ON
CANADA T4B 3N4

Report Date: 2016/09/12
Report #: R2258771
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B675614
Received: 2016/09/01, 11:31

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	2	N/A	2016/09/03	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	2	N/A	2016/09/08	AB SOP-00039	CCME CWS/EPA 8260c m
Cadmium - low level CCME - Dissolved	2	N/A	2016/09/12	AB WI-00065	Auto Calc
Cadmium - low level CCME (Total)	2	N/A	2016/09/12	AB WI-00065	Auto Calc
Chloride by Automated Colourimetry	2	N/A	2016/09/06	AB SOP-00020	SM 22 4500-Cl G m
Total Hexavalent Chromium	2	N/A	2016/09/06	AB SOP-00063	SM 22 3500-Cr B m
Conductivity @25C	2	N/A	2016/09/03	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons (F2-F4 in water)	2	2016/09/07	2016/09/07	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Hardness	2	N/A	2016/09/12	AB WI-00065	Auto Calc
Mercury-Low Level-Dissolved-Lab Filtered	2	2016/09/09	2016/09/09	EENVSOP-00031	EPA 1631E/245.1 R3 m
Mercury - Low Level (Total)	2	2016/09/09	2016/09/09	EENVSOP-00031	EPA 1631E/245.1 R3 m
Elements by ICP-Dissolved-Lab Filtered	2	N/A	2016/09/12	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Total	2	2016/09/12	2016/09/12	AB SOP-00014 / AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS-Dissolved-Lab Filtered	2	N/A	2016/09/12	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total	2	2016/09/12	2016/09/12	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	2	N/A	2016/09/12	AB WI-00065	Auto Calc
Sum of cations, anions	2	N/A	2016/09/12	AB WI-00065	Auto Calc
Nitrate and Nitrite	2	N/A	2016/09/06	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	2	N/A	2016/09/06	AB WI-00065	Auto Calc
Nitrogen, (Nitrite, Nitrate) by IC	1	N/A	2016/09/05	AB SOP-00023	SM 22 4110 B m
Nitrogen, (Nitrite, Nitrate) by IC	1	N/A	2016/09/06	AB SOP-00023	SM 22 4110 B m
pH @25°C	2	N/A	2016/09/03	AB SOP-00005	SM 22 4500 H+ B m
Sulphate by Automated Colourimetry	2	N/A	2016/09/06	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Filt. Residue)	2	2016/09/02	2016/09/05	AB SOP-00065	SM 22 2540 C m
Total Dissolved Solids (Calculated)	2	N/A	2016/09/12	AB WI-00065	Auto Calc
Total Suspended Solids (NFR)	2	2016/09/02	2016/09/05	AB SOP-00061	SM 22 2540 D m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Your P.O. #: 100347-001
Your Project #: ENNADAI LAKE
Your C.O.C. #: 501422-03-01

Attention:Elliott Holden

ARCADIS Canada
121 GRANTON DRIVE, UNIT 12
RICHMOND HILL, ON
CANADA T4B 3N4

Report Date: 2016/09/12
Report #: R2258771
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B675614
Received: 2016/09/01, 11:31

* 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.
Parminder Virk, Project Manager
Email: PVirk@maxxam.ca
Phone# (780) 577-7100

==========

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

AT1 BTEX AND F1-F4 IN WATER (WATER)

Maxxam ID		PK7170	PK7171		
Sampling Date		2016/08/24 14:00	2016/08/24		
COC Number		501422-03-01	501422-03-01		
	UNITS	MWLF-3	MWLF-DUP	RDL	QC Batch
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	0.10	8387598
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	<0.20	0.20	8387598
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	0.20	8387598
Reached Baseline at C50	mg/L	Yes	Yes		8387598
Volatiles					
Benzene	ug/L	<0.40	<0.40	0.40	8390210
Toluene	ug/L	<0.40	<0.40	0.40	8390210
Ethylbenzene	ug/L	<0.40	<0.40	0.40	8390210
m & p-Xylene	ug/L	<0.80	<0.80	0.80	8390210
o-Xylene	ug/L	<0.40	<0.40	0.40	8390210
Xylenes (Total)	ug/L	<0.80	<0.80	0.80	8390210
F1 (C6-C10) - BTEX	ug/L	260	340	100	8390210
F1 (C6-C10)	ug/L	260	340	100	8390210
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	102	101		8390210
4-Bromofluorobenzene (sur.)	%	93	95		8390210
D4-1,2-Dichloroethane (sur.)	%	110	112		8390210
O-TERPHENYL (sur.)	%	99	100		8387598
RDL = Reportable Detection Limit					

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		PK7170	PK7171		
Sampling Date		2016/08/24 14:00	2016/08/24		
COC Number		501422-03-01	501422-03-01		
	UNITS	MWLF-3	MWLF-DUP	RDL	QC Batch
Calculated Parameters					
Anion Sum	meq/L	3.1	3.0	N/A	8386421
Cation Sum	meq/L	3.9	3.9	N/A	8386421
Hardness (CaCO3)	mg/L	170	170	0.50	8386419
Ion Balance	N/A	1.3	1.3	0.010	8386420
Dissolved Nitrate (NO3)	mg/L	<0.044	<0.044	0.044	8386422
Nitrate plus Nitrite (N)	mg/L	<0.020	<0.020	0.020	8386423
Dissolved Nitrite (NO2)	mg/L	<0.033	<0.033	0.033	8386422
Calculated Total Dissolved Solids	mg/L	170	160	10	8385599
Misc. Inorganics					
Conductivity	uS/cm	330	320	1.0	8387207
pH	pH	6.42 (1)	6.39 (1)	N/A	8387203
Low Level Elements					
Dissolved Cadmium (Cd)	ug/L	0.12	0.12	0.020	8385909
Anions					
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	0.50	8387206
Alkalinity (Total as CaCO3)	mg/L	150	140	0.50	8387206
Bicarbonate (HCO3)	mg/L	180	180	0.50	8387206
Carbonate (CO3)	mg/L	<0.50	<0.50	0.50	8387206
Hydroxide (OH)	mg/L	<0.50	<0.50	0.50	8387206
Dissolved Sulphate (SO4)	mg/L	<1.0	<1.0	1.0	8387515
Dissolved Chloride (Cl)	mg/L	4.2	4.2	1.0	8387512
Nutrients					
Dissolved Nitrite (N)	mg/L	<0.010 (1)	<0.010 (1)	0.010	8388002
Dissolved Nitrate (N)	mg/L	<0.010 (1)	<0.010 (1)	0.010	8388002
Lab Filtered Elements					
Dissolved Aluminum (Al)	mg/L	0.10	0.092	0.0030	8394609
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	0.00060	8394609
Dissolved Arsenic (As)	mg/L	0.00044	0.00051	0.00020	8394609
Dissolved Barium (Ba)	mg/L	0.22	0.22	0.010	8394612
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	0.0010	8394609

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Sample received past method-specified hold time.

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Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		PK7170	PK7171		
Sampling Date		2016/08/24 14:00	2016/08/24		
COC Number		501422-03-01	501422-03-01		
	UNITS	MWLF-3	MWLF-DUP	RDL	QC Batch
Dissolved Boron (B)	mg/L	<0.020	<0.020	0.020	8394612
Dissolved Calcium (Ca)	mg/L	40 (1)	39 (1)	0.30	8394612
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0010	8394609
Dissolved Cobalt (Co)	mg/L	0.014	0.013	0.00030	8394609
Dissolved Copper (Cu)	mg/L	0.0065	0.0059	0.00020	8394609
Dissolved Iron (Fe)	mg/L	0.088	0.095	0.060	8394612
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	0.00020	8394609
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	0.020	8394612
Dissolved Magnesium (Mg)	mg/L	17	17	0.20	8394612
Dissolved Manganese (Mn)	mg/L	1.5 (1)	1.5 (1)	0.0040	8394612
Dissolved Molybdenum (Mo)	mg/L	0.00082	0.00075	0.00020	8394609
Dissolved Nickel (Ni)	mg/L	0.022	0.020	0.00050	8394609
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	0.10	8394612
Dissolved Potassium (K)	mg/L	8.3	8.1	0.30	8394612
Dissolved Selenium (Se)	mg/L	<0.00020	<0.00020	0.00020	8394609
Dissolved Silicon (Si)	mg/L	9.1	9.0	0.10	8394612
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	0.00010	8394609
Dissolved Sodium (Na)	mg/L	6.2 (1)	6.0 (1)	0.50	8394612
Dissolved Strontium (Sr)	mg/L	0.38 (1)	0.38 (1)	0.020	8394612
Dissolved Sulphur (S)	mg/L	0.62 (1)	0.56	0.20	8394612
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	0.00020	8394609
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	0.0010	8394609
Dissolved Titanium (Ti)	mg/L	0.0015	0.0010	0.0010	8394609
Dissolved Uranium (U)	mg/L	0.00084	0.00078	0.00010	8394609
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	0.0010	8394609
Dissolved Zinc (Zn)	mg/L	0.0040	<0.0030	0.0030	8394609

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results within acceptable limits of precision.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		PK7170	PK7171		
Sampling Date		2016/08/24 14:00	2016/08/24		
COC Number		501422-03-01	501422-03-01		
	UNITS	MWLF-3	MWLF-DUP	RDL	QC Batch
Low Level Elements					
Total Cadmium (Cd)	ug/L	0.15	0.15	0.020	8385596
Elements					
Total Aluminum (Al)	mg/L	3.1	3.9	0.0030	8394748
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	0.00060	8394748
Total Arsenic (As)	mg/L	0.00094 (1)	0.0012	0.00020	8394748
Total Barium (Ba)	mg/L	0.24	0.24	0.010	8394750
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	0.0010	8394748
Total Boron (B)	mg/L	<0.020	<0.020	0.020	8394750
Total Calcium (Ca)	mg/L	37	37	0.30	8394750
Total Chromium (Cr)	mg/L	0.012	0.014	0.0010	8394748
Total Cobalt (Co)	mg/L	0.015	0.016	0.00030	8394748
Total Copper (Cu)	mg/L	0.015	0.016	0.00020	8394748
Total Iron (Fe)	mg/L	4.8	5.6	0.060	8394750
Total Lead (Pb)	mg/L	0.0026	0.0033	0.00020	8394748
Total Lithium (Li)	mg/L	<0.020	<0.020	0.020	8394750
Total Magnesium (Mg)	mg/L	17	17	0.20	8394750
Total Manganese (Mn)	mg/L	1.4	1.4	0.0040	8394750
Total Molybdenum (Mo)	mg/L	0.00093	0.00091	0.00020	8394748
Total Nickel (Ni)	mg/L	0.028	0.030	0.00050	8394748
Total Phosphorus (P)	mg/L	0.33	0.49	0.10	8394750
Total Potassium (K)	mg/L	8.3	8.5	0.30	8394750
Total Selenium (Se)	mg/L	0.00022	0.00035	0.00020	8394748
Total Silicon (Si)	mg/L	14	15	0.10	8394750
Total Silver (Ag)	mg/L	<0.00010	0.00011	0.00010	8394748
Total Sodium (Na)	mg/L	5.6	5.6	0.50	8394750
Total Strontium (Sr)	mg/L	0.35	0.36	0.020	8394750
Total Sulphur (S)	mg/L	0.53	0.56	0.20	8394750
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	0.00020	8394748
Total Tin (Sn)	mg/L	<0.0010	<0.0010	0.0010	8394748
Total Titanium (Ti)	mg/L	0.34	0.40	0.0010	8394748
Total Uranium (U)	mg/L	0.0021	0.0022	0.00010	8394748

RDL = Reportable Detection Limit
(1) Duplicate exceeds acceptance criteria due to sample matrix.

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Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		PK7170	PK7171		
Sampling Date		2016/08/24 14:00	2016/08/24		
COC Number		501422-03-01	501422-03-01		
	UNITS	**MWLF-3**	**MWLF-DUP**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.0098	0.011	0.0010	8394748
Total Zinc (Zn)	mg/L	0.016	0.018	0.0030	8394748
RDL = Reportable Detection Limit					

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Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		PK7170	PK7171		
Sampling Date		2016/08/24 14:00	2016/08/24		
COC Number		501422-03-01	501422-03-01		
	UNITS	MWLF-3	MWLF-DUP	RDL	QC Batch
Misc. Inorganics					
Total Dissolved Solids	mg/L	220 (1)	200 (1)	50	8386641
Total Suspended Solids	mg/L	110 (2)	110 (2)	1.0	8386053
Metals					
Total Hex. Chromium (Cr 6+)	mg/L	<0.0010	<0.0010	0.0010	8388282

RDL = Reportable Detection Limit

(1) Detection limit raised based on sample volume used for analysis. Sample was past hold time when received.

(2) Sample was past hold time when received.

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Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		PK7170	PK7171		
Sampling Date		2016/08/24 14:00	2016/08/24		
COC Number		501422-03-01	501422-03-01		
	UNITS	**MWLF-3**	**MWLF-DUP**	**RDL**	**QC Batch**
Low Level Elements					
Total Mercury (Hg)	ug/L	0.014	0.014	0.0020	8392336
Lab Filtered Elements-Low					
Dissolved Mercury (Hg)	ug/L	0.0067	0.0067	0.0020	8392398
RDL = Reportable Detection Limit					

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Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

GENERAL COMMENTS

PCB results are attached to this report. The reference number for these results from Maxxam Campobello is B6J0429.

Sample PK7170-01 : Sample extracted past 14 day hold time for BTEX/F1.
Cation anion balance impacted due to matrix interference.

Sample PK7171-01 : Sample extracted past 14 day hold time for BTEX/F1.
Cation anion balance impacted due to matrix interference.

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8386053	GM4	Matrix Spike	Total Suspended Solids	2016/09/02		93	%	80 - 120
8386053	GM4	Spiked Blank	Total Suspended Solids	2016/09/02		89	%	80 - 120
8386053	GM4	Method Blank	Total Suspended Solids	2016/09/02	<1.0		mg/L	
8386053	GM4	RPD	Total Suspended Solids	2016/09/02	NC		%	20
8386641	GM4	Matrix Spike	Total Dissolved Solids	2016/09/05		NC	%	80 - 120
8386641	GM4	Spiked Blank	Total Dissolved Solids	2016/09/05		100	%	80 - 120
8386641	GM4	Method Blank	Total Dissolved Solids	2016/09/05	<10		mg/L	
8386641	GM4	RPD	Total Dissolved Solids	2016/09/05	0.24		%	20
8387203	CH7	Spiked Blank	pH	2016/09/03		100	%	97 - 103
8387203	CH7	RPD	pH	2016/09/03	0.84		%	N/A
8387206	CH7	Spiked Blank	Alkalinity (Total as CaCO3)	2016/09/03		99	%	80 - 120
8387206	CH7	Method Blank	Alkalinity (PP as CaCO3)	2016/09/03	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/09/03	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/09/03	<0.50		mg/L	
			Carbonate (CO3)	2016/09/03	<0.50		mg/L	
			Hydroxide (OH)	2016/09/03	<0.50		mg/L	
8387206	CH7	RPD	Alkalinity (PP as CaCO3)	2016/09/03	NC		%	20
			Alkalinity (Total as CaCO3)	2016/09/03	0.71		%	20
			Bicarbonate (HCO3)	2016/09/03	0.71		%	20
			Carbonate (CO3)	2016/09/03	NC		%	20
			Hydroxide (OH)	2016/09/03	NC		%	20
8387207	CH7	Spiked Blank	Conductivity	2016/09/03		100	%	90 - 110
8387207	CH7	Method Blank	Conductivity	2016/09/03	<1.0		uS/cm	
8387207	CH7	RPD	Conductivity	2016/09/03	0.39		%	20
8387512	KD5	Matrix Spike	Dissolved Chloride (Cl)	2016/09/06		NC	%	80 - 120
8387512	KD5	Spiked Blank	Dissolved Chloride (Cl)	2016/09/06		104	%	80 - 120
8387512	KD5	Method Blank	Dissolved Chloride (Cl)	2016/09/06	<1.0		mg/L	
8387512	KD5	RPD	Dissolved Chloride (Cl)	2016/09/06	0.23		%	20
8387515	KD5	Matrix Spike	Dissolved Sulphate (SO4)	2016/09/06		NC	%	80 - 120
8387515	KD5	Spiked Blank	Dissolved Sulphate (SO4)	2016/09/06		108	%	80 - 120
8387515	KD5	Method Blank	Dissolved Sulphate (SO4)	2016/09/06	<1.0		mg/L	
8387515	KD5	RPD	Dissolved Sulphate (SO4)	2016/09/06	0.18		%	20
8387598	AK8	Matrix Spike	O-TERPHENYL (sur.)	2016/09/04		98	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/09/04		100	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2016/09/04		99	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2016/09/04		99	%	50 - 130
8387598	AK8	Spiked Blank	O-TERPHENYL (sur.)	2016/09/04		108	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/09/04		112	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2016/09/04		113	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2016/09/04		110	%	70 - 130
8387598	AK8	Method Blank	O-TERPHENYL (sur.)	2016/09/04		98	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/09/04	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2016/09/04	<0.20		mg/L	
			F4 (C34-C50 Hydrocarbons)	2016/09/04	<0.20		mg/L	
8387598	AK8	RPD	F2 (C10-C16 Hydrocarbons)	2016/09/04	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2016/09/04	NC		%	40
			F4 (C34-C50 Hydrocarbons)	2016/09/04	NC		%	40
8388002	MPH	Matrix Spike	Dissolved Nitrite (N)	2016/09/05		103	%	80 - 120
			Dissolved Nitrate (N)	2016/09/05		104	%	80 - 120
8388002	MPH	Spiked Blank	Dissolved Nitrite (N)	2016/09/05		99	%	80 - 120
			Dissolved Nitrate (N)	2016/09/05		100	%	80 - 120
8388002	MPH	Method Blank	Dissolved Nitrite (N)	2016/09/05	<0.010		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Nitrate (N)	2016/09/05	<0.010		mg/L	
8388002	MPH	RPD	Dissolved Nitrite (N)	2016/09/05	NC		%	20
			Dissolved Nitrate (N)	2016/09/05	0.96		%	20
8388282	AL2	Matrix Spike	Total Hex. Chromium (Cr 6+)	2016/09/06		100	%	80 - 120
8388282	AL2	Spiked Blank	Total Hex. Chromium (Cr 6+)	2016/09/06		102	%	80 - 120
8388282	AL2	Method Blank	Total Hex. Chromium (Cr 6+)	2016/09/06	0.0010, RDL=0.0010		mg/L	
8388282	AL2	RPD	Total Hex. Chromium (Cr 6+)	2016/09/06	NC		%	20
8390210	SES	Matrix Spike	1,4-Difluorobenzene (sur.)	2016/09/08		101	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/09/08		94	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/09/08		107	%	70 - 130
			Benzene	2016/09/08		107	%	70 - 130
			Toluene	2016/09/08		106	%	70 - 130
			Ethylbenzene	2016/09/08		111	%	70 - 130
			m & p-Xylene	2016/09/08		110	%	70 - 130
			o-Xylene	2016/09/08		109	%	70 - 130
			F1 (C6-C10)	2016/09/08		91	%	70 - 130
8390210	SES	Spiked Blank	1,4-Difluorobenzene (sur.)	2016/09/08		102	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/09/08		95	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/09/08		109	%	70 - 130
			Benzene	2016/09/08		106	%	70 - 130
			Toluene	2016/09/08		102	%	70 - 130
			Ethylbenzene	2016/09/08		106	%	70 - 130
			m & p-Xylene	2016/09/08		107	%	70 - 130
			o-Xylene	2016/09/08		106	%	70 - 130
			F1 (C6-C10)	2016/09/08		100	%	70 - 130
8390210	SES	Method Blank	1,4-Difluorobenzene (sur.)	2016/09/08		102	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/09/08		95	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/09/08		106	%	70 - 130
			Benzene	2016/09/08	<0.40		ug/L	
			Toluene	2016/09/08	<0.40		ug/L	
			Ethylbenzene	2016/09/08	<0.40		ug/L	
			m & p-Xylene	2016/09/08	<0.80		ug/L	
			o-Xylene	2016/09/08	<0.40		ug/L	
			Xylenes (Total)	2016/09/08	<0.80		ug/L	
			F1 (C6-C10) - BTEX	2016/09/08	<100		ug/L	
			F1 (C6-C10)	2016/09/08	<100		ug/L	
8390210	SES	RPD	Benzene	2016/09/08	NC		%	40
			Toluene	2016/09/08	NC		%	40
			Ethylbenzene	2016/09/08	NC		%	40
			m & p-Xylene	2016/09/08	NC		%	40
			o-Xylene	2016/09/08	NC		%	40
			Xylenes (Total)	2016/09/08	NC		%	40
			F1 (C6-C10) - BTEX	2016/09/08	NC		%	40
			F1 (C6-C10)	2016/09/08	NC		%	40
8392336	JLO	Matrix Spike	Total Mercury (Hg)	2016/09/09		96	%	85 - 115
8392336	JLO	QC Standard	Total Mercury (Hg)	2016/09/09		100	%	85 - 115
8392336	JLO	Spiked Blank	Total Mercury (Hg)	2016/09/09		97	%	85 - 115
8392336	JLO	Method Blank	Total Mercury (Hg)	2016/09/09	<0.0020		ug/L	
8392336	JLO	RPD	Total Mercury (Hg)	2016/09/09	NC		%	20
8392398	JLO	Matrix Spike [PK7170-08]	Dissolved Mercury (Hg)	2016/09/09		103	%	85 - 115
8392398	JLO	QC Standard	Dissolved Mercury (Hg)	2016/09/09		97	%	85 - 115

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8392398	JLO	Spiked Blank	Dissolved Mercury (Hg)	2016/09/09		92	%	85 - 115
8392398	JLO	Method Blank	Dissolved Mercury (Hg)	2016/09/09	<0.0020		ug/L	
8392398	JLO	RPD [PK7170-08]	Dissolved Mercury (Hg)	2016/09/09	NC		%	20
8394609	HM3	Matrix Spike [PK7170-06]	Dissolved Aluminum (Al)	2016/09/12		NC	%	80 - 120
			Dissolved Antimony (Sb)	2016/09/12		104	%	80 - 120
			Dissolved Arsenic (As)	2016/09/12		97	%	80 - 120
			Dissolved Beryllium (Be)	2016/09/12		102	%	80 - 120
			Dissolved Chromium (Cr)	2016/09/12		97	%	80 - 120
			Dissolved Cobalt (Co)	2016/09/12		93	%	80 - 120
			Dissolved Copper (Cu)	2016/09/12		92	%	80 - 120
			Dissolved Lead (Pb)	2016/09/12		94	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/09/12		105	%	80 - 120
			Dissolved Nickel (Ni)	2016/09/12		91	%	80 - 120
			Dissolved Selenium (Se)	2016/09/12		106	%	80 - 120
			Dissolved Silver (Ag)	2016/09/12		98	%	80 - 120
			Dissolved Thallium (Tl)	2016/09/12		95	%	80 - 120
			Dissolved Tin (Sn)	2016/09/12		104	%	80 - 120
			Dissolved Titanium (Ti)	2016/09/12		104	%	80 - 120
			Dissolved Uranium (U)	2016/09/12		95	%	80 - 120
			Dissolved Vanadium (V)	2016/09/12		100	%	80 - 120
			Dissolved Zinc (Zn)	2016/09/12		95	%	80 - 120
8394609	HM3	Spiked Blank	Dissolved Aluminum (Al)	2016/09/12		101	%	80 - 120
			Dissolved Antimony (Sb)	2016/09/12		102	%	80 - 120
			Dissolved Arsenic (As)	2016/09/12		99	%	80 - 120
			Dissolved Beryllium (Be)	2016/09/12		102	%	80 - 120
			Dissolved Chromium (Cr)	2016/09/12		96	%	80 - 120
			Dissolved Cobalt (Co)	2016/09/12		94	%	80 - 120
			Dissolved Copper (Cu)	2016/09/12		95	%	80 - 120
			Dissolved Lead (Pb)	2016/09/12		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/09/12		100	%	80 - 120
			Dissolved Nickel (Ni)	2016/09/12		93	%	80 - 120
			Dissolved Selenium (Se)	2016/09/12		108	%	80 - 120
			Dissolved Silver (Ag)	2016/09/12		97	%	80 - 120
			Dissolved Thallium (Tl)	2016/09/12		97	%	80 - 120
			Dissolved Tin (Sn)	2016/09/12		103	%	80 - 120
			Dissolved Titanium (Ti)	2016/09/12		102	%	80 - 120
			Dissolved Uranium (U)	2016/09/12		97	%	80 - 120
			Dissolved Vanadium (V)	2016/09/12		99	%	80 - 120
			Dissolved Zinc (Zn)	2016/09/12		98	%	80 - 120
8394609	HM3	Method Blank	Dissolved Aluminum (Al)	2016/09/12	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2016/09/12	<0.00060		mg/L	
			Dissolved Arsenic (As)	2016/09/12	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2016/09/12	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2016/09/12	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2016/09/12	<0.00030		mg/L	
			Dissolved Copper (Cu)	2016/09/12	<0.00020		mg/L	
			Dissolved Lead (Pb)	2016/09/12	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2016/09/12	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2016/09/12	<0.00050		mg/L	
			Dissolved Selenium (Se)	2016/09/12	<0.00020		mg/L	
			Dissolved Silver (Ag)	2016/09/12	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2016/09/12	<0.00020		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Tin (Sn)	2016/09/12	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2016/09/12	<0.0010		mg/L	
			Dissolved Uranium (U)	2016/09/12	<0.00010		mg/L	
			Dissolved Vanadium (V)	2016/09/12	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2016/09/12	0.0035, RDL=0.0030		mg/L	
8394609	HM3	RPD [PK7170-06]	Dissolved Aluminum (Al)	2016/09/12	2.0		%	20
			Dissolved Antimony (Sb)	2016/09/12	NC		%	20
			Dissolved Arsenic (As)	2016/09/12	NC		%	20
			Dissolved Beryllium (Be)	2016/09/12	NC		%	20
			Dissolved Chromium (Cr)	2016/09/12	NC		%	20
			Dissolved Cobalt (Co)	2016/09/12	1.2		%	20
			Dissolved Copper (Cu)	2016/09/12	3.0		%	20
			Dissolved Lead (Pb)	2016/09/12	NC		%	20
			Dissolved Molybdenum (Mo)	2016/09/12	NC		%	20
			Dissolved Nickel (Ni)	2016/09/12	4.6		%	20
			Dissolved Selenium (Se)	2016/09/12	NC		%	20
			Dissolved Silver (Ag)	2016/09/12	NC		%	20
			Dissolved Thallium (Tl)	2016/09/12	NC		%	20
			Dissolved Tin (Sn)	2016/09/12	NC		%	20
			Dissolved Titanium (Ti)	2016/09/12	NC		%	20
			Dissolved Uranium (U)	2016/09/12	1.7		%	20
			Dissolved Vanadium (V)	2016/09/12	NC		%	20
			Dissolved Zinc (Zn)	2016/09/12	NC		%	20
8394612	JK9	Matrix Spike	Dissolved Barium (Ba)	2016/09/12		94	%	80 - 120
			Dissolved Boron (B)	2016/09/12		97	%	80 - 120
			Dissolved Calcium (Ca)	2016/09/12		NC	%	80 - 120
			Dissolved Iron (Fe)	2016/09/12		94	%	80 - 120
			Dissolved Lithium (Li)	2016/09/12		92	%	80 - 120
			Dissolved Magnesium (Mg)	2016/09/12		NC	%	80 - 120
			Dissolved Manganese (Mn)	2016/09/12		92	%	80 - 120
			Dissolved Phosphorus (P)	2016/09/12		99	%	80 - 120
			Dissolved Potassium (K)	2016/09/12		NC	%	80 - 120
			Dissolved Silicon (Si)	2016/09/12		102	%	80 - 120
			Dissolved Sodium (Na)	2016/09/12		NC	%	80 - 120
			Dissolved Strontium (Sr)	2016/09/12		NC	%	80 - 120
8394612	JK9	Spiked Blank	Dissolved Barium (Ba)	2016/09/12		98	%	80 - 120
			Dissolved Boron (B)	2016/09/12		101	%	80 - 120
			Dissolved Calcium (Ca)	2016/09/12		93	%	80 - 120
			Dissolved Iron (Fe)	2016/09/12		97	%	80 - 120
			Dissolved Lithium (Li)	2016/09/12		96	%	80 - 120
			Dissolved Magnesium (Mg)	2016/09/12		98	%	80 - 120
			Dissolved Manganese (Mn)	2016/09/12		97	%	80 - 120
			Dissolved Phosphorus (P)	2016/09/12		98	%	80 - 120
			Dissolved Potassium (K)	2016/09/12		101	%	80 - 120
			Dissolved Silicon (Si)	2016/09/12		103	%	80 - 120
			Dissolved Sodium (Na)	2016/09/12		100	%	80 - 120
			Dissolved Strontium (Sr)	2016/09/12		97	%	80 - 120
			Dissolved Sulphur (S)	2016/09/12		98	%	80 - 120
8394612	JK9	Method Blank	Dissolved Barium (Ba)	2016/09/12	<0.010		mg/L	
			Dissolved Boron (B)	2016/09/12	<0.020		mg/L	
			Dissolved Calcium (Ca)	2016/09/12	<0.30		mg/L	

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			Dissolved Iron (Fe)	2016/09/12	<0.060		mg/L	
			Dissolved Lithium (Li)	2016/09/12	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2016/09/12	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/09/12	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2016/09/12	<0.10		mg/L	
			Dissolved Potassium (K)	2016/09/12	<0.30		mg/L	
			Dissolved Silicon (Si)	2016/09/12	<0.10		mg/L	
			Dissolved Sodium (Na)	2016/09/12	<0.50		mg/L	
			Dissolved Strontium (Sr)	2016/09/12	<0.020		mg/L	
			Dissolved Sulphur (S)	2016/09/12	<0.20		mg/L	
8394612	JK9	RPD	Dissolved Barium (Ba)	2016/09/12	NC		%	20
			Dissolved Boron (B)	2016/09/12	2.1		%	20
			Dissolved Calcium (Ca)	2016/09/12	2.2		%	20
			Dissolved Iron (Fe)	2016/09/12	NC		%	20
			Dissolved Lithium (Li)	2016/09/12	NC		%	20
			Dissolved Magnesium (Mg)	2016/09/12	2.3		%	20
			Dissolved Manganese (Mn)	2016/09/12	2.8		%	20
			Dissolved Phosphorus (P)	2016/09/12	NC		%	20
			Dissolved Potassium (K)	2016/09/12	1.4		%	20
			Dissolved Silicon (Si)	2016/09/12	1.2		%	20
			Dissolved Sodium (Na)	2016/09/12	2.3		%	20
			Dissolved Strontium (Sr)	2016/09/12	2.0		%	20
			Dissolved Sulphur (S)	2016/09/12	2.3		%	20
8394748	HM3	Matrix Spike [PK7170-05]	Total Aluminum (Al)	2016/09/12		NC	%	80 - 120
			Total Antimony (Sb)	2016/09/12		108	%	80 - 120
			Total Arsenic (As)	2016/09/12		101	%	80 - 120
			Total Beryllium (Be)	2016/09/12		103	%	80 - 120
			Total Chromium (Cr)	2016/09/12		102	%	80 - 120
			Total Cobalt (Co)	2016/09/12		96	%	80 - 120
			Total Copper (Cu)	2016/09/12		94	%	80 - 120
			Total Lead (Pb)	2016/09/12		98	%	80 - 120
			Total Molybdenum (Mo)	2016/09/12		108	%	80 - 120
			Total Nickel (Ni)	2016/09/12		NC	%	80 - 120
			Total Selenium (Se)	2016/09/12		115	%	80 - 120
			Total Silver (Ag)	2016/09/12		103	%	80 - 120
			Total Thallium (Tl)	2016/09/12		99	%	80 - 120
			Total Tin (Sn)	2016/09/12		112	%	80 - 120
			Total Titanium (Ti)	2016/09/12		NC	%	80 - 120
			Total Uranium (U)	2016/09/12		98	%	80 - 120
			Total Vanadium (V)	2016/09/12		103	%	80 - 120
			Total Zinc (Zn)	2016/09/12		101	%	80 - 120
8394748	HM3	Spiked Blank	Total Aluminum (Al)	2016/09/12		105	%	80 - 120
			Total Antimony (Sb)	2016/09/12		106	%	80 - 120
			Total Arsenic (As)	2016/09/12		103	%	80 - 120
			Total Beryllium (Be)	2016/09/12		102	%	80 - 120
			Total Chromium (Cr)	2016/09/12		102	%	80 - 120
			Total Cobalt (Co)	2016/09/12		99	%	80 - 120
			Total Copper (Cu)	2016/09/12		100	%	80 - 120
			Total Lead (Pb)	2016/09/12		100	%	80 - 120
			Total Molybdenum (Mo)	2016/09/12		109	%	80 - 120
			Total Nickel (Ni)	2016/09/12		99	%	80 - 120
			Total Selenium (Se)	2016/09/12		108	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Silver (Ag)	2016/09/12		102	%	80 - 120
			Total Thallium (Tl)	2016/09/12		101	%	80 - 120
			Total Tin (Sn)	2016/09/12		109	%	80 - 120
			Total Titanium (Ti)	2016/09/12		103	%	80 - 120
			Total Uranium (U)	2016/09/12		102	%	80 - 120
			Total Vanadium (V)	2016/09/12		105	%	80 - 120
			Total Zinc (Zn)	2016/09/12		97	%	80 - 120
8394748	HM3	Method Blank	Total Aluminum (Al)	2016/09/12	<0.0030		mg/L	
			Total Antimony (Sb)	2016/09/12	<0.00060		mg/L	
			Total Arsenic (As)	2016/09/12	<0.00020		mg/L	
			Total Beryllium (Be)	2016/09/12	<0.0010		mg/L	
			Total Chromium (Cr)	2016/09/12	<0.0010		mg/L	
			Total Cobalt (Co)	2016/09/12	<0.00030		mg/L	
			Total Copper (Cu)	2016/09/12	<0.00020		mg/L	
			Total Lead (Pb)	2016/09/12	<0.00020		mg/L	
			Total Molybdenum (Mo)	2016/09/12	<0.00020		mg/L	
			Total Nickel (Ni)	2016/09/12	<0.00050		mg/L	
			Total Selenium (Se)	2016/09/12	<0.00020		mg/L	
			Total Silver (Ag)	2016/09/12	<0.00010		mg/L	
			Total Thallium (Tl)	2016/09/12	<0.00020		mg/L	
			Total Tin (Sn)	2016/09/12	<0.0010		mg/L	
			Total Titanium (Ti)	2016/09/12	<0.0010		mg/L	
			Total Uranium (U)	2016/09/12	<0.00010		mg/L	
			Total Vanadium (V)	2016/09/12	0.0018, RDL=0.0010		mg/L	
			Total Zinc (Zn)	2016/09/12	<0.0030		mg/L	
8394748	HM3	RPD [PK7170-05]	Total Aluminum (Al)	2016/09/12	1.3		%	20
			Total Antimony (Sb)	2016/09/12	NC		%	20
			Total Arsenic (As)	2016/09/12	NC		%	20
			Total Beryllium (Be)	2016/09/12	NC		%	20
			Total Chromium (Cr)	2016/09/12	11		%	20
			Total Cobalt (Co)	2016/09/12	4.7		%	20
			Total Copper (Cu)	2016/09/12	3.4		%	20
			Total Lead (Pb)	2016/09/12	3.3		%	20
			Total Molybdenum (Mo)	2016/09/12	NC		%	20
			Total Nickel (Ni)	2016/09/12	0.036		%	20
			Total Selenium (Se)	2016/09/12	NC		%	20
			Total Silver (Ag)	2016/09/12	NC		%	20
			Total Thallium (Tl)	2016/09/12	NC		%	20
			Total Tin (Sn)	2016/09/12	NC		%	20
			Total Titanium (Ti)	2016/09/12	17		%	20
			Total Uranium (U)	2016/09/12	11		%	20
			Total Vanadium (V)	2016/09/12	4.1		%	20
			Total Zinc (Zn)	2016/09/12	NC		%	20
8394750	JK9	Matrix Spike [PK7171-05]	Total Barium (Ba)	2016/09/12		102	%	80 - 120
			Total Boron (B)	2016/09/12		103	%	80 - 120
			Total Calcium (Ca)	2016/09/12		NC	%	80 - 120
			Total Iron (Fe)	2016/09/12		NC	%	80 - 120
			Total Lithium (Li)	2016/09/12		100	%	80 - 120
			Total Magnesium (Mg)	2016/09/12		102	%	80 - 120
			Total Manganese (Mn)	2016/09/12		NC	%	80 - 120
			Total Phosphorus (P)	2016/09/12		100	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Potassium (K)	2016/09/12		104	%	80 - 120
			Total Silicon (Si)	2016/09/12		NC	%	80 - 120
			Total Sodium (Na)	2016/09/12		103	%	80 - 120
			Total Strontium (Sr)	2016/09/12		99	%	80 - 120
8394750	JK9	Spiked Blank	Total Barium (Ba)	2016/09/12		104	%	80 - 120
			Total Boron (B)	2016/09/12		104	%	80 - 120
			Total Calcium (Ca)	2016/09/12		98	%	80 - 120
			Total Iron (Fe)	2016/09/12		101	%	80 - 120
			Total Lithium (Li)	2016/09/12		103	%	80 - 120
			Total Magnesium (Mg)	2016/09/12		101	%	80 - 120
			Total Manganese (Mn)	2016/09/12		100	%	80 - 120
			Total Phosphorus (P)	2016/09/12		100	%	80 - 120
			Total Potassium (K)	2016/09/12		107	%	80 - 120
			Total Silicon (Si)	2016/09/12		103	%	80 - 120
			Total Sodium (Na)	2016/09/12		107	%	80 - 120
			Total Strontium (Sr)	2016/09/12		101	%	80 - 120
			Total Sulphur (S)	2016/09/12		98	%	80 - 120
8394750	JK9	Method Blank	Total Barium (Ba)	2016/09/12	<0.010		mg/L	
			Total Boron (B)	2016/09/12	<0.020		mg/L	
			Total Calcium (Ca)	2016/09/12	<0.30		mg/L	
			Total Iron (Fe)	2016/09/12	<0.060		mg/L	
			Total Lithium (Li)	2016/09/12	<0.020		mg/L	
			Total Magnesium (Mg)	2016/09/12	<0.20		mg/L	
			Total Manganese (Mn)	2016/09/12	<0.0040		mg/L	
			Total Phosphorus (P)	2016/09/12	<0.10		mg/L	
			Total Potassium (K)	2016/09/12	<0.30		mg/L	
			Total Silicon (Si)	2016/09/12	<0.10		mg/L	
			Total Sodium (Na)	2016/09/12	<0.50		mg/L	
			Total Strontium (Sr)	2016/09/12	<0.020		mg/L	
			Total Sulphur (S)	2016/09/12	<0.20		mg/L	
8394750	JK9	RPD [PK7171-05]	Total Barium (Ba)	2016/09/12	0.36		%	20
			Total Boron (B)	2016/09/12	NC		%	20
			Total Calcium (Ca)	2016/09/12	0.23		%	20
			Total Iron (Fe)	2016/09/12	5.8		%	20
			Total Lithium (Li)	2016/09/12	NC		%	20
			Total Magnesium (Mg)	2016/09/12	0.52		%	20
			Total Manganese (Mn)	2016/09/12	0.21		%	20
			Total Phosphorus (P)	2016/09/12	NC		%	20
			Total Potassium (K)	2016/09/12	0.078		%	20
			Total Silicon (Si)	2016/09/12	2.9		%	20
			Total Sodium (Na)	2016/09/12	2.1		%	20
			Total Strontium (Sr)	2016/09/12	0.51		%	20

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Maxxam Job #: B675614
Report Date: 2016/09/12

ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Sulphur (S)	2016/09/12	NC		%	20

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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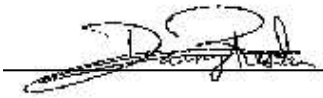
Maxxam Job #: B675614
Report Date: 2016/09/12

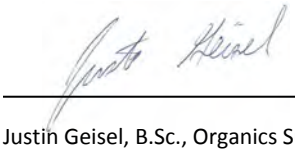
ARCADIS Canada
Client Project #: ENNADAI LAKE
Your P.O. #: 100347-001
Sampler Initials: EH

VALIDATION SIGNATURE PAGE

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



Daniel Reslan, cCT, QP, Organics Supervisor



Justin Geisel, B.Sc., Organics Supervisor

Maria Magdalena Florescu, Ph.D., P.Chem., QP, Inorganics Senior Analyst

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

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Maxxam Analytics International Corporation o/a Maxxam Analytics
Unit 105 - 349 Old Airport Road, Yellowknife, North West Territories Canada X1A 3X6 Tel (867) 445-2448 Toll-free 800-563-6266 Fax (905) 817-5779 www.maxxam.ca

114

Chain Of Custody Record

Page | of |

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#10410 ARCADIS Canada	Company Name	ARCADIS	Quotation #		Maxxam Job #	Bottle Order #:
Contact Name	Jason Mauchan	Contact Name	Elliott Holden	P.O. #	100347-001	B675614 AHD	501422
Address	121 GRANTON DRIVE, UNIT 12 RICHMOND HILL ON T4B 3N4	Address	329 Churchill Ave N OTTAWA, ON K1Z 5B8	Project #	ENNADAI LAKE	Chain Of Custody Record	Project Manager
Phone	(613) 721-0555 x Fax (905) 764-9386	Phone	6137210555 Fax	Project Name		C#501422-03-01	
Email	Jason.Mauchan@arcadis.com; Stephanie.Joyce@arca	Email	elliott.holden@arcadis.com	Site #			
				Sampled By	EH		

Regulatory Criteria: CCME

Special Instructions:

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

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Analysis Requested

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Metals Total, Dissolved	Hg Total, Dissolved	Cr6	TDS, TSS	NO2 NO3 N+N	Routine	PHC F1-F4	PCBs	BTEX	# of Bottles	Comments
1		MWLF - 3	2016/8/24	2pm	GW	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	14	
2		MWLF - DUP	2016/8/24		GW	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	14	
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

RECEIVED IN YELLOWKNIFE
By: JER
2016 -09- 01

Temp: 6 1 5 1 4

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
J-Mauchan	16/8/26	1000	Jenna Wo Ho	2016 09 01	1131	

Lab Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
☐	2.3.0 ice yes	☑ 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.

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your P.O. #: N/A
Your Project #: B675614
Your C.O.C. #: na

Attention:Parminder Virk

Maxxam Analytics
Edmonton - Environmental
9331 48th St
Edmonton, AB
T6B 2R4

Report Date: 2016/09/08
Report #: R4159395
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6J0429
Received: 2016/09/07, 10:30

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Polychlorinated Biphenyl in Water	2	2016/09/07	2016/09/08	CAM SOP-00309	EPA 8082A m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* 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.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5806
==========
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Maxxam Job #: B6J0429
Report Date: 2016/09/08

Maxxam Analytics
Client Project #: B675614
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		DAE402	DAE403		
Sampling Date		2016/08/24 14:00	2016/08/24 14:00		
COC Number		na	na		
	UNITS	PK7170 \ MWLF-3	PK7171 \ MWLF-DUP	RDL	QC Batch
PCBs					
Aroclor 1016	ug/L	<0.05	<0.05	0.05	4650660
Aroclor 1221	ug/L	<0.05	<0.05	0.05	4650660
Aroclor 1232	ug/L	<0.05	<0.05	0.05	4650660
Aroclor 1242	ug/L	<0.05	<0.05	0.05	4650660
Aroclor 1248	ug/L	<0.05	<0.05	0.05	4650660
Aroclor 1254	ug/L	<0.05	<0.05	0.05	4650660
Aroclor 1260	ug/L	<0.05	<0.05	0.05	4650660
Aroclor 1262	ug/L	<0.05	<0.05	0.05	4650660
Aroclor 1268	ug/L	<0.05	<0.05	0.05	4650660
Total PCB	ug/L	<0.05	<0.05	0.05	4650660
Surrogate Recovery (%)					
Decachlorobiphenyl	%	88	90		4650660

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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

Maxxam Job #: B6J0429
Report Date: 2016/09/08

Maxxam Analytics
Client Project #: B675614
Your P.O. #: N/A

GENERAL COMMENTS

Results relate only to the items tested.

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Maxxam Job #: B6J0429
Report Date: 2016/09/08

QUALITY ASSURANCE REPORT

Maxxam Analytics
Client Project #: B675614
Your P.O. #: N/A

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
4650660	Decachlorobiphenyl	2016/09/07	91	60 - 130	80	60 - 130	84	%		
4650660	Aroclor 1016	2016/09/07					<0.05	ug/L		
4650660	Aroclor 1221	2016/09/07					<0.05	ug/L		
4650660	Aroclor 1232	2016/09/07					<0.05	ug/L		
4650660	Aroclor 1242	2016/09/07					<0.05	ug/L	NC	30
4650660	Aroclor 1248	2016/09/07					<0.05	ug/L	NC	30
4650660	Aroclor 1254	2016/09/07					<0.05	ug/L	NC	30
4650660	Aroclor 1260	2016/09/07	96	60 - 130	76	60 - 130	<0.05	ug/L	NC	30
4650660	Aroclor 1262	2016/09/07					<0.05	ug/L		
4650660	Aroclor 1268	2016/09/07					<0.05	ug/L		
4650660	Total PCB	2016/09/07	96	60 - 130	76	60 - 130	<0.05	ug/L	NC	40

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.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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).

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

Maxxam Job #: B6J0429
Report Date: 2016/09/08

Maxxam Analytics
Client Project #: B675614
Your P.O. #: N/A

VALIDATION SIGNATURE PAGE

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

Cristina Carriere

Cristina Carriere, Scientific Services

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MAXXAM ANALYTICS
9331 - 48th Street
Edmonton, Alberta, T6B 2R4
(780) 577-7100
(780) 450-4187

Maxxam
A Bureau Veritas JV

SUBCONTRACTING

ARCADIS Canada - RICHMOND HILL
Maxxam PM Parminder Virk

07-Sep-16 10:30
Andrea Rieth
B6J0429
MAF ENV-1198

To: Maxxam Ontario (From Edmonton)

Job# B675614

Yes X No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)

Yes X No Special Protocol (if yes, Protocol _____)

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
PK7170-12R\MWLF-3	W	PCB in Water - Subcontract	2-EPCB	2016/08/24 14:00	2016/09/12
PK7171-12R\MWLF-DUP	W	PCB in Water - Subcontract	2-EPCB	2016/08/24 14:00	2016/09/12

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	9	10	9	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #2	5	8	10	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #3	8	10	8	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO

4 x 500

Receiving Maxxam Location: Maxxam Ontario (From Edmonton) JOB # _____

Relinquished by (Sign) _____ (print) DEJI WU Date and Time 2016/09/02 13:50

Received by (Sign) _____ (print) AMY MACRAE Date and Time 2016 DMS 2016/09/02 10:30

NOTES:

1) Please call us if due date cannot be met. Please reference Sample ID on your report.
2) Include copy of this completed form, Client COC & signed final report to

Reporting Requirements:

National:

Regional:

Shipping Instructions

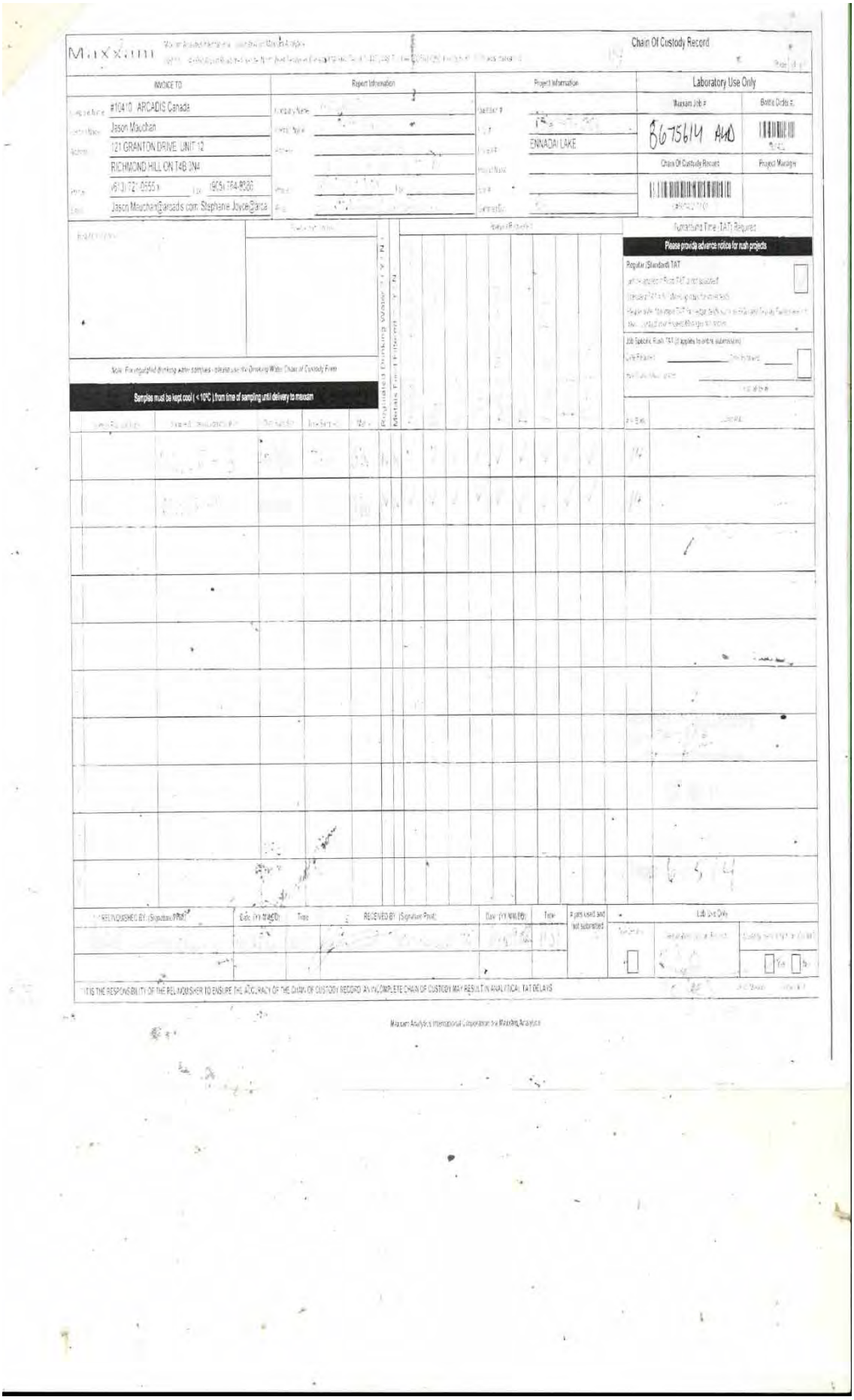
Ship Immediately (highlight Yellow) Ship Cold
Requires 9am Ship Room Temp
Requires Sat. Delivery Ship Frozen
Regular Ship next available day COC Must be Attached

Sender (Print) _____ Initial _____

Shipping Department Checklist

Correct Shipping location
Correct Sample Ids (Paperwork vs Bottles)
Yes No Special-Cooler, Ice, Tape-custody seal, Date&Sign

Date Shipped _____ Number of coolers _____
Shipper (Print) _____ Initial _____



Maxxam

Chain Of Custody Record

INVOICE TO	Report Information	Project Information	Laboratory Use Only
#10410 ARCADIS Canada			Maxxam Job # B675614
Jason Mauchan		ENNADAI LAKE	
121 GRANTON DRIVE, UNIT 12			Chain Of Custody Record
RICHMOND HILL ON L4B 3N4			
(905) 764-9380			
Jason.Mauchan@arcadis.com; Stephanie.Joyce@arca			

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

Regular (Standard) TAT

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

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only

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

Maxxam Analytics International Corporation o/a Maxxam Analytics

APPENDIX C

Groundwater Monitoring and Sampling Logs

Ground Water Monitoring and Sampling Logs

Well ID: MWLF-1
Project Number (Name): 100347-001 (Ennadai Lake LTM)
Monitoring Date: Aug. 24, 2016
Depth to Ice: 3.496 m btoc
Depth to Bottom of Well: 3.65 m btoc (Stantec, 2015)
Stick-Up: 0.4 m (Stantec, 2015)
Monitoring Note: Old lock (Master) on stick-up casing was cut off and replaced with new lock (MasterVLine). Casing, riser and J-plug are in good condition. Water in well was frozen.

Well ID: MWLF-2
Project Number (Name): 100347-001 (Ennadai Lake LTM)
Monitoring Date: Aug. 24, 2016
Depth to Ice: 3.684 m btoc
Depth to Bottom of Well: 3.68 m btoc (Stantec, 2015)
Stick-Up: 0.6 m (Stantec, 2015)
Monitoring Note: Old lock (Master) on stick-up casing was cut off and replaced with new lock (MasterVLine). Casing, riser and J-plug are in good condition. Ice was identified at the bottom of the well using interface probe.

Well ID: MWLF-3
Project Number (Name): 100347-001 (Ennadai Lake LTM)
Monitoring Date: Aug. 24, 2016
Depth to water: 1.488 m btoc
Depth to Bottom of Well: 2.415 m btoc
Stick-Up: 0.8 m (Stantec, 2015)
Monitoring Note: Old lock (Master) on stick-up casing was cut off and replaced with new lock (MasterVLine). Casing, riser and J-plug are in good condition.
Volume of Water Purged: 8 L
Purge method Bailer
Sample Date: Aug. 24, 2016
Sample Time: 2:00 PM
Sample Method: Bailer

Time	Water Level (m btoc)	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH	ORP (mV)
11:35-2:05	1.49	5.12	207	4.40	3.75	205.5

Note: Field parameters were collected using a YSI 556 MPS (calibrated by Arcadis field personnel on Aug. 23, 2016) before samples were collected. Field parameter readings stabilized after 30 minutes.

Water Observations: slightly cloudy, slight light brown grey colour, no odour, no sheen
Comments: none

APPENDIX D

Field Notes

MADE IN TACOMA
— SINCE 1916 —
Rite in the Rain®
— DEFYING MOTHER NATURE —

Name Elliott Holden (Arcadis)

Address

Phone

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Projects 100347-001

Roberts Bay - pages 1 to 11

CAM-D - pages 12 to 18

Ennadai Lake - pages 27 to 33

Rankin Inlet - pages 21 - 26 &
35 - 46

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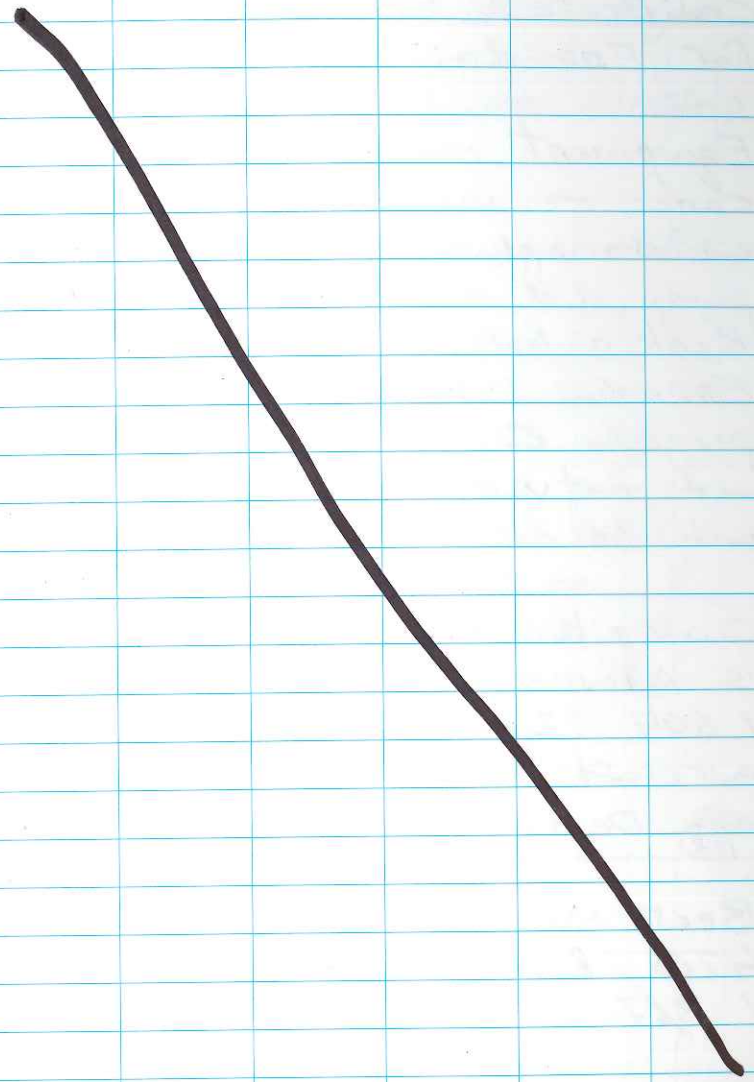

(20)

ICO 347-001 Aug. 23, 2016

6:48 AM Alan sent text that indicated winds were too high to fly out to site at the planned departure time of 8:00 AM. Trip was put on hold. Alan continued to monitor wind speeds.

8:45 AM Alan sent update saying wind speeds have increased. New forecast will be issued at 1:00 PM. Flight time is 2 hrs one way + 3 hrs at least of field work on the ground + sunset at 8:48 PM = latest departure time at 1:30 PM

(21)

Rite in the Rain

100347-001 Aug. 23, 2016

9:15 AM Arrive at Rankin Inlet Nickel Mine ~~Exit~~ site

Both warning signs are on the ground Sign posts (metal) are broken

Tide was too high to walk out to the locations where sediment samples had historically been taken. Low tide occurs ~ 4:30 AM and ~ 4:30 PM

Thermisters location on map and actual are not consistent

one thermistor string is missing casing and was found lying on the ground

located the location of the concrete slab behind the Health Centre

Slab has been covered with gravel and visual obs. suggest slab is preforming as designed

10:30 AM Back at hotel room to further develop the course of action for the day

Thermister strings T8 and T10 have data loggers that can be connected to computer

T1, T6, and T11 require a digital resistance meter