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CAM-D Simpson Lake Long Term Monitoring Event
Kivalliq Region, Nunavut

2018 Long Term Monitoring Report

CROWN-INDIGENOUS RELATIONS AND NORTHERN AFFAIRS CANADA
NUNAVUT REGIONAL OFFICE

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2018 LONG TERM MONITORING REPORT
CAM-D SIMPSON LAKE LONG TERM MONITORING EVENT
KIVALLIQ REGION, NUNAVUT

SLR Project No.: 209.40585.00000

Submitted by
SLR Consulting (Canada) Ltd.
Suite 203, 43 Auriga Drive
Ottawa, ON K2E 7Y8

For
Crown-Indigenous Relations and Northern Affairs Canada
Nunavut Regional Office
969 Qimugjuk Building, 2nd Floor
Iqaluit, Nunavut X0A 0H0

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Prepared by:

Kaitlyn Roberts, M.Sc.
Environmental Scientist

Reviewed by:

David Wilson, M.A.Sc., P.Eng.
Senior Engineer, Project Manager

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EXECUTIVE SUMMARY

SLR Consulting (Canada) Ltd. (SLR) was retained by Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) to complete the Year 7 Monitoring Program at CAM-D Simpson Lake (herein referred to as "the site"), located in the Kivalliq Region of Nunavut. CAM-D Simpson Lake is located at 68° 35' N and 91° 57' W, and is 100 km east of Gjoa Haven and 80 km West of Kugaaruk.

The objective of the long term monitoring event was to complete Year 7 monitoring activities as described in the *CAM-D Simpson Lake Long-Term Monitoring Plan,* INAC, 2010 (LTM Plan) which included the following:

- Monitor general site conditions (i.e., roads, buildings, etc.);
- Monitor the natural environment (i.e., wildlife);
- Perform a visual and geotechnical inspection of the Non-Hazardous Waste Landfill (NHWL) in accordance with the LTM Plan and the Abandoned Military Site Remediation Protocol (AMSRP);
- Conduct a groundwater sampling program at the four monitoring wells surrounding the NHWL at CAM-D;
- Collect soil samples at locations where new seepage or staining has been identified;
- Submit groundwater samples to a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory for analysis; and
- Submit draft and final versions of the CAM-D Long Term Monitoring (Year 7) Report to CIRNAC which include results compared to baseline data and applicable federal criteria.

Results of the 2018 CAM-D Simpson Lake site visit indicate that the NHWL is currently performing as designed and effectively containing the enclosed waste. Several areas of erosion and cracking are observed on all sides of the NHWL, but particularly on the NE and SW flanks. These features appear to have grown in size and extent compared to previous monitoring programs.

Several areas of ponded water have been historically noted to be surrounding the NHWL. Many of these water bodies have since evaporated but one remained north of the NHWL. A surface water sample was collected at this ponded water feature and results were compared to CWQG-PAL criteria. The cap appears to be flat and in good condition with no signs of settlement. Several areas of debris were noted around the NHWL but they do not appear to impact the integrity of the NHWL at this time. No soil samples were collected during the 2018 monitoring event.

All monitoring wells were frozen during the 2018 monitoring event, and as a result, no samples were collected. Results of the surface water analysis revealed CWQG-PAL exceedances of aluminum and copper concentrations. However, because surface water has never been collected at the site, it is unknown if these concentrations represent background conditions, or if they are related to the NHWL. Future surface water monitoring should continue at the same location.

All monitoring wells surrounding the NHWL showed potential signs of frost jacking and should be monitored during future monitoring programs as repair may be required. The locks were replaced on all wells and the keys remain in the possession of the CIRNAC representative.

Based on the results of the Year 7 LTM event at CAM-D Simpson Lake, SLR recommends continued increased frequency of monitoring as first recommended by Arcadis in the 2017 LTM Report. This is due to features such as cracking and erosion increasing in size and extent on and surrounding the NHWL. While these features do not currently represent failure of the NHWL, the growth of these features may compromise the integrity of the landfill in time and pose the potential for future failure. Additionally, because many groundwater exceedances were reported during the Year 5 monitoring event in 2016, and no groundwater samples were collected in 2018, it is recommended that increased monitoring continue as discussed above. The next monitoring event, Year 9, should be scheduled for 2020. No further action is recommended at this time.

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ACRONYMS AND ABBREVIATIONS

AMSRP	Abandoned Military Site Remediation Protocol
AST	Aboveground storage tank
ATV	All-terrain vehicle
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
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CSQG	Canadian Soil Quality Guidelines
CWQG-PAL	Canadian Water Quality Guidelines for the Protection of Aquatic Life
CWS	Canada Wide Standard
ECCC	Environment and Climate Change Canada
FCSAP	Federal Contaminated Sites Action Plan
FIGQG	Federal Interim Groundwater Quality Guidelines
GIS	Geographic Information System
GPS	Global Positioning System
GW	Groundwater
HASP	Health and Safety Plan
LORAN	Long Range Navigation
LTM	Long Term Monitoring
NHWL	Non-Hazardous Waste Landfill
PCBs	Polychlorinated Biphenyls
PHCs	Petroleum Hydrocarbons
POL	Petroleum, Oils, and Lubricants
PPM	Parts per million

QAQC	Quality Assurance/Quality Control
RDL	Reportable Detection Limit
RPD	Relative Percent Difference
SLR	SLR Consulting (Canada) Ltd.
ULA	Upper Limit of Acceptability
UMA	UMA Engineering Ltd./AECOM

1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) to complete the Year 7 Monitoring Program at the former Distant Early Warning (DEW) Line site CAM-D (herein referred to as "the site"), located in the Kivalliq Region of Nunavut. Nunavut. CAM-D Simpson Lake is located at 68° 35' N and 91° 57' W, and is 100 km east of Gjoa Haven and 80 km West of Kugaaruk.

1.1 Project Objectives

The objective of the long term monitoring event was to complete Year 7 monitoring activities as described in the *CAM-D Simpson Lake Long-Term Monitoring Plan,* INAC, 2010 (LTM Plan).

The program included visual monitoring of the non-hazardous waste landfill (NHWL), visual observation of general site conditions and the natural environment, and collection and analysis of groundwater samples and surface water samples. Analysis of field data and visual observations was conducted to satisfy the requirements of the Abandoned Military Site Remediation Protocol (AMSRP) (INAC, 2009) and the site-specific Field Sampling and Quality Assurance/Quality Control Plan (SLR, 2018).

1.2 Scope of Work

The scope of work for the 2018 work program was carried out in accordance with SLR's standard field investigative procedures and is consistent with the previous year's monitoring. The final scope of work for the project included the following items:

- Prepare and submit a Logistics Plan detailing the work schedule;
- Prepare and submit a detailed Health and Safety Plan (HASP);
- Prepare and submit a Sampling and Quality Assurance/Quality Control Plan detailing the proposed scope of work to CIRNAC;
- Arrange for a wildlife monitor to be present during fieldwork and conduct interviews to understand land use and wildlife trends;
- Monitor general site conditions (i.e., roads, buildings, etc.);
- Monitor the natural environment (i.e. wildlife);
- Perform a visual and geotechnical inspection of the NHWL in accordance with the LTM Plan and AMSRP;
- Conduct a groundwater sampling program at the four monitoring wells surrounding the NHWL at CAM-D;
- Collect soil samples at locations where new seepage or staining has been identified;
- Collect and analyse duplicate samples from at least 20% of samples;
- Submit groundwater samples to a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory for analysis of parameters outlined in Section 5.4;
- Prepare field reports summarizing LTM activities undertaken within two weeks of fieldwork completion; and
- Submit draft and final versions of the CAM-D Simpson Lake Long Term Monitoring (Year 7) Report to CIRNAC.

Details regarding the specific methodology of each task are located in Section 4.0.

2.0 BACKGROUND INFORMATION

2.1 Site Description

CAM-D Simpson Lake was constructed as a Distant Early Warning (DEW) Line site in 1957 by the Department of National Defense. The site was decommissioned in 1963 and in 1965 the responsibility of the site was assumed by CIRNAC.

The CAM-D site consisted of a module train, warehouse, garage, Inuit house, petroleum, oil, and lubricant (POL) tanks, Quonset huts, storage pads, a radar tower, and an airstrip. At the time of the 1994 site assessment, only the garage and POL pump house remained. All others had been demolished or removed. Between 1992 and 1995 the Department of National Defense (DND) constructed an unmanned Short Range Radar (SRR) facility approximately 1 km east of the former the CAM-D site.

Approximately 371 m^3 of soils with concentrations of metals, polychlorinated biphenyls (PCBs), petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs), which exceeded the AMSRP, were identified at the site during a soil investigation in 1994 by the Environmental Sciences Group at the Royal Military College. The Tier I contaminated soil was placed as intermediate fill in the non-hazardous landfill and the Tier II contaminated soil was shipped off site for disposal.

A total of 58 m^3 of hazardous materials was identified at the site. Hazardous materials identified at the site included batteries, lead, asbestos and PCB amended paint. Approximately 40 m^3 of the hazardous materials was observed to be painted with PCB/lead amended paint. All hazardous material was shipped off site for disposal. A total of 745 m^3 of non-hazardous waste has been identified at the site. Approximately 9,000 empty barrels were identified throughout the site, many of which were located in one of the five dumps found at CAM-D. Remediation took place at the site between 2008 and 2011.

The NHWL was constructed at the site in 2010 and closed in the fall of 2011. It was designed to contain non-hazardous materials only. The NHWL consists of four perimeter berms constructed of granular material. The waste was placed in the landfill in layers consisting of 0.5 m lifts of waste covered by 0.15 m of granular fill. The waste layers were compacted and a final cover consisting of a minimum of 1.0 m of granular fill was used to cap the landfill. The NHWL contains the following:

- Tier I Contaminated soil (i.e. soil with lead concentration up to 500 parts per million (ppm) and PCB concentrations up to 5 ppm;
- PHC fractions F3 and F4 contaminated soil;
- Non-Hazardous demolition debris such as timbers, plywood, and sheet metal;
- Non-hazardous site debris such as scrap metal and wood;
- Non-hazardous debris/soil excavated from landfills;
- Creosote timbers; and
- Double-bagged asbestos

The presence of permafrost and shallow groundwater depth make it unlikely that groundwater would ever be used for drinking water in this area.

2.2 Baseline Soil and Groundwater Data

Soil and groundwater data collected during the remediation was not available. Baseline soil and groundwater data for the purposes of this report are the results collected in 2012, Year 1 of the LTM Plan at CAM-D Simpson Lake.

2.2.1 Groundwater

In 2010, four monitoring wells (MW01 – MW04) were installed around the NHWL. No groundwater data is available from the year of installation. Groundwater samples have been collected from monitoring wells MW01, MW03, and MW04 in 2012, 2014, and 2016 which represent Years 1, 3, and 5 of the LTM Plan. Groundwater data is only available for MW02 in years 2012 and 2014.

For purposes of the 2016, Year 5 LTM Report, Arcadis considered baseline data to be 2012 and 2014 so that upper limit of acceptability (ULA) criteria could be calculated for all parameters. PHCs and PCBs have never been detected in groundwater at the site, however many metal exceedances have been reported including cadmium, copper, molybdenum, selenium, uranium, and zinc.

2.2.2 Soil

In 2012, Franz Environmental Inc. collected 11 soil samples surrounding the NHWL and submitted them for analysis of PHCs, PCBs, and metals. No soil samples were taken during remediation at the site and as a result, the 2012 analytical results are considered to be baseline soil data for the site.

PHCs and PCBs were not detected in any soil samples and all metal concentrations were reported blow applicable federal criteria.

2.3 Previous Monitoring Programs

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

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

To become familiar with the site, SLR reviewed the following reports pertaining to the site:

- *Long Term Monitoring, 2016, CAM-D Simpson Lake, Nunavut*, Final Report, dated February 3, 2017 by Arcadis Canada Inc.
- *CAM-D Simpson Lake Long-Term Monitoring Plan,* dated February 22, 2010 by INAC.
- *Abandoned Military Site Remediation Protocol,* dated March 2009 by INAC, Contaminated Sites Program.

The monitoring plan at CAM-D Simpson Lake began in 2012. **Tables 1 to 7** at the end of this report show historic groundwater data from 2012 to 2016 and historic soil data from 2012. Additional monitoring at an increased frequency was recommended by Arcadis after Year 5 of the LTM Plan due to features identified at the NHWL including cracking and erosion.

3.0 REGULATORY GUIDELINES

3.1 Groundwater

3.1.1 Baseline Samples

In the absence of groundwater criteria in the CAM-D Simpson Lake LTM Plan, analytical data for groundwater was compared to historical data according to the AMSRP guidance for post-construction monitoring. The AMSRP provides the following guidance for the assessment of groundwater:

Table 3-1: AMSRP Groundwater Monitoring Guidance

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 two 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 acceptable, in downgradient water bodies within 300 m	Assess causes of increasing contaminant concentrations. Evaluate whether remediation is required.	Assess cause of contaminant concentrations. Develop and implement a remedial plan.

The means and standard deviations of all baseline data (2012 to 2014) have been obtained for comparison with the results of the most recent monitoring event (2018). Acceptable values (ULA criteria) were calculated for groundwater results as the mean +/- three times the standard deviation of each analytical parameter. However, baseline data is sparse and for many parameters, there were insufficient data to calculate means and standard deviations. This is due

to the fact that these parameters were either not detected in the samples or were not analyzed for during baseline monitoring.

3.1.2 Federal Interim Groundwater Guidelines

In May 2010, Environment and Climate Change Canada (ECCC) under Federal Contaminated Sites Action Plan (FCSAP) released the *Federal Interim Groundwater Quality Guidelines* (FIGQG) for Federal Contaminated Sites. The guidelines were developed to assist federal custodians in assessing, remediating, and managing federally contaminated sites funded under the FCSAP. These guidelines are intended as an interim measure until Canadian Groundwater Quality Guidelines are available. The FIGQGs were most recently updated in June 2016.

The FIGQGs follow a tiered framework, consistent with the Canadian Soil Quality Guidelines (CSQGs) 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.

With consideration to surrounding land use, Table 2 in the FIGQGs, Generic Guidelines for Residential/Parkland Land Uses, Tier 1 Lowest Guideline for coarse-grained soil (FIGQGs, Table 2, and Tier 1) were reference for comparison purposes in this study.

3.2 Surface Water

No baseline surface water samples have been collected at the CAM-D Simpson Lake site. As such, there is no baseline analytical data to compare the 2018 surface water analytical results to and ULA criteria could not be calculated. The surface water sample was taken at the recommendation of the CIRNAC representative to assess the parameters of a surface water body that is situated to the north of the NHWL. The surface water body has been present at the site since at least 2016, as recorded on a map. Results of the analyses were compared to federal guidelines as described below.

3.2.1 Canadian Water Quality Guidelines for the Protection of Aquatic Life

Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG-PAL) are nationally approved limits of substances and other physical attributes (such as pH and temperature) in the water column where no adverse toxic effects are expected. The guidelines are a set of management tools developed to ensure that the introduction of toxic substances, do not lead to the degradation of Canadian fresh and marine waters. The CWQG-PAL were developed to provide basic scientific information about the effects of water quality variables and natural and anthropogenic substances on aquatic life.

The original document was published in 1991 by the Canadian Council of Ministers of the Environment (CCME) and has since been revised. The guidelines have been produced for both freshwater and marine aquatic life; freshwater defined as water with total dissolved salt content

equal or lower to 1000 ppm and marine water defined as water with total dissolved salt concentrations greater than 5000 ppm.

Additionally, two further derivations are considered in the guidelines: short-term and long-term exposure. Short-term guidelines are meant to estimate severe effects, such as spills, on aquatic life whereas long-term guidelines are mean to protect against all negative effects during indefinitely exposures.

As the NHWL at each site is a permanent structure, all surface water analytical results will be compared to the long-term exposure guidelines.

3.3 Soil

3.3.1 Baseline Samples

Similar to groundwater, analytical data for soil was compared to historical data according to the AMSRP (INAC, 2009) guidance for post-construction monitoring.

Baseline soil samples were collected in 2012 and ULA criteria have been derived from these analytical results. No soil samples have been collected since at CAM-D Simpson Lake.

While no soil was sampled during the 2018 monitoring event and as a result no 2018 analytical data is available, this method of comparison should continue to be used for monitoring events.

3.3.2 CCME - Environmental Quality Guidelines

The following CCME guidelines have been referenced in previous monitoring reports with respect to soil analytical results:

- *CSQGs for the Protection of Environmental and Human Health* (CCME, 1999, with updates) for residential/parkland use, including fact sheets for BTEX, non-potable water, coarse-grained soil.
- *Canada-Wide Standard (CWS) for Petroleum Hydrocarbons in Soil* (CCME, 2008a) – Tier 1 Residential/Parkland, coarse-grained soil, non-potable groundwater.

The rationale for choosing these particular criteria is based on the fact that the groundwater at CAM-D is not used for drinking purposes (non-potable) and coarse-grain material was assumed based on field observations as well as conservative reasons –criteria for coarse-grain soils are general more stringent than those applied to fine grain soils.

As described above, while no soil was sampled during the 2018 monitoring event, these guidelines should be used for the analysis of future analytical results.

4.0 INVESTIGATIVE METHODOLOGY

The visual inspection was carried out by Donovan Kitt, P.Eng. and the surface water sampling was carried out by Dalen Peterson, B.Sc. CIRNAC representative Jean Allen was present during the sampling and inspection activities and the crew was accompanied by Joanasie Ukuqtuunuaq, resident of Gjoa Haven, who acted as the wildlife monitor and provided knowledge on the region. The site was accessed with a de Havilland Twin Otter operated by

Summit Air. On the day of the site visit, August 16, 2018, air temperature was 1 degree Celsius and conditions were partly cloudy and windy.

A copy of the field notes is available in **Appendix B.**

4.1 Health and Safety Plan

Before commencement of the field activities, a detailed Health and Safety Plan (HASP) was created for CAM-D Simpson Lake that provided emergency contact information, emergency response plans, hazard identification, and hazard mitigation and prevention strategies.

The HASP was approved by SLR's internal Health and Safety Officer, Phil Folkersen, and by CIRNAC prior to field activities. The HASP was brought to site with field staff and its contents were discussed with the wildlife monitor and Summit Air pilots before visiting the CAM-D Simpson Lake site. A copy of the HASP has been retained on file at SLR and at the CIRNAC Nunavut Regional Office.

4.2 Non-Hazardous Waste Landfill Monitoring

A visual inspection of the NHWL was conducted at the CAM-D Simpson Lake site. The objectives of the visual inspections of the NHWL included:

- Visual inspection of the landfill caps and observing for areas of settlement, erosion, frost action, sloughing and cracking, animal burrows, vegetation re-establishment and percentage of cover, vegetation stress, soil or water staining, odours, seepage points or ponded water, exposed debris, condition of monitoring instruments, the condition of the wells, and any other features that may affect the integrity of the landfills;
- Opportunistic observations of wildlife presence, signs and droppings;
- Photographic records noting the scale, and directional viewpoints to substantiate all recorded observations. Observations will be mapped and annotated to show the location and size with regards to the landfill; and
- Provide all AutoCAD / GIS files associated with the site.

4.3 Natural Environment Monitoring

Natural environment data was collected during the 2018 CAM-D Simpson Lake site visit. The specific data collected included:

- Wildlife sightings (species, number, gender, etc.)
- Evidence of recent wildlife presence (droppings, tracks, feathers, etc.)
- Wildlife activity (nesting, denning, migrations)
- Qualitative assessment of relative numbers
- Revegetation of disturbed areas

This information was collected with the assistance of the wildlife monitor Joanasie Ukuqtuunuaq, who is familiar with the area.

4.4 Groundwater Sample Collection

All four wells (MW01, MW02, MW03, and MW04) were frozen and as a result, no groundwater samples were collected during the 2018 sampling event.

During future monitoring events, the following methodology should be employed to retain consistency with previous sampling programs.

Water level and depth of well should be recorded to calculate approximate well volume. Monitoring wells should be purged of three well volumes prior to sampling where available and water saved in case of the event of limited volumes and low recharge rates. Water quality parameters such as temperature, dissolved oxygen, conductivity, pH, and turbidity should also be recorded where available.

Following purging, samples should be collected using a peristaltic pump and dedicated, disposable, polyethylene tubing. A low-flow sampling methodology should be employed to ensure extraction rate does not exceed recovery rate. The following parameter stabilization guidelines should be utilized where available prior to sampling:

- pH +/- 0.2 units
- Temperature +/- 0.1 degrees Celsius
- Conductivity +/- 3%
- Redox +/- 20mV
- D/O +/- 0.2 mg/L
- Turbidity +/- 10%

In addition to water quality parameters, flow rate, water levels, and total quantity of water removed from well both during purging and sampling should be recorded on a field sheet.

Table 4-1 contains a summary of the proposed groundwater analysis.

Table 4-1: CAM-D Simpson Lake Groundwater Sampling Plan

	Sampling Location	PHC F1 and F2 (C_6-C_{16})	Total Metals	Dissolved Metals	PCBs	Total Suspended Solids	Major Ions[1]	Routine Parameters[2]
CAM-D Simpson Lake	MW01	X	X	X	X	X	X	X
	MW02	X	X	X	X	X	X	X
	MW03	X	X	X	X	X	X	X
	MW04	X	X	X	X	X	X	X
	Duplicate	X	X	X	X	X	X	X

[1] Major ions including Calcium (Ca^{2+}), sodium (Na^{+}), magnesium (Mg^{2+}), potassium (K^{+}), strontium (Sr^{2+}), sulfate (SO_4^{2-}), chloride(Cl^{-}), bicarbonate (HCO_3^{-}), and hydroxide (OH^{-})
[2] Routine Parameters including alkalinity, hardness, total dissolved solids, total suspended solids, pH, and conductivity.

In the absence of groundwater guidelines in the CAM-D Simpson Lake LTM Plan, analytical data for groundwater should continue to be compared to historical data, AMSRP guidance, and the *Federal Interim Groundwater Quality Guidelines* (FIGQG, June 2016), Table 2 *Generic Guidelines for Residential/Parkland Land Uses*, Tier 1 Lowest Guideline Values for coarse-grained soil.

4.5 Soil Sample Collection

Soil samples were to be collected in areas that exhibit new staining, odours or stressed vegetation, along with GPS coordinates and pictures. Samples were to be collected with a shovel which will be decontaminated with a laboratory-grade biodegradable cleaner (Alconox®) and rinsed between sampling locations. Soil samples were to be collected to a maximum depth of 30 cm and packed into glass jars with minimal to no headspace. Soil samples were to be placed on ice until laboratory analysis.

Duplicate samples were to be taken for 20% of the total soil samples. All samples were to be analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX), PHC F1 to F4 (C_6-C_{50}), PCBs, and CCME metals. Table 4-2 contains a summary of the soil analyses.

Table 4-2: CAM-D Simpson Lake Soil Sampling Plan

	BTEX	PHC F1–F4	PCBs	CCME Metals[1]
Sample X	X	X	X	X
Duplicate	X	X	X	X

[1] CCME Metals include arsenic, cadmium, chromium, cobalt, copper, lead, nickel, and zinc

Due to no new areas of staining or settlement observed at the site, no soil samples were taken during the 2018 monitoring event. However, should any future soil samples be taken at the site, results should be compared to previous soil sampling monitoring results, the AMSRP original DEW Line Clean-Up Criteria guidelines, CCME Environmental Quality Guidelines for the Protection of Environmental and Human Health for Parkland and Industrial Land Use sites, and the Canada Wide Standards for Petroleum Hydrocarbons.

4.6 Surface Water Sampling

One surface water sample SW1 (and duplicate SW2) were collected at CAM-D Simpson Lake during the 2018 monitoring event. The samples were collected from a surface water body that is situated to the north of the NHWL. The surface water body has been present since at least 2016 as noted on a map previously created by Arcadis (Arcadis, 2017). See **Drawing 2** for surface water sampling location.

Surface water samples were submitted to Maxxam Analytics in Yellowknife, NT for analyses of PHC Fractions F1 and F2 (C_6-C_{16}), total metals, dissolved metals, PCBs, total suspended solids, total dissolved solids and routine parameters including major ions and hardness. Additional routine parameters including pH, conductivity, and turbidity were measured in-situ. Laboratory Certificates of Analysis are available in **Appendix C.**

Table 4-3 contains a summary of the surface water analyses.

Table 4-3: CAM-D Simpson Lake Surface Water Sampling Plan

	Inorganics[1]	PHC F1–F2	PCBs	CCME Metals[2]
Sample X	X	X	X	X

[1] Inorganics Including Hardness, pH, Nutrients, and Anions
[2] CCME Metals include arsenic, cadmium, chromium, cobalt, copper, lead, nickel, and zinc

Water quality parameters were recorded prior to filling all bottles and are available in **Appendix B**. Bottles were filled carefully to ensure no inclusion of sediment in the bottle.

The sampling of this surface water feature was not planned prior to the commencement of the site visit but should the feature still exist during future monitoring programs, the same location should be sampled for surface water analysis.

In the absence of surface water guidelines in the CAM-D Simpson Lake LTM Plan, analytical data for surface water was compared to Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life, Long-Term Exposure.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL

Field procedures were implemented to minimize the potential of cross contamination between sampling locations. Sample handling protocols were established to track and maintain the integrity of the samples. Field handling of samples was minimized by transferring samples directly into containers, when possible. Where handling is required, disposable nitrile gloves will be used at all times and changed between samples. All monitoring equipment was decontaminated prior to initial use and between each location. During groundwater sampling, disposable tubing was dedicated to the individual wells and during all sampling activities a new pair of disposable nitrile gloves was used between each sample.

Photographs were taken of all areas of interest and the scale, location, and directional view point was recorded.

5.1 Replicate Samples

A replicate sample is a sequential sample that is taken immediately following the collection of a regular sample. Replicate samples were collected for approximately 20 percent (%) of the samples collected as part of the QA/QC sampling program. This equates to one duplicate per five wells samples. Duplicates are a type of replicate sample (two of the same), and these samples provide a rough estimate of the overall variability of the field technique and laboratory analysis.

5.2 Field Blanks

Field blanks are used to evaluate for contamination resulting from the sampling technique and from exposure to the air environment of the sampling location.

For this water quality monitoring program, because there is little variability anticipated between sampling techniques used at the various sites or between their atmospheres, one field blank was collected for both the CAM-D and Ennadai Lake sites.

The field blank sample was collected at the Ennadai Lake site on August 17th, 2018 at 15:20 am.

Deionised water was included in the bottle order from Maxxam Analytics for preparation of field blanks.

5.3 Travel Blanks

A travel blank is a sample of distilled “clean” water that is prepared by the laboratory performing the analysis. The travel blank is shipped to the site and remains sealed before being shipped back to the lab for analysis. A travel blank helps to identify the presence of container or preservative contamination, and is often used when the integrity of samples is of paramount concern (e.g., in legal matters). One travel blank was used for both the CAM-D Simpson Lake and Enndai Lake sites.

5.4 Laboratory

All surface water samples were analyzed by Maxxam Analytics. Maxxam is accredited by the Canadian Association for Laboratory Accreditation (CALA) for the parameters proposed for analysis, and uses recognized methods to conduct laboratory analyses. As conveyed by the laboratory, method blanks, certified reference materials, method spikes, duplicates, surrogates and laboratory control samples are routinely analysed as part of their QA/QC programs.

5.5 Relative Percent Difference

The relative percent difference (RPD – the absolute difference between the two values, divided by the mean) of duplicate analyses is used to evaluate the sample result variability. Where the concentration of a parameter is less than five times the laboratory reportable detection limit (RDL), the results are less precise and the RPD is not calculated.

The Guidance manual for Environmental Site Characterization in Support of Human Health Risk Assessment, Volume I (CCME, 2016) recommends that RPDs for parameters of duplicate groundwater samples not exceed 40%. The guide also recommends that RPDs for laboratory duplicates not exceed 20%. Should either of these guidelines be exceeded, a potential problem may be indicated.

6.0 RESULTS

6.1 Location

The NHWL is located west of the airstrip as shown in **Drawing 1** at the end of this report. Coordinates from the top of the landfill cap are 68°35'32.32"N, 91°57'9.36"W. The monitoring wells surrounding the NHWL are located at the following coordinates:

Table 6-1: CAM-D Simpson Lake Monitoring Wells

Source Description	Latitude	Longitude
MW01	68 35 35.29	-91 58 50.51
MW02	68 35 37.35	-91 58 48.83
MW03	68 35 37.54	-91 58 54.21
MW04	68 35 35.58	-91 58 56.07

Monitoring of the landfill included visual observations to assess physical integrity including evidence of erosion, ponding, frost action, settlement, and lateral movement. Groundwater was frozen in all wells during the 2018 monitoring event and as a result, no groundwater samples were collected. Additionally, two (2) surface water samples (SW1 and duplicate / SW2) were collected in a small body of water north of the landfill. See **Drawing 2** for sampling location.

6.2 Photographic Record

The photographic record of the NHWL and surrounding areas has been completed as per the scope of work (Photos 1 to 74, Attached USB). Photographs referenced in the body of this document are included in **Appendix A.** The complete photographic record is provided in the attached USB drive.

6.3 Visual Monitoring

Visual monitoring of the NHWL, natural environment, and surrounding areas was undertaken at CAM-D Simpson Lake during the 2018 monitoring event. Checklists were utilized for NHWL and natural environment monitoring and interviews were conducted with the local wildlife monitor to understand trends and changes over time.

6.3.1 Non-Hazardous Waste Landfill

The physical integrity of the NHWL was assessed by collecting visual evidence staining, seepage, erosion, frost action, settlement, and lateral movement. Features identified in previous monitoring programs were assessed during the 2018 site visit for condition and stability. Additionally, any new features were noted for size and extent. The locations of historic features referred to in the sections below are available on **Drawing 2** at the end of this report.

The Year 7 LTM event was the result of a recommendation by Arcadis in Year 5 to increase monitoring frequency at the NHWL. This was due to certain erosional and cracking features noted during the two previous monitoring events growing in size and extent. The state of the features during the 2018 monitoring event is discussed in the sections below. Table 6-2 provides a summary of the NHWL features.

Table 6-2: CAM-D Simpson Lake NHWL Feature Summary

Feature Letter	Feature Type	Location	Extent	Description / Change Comments	Viewpoint #
A	Erosion	Top of NHWL, near S Corner	<1%	Small erosion rill, Appears to be of similar size and extent as observed in 2016	32

Feature Letter	Feature Type	Location	Extent	Description / Change Comments	Viewpoint #
B	Vegetation	NE of MW04	<1%	Grass vegetation, grown in extent since 2014, Appears to be of similar size and extent as observed in 2016	7
C	Ponded Water	Numerous areas around base of NHWL	<1%	Abundant ponded water observed in 2016, mostly dry in 2018	15, 16, 18, 52, 56
D	Ponded Water	Numerous areas around base of NHWL	N/A	Abundant ponded water observed in 2016, mostly dry in 2018	N/A
E	Erosion	100 m NE of N Corner of NHWL	N/A	Significant distance from NHWL, Slumping and solifluction, Appears to be of similar size and extent as observed in 2016	N/A
F	Settlement	SW Berm	<1%	Horizontal cracking, Appears to be of similar size and extent as observed in 2016	7
G	Settlement	NW Berm	<1%	Horizontal cracking, Appears to be of similar size and extent as observed in 2016	9
H	Erosion	NE Berm	<1%	Erosion rill, Appears to have grown in size and extent since 2016	1 - 4
I	Settlement	E Corner	<1%	Pothole, Similar size and extent as observed in 2016.	N/A
J	Settlement	SE Berm	<1%	Horizontal cracking, Appears to be of similar size and extent as observed in 2016	6, 28
K	Settlement	NE Berm	<1%	Horizontal cracking, Appears to have grown in size and extent since 2016	1, 2, 3
L	Settlement	NE Berm	<1%	Horizontal cracking, Appears to have grown in size and extent since 2016	2, 3

Feature Letter	Feature Type	Location	Extent	Description / Change Comments	Viewpoint #
M	Settlement	N Corner	<1%	Pothole, Similar size and extent as observed in 2016.	3
N	Settlement	Mid-SW Berm, at toe	<1%	Horizontal cracking at toe, Appears to be of similar size and extent as observed in 2016	7, 32
O	Debris	N Corner	<1%	Metal debris exposed, Observed in 2018, Similar to what was observed in 2016	8
P	Debris	Landfill Cap, near W Corner	<1%	Plastic wire exposed, Observed in 2018, Similar to what was observed in 2016	44

Staining

No new areas of staining were observed during the 2018 site visit. Additionally, no historical staining features have ever been noted at the CAM-D Simpson Lake NHWL.

Seepage Points

Historically, significant ponded water has been observed surrounding the landfill. However, this ponded water did not appear to be the result of seepage from the landfill and was attributed to recent rainfall events in the area.

Ponding surrounding the landfill was observed to a lesser extent in 2018. No ponded water or seepage was observed on or immediately around the NHWL. A surface water sample was collected in a pond north of the NHWL (**Photo 18, Appendix A**).

Settlement

A small pothole was observed during the 2016 monitoring event at the base of the east corner of the NHWL. This feature was observed in 2018 but is not considered to impact the integrity of the landfill.

Many depressions are located on the landscape surrounding the NHWL and are thought to be naturally occurring (**Photos 15, 18, and 19, Appendix A**). Many of these depressions were filled with ponded water during the last site visit but have since dried. Cracking in the sediment is observed where ponded water has evaporated. The settlement does not appear to have grown in size since the last monitoring event.

Erosion

Erosional features have been previously noted on the SW and NE flanks of the NHWL. These features were observed in 2018 but appear to be of similar size and extent as observed previously **(Photo 3, Appendix A, Photo 32, Attached USB).**

Additional erosional features were noted on the NW flank **(Photo 9, Appendix A)**, and the SW flank **(Photo 7, Appendix A).** These erosional features are characterized by exposed cobbles, runnels, and minor sediment slumping. Currently, these features do not appear to be impacting the integrity of the landfill.

Erosion was noted on the access road leading from the airstrip to the NHWL **(Photo 20, Appendix A).** The erosion does not currently pose any access issues to the NHWL.

Frost Action

Evidence of frost action or cracking was observed on all flanks of the NHWL **(Photos 1-7, Appendix A).** Comparison with photographs from the 2016 monitoring event reveals cracking on the NE side of the NHWL appears to have grown in size and extent.

The previous monitoring report classified the NWHL as marginal with respect to these cracking features, meaning the physical performance appears to be deteriorating with time. Currently, the cracks do not expose any debris from the NHWL and no not appear to impact the landfill stability to date. However, these cracks should be monitored closely during future monitoring events as potential for failure is assessed at low to moderate.

Evidence of Burrows

Siksik burrows were identified near a culvert on the access road leading to the airstrip **(Photo 21, Appendix A)**. No other evidence of burrowing was identified.

Re-establishment of Vegetation

Re-establishment of vegetation is likely to take a significant amount of time due to the coarse materials used to construct the landfill (i.e. coarse gravel) and due to the fact that the growing season is short in northern regions. Vegetation regrowth was observed on the SW flank of the NHWL; however, cover is still less than 5% **(Photo 7, Appendix A).**

Grasses are beginning to grow surrounding all sides of the NHWL, but particularly in areas where ponded water exists **(Photo 18, Appendix A).**

Debris

Exposed debris was observed in multiple areas on and surrounding the NHWL. A pile of metal debris was observed NE of the NHWL **(Photo 19, Appendix A)**. The debris appears as though it may be situated in an area of previously ponded water. The debris does not appear to be associated with the NHWL.

In 2016, a small metal wire was observed to be protruding from the NW edge of the cap. This feature was observed in 2018 but does not appear to have migrated or grown in size or extent **(Photo 44, Attached USB)**.

Discussion

All 2018 physical observations indicate that the NHWL is performing as designed and is containing the enclosed waste. The features noted above to not appear to be compromising the physical integrity of the NHWL at present. Overall, the landfill appears to be in similar condition

as noted in previous years with the exception of several areas where frost cracking has widened or depended, particularly on the NE flank of the NHWL. These features should be continually monitored during future monitoring events as future deterioration could lead to potential failure of NHWL. The cap of the landfill is flat, with no indication of settlement or erosion occurring.

Soil samples were not collected during the 2018 site visit due to no new areas of staining or other anomalies being observed. A surface water sample was collected from an area of ponded water north of the NHWL. This area of ponded water has been observed during previous monitoring events but a surface water samples has not been collected at this location previously. The ponded water does not appear to be associated with seepage from the NHWL.

It is recommended that monitoring continue as per the increased schedule set out in the Year 5 LTM Report (Arcadis, 2016).

6.3.2 Natural Environment

Information regarding the natural environment was gathered directly through site observations and through interviews with Joanasie Ukuqtuunuaq, resident of Gjoa Haven and wildlife monitor.

No wildlife was observed during the site visit. Caribou tracks and scat, goose tracks, and siksik burrows were observed on the access road and areas surrounding the NWHL (**Photo 21, Appendix A).**

Various grasses were located on the ground surface surrounding the NHWL and on the SW slope of the NHWL. No stress to vegetation was observed anywhere on site.

6.3.3 Surrounding Areas

As proposed, a brief visual inspection of the areas surrounding the site was completed during the Year 7 monitoring event.

The access road leading from the airstrip to the NHWL continues to erode although the erosion does not pose any access issues at the moment **(Photo 20, Appendix A).** A culvert that was created out of old drums is located along the access road to the NHWL. The culvert itself appears to be in good condition, but cracking is noted along the road in the area where the culvert is buried **(Photo 21, Appendix A).** The airstrip appears to be in good condition and no issues were noted.

6.4 Results – Groundwater

6.4.1 General

All four monitoring wells (MW01, MW02, MW03, and MW04) were frozen and no samples were collected during the 2018 site visit. All four of the wells surrounding the NHWL are showing signs of potential jacking as the well monuments appear to have risen above the ground surface (**Photos 22 A and B, Appendix A**).

During the site visit, the lock on each of the monitoring wells was cut and replaced with a new lock. The keys to all wells at both sites are in possession of CIRNAC personnel.

6.5 Results – Soil

6.5.1 General

Historically, soil samples were only collected during the 2012 (Year 1) monitoring event. Soil was analyzed for PHCs, PCBs, and metals. The soil analytical results from 2012 are available in **Tables 5 to 7** at the end of this report.

A review of images from the 2016 monitoring event, and communications with the CIRNAC representative suggest that the NHWL is in comparable shape to previous years and does not show any evidence of present or historic staining.

As a result, no soil samples were collected at CAM-D during the 2018 sampling program.

6.6 Results – Surface Water

One surface water sample (SW1) and a duplicate (SW2) were collected from a depression north of MW03 that appeared to receive runoff originating from the NHWL cap that runs down the northwest flank. In-situ field indicator parameters were measured with an Aqua TROLL 600 Multiparameter Sonde. All sample bottles were filled and submitted for analysis. A total of 4 L of water was collected for the sample and duplicate.

No surface water samples have ever been collected at CAM-D Simpson Lake and as a result, the 2018 surface water analytical data could not be compared to ULA criteria. Instead, surface water results have been compared to CWQG-PAL guideline values.

All PCB, PHC, and inorganic concentrations were reported below detection limits. Several dissolved metal and total metal parameter concentrations exceeded criteria set out by the CWQG-PAL. The exceedances are as follows:

Table 6-3: 2018 Surface Water Exceedances at CAM-D Simpson Lake

	Parameter	CWQG-PAL Criteria (µg/L)	Concentration (µg/L)
SW1	Total Aluminum	100[1]	180
	Total Copper	2.3[2]	3.1
	Dissolved Copper	2.3[2]	2.8
SW2 (Duplicate)	Total Aluminum	100[1]	160
	Total Copper	2.3[2]	2.8
	Dissolved Copper	2.3[2]	2.3

[1] Calculated standard based on CCME Water Quality for the Protection of Aquatic Life guidelines –calculated using water pH as recommended by the FIGQG (2010).
[2] Calculated standard based on CCME Water Quality for the Protection of Aquatic Life guidelines –calculated using water hardness ($CaCO_3$) as recommended by the FIGQG (2010).

As this is the first monitoring program where a surface water sample has been collected, it is difficult to draw conclusions on whether the surface water exceedances noted above are representative of background conditions or if these exceedances represent an issue related to the erosional features or the NHWL itself. It is recommended that surface water sampling occur in the same location during future monitoring programs. Should concentrations increase, additional sampling measures surrounding the NHWL may be required.

6.7 QA/QC Results

6.7.1 Duplicate Samples – Relative Percent Difference

One (1) field duplicate sample was collected from the surface water body where SW1 was collected at CAM-D Simpson Lake and was analysed for general parameters, total metals, dissolved metals, BTEX/PHCs, and PCBs. RPD values were calculated where analyte concentrations were greater than five times the RDL.

All results for PCBs and BTEX/PHCs were below the RDL (non-detect) for all parameters, therefore no RPD values were calculated.

Two parameters exceeded the 40% RPD criterion: total nickel and dissolved titanium. However, neither of these parameters report concentrations five times above the RDL and are therefore not considered to be QAQC concerns. The remaining analyses fall within RPD quality targets.

A complete list of detection limits and RPD values for all parameters is available in **Tables 8 to 12** at the end of this report.

6.7.2 Field Blank

One (1) field blank was collected for both the CAM-D Simpson Lake and Ennadai Lake sites. The field blank was filled on August 17, 2018 at 15:20 at the Ennadai Lake site using laboratory supplied deionized water.

All field blank results were below the RDL (non-detect) for all parameters with the exception of copper, aluminum, and titanium. However, none of these parameters reported concentrations above five times the reportable detection limit and are therefore not considered to be a QAQC concern.

Complete field blank results are available in **Tables 8 to 12** at the end of this report.

6.7.3 Trip Blank

One (1) trip blank was collected for both the CAM-D Simpson Lake and Ennadai Lake sites. The trip blank was filled with laboratory supplied deionized water and sealed prior to SLR taking possession.

All trip blank results were below the RDL (non-detect) for all parameters.

Complete field blank results are available in **Tables 8 to 12** at the end of this report.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Observations made during the 2018 CAM-D Simpson Lake site visit indicate that the NHWL is performing as designed and effectively containing the enclosed waste. Several areas of erosion and cracking are observed on all sides of the NHWL, but particularly on the NE and SW flanks. These features appear to have grown in size and extent compared to previous monitoring programs.

Several areas of ponded water have been historically noted to be surrounding the NHWL. Many of these water bodies have since evaporated but one remained north of the NHWL. A surface water sample was collected at this ponded water feature and results were compared to CWQG-PAL criteria. The cap appears to be flat and in good condition with no signs of settlement. Several areas of debris were noted around the NHWL but they do not appear to impact the integrity of the NHWL at this time. No soil samples were collected during the 2018 monitoring event.

Access to site was via Twin Otter provided by Summit Air. The access road to the NHWL was in overall good condition, with some signs of erosion. Access to the site is not currently hindered by the presence of this erosion.

All monitoring wells were frozen during the 2018 monitoring event, and as a result, no groundwater analytical results are available. Results of the surface water analysis revealed CWQG-PAL exceedances of aluminum and copper concentrations. However, because surface water has never been collected at the site, it is unknown if these concentrations represent background conditions, or if they are related to the NHWL. Future surface water monitoring should continue at the same location.

All monitoring wells surrounding the NHWL showed potential signs of frost jacking and should be monitored during future monitoring programs as repair may be required. The locks were replaced on all wells and the keys remain in the possession of the CIRNAC representative.

Based on the results of the Year 7 LTM event at CAM-D Simpson Lake, SLR recommends continued increased frequency of monitoring as first recommended by Arcadis in the 2017 LTM Report. This is due to features such as cracking and erosion increasing in size and extent on and surrounding the NHWL. While currently in acceptable condition, the growth of these features may compromise the integrity of the landfill and pose the potential for failure. Additionally, because many groundwater exceedances were reported during the Year 5 monitoring event in 2016, and no groundwater samples were collected in 2018, it is recommended that increased monitoring continue as previously recommended by Arcadis. The next monitoring event, Year 9, should be scheduled for 2020. No further action is recommended at this time.

8.0 LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SLR for Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) and completed in compliance with Contract Number 4500381248. Under the CIRNAC Standing Offer 4600000874, CIRNAC has the exclusive right to copy and redistribute this report.

This report has been prepared for specific application to this site and site conditions existing at the time work for the report was completed. Any conclusions or recommendations made in this

report reflect SLR's professional opinion based on limited investigations including: visual observation of the site, surface and subsurface investigation at discrete locations and depths, and laboratory analysis of specific chemical parameters. The results cannot be extended to previous or future site conditions, portions of the site that were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters and materials that were not addressed. Substances other than those addressed by the investigation may exist within the site; and substances addressed by the investigation may exist in areas of the site not investigated in concentrations that differ from those reported. SLR does not warranty information from third party sources used in the development of investigations and subsequent reporting.

Nothing in this report is intended to constitute or provide a legal opinion. SLR expresses no warranty to the accuracy of laboratory methodologies and analytical results. SLR makes no representation as to the requirements of compliance with environmental laws, rules, regulations or policies established by federal, provincial or local government bodies. Revisions to the regulatory standards referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary.

CIRNAC may submit this report to the Nunavut Water Board and/or related Nunavut environmental regulatory authorities or persons for review and comment purposes.

9.0 REFERENCES

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TABLES

Crown-Indigenous Relations and Northern Affairs Canada
Contaminants and Remediation Division

CAM-D Simpson Lake Long-Term Monitoring Event
Kivalliq Region, Nunavut
SLR Project No.: 209.40585.00000

Table 1 - Historical GW Analytical Results - BTEX and Hydrocarbons

PARAMETER / Sample ID / Date	FIGQGs[1]	Upper Limit of Acceptability[2]	Lowest RDL	MW01						MW02		MW03				MW04			
				8/7/2012	8/7/2012	8/23/2014	8/23/2014	8/20/2016	8/20/2016	8/23/2014	8/20/2016	8/7/2012	8/7/2012	8/23/2014	8/20/2016	8/7/2012	8/7/2012	8/23/2014	8/20/2016
BTEX & F1 Hydrocarbons (µg/L)					Lab Dup.		Duplicate		Duplicate				Lab Dup.				Duplicate		
Benzene	140	NC	0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.20	<0.40	<0.20	---	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40
Toluene	83	NC	0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.20	<0.40	<0.20	---	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40
Ethylbenzene	11000	NC	0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.20	<0.40	<0.20	---	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40
o-Xylene	ns	NC	0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.20	<0.40	<0.20	---	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40
p+m-Xylene	ns	NC	0.40	<0.40	<0.40	<0.40	<0.40	<0.80	<0.80	<0.40	<0.80	<0.40	---	<0.40	<0.80	<0.40	<0.40	<0.40	<0.80
Total Xylenes	3900	NC	0.40	<0.40	<0.40	<0.40	<0.40	<0.80	<0.80	<0.40	<0.80	<0.40	---	<0.40	<0.80	<0.40	<0.40	<0.40	<0.80
F1 (C6-C10)	810	NC	25	<25	<25	<25	<25	<100	<100	<25	<100	<25	---	<25	<100	<25	<25	<25	<100
F1 (C6-C10) - BTEX	ns	NC	25	<25	<25	<25	<25	<100	<100	<25	<100	<25	---	<25	<100	<25	<25	<25	<100
F2-F4 Hydrocarbons (mg/L)																			
F2 (C10-C16 Hydrocarbons)	1300	NC	0.10	<100	---	<100	<100	<0.10	<0.10	---	<0.10	<100	<100	<100	<0.10	<100	<100	<100	<0.10
F3 (C16-C34 Hydrocarbons)	ns	NC	0.20	<100	---	<200	<200	<0.20	<0.20	---	<0.20	<100	<100	<200	<0.20	<100	<100	<200	<0.20
F4 (C34-C50 Hydrocarbons)	ns	NC	0.20	<100	---	<200	<200	<0.20	<0.20	---	<0.20	<100	<100	<200	<0.20	<100	<100	<200	<0.20
Reached Baseline at C50	ns	NC	N/A	Yes	---	Yes	Yes	Yes	Yes	---	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

µg/L - micrograms per Litre
mg/L - milligrams per litre
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated
RDL - Reporting Detection Limit

[1] Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1, Freshwater life pathway for coarse grained soils.
[2] Upper Limit of Acceptability is determined as described in Report Section 3.2.1. Upper limits of acceptability are calculated using mean of baseline data +3 standard deviations.

Bold & Red	FIGQG Exceedence
Bold, Red, & Outlined	ULA Exceedance
Highlighted	DL > Criteria

Table 2 - Historical GW Analytical Results - PCBs

PARAMETER / Sample ID / Date	FIGQGs[1]	Upper Limit of Acceptability[2]	MW01					MW02		MW03				MW04			
			8/7/2012	8/23/2014	8/23/2014	8/20/2016	8/20/2016	8/23/2014	8/20/2016	8/7/2012	8/7/2012	8/23/2014	8/20/2016	8/7/2012	8/7/2012	8/23/2014	8/20/2016
PCBs (µg/L)					Duplicate		Duplicate				Lab Dup.				Duplicate		
Aroclor 1016	ns	NC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05
Aroclor 1221	ns	NC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05
Aroclor 1232	ns	NC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05
Aroclor 1242	ns	NC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05
Aroclor 1248	ns	NC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05
Aroclor 1254	ns	NC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05
Aroclor 1260	ns	NC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05
Aroclor 1262	ns	NC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05
Aroclor 1268	ns	NC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05
Total PCB	ns	NC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05

Notes:

µg/L - micrograms per Litre
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated
RDL - Reporting Detection Limit

[1] Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1, Freshwater life pathway for coarse grained soils.
[2] Upper Limit of Acceptability is determined as described in Report Section 3.2.1. Upper limits of acceptability are calculated using mean of baseline data +3 standard deviations.

Bold & Red	FIGQG Exceedence
Bold, Red, & Outlined	ULA Exceedance
Highlighted	DL > Criteria

Table 3 - Historical GW Analytical Results - Total and Dissolved Metals

PARAMETER		Guidelines			Lowest RDL	MW01										MW02				MW03						MW04							
Sample ID		FIGQGs[1]	Upper Limit of Acceptability[2]																													
Date						8/7/2012	8/7/2012	8/23/2014	8/23/2014	8/23/2014	8/23/2014	8/20/2016	8/20/2016	8/20/2016	8/20/2016	8/23/2014	8/23/2014	8/19/2016	8/19/2016	8/7/2012	8/7/2012	8/23/2014	8/23/2014	8/19/2016	8/19/2016	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/23/2014	8/23/2014	8/19/2016	8/19/2016
Metals	Units	Total	Total	Dissolved		Total	Dissolved	Total	Duplicate	Dissolved	Duplicate	Total	Duplicate	Dissolved	Duplicate	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Duplicate	Dissolved	Duplicate	Total	Dissolved	Total	Dissolved
Aluminum (Al)	mg/L	0.1	NC	NC	0.003	NA	NA	NA	NA	NA	NA	0.022	0.023	0.0079	0.0071	NA	NA	0.063	0.0061	NA	NA	NA	NA	**1.2**	0.023	NA	NA	NA	NA	NA	NA	**5.9**	**0.83**
Antimony (Sb)	mg/L	2.0	NC	NC	0.00060	NA	NA	NA	NA	NA	NA	0.0016	0.0016	0.0014	0.0014	NA	NA	<0.00060	<0.00060	NA	NA	NA	NA	<0.00060	<0.00060	NA	NA	NA	NA	NA	NA	<0.00060	<0.00060
Arsenic (As)	mg/L	0.005	0.006	0.006	0.0002	0.0037	0.0039	0.0042	0.0037	0.0031	0.0031	0.0026	0.0027	0.0026	0.0026	0.00052	0.00035	0.00041	0.00029	0.0016	0.0016	0.0011	0.00082	0.0017	0.0013	0.00044	0.00042	0.00045	0.00036	0.00072	0.00055	0.0016	0.0013
Barium (Ba)	mg/L	0.5	NC	NC	0.01	NA	NA	NA	NA	NA	NA	0.011	0.011	<0.010	<0.010	NA	NA	0.011	<0.010	NA	NA	NA	NA	0.039	0.029	NA	NA	NA	NA	NA	NA	0.039	0.014
Beryllium (Be)	mg/L	0.0053	NC	NC	0.001	NA	NA	NA	NA	NA	NA	<0.0010	<0.0010	<0.0010	<0.0010	NA	NA	<0.0010	<0.0010	NA	NA	NA	NA	<0.0010	<0.0010	NA	NA	NA	NA	NA	NA	<0.0010	<0.0010
Boron (B)	mg/L	5	NC	NC	0.02	NA	NA	NA	NA	NA	NA	0.073	0.072	0.073	0.072	NA	NA	0.049	0.047	NA	NA	NA	NA	0.067	0.063	NA	NA	NA	NA	NA	NA	0.063	0.058
Cadmium	**ug/L**	0.017	1.4	0.24	0.02	**0.18**	**0.130**	**0.23**	**0.20**	**0.17**	**0.18**	**0.043**	**0.072**	**0.051**	**0.063**	**0.030**	**0.026**	**0.026**	**<0.020**	**1.1**	**0.061**	**0.053**	**0.046**	**<0.020**	**<0.020**	**0.075**	**0.064**	**0.042**	**0.039**	**0.024**	**0.023**	**<0.020**	**<0.020**
Calcium (Ca)	mg/L	ns	NC	NC	0.3	NA	NA	NA	NA	NA	NA	67	67	66	66	NA	NA	96	93	NA	NA	NA	NA	60	55	NA	NA	NA	NA	NA	NA	26	24
Chromium (Cr)	mg/L	0.0089	0.0035	0.0018	0.0010	0.0018	0.0016	0.0029	**0.0036**	<0.001	<0.001	0.0011	0.0011	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.001	<0.001	0.0012	<0.0010	0.0029	<0.0010	<0.001	<0.001	<0.001	<0.001	0.0011	<0.0010	**0.0065**	<0.0010
Chromium VI (6+)	mg/L	ns	NC	NC	0.0010	NA	NA	NA	NA	NA	NA	<0.0010	<0.0010	NA	NA	NA	NA	<0.0010	NA	NA	NA	NA	NA	<0.0010	NA	NA	NA	NA	NA	NA	NA	<0.0010	NA
Cobalt (Co)	mg/L	ns	0.0014	0.0010	0.0003	0.00044	0.00042	0.0012	0.001	0.0008	0.00082	0.00063	0.00062	0.00059	0.00059	0.00044	0.00031	0.00089	0.00085	0.00044	<0.0003	0.00052	0.00042	0.0010	0.00031	0.0005	0.00049	0.00041	0.00042	<0.00030	<0.00030	0.0015	<0.00030
Copper (Cu)	mg/L	0.002-0.004	0.065	0.055	0.0002	**0.012**	**0.011**	**0.038**	**0.032**	**0.027**	**0.027**	**0.02**	**0.02**	**0.012**	**0.012**	**0.032**	**0.020**	**0.0080**	**0.0076**	**0.046**	**0.041**	**0.017**	**0.010**	**0.0071**	0.0040	**0.024**	**0.025**	**0.021**	**0.02**	**0.013**	**0.0069**	**0.013**	**0.0029**
Iron (Fe)	mg/L	0.3	NC	NC	0.060	NA	NA	NA	NA	NA	NA	<0.060	<0.060	<0.060	<0.060	NA	NA	0.10	<0.060	NA	NA	NA	NA	**2.0**	0.12	NA	NA	NA	NA	NA	NA	**4.1**	<0.060
Lead (Pb)	mg/L	0.001-0.007	0.0050	0.0042	0.0002	0.0031	0.0029	0.0029	0.0025	0.002	0.0019	0.00076	0.00079	0.00078	0.00074	0.00073	<0.00020	**0.0027**	<0.00020	0.001	0.00055	0.0004	<0.00020	0.00083	<0.00020	<0.0002	<0.0002	<0.0002	<0.0002	<0.00020	<0.00020	0.00092	<0.00020
Lithium (Li)	mg/L	ns	NC	NC	0.02	NA	NA	NA	NA	NA	NA	0.15	0.15	0.14	0.15	NA	NA	0.051	0.047	NA	NA	NA	NA	0.078	0.068	NA	NA	NA	NA	NA	NA	0.029	<0.020
Magnesium (Mg)	mg/L	ns	NC	NC	0.2	NA	NA	NA	NA	NA	NA	65	66	64	64	NA	NA	99	98	NA	NA	NA	NA	72	66	NA	NA	NA	NA	NA	NA	15	13
Manganese (Mn)	mg/L	ns	NC	NC	0.004	NA	NA	NA	NA	NA	NA	0.078	0.08	0.072	0.074	NA	NA	0.73	0.70	NA	NA	NA	NA	0.11	0.075	NA	NA	NA	NA	NA	NA	0.075	0.015
Mercury (Hg)	**ug/L**	0.026	NC	NC	0.002	NA	NA	NA	NA	NA	NA	0.0029	<0.0020	<0.0020	<0.0020	NA	NA	0.0028	<0.0020	NA	NA	NA	NA	0.0024	<0.0020	NA	NA	NA	NA	NA	NA	<0.0020	<0.0020
Molybdenum (Mo)	mg/L	0.073	NC	NC	0.0002	NA	NA	NA	NA	NA	NA	**0.085**	**0.086**	**0.083**	**0.084**	NA	NA	0.0093	0.0093	NA	NA	NA	NA	0.036	0.033	NA	NA	NA	NA	NA	NA	0.0082	0.0083
Nickel (Ni)	mg/L	0.025-0.15	0.059	0.043	0.0005	0.001	0.0094	0.045	0.040	0.033	0.032	0.03	0.03	0.026	0.027	0.0058	0.0039	0.0031	0.0028	0.0036	0.0031	0.018	0.014	0.012	0.0088	0.0075	0.0076	0.0066	0.0063	0.0038	0.0025	0.0037	0.00055
Phosphorus (P)	mg/L	ns	NC	NC	0.1	NA	NA	NA	NA	NA	NA	<0.10	<0.10	<0.10	<0.10	NA	NA	<0.10	<0.10	NA	NA	NA	NA	<0.10	<0.10	NA	NA	NA	NA	NA	NA	<0.10	<0.10
Potassium (K)	mg/L	ns	NC	NC	0.3	NA	NA	NA	NA	NA	NA	18	18	18	18	NA	NA	9.5	9.0	NA	NA	NA	NA	29	26	NA	NA	NA	NA	NA	NA	23	19
Selenium (Se)	mg/L	0.001	NC	NC	0.0002	NA	NA	NA	NA	NA	NA	**0.0049**	**0.0049**	**0.0060**	**0.0046**	NA	NA	<0.00020	0.00030	NA	NA	NA	NA	0.00039	0.00051	NA	NA	NA	NA	NA	NA	0.00036	0.00040
Silicon (Si)	mg/L	NG	NC	NC	0.1	NA	NA	NA	NA	NA	NA	4.9	4.9	4.6	4.7	NA	NA	2.8	2.6	NA	NA	NA	NA	4.5	2.4	NA	NA	NA	NA	NA	NA	7.6	0.83
Silver (Ag)	mg/L	0.0001	NC	NC	0.0001	NA	NA	NA	NA	NA	NA	<0.00010	<0.00010	<0.00010	<0.00010	NA	NA	<0.00010	<0.00010	NA	NA	NA	NA	<0.00010	<0.00010	NA	NA	NA	NA	NA	NA	<0.00010	<0.00010
Sodium (Na)	mg/L	ns	NC	NC	0.50	NA	NA	NA	NA	NA	NA	910	910	860	870	NA	NA	51	48	NA	NA	NA	NA	230	210	NA	NA	NA	NA	NA	NA	140	130
Strontium (Sr)	mg/L	ns	NC	NC	0.020	NA	NA	NA	NA	NA	NA	0.71	0.72	0.68	0.69	NA	NA	0.41	0.39	NA	NA	NA	NA	0.41	0.37	NA	NA	NA	NA	NA	NA	0.18	0.16
Sulphur (S)	mg/L	ns	NC	NC	0.20	NA	NA	NA	NA	NA	NA	620	610	590	600	NA	NA	110	100	NA	NA	NA	NA	150	130	NA	NA	NA	NA	NA	NA	61	61
Thallium (Tl)	mg/L	0.0008	NC	NC	0.0002	NA	NA	NA	NA	NA	NA	<0.00020	<0.00020	<0.00020	<0.00020	NA	NA	<0.00020	<0.00020	NA	NA	NA	NA	<0.00020	<0.00020	NA	NA	NA	NA	NA	NA	<0.00020	<0.00020
Tin (Sn)	mg/L	ns	NC	NC	0.0010	NA	NA	NA	NA	NA	NA	<0.0010	<0.0010	<0.0010	<0.0010	NA	NA	<0.0010	<0.0010	NA	NA	NA	NA	<0.0010	<0.0010	NA	NA	NA	NA	NA	NA	<0.0010	<0.0010
Titanium (Ti)	mg/L	0.1	NC	NC	0.0010	NA	NA	NA	NA	NA	NA	0.0014	0.0012	<0.0010	<0.0010	NA	NA	0.0052	<0.0010	NA	NA	NA	NA	**0.11**	<0.0010	NA	NA	NA	NA	NA	NA	**0.27**	<0.0010
Uranium (U)	mg/L	0.015	NC	NC	0.0001	NA	NA	NA	NA	NA	NA	**0.27**	**0.28**	**0.27**	**0.27**	NA	NA	**0.19**	**0.19**	NA	NA	NA	NA	**0.074**	**0.064**	NA	NA	NA	NA	NA	NA	0.0048	0.0047
Vanadium (V)	mg/L	ns	NC	NC	0.0010	NA	NA	NA	NA	NA	NA	0.001	0.0011	<0.0010	<0.0010	NA	NA	<0.0010	<0.0010	NA	NA	NA	NA	0.0047	<0.0010	NA	NA	NA	NA	NA	NA	0.0089	<0.0010
Zinc (Zn)	mg/L	0.01	0.021	0.014	0.0030	**0.012**	0.0097	**0.014**	**0.011**	0.0092	**0.011**	0.0052	0.0051	0.0034	<0.0030	0.0059	0.0065	<0.0030	<0.0030	**0.011**	0.008	0.007	0.0008	0.0069	0.0034	0.0056	0.0038	0.0033	<0.003	0.0039	0.0046	**0.011**	<0.0030

Notes:

µg/L - micrograms per Litre
mg/L - milligrams per litre
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated
RDL - Reporting Detection Limit
[1] Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1, Freshwater life pathway for coarse grained soils.
[2] Upper Limit of Acceptability is determined as described in Report Section 3.2.1. Upper limits of acceptability are calculated using mean of baseline data +3 standard deviations.
[3] Guideline depends on hardness, guideline calcuated for each sample and compared to result

Bold & Red	FIGQG Exceedence
Bold, Red, & Outlined	ULA Exceedance
Highlighted	DL > Criteria

Table 4 - Historical GW Analytical Results - Inorganics

PARAMETER		FIGQGs[1]	Upper Limit of Acceptability[2]	RDL	MW01					MW02		MW03			MW04			
Sample ID																		
Date					8/7/2012	8/23/2014	8/23/2014	8/20/2016	8/20/2016	8/23/2014	8/20/2016	8/7/2012	8/23/2014	8/20/2016	8/7/2012	8/7/2012	8/23/2014	8/20/2016
Calculated Parameters							Duplicate		Duplicate							Duplicate		
Anion Sum	meq/L	ns	NC	N/A	---	---	---	53	50	---	15	---	---	19	---	---	---	9.6
Cation Sum	meq/L	ns	NC	N/A	---	---	---	47	47	---	15	---	---	18	---	---	---	8.6
Hardness ($CaCO_3$)	mg/L	ns	NC	0.50	630	---	---	430	430	---	640	560	---	410	380	380	---	110
Ion Balance	N/A	ns	NC	0.010	---	---	---	0.88	0.93	---	0.97	---	---	0.92	---	---	---	0.90
Dissolved Nitrate (NO_3)	mg/L	13	NC	0.044	---	---	---	5.8	5.8	---	1.1	---	---	1.4	---	---	---	1.4
Nitrate plus Nitrite (N)	mg/L	ns	15	0.020	0.59	0.33	0.34	1.3	1.3	11.9	0.24	0.63	3.17	0.36	0.44	0.45	2.53	0.40
Dissolved Nitrite (NO_2)	mg/L	0.06	NC	0.033	---	---	---	<0.033	<0.033	---	<0.033	---	---	**0.18**	---	---	---	**0.25**
Misc. Inorganics																		
Conductivity	uS/cm	ns	5863	1.0	3000	4600	4700	4400	4400	1200	1400	2100	2000	1800	1300	1300	1500	990
pH	pH	6.5-9.0	7 < 9	N/A	7.98	8.16	8.22	7.96	7.98	7.91	7.60	7.85	7.93	7.86	7.43	7.50	7.90	8.47
Colour	PtCo units	ns	22	2	16	14	14	18	17	11	7.1	8	9	9.1	5	5	7	5.1
Total Dissolved Solids	mg/L	ns	4406	10	2210	3420	3410	3100	3100	802	870	1410	1350	1200	888	876	956	590
Total Suspended Solids	mg/L	ns	18	1.0	<10	14	15	8.0	5.3	<10	4.0	15	<10	**21**	<10	<10	<10	**61**
Anions																		
Alkalinity (PP as $CaCO_3$)	mg/L	ns	NC	0.50	---	---	---	<0.50	<0.50	---	<0.50	---	---	<0.50	---	---	---	1.6
Alkalinity (Total as $CaCO_3$	mg/L	ns	NC	0.50	---	---	---	460	460	---	350	---	---	260	---	---	---	99
Bicarbonate (HCO_3)	mg/L	ns	NC	0.50	---	---	---	560	560	---	430	---	---	320	---	---	---	120
Carbonate (CO_3)	mg/L	ns	NC	0.50	---	---	---	<0.50	<0.50	---	<0.50	---	---	<0.50	---	---	---	1.9
Hydroxide (OH)	mg/L	ns	NC	0.50	---	---	---	<0.50	<0.50	---	<0.50	---	---	<0.50	---	---	---	<0.50
Dissolved Sulphate (SO_4)	mg/L	100	2279	1.0	**1100**	**1700**	**1800**	**1900**	**1800**	**190**	**310**	**550**	**430**	**420**	**390**	**390**	**380**	**190**
Dissolved Chloride (Cl)	mg/L	120	286	1.0	**160**	**140**	**140**	110	110	44	65	**170**	**180**	**190**	59	59	120	**130**
Dissolved Fluoride (F)	mg/L	0.12	2	0.050	**1.07**	**0.70**	**0.71**	**0.64**	**0.67**	**0.41**	**0.93**	**1.29**	**0.67**	**1.4**	**0.31**	**0.32**	**0.34**	**1.1**
Nutrients																		
Dissolved Nitrite (N)	mg/L	0.06	0.13	0.010	0.10	0.021	<0.010	<0.010	<0.010	<0.010	<0.010	0.054	0.036	0.054	<0.010	<0.010	0.014	**0.077**
Dissolved Nitrate (N)	mg/L	13	15	0.010	0.48	0.31	0.34	1.3	1.3	11.9	0.24	0.57	3.13	0.31	0.44	0.45	2.51	0.33

Notes:

mg/L - miligrams per Litre
meq/L - milliequivalents
uS/cm - micro Siemens per centimetre
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated
RDL - Reporting Detection Limit
[1] Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1, Freshwater life pathway for coarse grained soils.
[2] Upper Limit of Acceptability is determined as described in Report Section 3.2.1. Upper limits of acceptability are calculated using mean of baseline data +3 standard deviations.

Bold & Red	FIGQG Exceedence
Bold, Red, & Outlined	ULA Exceedance
Highlighted	DL > Criteria

Table 5 - Historical Soil Analytical Results - PHCs

PARAMETER	Federal		RDL	CAM-D S1	CAM-D DUP1	CAM-D S1	CAM-D DUP1	CAM-D S2	CAM-D S2	CAM-D S3	CAM-D S3	CAM-D S4	CAM-D S4
Sample ID	CCME [1] Residential/ Parkland	CWS for PHC in Soil (<1.5 m)[2]											
Date				8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012
Depth (m)				0 - 0.15	0.-0.15	0.35-0.5	0.35-0.5	0-0.15	0.35-0.5	0-0.15	0.35-0.5	0-0.15	0.35-0.5
BTEX & F1 Hydrocarbons (µg/g)													
Benzene	0.03	ns	0.02	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	0.37	ns	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.082	ns	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o-Xylene	ns	ns	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
p+m-Xylene	ns	ns	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Total Xylenes	11	ns	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
F1 (C6-C10)	ns	ns	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F1 (C6-C10) - BTEX	ns	30 (210)	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F2-F4 Hydrocarbons (µg/g)													
F2 (C10-C16 Hydrocarbons)	ns	150 (150)	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F3 (C16-C34 Hydrocarbons)	ns	300 (300)	10	54	61	<10	<10	64	18	100	14	43	20
F4 (C34-C50 Hydrocarbons)	ns	2800 (2800)	10	13	22	<10	<10	<10	<10	96	<10	<10	<10
Reached Baseline at C50	ns	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

µg/g - micrograms per gram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated
RDL - Reporting Detection Limit

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

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

Bold & Red	CCME Exceedence
Bold, Red, & Outlined	INAC Exceedance
Highlighted	DL > Criteria

Table 6 - Historical Soil Analytical Results - PCBs

PARAMETER	Federal	INAC DEW Line Cleanup Criteria, Tier II[2]	RDL	CAM-D S1	CAM-D DUP1	CAM-D S1	CAM-D DUP1	CAM-D S2	CAM-D S2	CAM-D S3	CAM-D S3	CAM-D S4	CAM-D S4
Sample ID	CCME[1] Residential/ Parkland												
Date				8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012
Depth (m)				0-0.15	0.-0.15	0.35-0.5	0.35-0.5	0-0.15	0.35-0.5	0-0.15	0.35-0.5	0-0.15	0.35-0.5
Polychlorinated Biphenyls (µg/g)													
Aroclor 1016	ns	ns	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1221	ns	ns	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1232	ns	ns	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1242	ns	ns	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1248	ns	ns	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1254	ns	ns	0.010	0.01	0.022	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1260	ns	ns	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1262	ns	ns	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Aroclor 1268	ns	ns	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Total PCB	1.3	5	0.010	0.01	0.022	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

Notes:

µg/g - micrograms per gram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated
RDL - Reporting Detection Limit
[1] CCME (2007), Canadian Soil Quality Guidelines, Update 7.0, Table 1. Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.
[2] Abandoned Military Site Remediation Protocol. Table 1. DEW Line Cleaup Criteria (DCC) for soil. DCC Tier II.

Bold & Red	CCME Exceedence
Bold, Red, & Outlined	INAC Exceedance
Highlighted	DL > Criteria

Table 7 - Historical Soil Analytical Results - Metals

PARAMETER	Federal	INAC DEW Line Cleanup Criteria, Tier II[2]	RDL	CAM-D S1	CAM-D DUP1	CAM-D S1	CAM-D DUP1	CAM-D S2	CAM-D S2	CAM-D S3	CAM-D S3	CAM-D S4	CAM-D S4	CAM-D S4 Lab-Dup
Sample ID	**CCME[1] Residential/ Parkland**													
Date				8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012	8/7/2012
Depth (m)				0 - 0.15	0.-0.15	0.35-0.5	0.35-0.5	0-0.15	0.35-0.5	0-0.15	0.35-0.5	0-0.15	0.35-0.5	0.35-0.5
Metals (µg/g)														
Acid Extractable Arsenic (As)	12	30	1	1.4	1.3	1.4	1.9	1.3	1.1	<1.0	1.2	1.2	<1.0	1
Acid Extractable Cadmium (Cd)	10	5	0.1	0.14	0.17	<0.10	0.1	0.18	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Acid Extractable Chromium (Cr)	64	250	1	19	18	20	21.0	19.0	14.0	12.0	18.0	16	14	14
Acid Extractable Cobalt (Co)	50	50	0.1	6.4	6.2	6.9	7.4	6.6	5.1	4.5	6.1	5.8	5	4.5
Acid Extractable Copper (Cu)	63	100	0.5	11	11	11	12	13	8.3	5	8	8.1	7	6.7
Acid Extractable Lead (Pb)	140	500	1	8.2	8.5	8.5	7.5	7.9	5.8	4.9	5.7	6.5	5	5.2
Acid Extractable Nickel (Ni)	45	100	0.5	10	9.8	11	12	10	7.4	5.9	9.5	8.3	7	7.4
Acid Extractable Zinc (Zn)	200	500	5	42	42	39	42	41	27	21	35	38	28	29
Acid Extractable Mercury (Hg)	6.6	2	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Physical Properties														
Moisture (%)	ns	ns	1.0	7.1	7.7	7.1	1.0	12	10	10	9.6	7.9	10	8.5

Notes:
µg/g - micrograms per gram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated
RDL - Reporting Detection Limit
[1] CCME Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.
[2] Abandoned Military Site Remediation Protocol. Table 1. DEW Line Cleaup Criteria (DCC) for soil. DCC Tier II.

Bold & Red	CCME Exceedance
Bold, Red, & Outlined	INAC Exceedance
Highlighted	DL > Criteria

Table 8: 2018 Surface Water Analytical Results - PHCs

Sample ID	Units	RDL	Upper Limits of Acceptability [1]	CCME Freshwater Aquatic Life [2]	SW1	SW2 (Duplicate)	RPD	Field Blank (DUP 2)	Trip Blank
Type					SW	SW		DI Water	DI Water
Date					16-Aug-18	16-Aug-18		17-Aug-18	17-Aug-18
Time					14:33	14:33		15:20	--
Total Xylenes	µg/L	0.89	NC	ns	<0.89	<0.89	N/A	<0.89	<0.89
F1 (C6-C10)	µg/L	100	NC	ns	<100	<100	N/A	<100	<100
F1 (C6-C10) - BTEX	µg/L	100	NC	ns	<100	<100	N/A	<100	<100
F2 (C10-C16 Hydrocarbons)	µg/L	100	NC	ns	<100	<100	N/A	<100	<100
						Batch Average	N/A		

Notes:

µg/L - micrograms per Litre
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated
RDL - Reporting Detection Limit

1 - Upper Limit of Acceptability is determined as described in Report Section 3.1.1 using baseline data. As no previous surface water data exists at CAM-D, ULAs were not used as criteria for surface water concentrations
2 - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life
3 - Calculated standard based on CCME Water Quality for the Protection of Aquatic Life guidelines - calculated using water hardness (CaCO3) and pH (aluminum only)

Bold & Red	CCME Exceedance
Highlighted	DL > Criteria

RPD = abs (X1 - X2)/((X1 + X2)/2) * 100
X1 = Sample Parameter Value
X2 = Duplicate Parameter Value
N/A - No RPD calculated

Table 9: 2018 Surface Water Analytical Results - Total Metals

Sample ID	Units	RDL	Upper Limits of Acceptability [1]	CCME Freshwater Aquatic Life [2]	SW1	SW2 (Duplicate)	RPD	Field Blank (DUP 2)	Trip Blank
Type					SW	SW		Water	Water
Date					16-Aug-18	16-Aug-18		17-Aug-18	17-Aug-18
Time					14:33	14:33		15:20	--
Total Aluminum (Al)	µg/L	3	NC	100 [3]	**180**	**160**	2.9	5.0	<3
Total Antimony (Sb)	µg/L	0.6	NC	ns	<0.6	<0.6	N/A	<0.6	<0.6
Total Arsenic (As)	µg/L	0.2	NC	5	0.43	0.45	1.1	<0.2	<0.2
Total Barium (Ba)	µg/L	10	NC	ns	10	<0.010	N/A	<10	<10
Total Beryllium (Be)	µg/L	1	NC	ns	<1.0	<1.0	N/A	<1	<1
Total Boron (B)	µg/L	20	NC	1500	<20	<20	N/A	<20	<20
Total Cadmium (Cd)	µg/L	0.02	NC	0.09	<0.02	<0.02	N/A	<0.02	<0.02
Total Calcium (Ca)	µg/L	300	NC	ns	20000	20000	0.0	<300	<300
Total Chromium (Cr)	µg/L	1	NC	8.9	3.2	<1.0	N/A	<1	<1
Total Cobalt (Co)	µg/L	0.3	NC	ns	<0.3	<0.3	N/A	<0.3	<0.3
Total Copper (Cu)	µg/L	0.2	NC	2.3 [3]	**3.1**	**2.8**	2.5	0.29	<0.2
Total Iron (Fe)	µg/L	60	NC	300	200	180	2.6	<60	<60
Total Lead (Pb)	µg/L	0.2	NC	3	0.3	0.25	4.5	<0.2	<0.2
Total Lithium (Li)	µg/L	20	NC	ns	<20	<20	N/A	<20	<20
Total Magnesium (Mg)	µg/L	200	NC	ns	11000	11000	0.0	<200	<200
Total Manganese (Mn)	µg/L	4	NC	ns	4.5	<4.0	N/A	<4	<4
Total Molybdenum (Mo)	µg/L	0.2	NC	73	1.6	1.5	1.6	<0.2	<0.2
Total Nickel (Ni)	µg/L	0.5	NC	92	1.8	0.61	24.7	<0.5	<0.5
Total Phosphorus (P)	µg/L	100	NC	ns	<100	<100	N/A	<100	<100
Total Potassium (K)	µg/L	300	NC	ns	3600	3600	0.0	<300	<300
Total Selenium (Se)	µg/L	0.2	NC	1	<0.2	<0.2	N/A	<0.2	<0.2
Total Silicon (Si)	µg/L	100	NC	ns	460	440	1.1	<100	<100
Total Silver (Ag)	µg/L	0.1	NC	0.25	0.12	0.13	2.0	<0.1	<0.1
Total Sodium (Na)	µg/L	500	NC	ns	13000	13000	0.0	<500	<500
Total Strontium (Sr)	µg/L	20	NC	ns	74	74	0.0	<20	<20
Total Sulphur (S)	µg/L	200	NC	ns	7900	8000	0.3	<200	<200
Total Thallium (Tl)	µg/L	0.2	NC	0.8	<0.2	<0.2	N/A	<0.2	<0.2
Total Tin (Sn)	µg/L	1	NC	ns	1.1	<1.0	N/A	<1	<1
Total Titanium (Ti)	µg/L	1	NC	100	13	9.4	8.0	1.1	<1
Total Uranium (U)	µg/L	0.1	NC	15	5.4	5.5	0.5	<0.1	<0.1
Total Vanadium (V)	µg/L	1	NC	ns	<1.0	<1.0	N/A	<1	<1
Total Zinc (Zn)	µg/L	3	NC	7	<3.0	<3.0	N/A	<3	<3
						Batch Average	3.1		

Notes:

µg/g - micrograms per gram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated
RDL - Reporting Detection Limit

1 - Upper Limit of Acceptability is determined as described in Report Section 3.1.1 using baseline data. As no previous surface water data exists at CAM-D, ULAs were not used as criteria for surface water concentrations
2 - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life
3 - Calculated standard based on CCME Water Quality for the Protection of Aquatic Life guidelines - calculated using water hardness (CaCO3) and pH (aluminum only)

Bold & Red CCME Exceedance
Highlighted DL > Criteria

RPD = abs (X1 - X2)/((X1 + X2)/2) * 100
X1 = Sample Parameter Value
X2 = Duplicate Parameter Value
N/A - No RPD calculated

Table 10: 2018 Surface Water Analytical Results - Dissolved Metals

Sample ID	Units	RDL	Upper Limits of Acceptability [1]	CCME Freshwater Aquatic Life [2]	SW1	SW2 (Duplicate)	RPD	Field Blank (DUP 2)	Trip Blank
Type					SW	SW		Water	Water
Date					16-Aug-18	16-Aug-18		17-Aug-18	17-Aug-18
Time					14:33	14:33		15:20	--
Dissolved Aluminum (Al)	µg/L	3	NC	100 [3]	50	45	2.6	<3	<3
Dissolved Antimony (Sb)	µg/L	0.6	NC	ns	<1.0	<0.60	N/A	<0.6	<0.6
Dissolved Arsenic (As)	µg/L	0.2	NC	5	0.42	0.43	0.6	<0.2	<0.2
Dissolved Barium (Ba)	µg/L	10	NC	ns	<10	<10	N/A	<10	<10
Dissolved Beryllium (Be)	µg/L	1	NC	ns	<1.0	<1.0	N/A	<1	<1
Dissolved Boron (B)	µg/L	20	NC	1500	<20	<20	N/A	<20	<20
Dissolved Cadmium (Cd)	µg/L	0.02	NC	0.09	<0.02	<0.02	N/A	<0.02	<0.02
Dissolved Calcium (Ca)	µg/L	300	NC	ns	20000	20000	0.0	<300	<300
Dissolved Chromium (Cr)	µg/L	1	NC	8.9	<1.0	<1.0	N/A	<1	<1
Dissolved Cobalt (Co)	µg/L	0.3	NC	ns	<0.30	<0.30	N/A	<0.3	<0.3
Dissolved Copper (Cu)	µg/L	0.2	NC	2.3 [3]	**2.8**	**2.3**	4.9	0.23	<0.2
Dissolved Iron (Fe)	µg/L	60	NC	300	74	66	2.9	<60	<60
Dissolved Lead (Pb)	µg/L	0.2	NC	3	<0.2	<0.2	N/A	<0.2	<0.2
Dissolved Lithium (Li)	µg/L	20	NC	ns	<20	<20	N/A	<20	<20
Dissolved Magnesium (Mg)	µg/L	200	NC	ns	11000	11000	0.0	<200	<200
Dissolved Manganese (Mn)	µg/L	4	NC	ns	<4.0	<4.0	N/A	<4	<4
Dissolved Molybdenum (Mo)	µg/L	0.2	NC	73	1.3	1.3	0.0	<0.2	<0.2
Dissolved Nickel (Ni)	µg/L	0.5	NC	92	<0.5	<0.5	N/A	<0.5	<0.5
Dissolved Phosphorus	µg/L	100	NC	ns	<100	<100	N/A	<100	<100
Dissolved Potassium (K)	µg/L	300	NC	ns	3,500	3,500	0.0	<300	<300
Dissolved Selenium (Se)	µg/L	0.2	NC	1	<0.2	<0.2	N/A	<0.2	<0.2
Dissolved Silicon (Si)	µg/L	100	NC	ns	150	120	5.6	<100	<100
Dissolved Silver (Ag)	µg/L	0.1	NC	0.25	<0.1	<0.1	N/A	<0.1	<0.1
Dissolved Sodium (Na)	µg/L	500	NC	ns	12000	12000	0.0	<500	<500
Dissolved Strontium (Sr)	µg/L	20	NC	ns	75	75	0.0	<20	<20
Dissolved Sulphur	µg/L	200	NC	ns	8,000	8,200	0.6	<200	<200
Dissolved Thallium (Tl)	µg/L	0.2	NC	0.8	<0.2	<0.2	N/A	<0.2	<0.2
Dissolved Tin (Sn)	µg/L	1	NC	ns	<1.0	<1.0	N/A	<1	<1
Dissolved Titanium (Ti)	µg/L	1	NC	100	4.0	2.6	10.6	<1	<1
Dissolved Uranium (U)	µg/L	0.1	NC	15	5.4	5.3	0.5	<0.1	<0.1
Dissolved Vanadium (V)	µg/L	1	NC	ns	<1.0	<1.0	N/A	<1	<1
Dissolved Zinc (Zn)	µg/L	3	NC	7	<3.0	<3.0	N/A	<3	<3
						Batch Average	2.0		

Notes:

µg/L - micrograms per Litre
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated
RDL - Reporting Detection Limit

1 - Upper Limit of Acceptability is determined as described in Report Section 3.1.1 using baseline data. As no previous surface water data exists at CAM-D, ULAs were not used as criteria for surface water concentrations
2 - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life
3 - Calculated standard based on CCME Water Quality for the Protection of Aquatic Life guidelines - calculated using water hardness (CaCO3) and pH (aluminum only)

Bold & Red CCME Exceedance
Highlighted DL > Criteria

RPD = abs (X1 - X2)/((X1 + X2)/2) * 100
X1 = Sample Parameter Value
X2 = Duplicate Parameter Value
N/A - No RPD calculated

Table 11: 2018 Surface Water Analytical Results - Inorganics

Sample ID	Units	RDL	Upper Limits of Acceptability [1]	CCME Freshwater Aquatic Life [2]	SW1	SW2 (Duplicate)	RPD	Field Blank (DUP 2)	Trip Blank
Type					SW	SW		Water	Water
Date					16-Aug-18	16-Aug-18		17-Aug-18	17-Aug-18
Time					14:33	14:33		15:20	--
Calculated Parameters									
Anion Sum	meq/L	N/A	NC	ns	2.7	2.7	0.0	0	3.1
Cation Sum	meq/L	N/A	NC	ns	2.5	2.5	0.0	0.008	0
Hardness (CaCO3)	mg/L	0.50	NC	ns	95	95	0.0	<0.50	<0.50
Ion Balance (% Difference)	%	N/A	NC	ns	2.8	2.2	6.0	NC	NC
Dissolved Nitrate (NO3)	mg/L	0.44	NC	13	<0.044	<0.044	N/A	<0.044	<0.044
Nitrate plus Nitrite (N)	mg/L	0.14	NC	ns	<0.014	<0.014	N/A	<0.014	<0.014
Dissolved Nitrite (NO2)	mg/L	0.33	NC	0.06	<0.033	<0.033	N/A	<0.033	<0.033
Calculated Total Dissolved Solids	mg/L	10	NC	ns	140	140	0.0	<10	110
Misc. Inorganics									
Conductivity	uS/cm	2.0	NC	ns	260	260	0.0	<2.0	290
pH	pH	N/A	NC	6.5-9.0	7.99	7.97	0.1	5.07	8.02
Total Suspended Solids	mg/L	1.0	NC	ns	<1.0	<1.0	N/A	<1.0	<1.0
Anions									
Alkalinity (PP as CaCO3)	mg/L	1.0	NC	ns	<1.0	<1.0	N/A	<1.0	<1.0
Alkalinity (Total as CaCO3)	mg/L	1.0	NC	ns	84	84	0.0	<1.0	110
Bicarbonate (HCO3)	mg/L	1.0	NC	ns	100	100	0.0	<1.0	130
Carbonate (CO3)	mg/L	1.0	NC	ns	<1.0	<1.0	N/A	<1.0	<1.0
Hydroxide (OH)	mg/L	1.0	NC	ns	<1.0	<1.0	N/A	<1.0	<1.0
Dissolved Sulphate (SO4)	mg/L	1.0	NC	100	27	26	0.9	<1.0	43
Dissolved Chloride (Cl)	mg/L	1.0	NC	120	15	15	0.0	<1.0	4.2
Nutrients									
Dissolved Nitrite (N)	mg/L	0.10	NC	0.06	<0.010	<0.010	N/A	<0.010	<0.010
Dissolved Nitrate (N)	mg/L	0.10	NC	13	<0.010	<0.010	N/A	<0.010	<0.010
						Batch Average	0.6		

Notes:

uS/cm - microsiemens per centimetre
mg/L - miligrams per litre
meq/L - microeqivalence per litre
% - percent
ns - no standard listed
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
NC - Not calculated
RDL - Reporting Detection Limit

1 - Upper Limit of Acceptability is determined as described in Report Section 3.1.1 using baseline data. As no previous surface water data exists at CAM-D, ULAs were not used as criteria for surface water concentrations
2 - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life
3 - Calculated standard based on CCME Water Quality for the Protection of Aquatic Life guidelines - calculated using water hardness (CaCO3) and pH (aluminum only)

Bold & Red	CCME Exceedence
Highlighted	DL > Criteria

RPD = abs (X1 - X2)/((X1 + X2)/2) * 100
X1 = Sample Parameter Value
X2 = Duplicate Parameter Value
N/A - No RPD calculated

Table 12: 2018 Surface Water Analytical Results - PCBs

Sample ID	Units	RDL	Upper Limits of Acceptability [1]	CCME Freshwater Aquatic Life [2]	SW1	SW2 (Duplicate)	RPD	Field Blank (DUP 2)	Trip Blank
Type					SW	SW		Water	Water
Date					16-Aug-18	16-Aug-18		17-Aug-18	17-Aug-18
Time					14:33	14:33		15:20	--
Aroclor 1016	µg/L	0.05	NC	ns	<0.05	<0.05	N/A	<0.05	<0.05
Aroclor 1221	µg/L	0.05	NC	ns	<0.05	<0.05	N/A	<0.05	<0.05
Aroclor 1232	µg/L	0.05	NC	ns	<0.05	<0.05	N/A	<0.05	<0.05
Aroclor 1242	µg/L	0.05	NC	ns	<0.05	<0.05	N/A	<0.05	<0.05
Aroclor 1248	µg/L	0.05	NC	ns	<0.05	<0.05	N/A	<0.05	<0.05
Aroclor 1254	µg/L	0.05	NC	ns	<0.05	<0.05	N/A	<0.05	<0.05
Aroclor 1260	µg/L	0.05	NC	ns	<0.05	<0.05	N/A	<0.05	<0.05
Aroclor 1262	µg/L	0.05	NC	ns	<0.05	<0.05	N/A	<0.05	<0.05
Aroclor 1268	µg/L	0.05	NC	ns	<0.05	<0.05	N/A	<0.05	<0.05
Total PCB	µg/L	0.05	NC	ns	<0.05	<0.05	N/A	<0.05	<0.05
						Batch Average	N/A		

Notes:

µg/L - micrograms per litre
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
NC - Not calculated. When there are only non-detect values, no standard deviation was calculated
RDL - Reporting Detection Limit

1 - Upper Limit of Acceptability is determined as described in Report Section 3.1.1 using baseline data. As no previous surface water data exists at CAM-D, ULAs were not used as criteria for surface water concentrations

2 - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life

3 - Calculated standard based on CCME Water Quality for the Protection of Aquatic Life guidelines - calculated using water hardness (CaCO3) and pH (aluminum only)

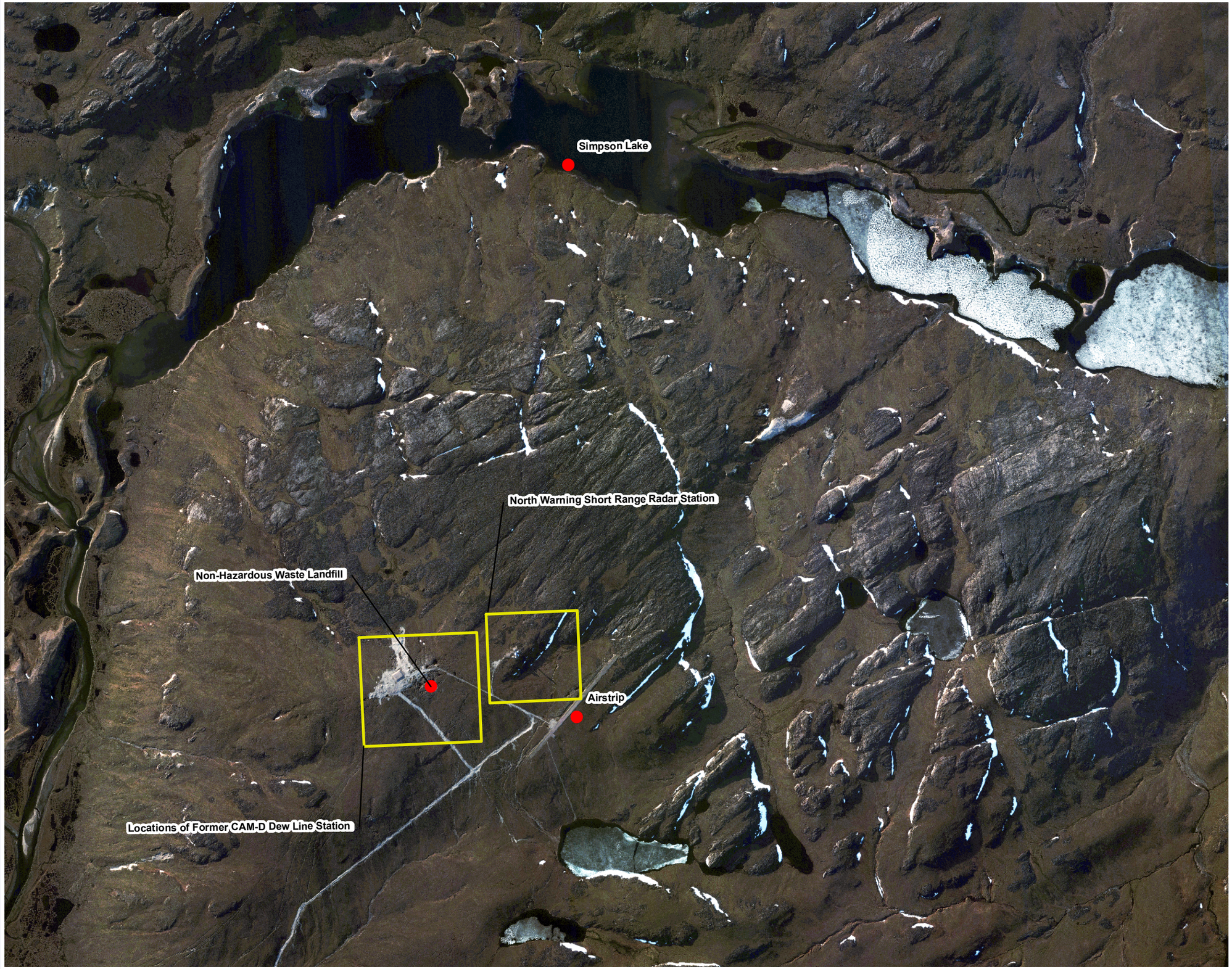
Bold & Red CCME Exceedance
Highlighted DL > Criteria

RPD = abs (X1 - X2)/((X1 + X2)/2) * 100
X1 = Sample Parameter Value
X2 = Duplicate Parameter Value
N/A - No RPD calculated

DRAWINGS

Crown-Indigenous Relations and Northern Affairs Canada
Contaminants and Remediation Division

CAM-D Simpson Lake Long-Term Monitoring Event
Kivalliq Region, Nunavut
SLR Project No.: 209.40585.00000



LEGEND

Approximate Site Locations

0 0.25 0.5 1 Kilometers

SCALE: 1:30,000
WHEN PLOTTED CORRECTLY AT 11 x 17
Canada Lambert Conformal Conic

NOTES

This map is for conceptual purposes only and should not be used for navigational purposes.

Basedata:

CROWN INDIGENOUS RELATIONS AND NORTHEN AFFAIRS CANADA (CIRNAC)

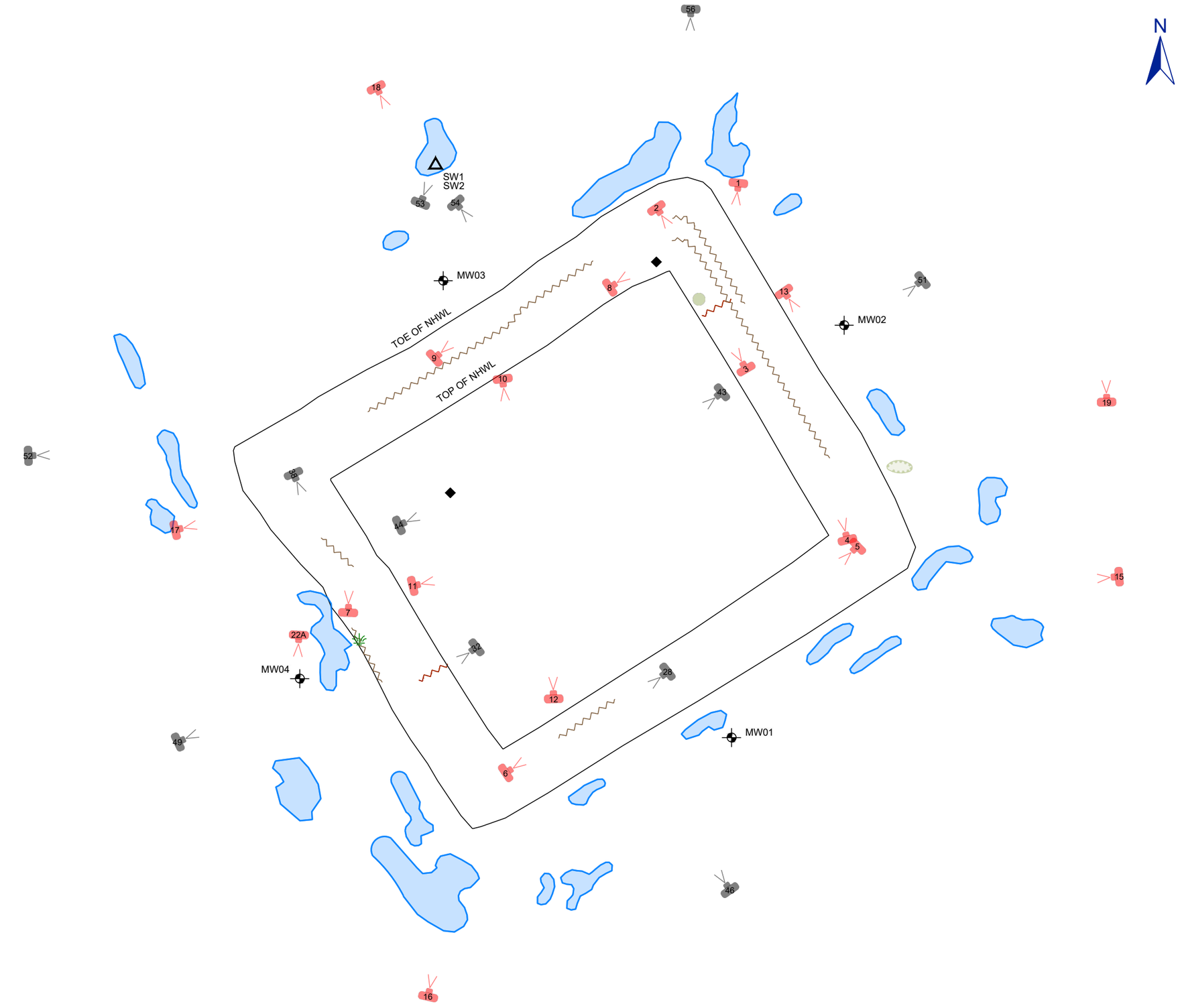
CAM-D, SIMPSON LAKE, NUNAVUT

SITE LOCATION

December, 2018	Rev **0.0**	Drawing No. **1**
Project No. 209.40585.00000		

SLR global environmental solutions

N:\Markham\GIS_Projects_GIS\209_40585_INAC\11.MXDs\209_40585_SiteLocations.mxd



NOTES:
REFERENCED FROM ARCADIS FIGURE *SITE PLAN* (NOVEMBER 2016).

LEGEND:

- DEPRESSION
- PONDED WATER
- EROSION
- SURFACE MATERIAL SLUMP
- METAL DEBRIS
- POTHOLE
- VEGETATION
- MONITORING WELL (ARCADIS, 2016)
- SURFACE WATER SAMPLING
- # VIEWPOINT PHOTOGRAPH INCLUDED IN APPENDIX A
- # VIEWPOINT PHOTOGRAPH INCLUDED IN ATTACHED USB

0 5 10 20 30 m

SCALE 1:600
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 19 W

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

CROWN-INDIGENOUS RELATIONS AND NORTHERN AFFAIRS CANADA (CIRNAC)
CAM-D SIMPSON LAKE
NUNAVUT

CAM-D SIMPSON LAKE LONG TERM MONITORING EVENT

CAM-D SIMPSON LAKE NON-HAZARDOUS WASTE LANDFILL PLAN

Date: December 17, 2018

Project No. 209.40585.00000

Drawing No. 2

SLR global environmental solutions

Cadfile name: S_209-40585-00000-A2.dwg

APPENDIX A
Site Photographs

Crown-Indigenous Relations and Northern Affairs Canada
Contaminants and Remediation Division

CAM-D Simpson Lake Long-Term Monitoring Event
Kivalliq Region, Nunavut
SLR Project No.: 209.40585.00000

Photograph 1. View along NE Flank, facing SE

Photograph 2. Cracking along NE Flank, facing SE

Photograph 3. Cracking on NE flank, facing NW

Photograph 4. Cracking on NE flank, facing NW

Photograph 5. Cracking on SE flank, facing SW

Photograph 6. Cracking on SE flank, facing NE

Photograph 7. Erosion on SW flank, facing NE

Photograph 8. Metal debris on NW flank, facing NW

Photograph 9. Erosion on NW flank, facing NW

Photograph 10. Landfill cap, facing S

Photograph 11. Landfill cap, facing E

Photograph 12. Landfill Cap, facing N

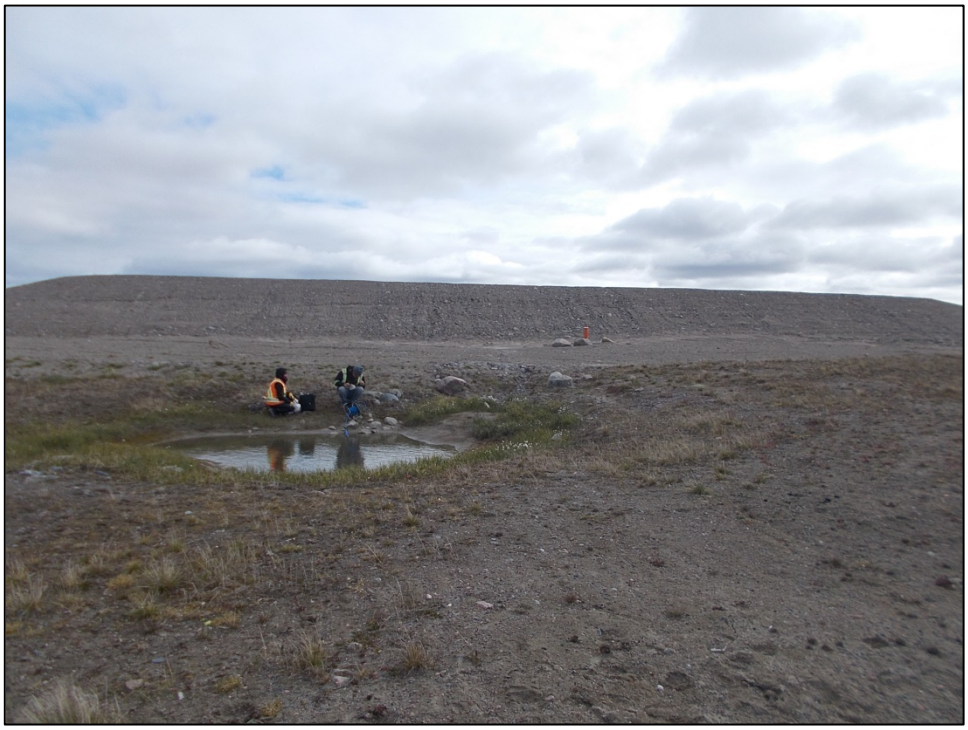
Photograph 13. Wire at toe of landfill cap, facing SE

Photograph 14. NE flank, facing SW

Photograph 15. East corner of NHWL, facing W

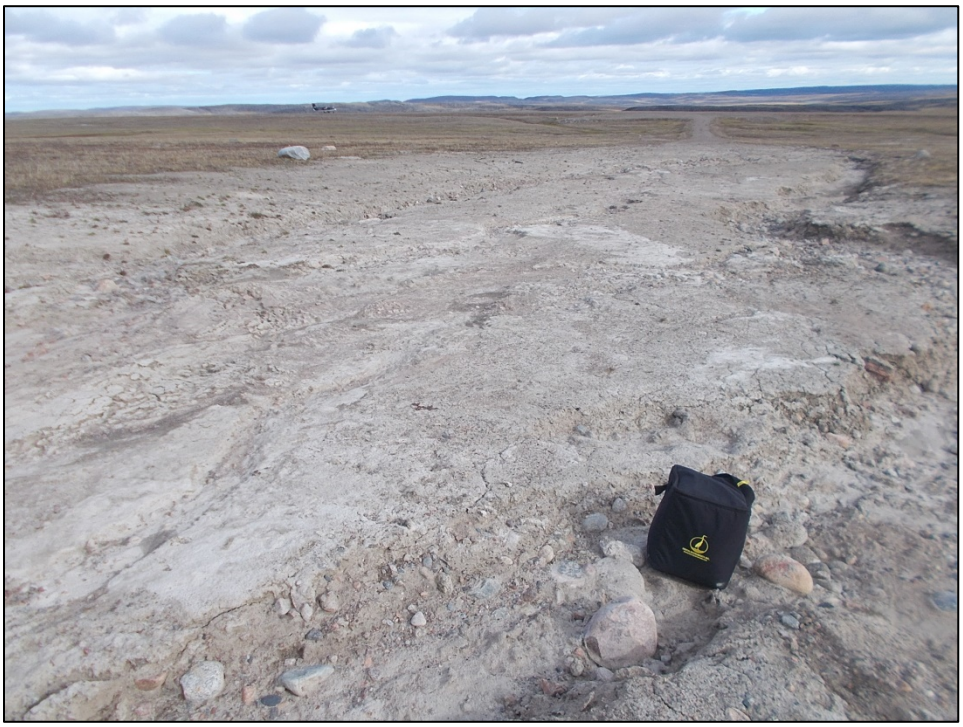
Photograph 16. South corner, facing N

Photograph 17. Erosion on SW flank, facing W



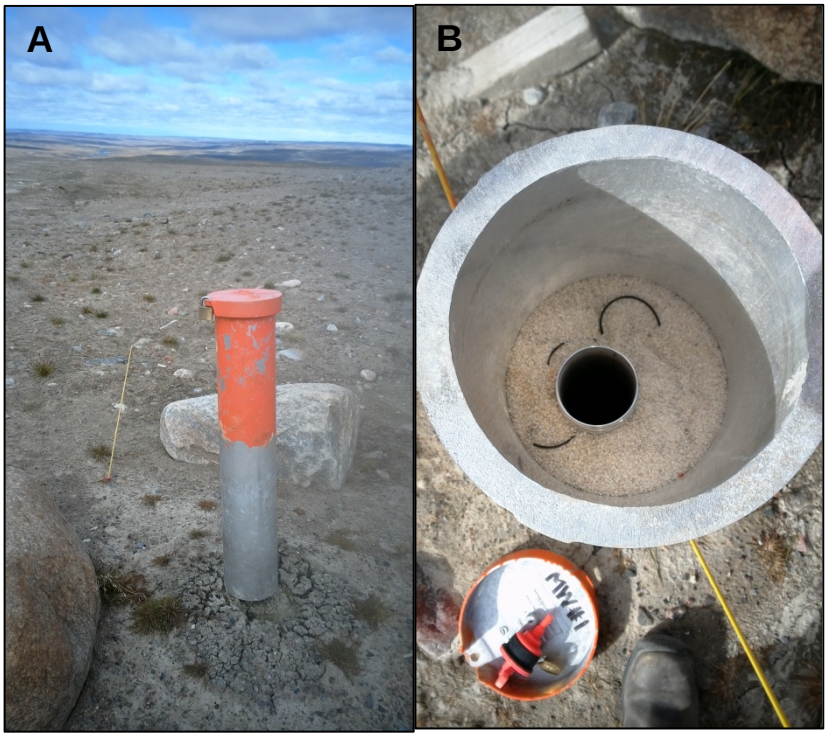
Photograph 18. NW flank, facing SE, Surface water sampling location

Photograph 19. Metal debris NE of Landfill, facing N



Photograph 20. Erosion on access road, facing E

Photograph 21. Siksik burrows and cracking from culvert on access road



Photograph 22 A. Example of Heaving at MW04,
B. Heaving at MW01, inside casing.

APPENDIX B
Field Sheets and Notes

Crown-Indigenous Relations and Northern Affairs Canada
Contaminants and Remediation Division

CAM-D Simpson Lake Long-Term Monitoring Event
Kivalliq Region, Nunavut
SLR Project No.: 209.40585.00000

Non-Hazardous Waste Landfill Visual Inspection

Project Number.: 209.40585.0000 Date: 08/16/2018.

Project Name: INAC Nunavut 2018 Weather: +1C, windy, partly cloudy

Site CAM-D Simpson Lake. Field Staff: D. Kitt, D. Peterson.

Item	Presence / Absence (Y/N)	Extent (LxWxD)	Description	Coodinates	Other Notes (Photo reference etc)
Settlement	Y	Several depressions surrounding NHWEF	Naturally occuring.	Area around landfill	
Erosion	Y	~~Water runni~~ Length of landfill face.	Erosion originating from cap on NE, SW, + NW faces. Erosion on access road	Flanks	Photos 5, 7, 16, 17, 18, 19, 23, 25, 46, 57-60
Frost Action	Y	All flanks of landfill.	Frost cracking on all flanks.	Flanks	All photos of landfill flanks.
Animal Burrows	Y	2 burrows	Siksik burrows on culvert near strip	Road	61, 62
Vegetation	Y	SW flank - grasses (north side)	Vegetation (<5%) starting to grow on SW flank.	SW flank	77, 78
Staining	N	N/A	N/A	N/A	
Vegetation Stress	N	N/A	N/A	N/A	
Seepage	N	N/A	N/A	N/A	
Exosed Debris	Y	several locations.	wire, metal debris, tile (asbestos?)	NW flank, ground toe, depression.	24, 28, 35, 54, 56
Condition of Monitoring Instruments	Good.	N/A	N/A	N/A	
Other					

Natural Environment Monitoring Checklist

Project Number.: 209.40585.00000 Date: 08/16/2018

Project Name: INAC Nunavut 2018 Weather: +1°C, windy, partly cloudy

Site CAM-D Simpson Lake Field Staff: D. Kith, D. Peterson

Item	Presence / Absence (Y/N)	Extent (LxWxD)	Description	Other Notes (Photo reference etc)
Wildlife Sightings	N	N/A	N/A	N/A.
Evidence of Wildlife	Y	Throughout road + landfill area.	-Caribou tracks + scat -Goose tracks + scat - Siksik burrows · near culvert on road.	Photos 61 + 62
Wildlife Activity	Y	Along culvert	Siksik burrowing around culvert near air strip.	Photos 61 + 62
Relatve Number	N/A	N/A	N/A	N/A
Evidence of Revegetation	Y	North half of SW face. (<5%)	Minimal vegetation near toe on SW flank.	Photo 45
Other:				
Other:				

CAM-D LTM 08/16/2018
@ 9:22 Left Gjoa Haven
- Pilots x2 (Summit)
- Jean Allen (INAC)
- Donovan Kitt (SLR)
- Daben Peterson (SLR)
- Wildlife Monitor (JU)
@ 10:14 Touched down, 1°C Partly cloudy
@ 10:25 H+S meeting.
@ 11:00 Arrived @ MW2

MW2 - Frozen @ 1.293 mbtoc
- cut off Guard Lock
- Replaced w/ Master Lock.
- WGC, Heaved ~ 0.04 m
MW1 - Frozen @ 1.788 mbtoc
- cut Guard lock + replaced

Rite in the Rain.

- Took photos of landfill extents
- Collected SW sample from water near MW03 - w/ erosion channel leading up to it.
- Took photo of metal debris N. of landfill
- Photo of possible asbestoes tiles on road
- Photos of erosion on road
- Photos of burrowing near drum culvert by airstrip
- Packed up Tuyin
@ 15:49 - Touched off.

Rite in the Rain.

with Master Lock.
- WGC, Heaved ~ 0.20 m

MW4 - Heaved 0.49 m
- frozen @ 1.725
- Cut Guard lock + replaced with Master Lock

MW3 Heaved - 0.31 m.
- frozen @ 1.632
- Cut Guard lock + replaced with Master lock
- Well vented - J-plug off.

@ 13:00
- Measured cracking + erosion features on landfill.

@ 16:30 touched down in Gjoa. Paid wildlife monitor. Refueled.
@ 16:53 touched off for Rankin Inlet.

@ 20:24 Touched down in Rankin.

* Runway @ CAM-D was in good condition.

Ennadai Lake 08/17/2018

@7:33 Ride arrived @ Hotel. Picked up pilots

@ 8:04 Arrived @ Airport. Grace Beadsall took another job & is unable to be wildlife monitor. Contacted Robert (backup monitor in Arviat) but he is on another job in Pond Inlet.
- Tried contacting the Hunter + Trapper Ass. in Rankin, but no answer.
- Jacob (INAC) employee agreed to be the wildlife monitor. Discussed w/ Pilots + Jean and everyone is in agreement.

@8:46 - Touched off from Rankin
- Donavan Kitt (SLR)
- Dalen Peterson (SLR)
- Daly (Summit)
- Andy (Summit)
- Jean (INAC)
- Jacob (INAC)

- 8 caribou identified on initial fly over east of strip

@ 11:16 touched down

@ 11:32 Finished Hrs.

- MWLF-3 - WGC
  - monitored + purged (5L)
  - saved (2L in case of insufficient recharge)

- MWLF-2 - WGC
  - frozen

MWLF-1 - WGC
- dry.

- Completed geotech. inspection
  - No issues.
- Saw 3 bull caribou on way to strip.
- saw cow caribou north of strip.
- bull caribou came up to plane while we were completing field blank.
- field blank @ 15:16
- loaded plane
- touched off @ 15:42
- touched down @ 18:04.
> runway soft - pilot thinks it is attributed to wet year.

Rite in the Rain.

August 16, 2018

- Airport @ 9:00
  - ↳ Met Jennasie
  - ↳ Filled Water & Alconox Bottles
- Take off ~9:30
- Landed 10:15
  - ↳ Review HASP & Safety Kick off
  - ↳ Unload Gear
- Started Monitoring 11:20
  - ↳ MW2 Frozen @ 1.293 mbTOC
    - Replaced Lock - Minimal Heaving
    - Hex Oppm IBL Oppm
  - ↳ MW1 Frozen @ 1.748 mbTOC
    - Replaced Lock - Heaved Stick up 20 cm
    - Hex Oppm IBL Oppm
  - ↳ MW4 Frozen @ 1.725
    - Replaced Lock
    - Stick up Heaved out of Ground - Broken Reflector Marker
    - Hex Oppm IBL Oppm
  - ↳ MW3 Frozen @ 1.632 mbTOC
    - Replaced Lock
    - Heaved Stick up
    - Hex Oppm IBL Oppm
    - Vented. J-Plug Found Popped off in Stick-up

Rite in the Rain

↳ Landfill Inspection
- Measure/Note & Photo Features

↳ SW Sampling
pH: 8.11 Temp: 8.87 °C
ORP: 252.3mV EC: 266.07 µS/cm
DO: 12.39 mg/L Turb: 363.55 NTU
Time: 14:33
Took Dup of SW1 & Labelled SW2

↳ Fixed Reflector @ MW4
↳ Packed up @ Landfill
↳ Noted/GPSed/Photos of Road Erosion Leading To Runway
↳ Packed up & offsite @ 15:45
↳ Fly To Gjoa And Drop off Joanasie
↳ Fly To Rankin Inlet
↳ End 22:00 (21:00 Rankin)

August 17, 2018

- Shuttle @ 7:30
- Wildlife Monitor Took Another Job
  - ↳ Jacob (Summer Student) Resumed Role
- Take off 8:45
- Ennadai Lake @ ~11:00
  - ↳ 7 Caribou on Runway
- Landed ~11:10
- Review H&S & Unpack 11:36
- Monitoring GW Wells
  - ↳ MWLF-3 → Good Condition

    Hex: 0ppm IBL: 0ppm

    Depth To H_2O: 1.659 m bTOC EOH: 2.41

    Pre Purge

    pH: 5.90 Temp: 6.02 EC: 102.75

    ORP: 282.3 DO: 3.06 Turb 1.30

    3 Well Volumes ~ 5L

    Purged: 5L

  - ↳ MWLF-2 → Good Condition

    Hex: 0ppm IBL: 0ppm

    EOH @ 3.67 m bTOC

    - Ice observed on Probe

Rite in the Rain

↳ MWLF-1 → Good Condition
Hex: 0ppm IBL: 0ppm
Depth To GW: —
EOH: 3.48 mbTOC
No Evidence of Ice on Probe

- Start Landfill Inspection 12:30
  ↳ Photos of Structure/~~Area~~/Features

- Sample MWLF-3
  ↳ Depth To GW: 1.665 mbTOC
  E.O.H. 32.41
  Start Pumping @ 13:49
  - Initial Drawdown To 1.682 mbTOC
  - Turned Down Pump
  - GW @ 1.676 @ 13:50

500mL in 2:20 — 1.676 @ 13:51
1.677 @ 13:53
500mL — 1.679 @ 13:54
in 3:02 (5.22 Rw) 1.677 @ 13:55 Turned Pump Down
500mL — 1.677 @ 13:56
in 2:52 (8.11 Rw) 1.679 @ 13:57
1.677 13:58
1.678 13:59
1.677 14:00

Aug 18, 2018

- Start 6:30 (Rankin)
- Shuttle to Airport
- Pick up Samples/Coolers
- Load Plane
- Take off @ 7:30
  - Re-Fuel in Baker Lake 8:30-9
  - Land 11:45
- Change Flights
- Submit Samples 12:20 - 13:00
- Ship Equip
- Return Coolers
- Drop Equip @ office
- Fly to Calgary (Flts delayed)
  - Depart 8:30 (9:30 Rankin)
- Hotel @ 11:45 (12:45 Rankin)

Aug 19, 2018

- Start ~~7:30~~ 8:00
- Fly to GP
- Unload @ office
- End 12:30

PRE SAMPLE PARAMETERS (ALL STABLE EXCEPT TURBIDITY) ON TABLET.

SAMPLED @ 14:02 - 14:35
MWLF-3 & DUP 10 BOTTLES EACH

- PACK UP SAMPLES & GEAR
- WALK TO RUNWAY
- COLLECT FIELD BLANK @ 15:20 (10 BOTTLES)
- LOAD PLANE
- TAKE OFF 15:45
  - RUNWAY VERY SOFT. HAD TO BACK PLANE UP TO TAKE OFF.
- RANKIN INLET LANDED 17:30
- SAMPLES INTO COOLER @ AIRPORT
- HOTEL @ 18:05

- eCOCs 7:30 - 8:45

Rite in the Rain

APPENDIX C
Laboratory Certificates

Crown-Indigenous Relations and Northern Affairs Canada
Contaminants and Remediation Division

CAM-D Simpson Lake Long-Term Monitoring Event
Kivalliq Region, Nunavut
SLR Project No.: 209.40585.00000

Your Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Your C.O.C. #: 8040

Attention: Donovan Kitt

SLR CONSULTING (CANADA) LTD.
200 10135-101AVE
GRANDE PRARIE , AB
CANADA

Report Date: 2018/08/25
Report #: R2609427
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B869980
Received: 2018/08/18, 13:26

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	2018/08/22	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	2	N/A	2018/08/22	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	2	N/A	2018/08/23	AB SOP-00039	Auto Calc
Cadmium - low level CCME - Dissolved	2	N/A	2018/08/25	AB WI-00065	Auto Calc
Cadmium - low level CCME (Total)	2	N/A	2018/08/24	AB WI-00065	Auto Calc
Chloride by Automated Colourimetry	2	N/A	2018/08/22	AB SOP-00020	SM 22 4500-Cl-E m
Conductivity @25C	2	N/A	2018/08/22	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (2)	2	2018/08/23	2018/08/23	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Hardness	2	N/A	2018/08/22	AB WI-00065	Auto Calc
Elements by ICP - Dissolved (3)	2	N/A	2018/08/22	AB SOP-00042	EPA 6010d R4 m
Elements by ICP - Total	2	2018/08/23	2018/08/23	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Dissolved (3)	2	N/A	2018/08/23	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	2	2018/08/23	2018/08/23	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	2	N/A	2018/08/22	AB WI-00065	Auto Calc
Sum of cations, anions	2	N/A	2018/08/22	AB WI-00065	Auto Calc
Nitrate and Nitrite	2	N/A	2018/08/22	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	2	N/A	2018/08/22	AB WI-00065	Auto Calc
Nitrogen (Nitrite - Nitrate) by IC	2	N/A	2018/08/21	AB SOP-00023	SM 23 4110 B m
Polychlorinated Biphenyls in Water (1)	2	2018/08/23	2018/08/24	CAL SOP-00149	EPA 8082A R1 m
Total PCBs in Water (1)	2	N/A	2018/08/24	CAL SOP-00149	Auto Calc
pH @25°C (4)	2	N/A	2018/08/22	AB SOP-00005	SM 23 4500 H+ B m
Sulphate by Automated Colourimetry	2	N/A	2018/08/22	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	2	N/A	2018/08/22	AB WI-00065	Auto Calc
Total Suspended Solids (NFR)	2	2018/08/22	2018/08/22	AB SOP-00061	SM 23 2540 D m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

Your Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Your C.O.C. #: 8040

Attention: Donovan Kitt

SLR CONSULTING (CANADA) LTD.
200 10135-101AVE
GRANDE PRARIE , AB
CANADA

Report Date: 2018/08/25
Report #: R2609427
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B869980
Received: 2018/08/18, 13:26

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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.

(1) This test was performed by Maxxam Calgary Environmental
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: Whenever applicable, Dissolved >Total for any parameter that falls within method uncertainty for duplicates is likely equivalent. If RPD is >20% samples were reanalyzed and confirmed.
(4) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Maxxam endeavours to analyze samples as soon as possible after receipt.

Encryption Key

Maxxam
25 Aug 2018 12:23:01

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Carmen McKay, Project Manager
Email: CMcKay@maxxam.ca
Phone# (403)219-3683

==========

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

Maxxam Job #: B869980
Report Date: 2018/08/25

SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		UC6465	UC6466		
Sampling Date		2018/08/16 14:33	2018/08/16 14:33		
COC Number		8040	8040		
	UNITS	**SW1**	**SW2**	**RDL**	**QC Batch**
Calculated Parameters					
Anion Sum	meq/L	2.7	2.7	N/A	9111314
Cation Sum	meq/L	2.5	2.5	N/A	9111314
Hardness (CaCO3)	mg/L	95	95	0.50	9111312
Ion Balance (% Difference)	%	2.8	2.2	N/A	9111313
Dissolved Nitrate (NO3)	mg/L	<0.044	<0.044	0.044	9110786
Nitrate plus Nitrite (N)	mg/L	<0.014	<0.014	0.014	9110787
Dissolved Nitrite (NO2)	mg/L	<0.033	<0.033	0.033	9110786
Calculated Total Dissolved Solids	mg/L	140	140	10	9111316
Misc. Inorganics					
Conductivity	uS/cm	260	260	2.0	9112557
pH	pH	7.99	7.97	N/A	9112551
Total Suspended Solids	mg/L	<1.0	<1.0	1.0	9112257
Low Level Elements					
Dissolved Cadmium (Cd)	ug/L	<0.020	<0.020	0.020	9111108
Total Cadmium (Cd)	ug/L	<0.020	<0.020	0.020	9112785
Anions					
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	1.0	9112556
Alkalinity (Total as CaCO3)	mg/L	84	84	1.0	9112556
Bicarbonate (HCO3)	mg/L	100	100	1.0	9112556
Carbonate (CO3)	mg/L	<1.0	<1.0	1.0	9112556
Hydroxide (OH)	mg/L	<1.0	<1.0	1.0	9112556
Dissolved Sulphate (SO4)	mg/L	27	26	1.0	9112749
Dissolved Chloride (Cl)	mg/L	15	15	1.0	9112743
Nutrients					
Dissolved Nitrite (N)	mg/L	<0.010	<0.010	0.010	9110894
Dissolved Nitrate (N)	mg/L	<0.010	<0.010	0.010	9110894
RDL = Reportable Detection Limit N/A = Not Applicable					

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

Maxxam Job #: B869980
Report Date: 2018/08/25

SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		UC6465	UC6466		
Sampling Date		2018/08/16 14:33	2018/08/16 14:33		
COC Number		8040	8040		
	UNITS	**SW1**	**SW2**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	0.10	9110633
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	108	112		9110633
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 #: B869980
Report Date: 2018/08/25

SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		UC6465	UC6466		
Sampling Date		2018/08/16 14:33	2018/08/16 14:33		
COC Number		8040	8040		
	UNITS	**SW1**	**SW2**	**RDL**	**QC Batch**
Polychlorinated Biphenyls					
Aroclor 1016	mg/L	<0.000050	<0.000050	0.000050	9113827
Aroclor 1221	mg/L	<0.000050	<0.000050	0.000050	9113827
Aroclor 1232	mg/L	<0.000050	<0.000050	0.000050	9113827
Aroclor 1242	mg/L	<0.000050	<0.000050	0.000050	9113827
Aroclor 1248	mg/L	<0.000050	<0.000050	0.000050	9113827
Aroclor 1254	mg/L	<0.000050	<0.000050	0.000050	9113827
Aroclor 1260	mg/L	<0.000050	<0.000050	0.000050	9113827
Aroclor 1262	mg/L	<0.000050	<0.000050	0.000050	9113827
Aroclor 1268	mg/L	<0.000050	<0.000050	0.000050	9113827
Total PCB	mg/L	<0.000050	<0.000050	0.000050	9110350
Surrogate Recovery (%)					
NONACHLOROBIPHENYL (sur.)	%	96	113		9113827
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 #: B869980
Report Date: 2018/08/25

SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		UC6465			UC6465			UC6466		
Sampling Date		2018/08/16 14:33			2018/08/16 14:33			2018/08/16 14:33		
COC Number		8040			8040			8040		
	UNITS	**SW1**	**RDL**	**QC Batch**	**SW1 Lab-Dup**	**RDL**	**QC Batch**	**SW2**	**RDL**	**QC Batch**
Elements										
Dissolved Aluminum (Al)	mg/L	0.050	0.0030	9113082	0.050	0.0030	9113082	0.045	0.0030	9113082
Total Aluminum (Al)	mg/L	0.18	0.0030	9113843				0.16	0.0030	9113843
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	9113082	<0.00060	0.00060	9113082	<0.00060	0.00060	9113082
Total Antimony (Sb)	mg/L	<0.00060	0.00060	9113843				<0.00060	0.00060	9113843
Dissolved Arsenic (As)	mg/L	0.00042	0.00020	9113082	0.00034	0.00020	9113082	0.00043	0.00020	9113082
Total Arsenic (As)	mg/L	0.00043	0.00020	9113843				0.00045	0.00020	9113843
Dissolved Barium (Ba)	mg/L	<0.010	0.010	9112680	<0.010	0.010	9112680	<0.010	0.010	9112680
Total Barium (Ba)	mg/L	0.010	0.010	9113849				<0.010	0.010	9113849
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	9113082	<0.0010	0.0010	9113082	<0.0010	0.0010	9113082
Total Beryllium (Be)	mg/L	<0.0010	0.0010	9113843				<0.0010	0.0010	9113843
Dissolved Boron (B)	mg/L	<0.020	0.020	9112680	<0.020	0.020	9112680	<0.020	0.020	9112680
Total Boron (B)	mg/L	<0.020	0.020	9113849				<0.020	0.020	9113849
Dissolved Calcium (Ca)	mg/L	20	0.30	9112680	20	0.30	9112680	20	0.30	9112680
Total Calcium (Ca)	mg/L	20	0.30	9113849				20	0.30	9113849
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	9113082	<0.0010	0.0010	9113082	<0.0010	0.0010	9113082
Total Chromium (Cr)	mg/L	0.0032	0.0010	9113843				<0.0010	0.0010	9113843
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	9113082	<0.00030	0.00030	9113082	<0.00030	0.00030	9113082
Total Cobalt (Co)	mg/L	<0.00030	0.00030	9113843				<0.00030	0.00030	9113843
Dissolved Copper (Cu)	mg/L	0.0028	0.00020	9113082	0.0027	0.00020	9113082	0.0023	0.00020	9113082
Total Copper (Cu)	mg/L	0.0031	0.00020	9113843				0.0028	0.00020	9113843
Dissolved Iron (Fe)	mg/L	0.074	0.060	9112680	0.072	0.060	9112680	0.066	0.060	9112680
Total Iron (Fe)	mg/L	0.20	0.060	9113849				0.18	0.060	9113849
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	9113082	<0.00020	0.00020	9113082	<0.00020	0.00020	9113082
Total Lead (Pb)	mg/L	0.00030	0.00020	9113843				0.00025	0.00020	9113843
Dissolved Lithium (Li)	mg/L	<0.020	0.020	9112680	<0.020	0.020	9112680	<0.020	0.020	9112680
Total Lithium (Li)	mg/L	<0.020	0.020	9113849				<0.020	0.020	9113849
Dissolved Magnesium (Mg)	mg/L	11	0.20	9112680	11	0.20	9112680	11	0.20	9112680
Total Magnesium (Mg)	mg/L	11	0.20	9113849				11	0.20	9113849
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	9112680	<0.0040	0.0040	9112680	<0.0040	0.0040	9112680
Total Manganese (Mn)	mg/L	0.0045	0.0040	9113849				<0.0040	0.0040	9113849

RDL = Reportable Detection Limit
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Maxxam Job #: B869980
Report Date: 2018/08/25

SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		UC6465			UC6465			UC6466		
Sampling Date		2018/08/16 14:33			2018/08/16 14:33			2018/08/16 14:33		
COC Number		8040			8040			8040		
	UNITS	**SW1**	**RDL**	**QC Batch**	**SW1 Lab-Dup**	**RDL**	**QC Batch**	**SW2**	**RDL**	**QC Batch**
Dissolved Molybdenum (Mo)	mg/L	0.0013	0.00020	9113082	0.0013	0.00020	9113082	0.0013	0.00020	9113082
Total Molybdenum (Mo)	mg/L	0.0016	0.00020	9113843				0.0015	0.00020	9113843
Dissolved Nickel (Ni)	mg/L	<0.00050	0.00050	9113082	0.00060	0.00050	9113082	<0.00050	0.00050	9113082
Total Nickel (Ni)	mg/L	0.0018	0.00050	9113843				0.00061	0.00050	9113843
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	9112680	<0.10	0.10	9112680	<0.10	0.10	9112680
Total Phosphorus (P)	mg/L	<0.10	0.10	9113849				<0.10	0.10	9113849
Dissolved Potassium (K)	mg/L	3.5	0.30	9112680	3.6	0.30	9112680	3.5	0.30	9112680
Total Potassium (K)	mg/L	3.6	0.30	9113849				3.6	0.30	9113849
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	9113082	<0.00020	0.00020	9113082	<0.00020	0.00020	9113082
Total Selenium (Se)	mg/L	<0.00020	0.00020	9113843				<0.00020	0.00020	9113843
Dissolved Silicon (Si)	mg/L	0.15	0.10	9112680	0.14	0.10	9112680	0.12	0.10	9112680
Total Silicon (Si)	mg/L	0.46	0.10	9113849				0.44	0.10	9113849
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	9113082	<0.00010	0.00010	9113082	<0.00010	0.00010	9113082
Total Silver (Ag)	mg/L	0.00012	0.00010	9113843				0.00013	0.00010	9113843
Dissolved Sodium (Na)	mg/L	12	0.50	9112680	12	0.50	9112680	12	0.50	9112680
Total Sodium (Na)	mg/L	13	0.50	9113849				13	0.50	9113849
Dissolved Strontium (Sr)	mg/L	0.075	0.020	9112680	0.075	0.020	9112680	0.075	0.020	9112680
Total Strontium (Sr)	mg/L	0.074	0.020	9113849				0.074	0.020	9113849
Dissolved Sulphur (S)	mg/L	8.0	0.20	9112680	8.1	0.20	9112680	8.2	0.20	9112680
Total Sulphur (S)	mg/L	7.9	0.20	9113849				8.0	0.20	9113849
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	9113082	<0.00020	0.00020	9113082	<0.00020	0.00020	9113082
Total Thallium (Tl)	mg/L	<0.00020	0.00020	9113843				<0.00020	0.00020	9113843
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	9113082	<0.0010	0.0010	9113082	<0.0010	0.0010	9113082
Total Tin (Sn)	mg/L	0.0011	0.0010	9113843				<0.0010	0.0010	9113843
Dissolved Titanium (Ti)	mg/L	0.0040	0.0010	9113082	0.0020	0.0010	9113082	0.0026	0.0010	9113082
Total Titanium (Ti)	mg/L	0.013	0.0010	9113843				0.0094	0.0010	9113843
Dissolved Uranium (U)	mg/L	0.0054	0.00010	9113082	0.0054	0.00010	9113082	0.0053	0.00010	9113082
Total Uranium (U)	mg/L	0.0054	0.00010	9113843				0.0055	0.00010	9113843
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	9113082	<0.0010	0.0010	9113082	<0.0010	0.0010	9113082
Total Vanadium (V)	mg/L	<0.0010	0.0010	9113843				<0.0010	0.0010	9113843
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	9113082	<0.0030	0.0030	9113082	<0.0030	0.0030	9113082

RDL = Reportable Detection Limit
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Maxxam Job #: B869980
Report Date: 2018/08/25

SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		UC6465			UC6465			UC6466		
Sampling Date		2018/08/16 14:33			2018/08/16 14:33			2018/08/16 14:33		
COC Number		8040			8040			8040		
	UNITS	**SW1**	**RDL**	**QC Batch**	**SW1 Lab-Dup**	**RDL**	**QC Batch**	**SW2**	**RDL**	**QC Batch**
Total Zinc (Zn)	mg/L	<0.0030	0.0030	9113843				<0.0030	0.0030	9113843

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SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		UC6465	UC6466			UC6466		
Sampling Date		2018/08/16 14:33	2018/08/16 14:33			2018/08/16 14:33		
COC Number		8040	8040			8040		
	UNITS	**SW1**	**SW2**	**RDL**	**QC Batch**	**SW2 Lab-Dup**	**RDL**	**QC Batch**
Volatiles								
Xylenes (Total)	mg/L	<0.00089	<0.00089	0.00089	9109870			
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	0.10	9109870			
F1 (C6-C10)	mg/L	<0.10	<0.10	0.10	9112505	<0.10	0.10	9112505
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	104	104		9112505	104		9112505
4-Bromofluorobenzene (sur.)	%	101	103		9112505	103		9112505
D4-1,2-Dichloroethane (sur.)	%	133	133		9112505	134		9112505

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Client Project #: 209.40585.00000
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GENERAL COMMENTS

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

Package 1	4.7°C
Package 2	7.0°C
Package 3	6.3°C

As per client request, total metals were added on all samples 2018/08/22

Results relate only to the items tested.

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Maxxam Job #: B869980
Report Date: 2018/08/25

QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9110633	O-TERPHENYL (sur.)	2018/08/21	115	60 - 140	115	60 - 140	114	%		
9112505	1,4-Difluorobenzene (sur.)	2018/08/22	100	50 - 140	98	50 - 140	104	%		
9112505	4-Bromofluorobenzene (sur.)	2018/08/22	110	50 - 140	100	50 - 140	102	%		
9112505	D4-1,2-Dichloroethane (sur.)	2018/08/22	128	50 - 140	128	50 - 140	132	%		
9113827	NONACHLOROBIPHENYL (sur.)	2018/08/23	96	50 - 130	97	50 - 130	95	%		
9110633	F2 (C10-C16 Hydrocarbons)	2018/08/21	120	60 - 140	123	60 - 140	<0.10	mg/L	NC	30
9110894	Dissolved Nitrate (N)	2018/08/21	101	80 - 120	101	80 - 120	<0.010	mg/L	NC	20
9110894	Dissolved Nitrite (N)	2018/08/21	101	80 - 120	101	80 - 120	<0.010	mg/L	NC	20
9112257	Total Suspended Solids	2018/08/22	100	80 - 120	97	80 - 120	<1.0	mg/L	NC	20
9112505	F1 (C6-C10)	2018/08/22	74	60 - 140	111	60 - 140	<0.10	mg/L	NC	30
9112551	pH	2018/08/22			100	97 - 103			0.91	N/A
9112556	Alkalinity (PP as CaCO3)	2018/08/22					<1.0	mg/L	7.4	20
9112556	Alkalinity (Total as CaCO3)	2018/08/22			102	80 - 120	<1.0	mg/L	0.37	20
9112556	Bicarbonate (HCO3)	2018/08/22					<1.0	mg/L	1.7	20
9112556	Carbonate (CO3)	2018/08/22					<1.0	mg/L	7.4	20
9112556	Hydroxide (OH)	2018/08/22					<1.0	mg/L	NC	20
9112557	Conductivity	2018/08/22			100	90 - 110	<2.0	uS/cm	0.60	10
9112680	Dissolved Barium (Ba)	2018/08/22	98	80 - 120	100	80 - 120	<0.010	mg/L	NC	20
9112680	Dissolved Boron (B)	2018/08/22	101	80 - 120	102	80 - 120	<0.020	mg/L	NC	20
9112680	Dissolved Calcium (Ca)	2018/08/22	95	80 - 120	97	80 - 120	<0.30	mg/L	0.10	20
9112680	Dissolved Iron (Fe)	2018/08/22	97	80 - 120	98	80 - 120	<0.060	mg/L	3.2	20
9112680	Dissolved Lithium (Li)	2018/08/22	97	80 - 120	99	80 - 120	<0.020	mg/L	NC	20
9112680	Dissolved Magnesium (Mg)	2018/08/22	100	80 - 120	101	80 - 120	<0.20	mg/L	0.0055	20
9112680	Dissolved Manganese (Mn)	2018/08/22	98	80 - 120	99	80 - 120	<0.0040	mg/L	NC	20
9112680	Dissolved Phosphorus (P)	2018/08/22	100	80 - 120	99	80 - 120	<0.10	mg/L	NC	20
9112680	Dissolved Potassium (K)	2018/08/22	100	80 - 120	101	80 - 120	<0.30	mg/L	0.57	20
9112680	Dissolved Silicon (Si)	2018/08/22	97	80 - 120	97	80 - 120	<0.10	mg/L	2.5	20
9112680	Dissolved Sodium (Na)	2018/08/22	97	80 - 120	100	80 - 120	<0.50	mg/L	0.62	20
9112680	Dissolved Strontium (Sr)	2018/08/22	96	80 - 120	99	80 - 120	<0.020	mg/L	0.30	20
9112680	Dissolved Sulphur (S)	2018/08/22					<0.20	mg/L	0.23	20
9112743	Dissolved Chloride (Cl)	2018/08/22	NC	80 - 120	105	80 - 120	<1.0	mg/L	0.55	20

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Maxxam Job #: B869980
Report Date: 2018/08/25

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9112749	Dissolved Sulphate (SO4)	2018/08/22	112	80 - 120	108	80 - 120	<1.0	mg/L	NC	20
9113082	Dissolved Aluminum (Al)	2018/08/23	NC	80 - 120	100	80 - 120	<0.0030	mg/L	0.27	20
9113082	Dissolved Antimony (Sb)	2018/08/23	88	80 - 120	88	80 - 120	<0.00060	mg/L	NC	20
9113082	Dissolved Arsenic (As)	2018/08/23	97	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20
9113082	Dissolved Beryllium (Be)	2018/08/23	99	80 - 120	96	80 - 120	<0.0010	mg/L	NC	20
9113082	Dissolved Chromium (Cr)	2018/08/23	96	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20
9113082	Dissolved Cobalt (Co)	2018/08/23	95	80 - 120	96	80 - 120	<0.00030	mg/L	NC	20
9113082	Dissolved Copper (Cu)	2018/08/23	93	80 - 120	96	80 - 120	<0.00020	mg/L	0.95	20
9113082	Dissolved Lead (Pb)	2018/08/23	94	80 - 120	95	80 - 120	<0.00020	mg/L	NC	20
9113082	Dissolved Molybdenum (Mo)	2018/08/23	99	80 - 120	98	80 - 120	<0.00020	mg/L	2.1	20
9113082	Dissolved Nickel (Ni)	2018/08/23	94	80 - 120	95	80 - 120	<0.00050	mg/L	19	20
9113082	Dissolved Selenium (Se)	2018/08/23	99	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20
9113082	Dissolved Silver (Ag)	2018/08/23	96	80 - 120	97	80 - 120	<0.00010	mg/L	NC	20
9113082	Dissolved Thallium (Tl)	2018/08/23	96	80 - 120	96	80 - 120	<0.00020	mg/L	NC	20
9113082	Dissolved Tin (Sn)	2018/08/23	98	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20
9113082	Dissolved Titanium (Ti)	2018/08/23	95	80 - 120	104	80 - 120	<0.0010	mg/L	NC	20
9113082	Dissolved Uranium (U)	2018/08/23	97	80 - 120	96	80 - 120	<0.00010	mg/L	0.11	20
9113082	Dissolved Vanadium (V)	2018/08/23	98	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20
9113082	Dissolved Zinc (Zn)	2018/08/23	92	80 - 120	97	80 - 120	<0.0030	mg/L	NC	20
9113827	Aroclor 1016	2018/08/23					<0.000050	mg/L	NC	30
9113827	Aroclor 1221	2018/08/23					<0.000050	mg/L	NC	30
9113827	Aroclor 1232	2018/08/23					<0.000050	mg/L	NC	30
9113827	Aroclor 1242	2018/08/23					<0.000050	mg/L	NC	30
9113827	Aroclor 1248	2018/08/23					<0.000050	mg/L	NC	30
9113827	Aroclor 1254	2018/08/23					<0.000050	mg/L	NC	30
9113827	Aroclor 1260	2018/08/23	87	50 - 130	95	50 - 130	<0.000050	mg/L	NC	30
9113827	Aroclor 1262	2018/08/23					<0.000050	mg/L	NC	30
9113827	Aroclor 1268	2018/08/23					<0.000050	mg/L	NC	30
9113843	Total Aluminum (Al)	2018/08/23	108	80 - 120	97	80 - 120	<0.0030	mg/L	6.3	20
9113843	Total Antimony (Sb)	2018/08/23	107	80 - 120	96	80 - 120	<0.00060	mg/L	2.4	20
9113843	Total Arsenic (As)	2018/08/23	103	80 - 120	98	80 - 120	<0.00020	mg/L	2.1	20

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QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9113843	Total Beryllium (Be)	2018/08/23	103	80 - 120	96	80 - 120	<0.0010	mg/L	0.63	20
9113843	Total Chromium (Cr)	2018/08/23	102	80 - 120	100	80 - 120	<0.0010	mg/L	0.0056	20
9113843	Total Cobalt (Co)	2018/08/23	101	80 - 120	100	80 - 120	<0.00030	mg/L	0.32	20
9113843	Total Copper (Cu)	2018/08/23	99	80 - 120	100	80 - 120	<0.00020	mg/L	0.31	20
9113843	Total Lead (Pb)	2018/08/23	98	80 - 120	97	80 - 120	<0.00020	mg/L	1.0	20
9113843	Total Molybdenum (Mo)	2018/08/23	111	80 - 120	99	80 - 120	<0.00020	mg/L	3.4	20
9113843	Total Nickel (Ni)	2018/08/23	99	80 - 120	98	80 - 120	<0.00050	mg/L	0.31	20
9113843	Total Selenium (Se)	2018/08/23	99	80 - 120	98	80 - 120	<0.00020	mg/L	4.9	20
9113843	Total Silver (Ag)	2018/08/23	101	80 - 120	98	80 - 120	<0.00010	mg/L	5.9	20
9113843	Total Thallium (Tl)	2018/08/23	100	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20
9113843	Total Tin (Sn)	2018/08/23	107	80 - 120	97	80 - 120	<0.0010	mg/L	3.2	20
9113843	Total Titanium (Ti)	2018/08/23	104	80 - 120	99	80 - 120	<0.0010	mg/L	5.3	20
9113843	Total Uranium (U)	2018/08/23	104	80 - 120	101	80 - 120	<0.00010	mg/L	2.1	20
9113843	Total Vanadium (V)	2018/08/23	105	80 - 120	100	80 - 120	<0.0010	mg/L	4.0	20
9113843	Total Zinc (Zn)	2018/08/23	101	80 - 120	98	80 - 120	<0.0030	mg/L	0.55	20
9113849	Total Barium (Ba)	2018/08/23	95	80 - 120	95	80 - 120	<0.010	mg/L	1.4	20
9113849	Total Boron (B)	2018/08/23	99	80 - 120	99	80 - 120	<0.020	mg/L	4.7	20
9113849	Total Calcium (Ca)	2018/08/23	NC	80 - 120	98	80 - 120	<0.30	mg/L	0.17	20
9113849	Total Iron (Fe)	2018/08/23	NC	80 - 120	97	80 - 120	<0.060	mg/L	2.6	20
9113849	Total Lithium (Li)	2018/08/23	94	80 - 120	94	80 - 120	<0.020	mg/L	3.7	20
9113849	Total Magnesium (Mg)	2018/08/23	98	80 - 120	98	80 - 120	<0.20	mg/L	0.33	20
9113849	Total Manganese (Mn)	2018/08/23	97	80 - 120	98	80 - 120	<0.0040	mg/L	0.31	20
9113849	Total Phosphorus (P)	2018/08/23	99	80 - 120	98	80 - 120	<0.10	mg/L	4.3	20
9113849	Total Potassium (K)	2018/08/23	98	80 - 120	98	80 - 120	<0.30	mg/L	3.5	20
9113849	Total Silicon (Si)	2018/08/23	101	80 - 120	99	80 - 120	<0.10	mg/L	4.1	20
9113849	Total Sodium (Na)	2018/08/23	NC	80 - 120	97	80 - 120	<0.50	mg/L	1.0	20
9113849	Total Strontium (Sr)	2018/08/23	94	80 - 120	95	80 - 120	<0.020	mg/L	1.0	20

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

Maxxam Job #: B869980
Report Date: 2018/08/25

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9113849	Total Sulphur (S)	2018/08/23					<0.20	mg/L	0.53	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.

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 spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 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 (absolute difference <= 2x RDL).

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SLR CONSULTING (CANADA) LTD.
Client Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampler Initials: DAP

VALIDATION SIGNATURE PAGE

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

Justin Geisel, B.Sc., Organics Supervisor

Poonam Sharma, cCT, Organics Supervisor

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

Winnie Au, B.Sc., QP, Scientific Specialist

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

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CUSTODY TRACKING FORM

eCOC Number
W8040

- Please use this form for custody tracking when submitting the work instructions via eCOC (Electronic Chain of Custody).
- Please ensure your form **has a barcode** or a **Maxxam eCOC confirmation number** in the top right hand side. This number links your electronic submission to your samples.
- This form should be **placed in the cooler with your samples.**

RELINQUISHED BY				RECEIVED BY			
Dalen Peterson		Date	2018/08/18	Landon McLean		Date	2018/08/19
		Time (24HR)	12:25			Time (24HR)	12:20
		Date	/ /			Date	/ /
		Time (24HR)	:			Time (24HR)	:
		Date	/ /			Date	/ /
		Time (24HR)	:			Time (24HR)	:

Unless otherwise agreed to, submissions and use of services are governed by Maxxam's standard terms and conditions which can be found at www.maxxam.ca/terms

TRIAGE INFORMATION

Sampled by *(print)*: Dalen Peterson / Donovan Kitt

Number of Coolers/Packages: 1

Rush ☐ Micro ☐ Immediate Test ☐ Food Residue ☐ Food Chemistry ☐

LABORATORY USE ONLY

Received At: MED2

Labeled By:

Verified By:

Lab Comments:
RECEIVED IN YELLOWKNIFE
By: Jeffery S
Ice-yes 2018-08-18 13:26
Sealed-yes
See Temp Record

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
See	ACTR				

Temp: / /

Job B869980

Maxxam
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eCOC: W8040

Results Required By Date: 2018/08/31

Invoice Information

Attn: Donovan Kitt
SLR CONSULTING (CANADA) LTD
10015 102 ST.
GRAND PRAIRIE, AB
T8V 2V5 , CANADA
Email to:
dkitt@slrconsulting.com
analytical@slrconsulting.com

Report Information

Attn: Donovan Kitt
SLR CONSULTING (CANADA) LTD.
200 10135-101AVE
GRANDE PRARIE , AB
CANADA
Email to:
dkitt@slrconsulting.com

Project Information

Quote #:
PO/AFE#:
Project #: 209.40585.00000
Site Location: CAM-D Simpson Lake
Sampled By: DAP

Analytical Summary

Client Sample ID	Sampling Date/Time	Matrix	Dissolved Metals	Major Ions	PCBs	PHC F1 and F2 (C6-C16)	Routine Parameters	Total Metals	Total Suspended Solids
SW1	2018/08/16 14:33	SURFACE WATER	X	X	X	X	X	X	X
SW2	2018/08/16 14:33	SURFACE WATER	X	X	X	X	X	X	X

Submission Information

# of Samples: 2

global environmental solutions

Calgary, AB
1185-10201 Southport Rd SW
Calgary, AB T2W 4X9
Canada
Tel: (403) 266-2030
Fax: (403) 263-7906

Edmonton, AB
6940 Roper Road
Edmonton, AB T6B 3H9
Canada
Tel: (780) 490-7893
Fax: (780) 490-7819

Grande Prairie, AB
10015 102 Street
Grande Prairie, AB T8V 2V5
Canada
Tel: (780) 513-6819
Fax: (780) 513-6821

Kamloops, BC
8 West St. Paul Street
Kamloops, BC V2C 1G1
Canada
Tel: (250) 374-8749
Fax: (250) 374-8656

Kelowna, BC
200-1475 Ellis Street
Kelowna, BC V1Y 2A3
Canada
Tel: (250) 762-7202
Fax: (250) 763-7303

Markham, ON
200 - 300 Town Centre Blvd
Markham, ON L3R 5Z6
Canada
Tel: (905) 415-7248
Fax: (905) 415-1019

Nanaimo, BC
9-6421 Applecross Road
Nanaimo, BC V9V 1N1
Canada
Tel: (250) 390-5050
Fax: (250) 390-5042

Ottawa, ON
43 Auriga Drive, Suite 203
Ottawa, ON K2E 7Y8
Canada
Tel: (613) 725-1777
Fax: (905) 415-1019

Prince George, BC
1586 Ogilvie Street
Prince George, BC V2N 1W9
Canada
Tel: (250) 562-4452
Fax: (250) 562-4458

Regina, SK
1048 Winnipeg Street
Regina, SK S4R 8P8
Canada
Tel: (306) 525-4690
Fax (306) 525-4691

Saskatoon, SK
620-3530 Millar Avenue
Saskatoon, SK S7P 0B6
Canada
Tel: (306) 374-6800
Fax: (306) 374-6077

Toronto, ON
36 King Street East, 4th Floor
Toronto, ON M5C 3B2
Canada
Tel: (905) 415-7248
Fax: (905) 415-1019

Vancouver, BC (Head Office)
200-1620 West 8th Avenue
Vancouver, BC V6J 1V4
Canada
Tel: (604) 738-2500
Fax: (604) 738-2508

Victoria, BC
Unit 303 – 3960 Quadra Street
Victoria, BC V8X 4A3
Canada
Tel: (250) 475-9595
Fax: (250) 475-9596

Winnipeg, MB
1353 Kenaston Boulevard
Winnipeg, MB R3P 2P2
Canada
Tel: (204) 477-1848
Fax: (204) 475-1649

Whitehorse, YT
6131 6th Avenue
Whitehorse, YT Y1A 1N2
Canada
Tel: (867) 688-2847

Yellowknife, NT
Unit 44, 5022 49 Street
Yellowknife, NT X1A 3R8
Canada
Tel: (867) 765-5695