

Updated Phase II Environmental Site Assessment

Mooseland Mine Site

Build Nova Scotia.

60680169

September 2023



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September 8, 2023

Project #
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Subject: Updated Phase II Environmental Site Assessment – Mooseland Mine Site Mooseland Mine Site

Dear Mr. MacPhee:

AECOM Canada Ltd. (AECOM) is pleased to present this Updated Phase II Environmental Site Assessment (ESA) Report associated with the Mooseland Mine Site, located in Mooseland, Nova Scotia to Build Nova Scotia (BNS).

If you have any questions about the information presented within this report, please do not hesitate to contact me directly.

Sincerely,
AECOM Canada Ltd.

Rory McNeil
P.Eng. Project Manager
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Encl.

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01	2023/04/25	DH	Incorporated BNS' comments from Draft Report

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Executive Summary

AECOM Canada Ltd. (AECOM) was retained by Build Nova Scotia (BNS), formally known as Nova Scotia Lands Inc. (NSLI), to complete an Updated Phase II Environmental Site Assessment (ESA) for the former Mooseland Mine Site located at 3630 Mooseland Road, Mooseland, Nova Scotia (associated Parcel Identifier Number (PID): 41019332).. As requested by BNS, the area of focus for the Phase II ESA is limited to the historic mining Crown land area within the PID 41019332 (hereafter referred to as the “Site”).

The specific objectives of this report are as follows:

- Provide an update to the AECOM (2022) Phase II ESA, incorporating newly acquired site specific groundwater, sediment, and interstitial porewater quality data collected in January, 2023.
- Develop the preliminary problem formulation and identify high-priority data needs in support of a future quantitative HHERA.
- Provide a high-level description of proposed soil and surface water background sampling to be completed at a later date.
- Provide a high-level description of proposed aquatic food-web tissue sampling to be completed at a later date.

The findings and conclusions presented in this report apply only to the recognized environmental conditions assessed at the Site. The table below summarizes the findings related to groundwater, porewater, and sediment investigations completed as part of the scope of work for this Phase II ESA. The maximum concentration between the two sampling events (June 2022, January 2023) is presented in the table below.

Updated Phase II ESA Summary of Findings

Phase II ESA Activities		Phase II ESA Findings
Groundwater		
1.	Completion of an additional round of sampling	<ul style="list-style-type: none"> ■ Manganese impacts were identified at all six (6) of the six wells. ■ Arsenic impacts were identified at four (4) of the six (6) wells. ■ In addition to exceedances in arsenic, the following impacts were identified at select wells: <ul style="list-style-type: none"> - Aluminum (Max. Concentration: 920 ug/L) – Jan. 2023 - Arsenic (Max. Concentration: 3,700 ug/L) – Jan. 2023 - Cadmium (Max. Concentration: 1.5 ug/L) –Jan. 2023 - Cobalt (Max. Concentration: 23 ug/L) – June 2022 - Copper (Max. Concentration: 35 ug/L) – Jan. 2023 - Iron (Max. Concentration: 5,600 µg/L) – June 2022 - Manganese (Max. Concentration: 2,900 ug/L) – Jan. 2023
Porewater and Sediment – Assessment		
2.	Collected seven (7) porewater and sediment samples	<p><u>Porewater (porewater samples only collected in Jan. 2023):</u></p> <ul style="list-style-type: none"> ■ Aluminum and arsenic impacts were identified at all seven (7) of the porewater locations, and iron impacts were identified at six (6) of the seven (7) porewater locations. ■ In addition to these exceedances, the following impacts were also seen at select porewater locations: <ul style="list-style-type: none"> - Aluminum (Max. Concentration: 500 ug/L) - Arsenic (Max. Concentration: 6,800 ug/L) - Cobalt (Max. Concentration: 2.6 ug/L) - Copper (Max. Concentration: 2.4 ug/L) - Iron (Max. Concentration: 7,100 µg/L) - Lead (Max. Concentration: 4.5 µg/L) - Manganese (Max. Concentration: 920 ug/L) - Mercury (Max. Concentration: 0.065 ug/L) - Zinc (Max Concentration: 12 ug/L)

Phase II ESA Activities	Phase II ESA Findings
	<p>Sediment: Upgradient of tailings plume: SED1-SED3, PWSED1</p> <ul style="list-style-type: none"> ■ Background samples collected. No exceedances noted. <p>Adjacent to tailings plume: SED4-SED8, PWSED2 – PWSED7</p> <ul style="list-style-type: none"> ■ The following impacts were noted in one or more of the following parameters: <ul style="list-style-type: none"> - Arsenic (Max. Concentration: 9,800 mg/kg) – Jan. 2023 - Iron (Max. Concentration: 77,000 mg/kg) - Jan. 2023 - Manganese (Max. Concentration: 44,000 mg/kg) - Jan. 2023 - Mercury (Max. Concentration: 28 mg/kg) - Jan. 2023 - Selenium (Max. Concentration: 3.5 mg/kg) - Jan. 2023 <p>Downgradient of tailings plume: SED10, SED11</p> <ul style="list-style-type: none"> ■ Exceedances noted in arsenic (20 mg/kg) and mercury (0.68 mg/kg) for one sample (SED11) – June 2022

The vertical and horizontal extent of soil and groundwater contamination has not yet been determined. Additional work will need to be completed to determine this information,

A conceptual site model (CSM) for the Site is critical to understanding the sources from which the contaminants of concern (COCs) originate, the pathways through which these COCs can travel, and the receptors that are potentially exposed to these COCs. The objective of the CSM is to characterize the surface and subsurface conditions that exist at the Site and determine the COCs and exposure pathways that are drivers of risk of adverse effects to human and ecological receptors associated with excess exposures due to the release, fate and transport of contaminants from sources and surrounding impacted areas. This information can be used to identify risk management strategies to mitigate the sources and minimize the possibility for harmful exposures of human and ecological receptors to contaminant sources and releases of COCs.

At the Mooseland Mine Site, the disposition of tailings and waste rock, as well as fugitive particulate deposition, associated with the historic mining activities are the original sources of the potential contaminants of concern (PCOC). The Phase II ESA identified thirteen (13) metals measured in soil exceeding the Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS).

Arsenic and mercury are well known toxic contaminants of concern associated with emissions and wastes released to the environment from historic mineral processing and gold extraction, including waste rock and tailings. At the outset of this project arsenic and mercury have been identified as COCs of primary concern and the focus of this investigation. Other potential COCs (PCOCs) identified through the soil screening evaluation are discussed in the following section.

- Arsenic - in excess of the NSE Tier1 EQS of 10 mg/kg for all of the samples analysed (24/24); and
- Mercury - in excess of the NSE Tier1 EQS of 6.6 mg/kg for 21% of the samples analysed (5/24)

Additionally, eleven (11) PCOCs for further consideration for SSRA are identified based on the screening evaluation against the NSE Tier 1 EQS for metals of the available analytical data for soil tailings samples collected from areas impacted by historic mining activities at the Mooseland Site specifically,

- Aluminum, antimony, beryllium, cadmium, cobalt, iron, lead, manganese, molybdenum, selenium and thallium.

Potential exposure pathways to the above noted COCs and PCOCs for human and ecological receptors are as follows:

1. Soil Contact / Ingestion: Tailings and waste rock are located on-site and there are currently no barriers (i.e., fencing, asphalt, etc.) to protect human or ecological receptors from coming into contact with the impacted areas. Therefore, the soil contact / ingestion pathway is considered to be operable.
2. Leaching to Potable Water: Based on the results of the Phase I ESA (AECOM, 2022), it was determined that water wells are present within 250 m of the Site. Therefore, the leaching to potable water pathway is considered to be operable.
3. Inhalation of Indoor Air: The Inhalation of indoor air/vapour migration from groundwater to indoor air pathway is not considered to be operable since occupied buildings do not exist within 30 metres of the Site and no buildings exist on the Site.
4. Inhalation of Outdoor Air: The tailings solids are relatively fine grained and are subject to dusting that can be carried with ground-level winds and dispersed along the direction of the prevailing winds. Therefore, the inhalation of outdoor air pathway is considered to be operable.
5. Leaching and Migrating to Off-Site Surface Water: Tailings deposits and associated surface water runoff have been observed on-site to be leading into the Tangier River. Impacts are above the groundwater table, and leaching (from precipitation) to groundwater, and then migrating to surface water. Therefore, the leaching and migrating to off-site surface water pathway is considered to be operable.

The Table below provides a summary of the recommended additional field programs recommend for the Site.

Summary of Recommended Additional Field Programs

Environmental Concern	Recommended Additional Field Programs
Waste Rock and Tailings	<ul style="list-style-type: none"> ▪ Additional geochemical sampling program ▪ Additional delineation program ▪ GPR study of waste rock piles
Impacted Soils	<ul style="list-style-type: none"> ▪ Additional soil delineation ▪ Additional background soil sampling
Terrestrial Environment	<ul style="list-style-type: none"> ▪ Plant survey and plant tissue sampling
Impacted Surface Water and Porewater	<ul style="list-style-type: none"> ▪ Aquatic tissue sampling ▪ Continued surface water and additional background surface water sampling ▪ Additional surface water samples for on-site shaft and pond
Impacted Sediment	<ul style="list-style-type: none"> ▪ Additional ssediment delineation ▪ Additional background sediment sampling
Impacted Groundwater	<ul style="list-style-type: none"> ▪ Continued groundwater sampling
Hecla Mine Shaft	<ul style="list-style-type: none"> ▪ Further detailed inspection
Surface Debris	<ul style="list-style-type: none"> ▪ A detailed survey of the material including identifying hazardous waste should be completed

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1. Introduction

AECOM Canada Ltd. (AECOM) was retained by Build Nova Scotia (BNS), formally known as Nova Scotia Lands Inc. (NSLI), to complete a Phase II Environmental Site Assessment (ESA) for the former Mooseland Mine Site located at 3630 Mooseland Road, Mooseland, Nova Scotia (associated Parcel Identifier Number (PID): 41019332). The general location of the property is shown on **Figure 1, Appendix A**. As requested by BNS, the area of focus for the Phase II ESA is limited to the historic mining Crown land area within the PID 41019332 (hereafter referred to as the "Site"). The approximate property boundary associated with Property Online for PID 41019332, as well as the Phase II ESA area of focus is presented on **Figure 2, Appendix A**. Site features, including waste rock, tailings, and former mining infrastructure, is presented on **Figure 3, Appendix A**.

Subsequent to completion of the Phase II ESA (AECOM 2022), a memo was submitted to BNS in January 2023 with an overview of the proposed additional work. BNS requested that additional investigations be carried out at the Site to:

1. Assess variability and seasonal differences in groundwater, porewater, and surface water quality;
2. Assess sediment and surface water interactions through paired sediment and porewater chemistry data;
3. Establish a robust estimate of local background soil and surface water quality;
4. Measure concentrations of tailings related contaminants in biological tissues in the aquatic environment; and,
5. Develop a preliminary problem formulation identifying linkages between human and ecological receptors and tailings related contaminants to form the basis of a future quantitative detailed human health and ecological risk assessment (HHERA) and identify data gaps and information needs to support the HHERA.

1.1 Objectives

The specific objectives of the current report are to:

1. Provide an update to the AECOM (2022) Phase II ESA, incorporating newly acquired site specific groundwater, sediment, and interstitial porewater quality data collected in January, 2023.
2. Develop the preliminary problem formulation and identify high-priority data needs in support of a future quantitative HHERA.
3. Provide a high-level description of proposed soil and surface water background sampling to be completed at a later date.
4. Provide a high-level description of proposed aquatic food-web tissue sampling to be completed at a later date.

2. Regulatory Framework

2.1 Nova Scotia Environment Contaminated Sites Regulations

AECOM, on behalf of BNS submitted Nova Scotia Environment and Climate Change (NSECC) Notification of Free Product or Contamination (FRM-100) under the provincial Contaminated Sites Regulations (CSR) on September 27th, 2022. The submission was acknowledged by NSECC in an obligations letter dated October 5, 2022, and is included herein as **Appendix E**, which makes the Site subject to the Nova Scotia Contaminated Sites Regulations.

2.1.1 Applicable Environmental Quality Standards

The subject property evaluation was completed in accordance with the NSECC Contaminated Sites Regulations . NSE Tier I Environmental Quality Standards (EQS) criteria provide the applicable guidelines for the Site. Site characteristics that are used to determine the NSE Tier I EQS (NSE-EQS) are as follows: **residential land use, potable water supply, coarse-grained soils., potable water supply, coarse-grained soils.**

Soil and Tailings Guidelines:

- Nova Scotia Environment (NSE) Tier I Environmental Quality Standards (EQS) for Soil – residential, potable water, coarse grained soils (Table 1A)

Groundwater Guidelines:

- Nova Scotia Environment (NSE) Tier I Environmental Quality Standards (EQS) for Groundwater – residential, potable water, coarse grained soils (Table 4A)
- Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Groundwater Discharging to Surface Water (>10 m from Surface Water Body - Fresh Water) (Table 3)

Surface Water Guidelines:

- Nova Scotia Environment (NSE) Tier I Environmental Quality Standards (EQS) for Surface Water and Groundwater Discharging to Surface Water (Table 3)

Surface water NSE-EQS was applied to porewater samples to assess potential exposures of benthic organisms in the sediments (bivalves, crustaceans, worms etc.) and also assess potential exposures to bottom feeding pelagic aquatic organisms.in the absence of specific criteria for porewater.

Sediment Guidelines:

- Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Sediment (freshwater); Table 2

2.2 Nova Scotia Environment Contaminated Sites Regulations – Risk Assessment

It is anticipated that a detailed quantitative HHERA will be an important component of any future site risk management strategy. Future quantitative risk assessment will be conducted in accordance with NSECC Contaminated Sites Regulations.

The NSECC Contaminated Sites Regulation (i.e., the Regulation) allows for site specific risk assessment (SSRA), as described in the Nova Scotia Environment (NSE) Remediation Levels Protocol (PRO-500) for the development of site-specific target levels (SSTLs) while the NSE Remedial Action Plan Protocol (PRO-600) provides direction on the development of a risk management planning for conditional closure scenarios where exposure management and long-term site management could be implemented at a site. Long-term exposure management measures may be applied for contaminated sites, such as those with abandoned mine tailings, that cannot be remediated up to acceptable NSE Tier 1 Environmental Quality Standards (EQS) and/or NSE Tier 2 Pathway Specific Standards (PSS) levels; thereby, requiring the development, implementation and reporting of a risk management plan.

In accordance with the NSE Remediation Levels Protocol (PRO-500), for substances other than petroleum hydrocarbons (PHCs), established methodologies and computer models are permitted to be used in SSRA, including, but not limited to, those methods developed and published by the CCME for the risk management of contaminated sites in Canada.

A NSE Tier 2 SSRA means a site-specific environmental and human health risk assessment that is based on conditions at a particular site. The NSE Tier 2 SSRA evaluates actual site risks of adverse effects from exposure to select chemicals of concern (COCs) for human and ecological receptors using standardized methodologies and develops appropriate remediation levels for select COCs that may be used as remediation criteria. Through a NSE Tier 2 SSRA, site-specific target levels (SSTLs) can be developed providing alternative risk-based site-specific remediation levels for a site. The SSTLS should be protective of environmental risks found at a site, based on site-specific information and require detailed site information, as well as a Conceptual Site Model (CSM) to justify their development and application in lieu of the corresponding NSE Tier 2 PSS.

Actual site data documented physical properties for surface soil (≤ 1.5 metres below ground surface (mbgs)) and subsurface soils (>1.5 mbgs), as defined by CCME (2016), and actual site data documented physical properties of the site groundwater, as per CCME characterizing the subsurface conditions at the site and the surrounding area, are used instead of defaults in mathematical models to calculate exposure possible risks of adverse effects to environmental receptors and propose site specific target remedial levels. Depending on which default parameters in the risk assessment (RA) exposure model (see NSE Remediation Levels Protocol PRO-500, Appendix 1, Table 2) are modified using actual site data to produce the SSTLs (if met), can result in unconditional or conditional site closure. Changes to other default parameters in the RA exposure model (e.g., human exposure parameters and building parameters) often signifies the need for ongoing exposure management, as a requirement of site closure for which conditional closure is only allowable under Environmental Site Assessment for Limited Remediation Protocol (PRO-200).

As outlined in the NSE Remediation Levels Protocol (PRO-500), the preferred sources for the required chemical, physical and toxicological data, in the following hierarchy, are:

- Health Canada
- CCME
- Canadian provincial jurisdictions
- US EPA

In accordance with the Regulation and applicable protocols and guidance, prior to conducting an SSRA for substances other than petroleum hydrocarbons (PHCs), the following evaluation steps are required to be completed:

- Evaluation of the substances against protocol NSE Tier 1 EQS, if available, for the substance.

- If NSE Tier 1 EQS does not exist, then an evaluation of site concentrations data against screening levels from other jurisdictions (i.e., Health Canada, CCME, other Canadian provincial jurisdictions and the US EPA) should be presented and the findings discussed.
- Provide a detailed written and tabulated hazard, exposure and receptor assessment to the Nova Scotia Minister of the Environment for review and consideration of whether a more comprehensive quantitative SSRA is required.

The above steps are analogous to steps involved in the Problem Formulation Stage of an Environmental Risk Assessment, one of three core components to the integrated risk management process (CCME, 2016) as shown **Figure 2-1** and **Figure 2-2** below. It is important to be mindful that the Environmental Risk Assessment and the Problem Formulation Stage is an iterative process, which involves data collection and analysis, model development, gaps analyses and further sampling and environmental investigation to verify key assumptions underpinning the SSRA. Additional environmental studies / surveys to gather new evidence to fill critical information and knowledge gaps for refining RA model assumptions and reducing uncertainties may be necessary for the development, implementation and assessment of appropriate remediation options and/ or risk management planning.

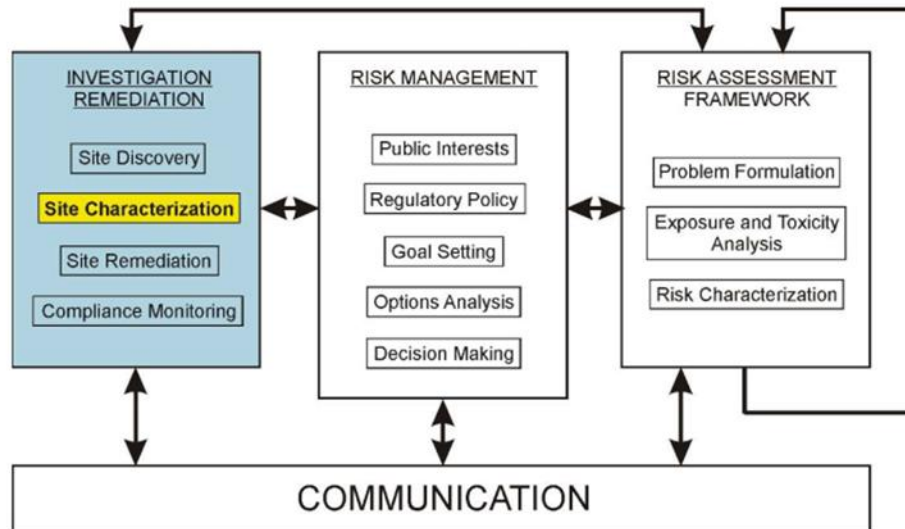


Figure 2-1: Integrated Risk Management Process (CCME, 2016)

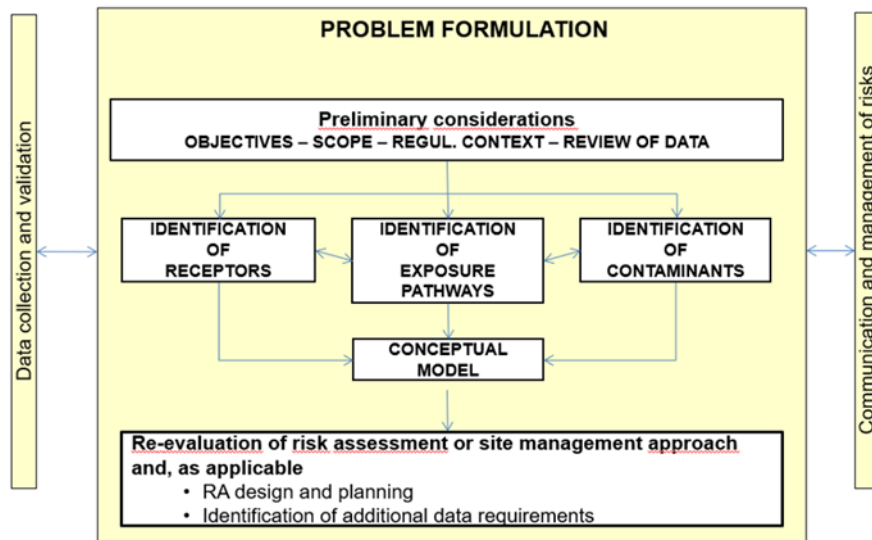


Figure 2-2: Problem Formulation Key Step in Environmental and Human Health Risk Assessment (Source FCSAP Presentation ECC/HC, February 2017)

2.3 Applicable Federal Acts and Regulations

In addition to the relevant Nova Scotia Acts and Regulations (July 2013, amended 2020), under the Environment Act of Nova Scotia, other relevant Federal Acts include the Fisheries Act, the Canadian Environmental Protection Act, the Species at Risk Act, the Migratory Birds Convention Act, and the Canadian Environmental Assessment Act.

3. Site Information

3.1 Subject Property Description

The Site is located at the civic address of 3630 Mooseland Road in Mooseland, NS (PID: 41019332), approximately 24 km north of Tangier, NS. This PID is in a remote location, which spans 349.6 hectares (864.0 acres) and is almost entirely undeveloped, except for a roadway (Mooseland Road) running through it (northwest to southeast), and sparse historical mining-related infrastructure. Vegetation consists of a mixture of forest and shrubland. The Site is accessible by vehicle along Mooseland Road.

3.1.1 Historical Land Use

The Site is located in an area of historic mining activity in the Mooseland gold district. Mining and milling activities occurred intermittently in the area between 1861 and 1934. During this time period, approximately 120 kg of gold was reportedly recovered from 8217 tonnes of crushed rock (Parsons et al. 2003).

Since then, sporadic exploration has continued within the district. The most recent advanced exploration effort was made by Acadia Minerals and Hecla Mining in the late 1980s, with the drilling of 135 boreholes, and the sinking of a 400-foot shaft (Horne et al. 2004). In 2003, Azure Resources Corporation optioned the Mooseland property and in late 2003 and early 2004, the company established a decline and carried out bulk sampling of the Little North and Cummings belts.

3.1.2 Site Buildings and Structures

Abandoned, historical mining-related infrastructure is present on-site. At the time of the site visits, three (3) Quonset Huts were identified and were located in the cleared area at the end of the road off of 3630 Mooseland Road, adjacent to the waste rock area. One hut is currently attached to a steel structure and contents inside include garbage and waste, the second hut (insulated) has wooden boxes and old core samples stored inside, and the remaining hut is newer which has wooden boxes and newer core samples inside – this hut may belong to Atlantic Gold. AECOM was told by Atlantic Gold that they are completing minor work at the Site (removing historic core samples).

The steel structure identified on-site that is attached to one of the Quonset Huts could potentially be a former headframe over a mine shaft for two separate compartments. The houses at the top likely protected pulleys of hoists, there were no wire ropes present.

There was also a small plywood structure identified southeast of area where the Quonset huts are located. It was noted that there is piping entering the back of the structure.

The three former stamp mills that were historically known to be located on-site were not identified at the time of the site visit.

3.1.3 Mine Waste and Physical Hazards

Tailings and waste rock are present and scattered throughout the Site, and various debris and waste (consisting of garbage, wood, tubing, metal, drill rods, tires etc.) were littered intermittently throughout the Site, as well as stored in one of the Quonset huts. Limited fencing structures surrounding the waste rock were also noted to be present within the area of the Quonset huts.

Former mine shafts are located on-site in various areas and signage was noted throughout the Site to warn the public of “hazardous open holes”. A ponded area was noted southeast of the Quonset huts which might be the former Hecla mining shaft. A large, ponded body of water is located approximately 200 m northwest of the Quonset huts, which may be a flooded former mine shaft.

3.2 Physical Setting

3.2.1 Regional Topography

Site elevation varies between 90 – 110 meters above sea level (masl). Elevation tends to slope northeast towards the Tangier River. Topography for the Site and surrounding area is presented in **Figure 1, Appendix A**.

3.2.2 Regional Geology

Bedrock in the area is of Cambro-Ordovician age, belonging to the Meguma group which comprises the southern half of Nova Scotia’s land mass (Patterson 1993). The Meguma group is subdivided into two primary formations: the Goldenville and Halifax formation (Patterson 1993). The basal part is the Goldenville formation, which is overlain by the Halifax formation (Prime and White 2007), except in some areas where it is exposed at the surface.

In the Mooseland Gold District, an anticline of the Goldenville Formation is exposed at the surface (Malcolm 1929, Horne et al. 2004). Generally, the Goldenville formation is primarily composed of metasandstone, with some interbedded metasilstone and slate, and in some cases, layering of sheets of rock is clearly visible (Prime and White 2007). The colour of the rock varies from medium grey to green-grey (Prime and White 2007). Low levels of sulphides (typically <1%) are common, usually in the form of isolated pyrite crystals (Prime and White 2007).

Gold-bearing deposits in the Mooseland Gold District have been described as intensely folded and metamorphosed sediments which are impure quartzites and narrow bands of interbedded slates (Mawpley 1938). Large and small arsenopyrite crystals are common and occur mostly in impure quartzites or slate (Mawpley 1938).

3.2.3 Regional Hydrogeology / Hydrology

Site-specific hydrogeologic information was not identified during the course of this assessment. Groundwater flow is expected to follow the regional topography, towards the Tangier River (northeast), located adjacent to the Site. However, the current groundwater flow direction and depth in the vicinity of the Site cannot be confirmed without site-specific groundwater monitoring well data.

Surface water features on or near the Site (identified on **Figure 1**) include the following:

- Tangier River is located adjacent (northeast) to the Site and flow direction is towards the southeast.
- A tributary leading into Tangier River is located northwest of the Site.
- Wetland areas are present on-site, as well as north, northwest, and east of the Site.
- Sluice Brook is located on-site and originates from Sluice Lake. Topographic maps indicate that Sluice Brook flows northeast into a wetland area on-site, and eventually into Tangier River.
- A ponded body of water is located on-site southeast of the Quonset huts. This ponded area may be the former Hecla mining shaft.
- A large, ponded body of water located approximately 200 m northwest of the Quonset huts which may potentially be a flooded former mine shaft.

A search of water wells present on-site, and within a 250 m radius of the Site, was completed as part of the ERIS

database search during the Phase I ESA. The search results found that there are 4 water wells present on-site, and one water well was identified approximately 247.8 m from the Site.

3.3 Adjacent Land Use

The surrounding area on the west, east, and south sides of the Site appeared to be resource forest area and undeveloped, and Tangier River is located north and adjacent to the Site.

The nearest occupied building is the Saint Thomas Anglican Church, located approximately 1.2 km from the Site.

It is also noted that there appears to be a designated fishing area located in Tangier River, downstream and approximately 1.3 km from the Site called "Hawbolts Farm Pool".

3.4 Previous Environmental Site Investigations

Previous environmental reports were provided to AECOM by BNS and a summary of each report is presented within the AECOM Phase I ESA (AECOM, 2022).

A summary of the findings from the Phase I ESA completed by AECOM is provided below.

3.4.1 Phase I ESA (AECOM, 2022)

Based on the results of the Phase I ESA, AECOM identified the following key information:

1. The Site is located in an area of historic mining activity in the Mooseland gold district. Mining and milling activities have been carried out intermittently in the area between 1861 and 1934, during which 120 kg of gold was reported to be recovered from 8217 tonnes of crushed rock. Since then, sporadic exploration has continued. The most recent advanced exploration made was by Acadia Minerals and Hecla Mining in the late 1980s, with the drilling of 135 boreholes, and the sinking of a 400-foot shaft. In 2003, Azure Resources Corporation optioned the Mooseland property and in late 2003 and early 2004, the company established a decline and carried out bulk sampling of the Little North and Cummings belts.
2. The surrounding area on the west, east, and south sides of the Site appeared to be resource forest area and undeveloped, and Tangier River is located north and adjacent to the Site. The closest publicly accessed building to the Site is the Saint Thomas Anglican Church which is located over 1.2 km from the Site. It is also noted that there appears to be a local fishing area located in Tangier River, downstream and approximately 1.3 km from the Site called "Hawbolts Farm Pool". No additional details were able to be found related to this fishing area. Based on a review of topographic maps, it appears there is a mine located approximately 1.75 km northwest of the Site. Based on a review of the results of the ERIS search, within 250 m of the Site there appears to be a number of abandoned mine openings, one contaminated site, a number of drill holes, mineral occurrences, and water wells.
 - An expanded review of the Nova Scotia Well Log Records indicated that the well information provided by ERIS and was incomplete.
 - The ERIS report indicated that there were 4 wells on-site and one within 250m. The review of NS Well Log Records found that none of these wells were considered to be on-site, with one well located more than 10km away and the last well could not be located.
 - The Nova Scotia Well Log Records indicated that there were 3 domestic water wells within 1km of the Site; 8 wells within 2.6km of the Site; and . There may be more wells nearby as only wells with civic addresses provided in the record database could be located with respect to spatial accuracy.

- It also should be noted that properties on Island Drive would be on domestic water wells and these residential island properties are situated approximately 1.8km southeast (downstream island within Tangier River) of the Site.

3. Current structures located on-site during the time of the site visit include the following:

- Quonset Hut:
 - Building details: concrete slab with metal (steel) walls and roof. No front wall – entrance is open. No back wall - the back of the hut is open and attached to a steel structure.
 - Insulated: no
 - Contents: garbage / waste
 - Location: cleared area at the end of the road off of 3630 Mooseland Road – adjacent to waste rock area.
 - Notes: currently attached to steel structure noted below.
- Quonset Hut (insulated):
 - Building details: concrete slab with metal (steel) walls and roof
 - Insulation: yes - yellow insulation (potential asbestos containing material)
 - Contents: wooden boxes old core samples
 - Location: cleared area at the end of the road off of 3630 Mooseland Road – adjacent to waste rock area.
- Quonset Hut (newer):
 - Building details: concrete slab with metal (steel) walls and roof. No front wall – entrance is open.
 - Insulated: no
 - Contents: wooden boxes - newer core samples
 - Location: cleared area at the end of the road off 3630 Mooseland Road – adjacent to waste rock area. On other side of the road from the other Quonset Huts.
 - Notes: this newer storage area may belong to Atlantic Gold.
- Steel structure:
 - Building details: steel structure
 - Insulated: not applicable
 - Contents: not applicable
 - Location: attached to Quonset Hut that is currently storing garbage / waste
 - Notes: potential that this structure was a headframe over a mine shaft for two separate compartments. The houses at the top likely protected pulleys of hoists, there were no wire ropes present.
- Small plywood structure (possible former pump house):
 - Building details: plywood structure with roof. Piping entering the structure.
 - Insulated: no
 - Contents: empty
 - Location: located near a ponded water area, which is potentially the former Hecla Mine Shaft, that was located to the southeast of area where the Quonset huts are located
 - Notes: piping entering the back of the structure

The three former stamp mills that were known to be located on-site were not identified at the time of the site visit.

4. A sparsely vegetated tailings deposit was noted along the western bank of the Tangier River. Well oxidized sandy tailings were noted near former stamp mill. Waste rock was noted throughout the Site.
5. At the time of the site visit, various debris and waste (consisting of garbage, wood, tubing, metal, drill rods, tires etc.) were littered intermittently throughout the Site, as well as stored in one of the Quonset huts located next to the former stamp mill.
6. Historical soil samples collected at the Site reportedly show elevated concentrations of arsenic and mercury present in the tailings on-site. Based on previous reporting completed for the Site, it was noted that the total area considered to be potentially impacted consisting of 34,093 square meters (8.5 acres), with an estimated 8,217 tonnes of tailings.

7. Based on previous environmental reports and results from the ERIS database report, it is noted that former mine shafts are located on-site in various areas. There are four (4) former mine shafts located in the area of tailings along the Tangier River, as well as multiple mine shafts in the area along Sluice Brook. Signage was noted throughout the Site to warn the public of "hazardous open holes". The ponded water area located southeast of the Quonset huts is potential to be former Hecla mining shaft.

Based on the results of the Phase I ESA, AECOM recommends the following:

Solid Waste Management:

1. A survey of all debris and solid waste should be conducted prior to disposal. Insulation should be sampled to see if it contains asbestos.
2. All debris and other solid wastes should be removed from the Site and disposed in compliance with Provincial and Municipal legislation. Characterization of the waste should take place prior to or concurrently with removal.

Potential Environmental Contamination:

3. A Phase II ESA program should be conducted to investigate potential environmental contamination of soil, surface water and groundwater on the Site as a result of historical gold mining operations and the waste generated during that time. The Phase II ESA should focus on known areas of concern such as known tailings areas, waste storage areas, former stamp mill areas, pond/ former shaft areas and any known waste discharge locations. It is expected that the primary Contaminants of Concern (COC) will be heavy metals (arsenic and mercury).

Additional items to be considered include the following:

Physical Hazards:

4. In addition to debris and solid waste, a survey of manmade structures identified on-site (steel structure (potential headframe)), Quonset huts, former pump house) should be conducted to identify those that require remedial actions. If determined that the manmade structure should be removed, the materials should be disposed of in compliance with Provincial and Municipal legislation.
5. A survey of former mine shafts should be conducted to identify those that require remedial actions to address physical hazards such as excessive drops and/or falls.

4. Phase II ESA

4.1 Initial Phase II ESA Field Program – June 2022

In June 2022, AECOM completed the initial field program which consisted of borehole drilling and monitoring well installation, and hand auguring along with soil, tailings, groundwater, surface water and sediment sampling, chemical analysis of selected samples, and evaluation of the analytical data.

The Phase II ESA was conducted in accordance with the Nova Scotia Environment (NSE) Contaminated Sites Guidelines (2013) Phase II Environmental Site Assessment Protocol (PRO-400). The field methodologies, observations, analytical results and QAQC from this initial investigation are presented in the Phase II ESA report titled “Phase II Environmental Site Assessment – Mooseland Mine Site – October 2022”.

A summary of these findings are presented in **Table 1** below.

Table 1: Phase II ESA Summary of Findings – June 2022

Phase II ESA Activities		Phase II ESA Findings
Soil and Tailings - Impact Assessment and Delineation *		
1.	Collected twenty-two (22) soil samples	<ul style="list-style-type: none"> ▪ Noteworthy impacts in arsenic and mercury were identified in soil samples and are suspected to be associated with previous mining activities that took place at Site. ▪ In addition to exceedances in arsenic and mercury, the following impacts were noted in soil: <ul style="list-style-type: none"> - Aluminum (Max. Concentration: 28,000 mg/kg) - Antimony (Max. Concentration: 7.8 mg/kg) - Arsenic (Max. Concentration: 26,000 mg/kg) - Beryllium (Max. Concentration: 2.4 mg/kg) - Cadmium (Max. Concentration: 3.4 mg/kg) - Cobalt (Max. Concentration: 430 mg/kg) - Iron (Max. Concentration: 160,000 mg/kg) - Lead (Max. Concentration: 190 mg/kg) - Manganese (Max. Concentration: 68,000 mg/kg) - Mercury (Max. Concentration: 23 mg/kg) - Molybdenum (Max. Concentration: 27 mg/kg) - Selenium (Max. Concentration: 3.8 mg/kg) - Thallium (Max. Concentration: 2.6 mg/kg)
2.	Collected four (4) tailings samples (T1-T4) and seven tailings delineation samples (TD1-TD7)	<p>Tailings:</p> <ul style="list-style-type: none"> ▪ Arsenic (Max. Concentration: 9,900 mg/kg) and iron (Max. Concentration: 24,000 mg/kg) impacts were identified in all tailings samples. ▪ Mercury (Max. Concentration: 11 mg/kg) and manganese (Max. Concentration: 630 mg/kg) impacts were identified in two (2) of the tailings samples (T2, T3). <p>Tailings Delineation:</p> <ul style="list-style-type: none"> ▪ Arsenic (Max. Concentration: 22,000 mg/kg) impacts identified in all tailings delineation samples. ▪ Additional impacts were identified in in select samples.: <ul style="list-style-type: none"> ▪ Aluminum (Max. Concentration: 22,000 mg/kg), ▪ Antimony (Max. Concentration: 10 mg/kg), ▪ Beryllium (Max. Concentration: 1.1 mg/kg), ▪ Cadmium (Max. Concentration: 3.3 mg/kg), ▪ Iron (Max. Concentration: 28,000 mg/kg), ▪ Lead (Max. Concentration: 180 mg/kg) ▪ Manganese (Max. Concentration: 690 mg/kg) ▪ Mercury (Max. Concentration: 10 mg/kg), and ▪ Selenium (Max. Concentration: 4.4 mg/kg)

Phase II ESA Activities		Phase II ESA Findings
Soil – Background Assessment		
3.	Collected five (5) background soil samples: BG1-BG5	<ul style="list-style-type: none"> ▪ Arsenic (Max. Concentration: 74 mg/kg) impacts were identified at each background soil location. ▪ Manganese (Max. Concentration: 1100 mg/kg) impacts were identified at two (2) of the background locations: BG3, BG4. ▪ Selenium (Max. Concentration: 1.7 mg/kg) impacts were identified at two (2) of the background locations: BG2, BG3. ▪ Aluminum (18,000 mg/kg) impacts were identified at one (1) of the background locations: BG3. ▪ Iron (Max. Concentration: 30,000 mg/kg) impacts were identified at three (3) of the background soil locations (BG2, BG3, BG4).
Waste Rock – Assessment and Delineation		
4.	Collected two (2) waste rock samples	<ul style="list-style-type: none"> ▪ Elevated levels of aluminum, arsenic, iron and manganese are present in the (2) waste rock samples collected at Site.
Groundwater		
5.	Installed six (6) monitoring wells (MW1 – MW6) and completed sampling at each well	<ul style="list-style-type: none"> ▪ Arsenic impacts were identified at four (4) of the six (6) wells. ▪ In addition to exceedances in arsenic, the following impacts were identified at select wells: <ul style="list-style-type: none"> - Aluminum (Max. Concentration: 180 ug/L) - Arsenic (Max. Concentration: 1,400 ug/L) - Cadmium (Max. Concentration: 0.26 ug/L) - Cobalt (Max. Concentration: 23 ug/L) - Copper (Max. Concentration: 5.4 ug/L) Iron (Max. Concentration: 5,600 ug/L) ▪ Lead (Max. Concentration: 1.1 ug/L) Manganese (Max. Concentration: 1,700 ug/L)
Surface Water and Sediment – Assessment		
6.	Collected nine (9) SW samples: SW1-SW9 and eight (8) sediment samples SED1-SED8	<p>Surface Water:</p> <p>Upgradient of tailings plume: SW1-SW3</p> <ul style="list-style-type: none"> ▪ Background samples collected. Exceedances of NS-EQS noted for aluminum (Max. Concentration: 260 ug/L) and iron (Max. Concentration: 560 ug/L) for each location. <p>Adjacent to tailings plume: SW4-SW6</p> <ul style="list-style-type: none"> ▪ Exceedances noted in aluminum (Max. Concentration: 280 ug/L) and iron (Max. Concentration: 580 ug/L) for each location. <p>Downgradient of tailings plume: SW7-SW9</p> <ul style="list-style-type: none"> ▪ Exceedances noted in aluminum (Max. Concentration: 250 ug/L) and iron (Max. Concentration: 580 ug/L) for each location, and arsenic (7.1 ug/L) impacts for SW7 location. <p>Sediment:</p> <p>Upgradient of tailings plume: SED1-SED3</p> <ul style="list-style-type: none"> ▪ Background samples collected. No exceedances noted. <p>Adjacent to tailings plume: SED4-SED6</p> <ul style="list-style-type: none"> ▪ No exceedances noted <p>Downgradient of tailings plume: SED7-SED8</p> <ul style="list-style-type: none"> ▪ Exceedances noted in arsenic (Max. Concentration: 660 mg/kg) and mercury (Max. Concentration: 6.1 mg/kg) in both samples.
7.	Collected two (2) SW samples: SW10, SW11 and two (2) sediment samples: SED10-SED11	<p>Surface Water:</p> <p>Further Downgradient of tailings plume: SW10, SW11</p> <ul style="list-style-type: none"> ▪ Exceedances noted in aluminum (Max. Concentration: 260 ug/L) and iron (Max. Concentration: 620 ug/L) for each location. <p>Sediment:</p> <p>Further Downgradient of tailings plume: SED10, SED11</p> <ul style="list-style-type: none"> ▪ Exceedances noted in arsenic (20 mg/kg) and mercury (0.68 mg/kg) for one sample (SED11).
8.	Collected one (1) SW sample: SW13	<ul style="list-style-type: none"> ▪ Aluminum (29 ug/L) and arsenic (94 ug/L) impacts noted in the sample collected from the ponded water.

Phase II ESA Activities		Phase II ESA Findings
9.	Collected one (1) SW sample: SW12	<ul style="list-style-type: none"> Aluminum (37 ug/L), arsenic (8.9 ug/L) and iron (690 ug/L) impacts noted in the sample collected from the ponded water (former Hecla Mine Shaft).

Notes:

*: Previous Phase II sampling completed by others (Parsons 2012) showed a maximum tailings concentration in arsenic (256,000 mg/kg) and mercury (30 mg/kg). It can be assumed that these concentrations are still present at the site.

4.2 Additional Phase II ESA Field Program – January 2023

AECOM received a request to continue work on the Mooseland Mine ESA project. As per the recommendations provided to BNS in the Phase II ESA report, an additional scope of work was proposed to further evaluate the former Mooseland Mine Site in support of using a staged risk assessment approach.

A memo was submitted to BNS in January 2023 with an overview of the additional work to be completed to support a Human Health and Environment Risk Assessment (HHERA). The recent scope of work completed consisted of an additional round of groundwater sampling to establish variability and seasonal differences in groundwater quality, as well as paired sediment and porewater sampling at additional locations associated with the Site.

The January 2023 memo also included the recommendation to complete additional soil background sampling, surface water sampling, as well as tissue sampling for both benthic invertebrates and fish. This additional soil, surface water and tissue sampling could not be completed due to unfavourable winter conditions.

4.2.1 Methodology

AECOM returned to Site in January 2023 to complete supplemental Phase II ESA sampling for the Site. The scope of work included an additional round of groundwater sampling to establish potential variability in groundwater quality. Sediment and porewater sampling was also completed at additional locations at Site along with chemical analysis of selected samples and evaluation of the analytical data.

An overview of the Phase II ESA sampling program that was completed at the Site is as follows:

Groundwater:

- Completed an additional round of groundwater sampling to establish variability and seasonal differences in groundwater.
- Resampled all existing groundwater monitoring wells.
- Samples were submitted for laboratory analysis of dissolved metals, including mercury.

Paired Sediment and Porewater Sampling:

- Collected porewater samples at three (3) locations in front of each of the tailing's areas, for a total of six (6) samples.
- Collected porewater samples at one (1) location upstream of the tailings areas.
- Collected a collocated sediment sample after the porewater samples had been collected.
- Porewater and paired sediment samples were submitted for laboratory analysis for dissolved metals, including mercury, and sediment samples were also submitted for methylmercury analysis.

4.2.2 Sampling Program Rationale

Table 2 below provides a summary of the sample locations and the rationale, as applicable.

Table 2: Sampling Locations and Rationale

Phase II ESA Activities	Sampling Rationale	Analyses	Media	Potential Receptor Type	
Groundwater					
1.	Completion of an additional round of sampling	To establish variability and seasonal differences in groundwater.	Dissolved Metals incl. mercury	Groundwater	Human Health and Environment
Porewater and Sediment – Assessment					
2.	Six (6) paired porewater and sediment samples	Collected three (3) porewater and sediment samples in front of each of the tailings areas.	<u>Porewater:</u> Dissolved Metals incl. mercury	Porewater and Sediment	Human Health and Environment
3.	One (1) paired porewater and sediment samples	Collected a paired porewater and sediment samples at one (1) location upstream of the tailings areas.	<u>Sediment:</u> Dissolved Metals incl. mercury, methylmercury		

4.2.3 Sampling Procedures

4.2.3.1 Groundwater Sampling Procedures

Prior to groundwater sampling at monitoring well locations, static groundwater level measurements were collected on January 13th, 2023. An oil-water interface probe was used to measure the depth to groundwater and assess for the presence of non-aqueous phase liquid (NAPL) at each well location.

Prior to sampling, monitoring wells were purged by removing a minimum of three (3) well volumes of water from the well. The removal of groundwater was completed by hand purging with Waterra™ dedicated tubing. If a monitoring well went dry during purging, it was allowed to recharge to static water level before collecting a groundwater sample. Groundwater removed from the wells during purging activities was discharged to ground.

Groundwater samples were collected in laboratory supplied containers. Samples collected for analysis of dissolved metals were field filtered using a 0.45 micron filter media and then collected in laboratory supplied containers pre-charged with nitric acid preservative. All collected groundwater samples were kept cool in iced coolers for submission to the analytical laboratory. All samples were received by the laboratory within designated hold times and in good condition ([Appendix C](#)).

A total of six (6) groundwater samples (including one (1) field duplicate) were collected from each monitoring well (MW1 to MW4 and MW6) on January 13th, 2023 and all samples were submitted for dissolved metals analysis (incl. mercury). MW5 was frozen on January 13th, 2023 but was sampled later on January 19th, 2023 and submitted for metals analysis (incl. mercury).

Groundwater sampling locations are shown on [Figure 7, Appendix A](#).

4.2.3.2 Porewater Sampling Procedures

Porewater sampling took place on January 20, 2023. Porewater samples were collected following AECOM's SOPs. A porewater sampler was placed into the sediment of the surface water body and then suction (via syringes) was applied to purge three (3) tube volumes before the samples were collected. Samples were field filtered and

collected in laboratory supplied containers and kept below a temperature of 10 degrees Celsius until submission to the laboratory.

A total of eight (8) porewater samples (including one (1) field duplicate) were collected during this field program and submitted for dissolved metals analysis (incl. mercury). One (1) sample was taken upgradient of the tailing plumes (PW1), three (3) samples were taken in front of each of the tailings plumes (PW2-PW7).

Porewater sampling locations are shown on **Figure 9, Appendix A**.

4.2.3.3 Sediment Sampling Procedures

Sediment sampling took place immediately after porewater sampling on January 20, 2023. Sediment samples were collected following AECOM's SOPs. An Ekman dredge sampler was used to collect the sediment samples by lowering it into the water until the grab hits the bottom of the waterbody. Samples were collected in laboratory supplied containers.

A total of eight (8) sediment samples (including one (1) field duplicate) were collected during this field program and submitted for metals analysis, including mercury and methylmercury. The sediment samples were collected in the same location as the porewater samples across site (PWSED1-PWSED7).

Sediment sampling locations are shown on **Figure 10, Appendix A**.

4.2.4 Sample Collection and Analysis

All samples collected as part of this program were submitted to Bureau Veritas Laboratories (BV Labs) located in Bedford, Nova Scotia, for chemical analyses. BV Labs is accredited to ISO/IEC 17025 standards by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC). Laboratory methods and analytical results for each chemical analysis are provided with the laboratory Certificate of Analysis (COAs).

The field and laboratory program is summarized in **Table 3** below.

Table 3: Field and Laboratory Program

Media	Analysis	Samples Submitted	Sample IDs	QAQC Samples	
				Field Duplicates	Analysis
Groundwater					
Groundwater	Dissolved metals incl. mercury	7	MW1-MW6	DUP 1	Dissolved metals incl. mercury
Porewater and Sediment – Assessment					
Porewater	Metals incl. mercury	8	PW1-PW7	PWDUP 1	Dissolved metals incl. mercury
Sediment	Metals incl. mercury and methylmercury	8	PWSED1-PWSED7	PWSEDDUP 1	Metals incl. mercury and methylmercury

4.2.5 Quality Assurance and Quality Control

AECOM's site investigation and quality control program for Phase II ESA activities followed standard QA/QC procedures in accordance with AECOM standard operating procedures (SOPs) to minimize any cross-contamination between samples. Clean nitrile gloves were used throughout the investigation program to eliminate cross-contamination between sampling points.

All field personnel were instructed in proper sampling handling, documentation, and chain-of-custody (COC) procedures before beginning field activities. The field sampler was personally responsible for the care and custody of samples until transferred to the laboratory. A COC record was provided to the analytical laboratory at the time of sample submission. When transferring the possession of samples, the individuals relinquishing and receiving the samples completed the appropriate laboratory forms with the required signature, date and note the time on the record.

AECOM field personnel followed strict sample collecting handling practices, including changing disposable gloves for each sample collected and decontamination of field sampling equipment between samples, to ensure the integrity of sample collection. All samples were collected in pre-cleaned laboratory supplied containers with the appropriate preservatives provided within the sample containers and all samples were submitted for individual analysis within the laboratory prescribed hold times. Samples were packaged in coolers with sufficient packing material to ensure safe shipment of glass containers and ice was placed in coolers to maintain sample temperatures. All samples were kept below a temperature of 10°C once sampled until submission to the laboratory.

AECOM collected field QA/QC samples to assess for sampling induced variability. **Table 4** below shows the blind field duplicate samples that were submitted for laboratory analyses.

Table 4: Field Duplicate Sample Submission

Field Duplicate Sample ID	Corresponding Sample ID	Laboratory Analyses
Groundwater		
DUP 1	MW6	Dissolved metals incl. mercury
Porewater		
PWDUP 1	PW2	Metals incl. mercury
Sediment		
PWSEDDUP 1	PWSED2	Metals incl. mercury and methylmercury

BV Labs also undertakes an internal duplicate analyses for QA/QC purposes using laboratory duplicates, process blanks, process recovery and matrix spike analyses.

4.3 Field Investigation Observations

4.3.1 Groundwater

Free product was not encountered in any of the monitoring wells visited. No odours were noted on-site while completing groundwater sampling. A brown tinge and some silt presence were noted for each well while purging activities took place.

Based on the groundwater elevations as measured in the field for the Phase II report, the groundwater flow direction is to the northeast toward the Tangier River as shown on **Figure 7, Appendix A**. The groundwater elevation data from MW5 was not used in the calculation of the groundwater flow direction. The hydraulic gradient is estimated to be 0.033 m/m. Additional monitoring well hydraulic conductivity testing is required to determine the groundwater velocity for the Site.

4.3.2 Porewater

All of the samples were collected from sediment within the Tangier River. PW1-PW4 had a slight yellow tinge, PW5 and PW6 had a dark brown tinge, and PW7 was observed to have an orange tinge. No sheen or odour were noted in the porewater samples.

4.3.3 Sediment

Sediment samples PWSED1 and PWSED2 were noted to be dark brown in color with some silt and organics. PWSED3-PWSED6 samples were a similar dark brown colour, but with the addition of tailings due to the proximity of historical tailing plumes. PWSED7 was noted to be orange/grey sand. No staining or odour were noted in the sediment samples.

4.4 Laboratory Analytical Results

Sampling locations are shown on figures presented in **Appendix A**, analytical results are presented in **Appendix B**, and Laboratory Certificates of Analysis (COAs) are presented in **Appendix C**. Results are described in the sections to follow.

4.4.1 Groundwater Summary

Table 5 below shows the exceedances that were found during the groundwater sampling program.

Table 5: Groundwater Sample Exceedances

Sample ID	Sample Date	Parameter / Concentration (µg/l)	NSE-EQS ¹ Guideline Concentration (ug/l)	NSE-EQS ² (Freshwater) Guideline Concentration (ug/l)
MW1	2023/01/13	<ul style="list-style-type: none"> ▪ Aluminum: 70 ▪ Arsenic: 490 ▪ Cobalt: 5 ▪ Manganese: 2,900 	<ul style="list-style-type: none"> ▪ Arsenic: 10 ▪ Cobalt: 3.8 ▪ Manganese: 120 	<ul style="list-style-type: none"> ▪ Aluminum: 50 ▪ Arsenic: 50
MW2	2023/01/13	<ul style="list-style-type: none"> ▪ Aluminum: 730 ▪ Arsenic: 100 ▪ Cadmium: 1.5 ▪ Cobalt: 5.5 ▪ Copper: 35 ▪ Manganese: 180 	<ul style="list-style-type: none"> ▪ Arsenic: 10 ▪ Cobalt: 3.8 ▪ Manganese: 120 	<ul style="list-style-type: none"> ▪ Aluminum: 50 ▪ Arsenic: 50 ▪ Cadmium: 0.9 ▪ Cobalt: 10 ▪ Copper: 20
MW3	2023/01/13	<ul style="list-style-type: none"> ▪ Aluminum: 920 ▪ Cobalt: 7.1 ▪ Manganese: 890 	<ul style="list-style-type: none"> ▪ Cobalt: 3.8 ▪ Manganese: 120 	<ul style="list-style-type: none"> ▪ Aluminum: 50
MW4 (Background Well)	2023/01/13	<ul style="list-style-type: none"> ▪ Manganese: 230 	<ul style="list-style-type: none"> ▪ Manganese: 120 	<ul style="list-style-type: none"> ▪ No exceedances
MW5	2023/01/19	<ul style="list-style-type: none"> ▪ Aluminum: 57 ▪ Arsenic: 29 ▪ Manganese: 780 	<ul style="list-style-type: none"> ▪ Arsenic: 10 ▪ Manganese: 120 	<ul style="list-style-type: none"> ▪ Aluminum: 50
MW6	2023/01/13	<ul style="list-style-type: none"> ▪ Arsenic: 3,700 ▪ Manganese: 300 	<ul style="list-style-type: none"> ▪ Arsenic: 10 ▪ Manganese: 120 	<ul style="list-style-type: none"> ▪ Arsenic: 50
MW6 (FD)	2023/01/13	<ul style="list-style-type: none"> ▪ Arsenic: 2,800 ▪ Manganese: 230 	<ul style="list-style-type: none"> ▪ Arsenic: 10 ▪ Manganese: 120 	<ul style="list-style-type: none"> ▪ Arsenic: 50

Notes:

¹: Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Groundwater – residential, potable water, coarse grained soils (Table 4A)

²: Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Groundwater Discharging to Surface Water (>10 m from Surface Water Body - Fresh Water) (Table 3)

4.4.2 Porewater Summary

Table 6 below shows the exceedances that were found during the porewater sampling program.

Table 6: Porewater Sample Exceedances

Sample ID	Sample Date	Parameter / Concentration (µg/l)	NSE-EQS ¹ Guideline Concentration (ug/l)
PW1	2023/01/19	<ul style="list-style-type: none"> ▪ Aluminum: 470 ▪ Arsenic: 7.3 ▪ Iron: 1,000 ▪ Lead: 3.7 	<ul style="list-style-type: none"> ▪ Aluminum: 5.0 ▪ Arsenic: 5.0 ▪ Iron: 300 ▪ Lead: 1.0
PW2	2023/01/19	<ul style="list-style-type: none"> ▪ Aluminum: 290 ▪ Arsenic: 20 ▪ Iron: 1,600 ▪ Zinc: 12 	<ul style="list-style-type: none"> ▪ Aluminum: 5.0 ▪ Arsenic: 5.0 ▪ Iron: 300 ▪ Zinc: 7.0
PW2 (FD)	2023/01/19	<ul style="list-style-type: none"> ▪ Aluminum: 280 ▪ Arsenic: 20 ▪ Iron: 1600 ▪ Zinc: 9.2 	<ul style="list-style-type: none"> ▪ Aluminum: 5.0 ▪ Arsenic: 5.0 ▪ Iron: 300 ▪ Zinc: 7.0
PW3	2023/01/19	<ul style="list-style-type: none"> ▪ Aluminum: 150 ▪ Arsenic: 50 ▪ Cobalt: 2.6 ▪ Iron: 2,200 ▪ Mercury: 0.065 	<ul style="list-style-type: none"> ▪ Aluminum: 5.0 ▪ Arsenic: 5.0 ▪ Cobalt: 1.0 ▪ Iron: 300 ▪ Mercury: 0.026
PW4	2023/01/19	<ul style="list-style-type: none"> ▪ Aluminum: 79 ▪ Arsenic: 6,800 ▪ Mercury: 0.065 	<ul style="list-style-type: none"> ▪ Aluminum: 5.0 ▪ Arsenic: 5.0 ▪ Mercury: 0.026
PW5	2023/01/19	<ul style="list-style-type: none"> ▪ Aluminum: 73 ▪ Arsenic: 13 ▪ Cobalt: 1.8 ▪ Iron: 1500 	<ul style="list-style-type: none"> ▪ Aluminum: 5.0 ▪ Arsenic: 5.0 ▪ Cobalt: 1.0 ▪ Iron: 300
PW6	2023/01/19	<ul style="list-style-type: none"> ▪ Aluminum: 62 ▪ Arsenic: 9.5 ▪ Iron: 1200 ▪ Manganese: 920 	<ul style="list-style-type: none"> ▪ Aluminum: 5.0 ▪ Arsenic: 5.0 ▪ Iron: 300 ▪ Manganese: 430
PW7	2023/01/19	<ul style="list-style-type: none"> ▪ Aluminum: 500 ▪ Arsenic: 860 ▪ Copper: 2.4 ▪ Iron: 7,100 ▪ Lead: 4.5 ▪ Mercury: 0.05 	<ul style="list-style-type: none"> ▪ Aluminum: 5.0 ▪ Arsenic: 5.0 ▪ Copper: 2.0 ▪ Iron: 300 ▪ Lead: 1.0 ▪ Mercury: 0.026

Notes:

¹: Nova Scotia Environment (NSE) Tier I Environmental Quality Standards (EQS) for Surface Water and Groundwater Discharging to Surface Water (Table 3) (Freshwater)

4.4.3 Sediment Summary

Table 7 below shows the exceedances that were found during the sediment sampling program.

Table 7: Sediment Sample Exceedances

Sample ID	Sample Date	Parameter / Concentration (mg/kg)	NSE-EQS ¹ Guideline Concentration (mg/kg)
PWSED2	2023/01/19	<ul style="list-style-type: none"> ▪ Arsenic: 120 ▪ Mercury: 2.1 ▪ Selenium: 2.2 	<ul style="list-style-type: none"> ▪ Arsenic: 17 ▪ Mercury: 0.486 ▪ Selenium: 2
PWSED2 (FD)	2023/01/19	<ul style="list-style-type: none"> ▪ Arsenic: 87 ▪ Mercury: 0.73 	<ul style="list-style-type: none"> ▪ Arsenic: 17 ▪ Mercury: 0.486
PWSED3	2023/01/19	<ul style="list-style-type: none"> ▪ Arsenic: 1,300 ▪ Mercury: 11 	<ul style="list-style-type: none"> ▪ Arsenic: 17 ▪ Mercury: 0.486
PWSED4	2023/01/19	<ul style="list-style-type: none"> ▪ Arsenic: 5,800 ▪ Mercury: 3.2 	<ul style="list-style-type: none"> ▪ Arsenic: 17 ▪ Mercury: 0.486
PWSED5	2023/01/19	<ul style="list-style-type: none"> ▪ Arsenic: 590 ▪ Manganese: 3,400 ▪ Mercury: 0.98 ▪ Selenium: 3.5 	<ul style="list-style-type: none"> ▪ Arsenic: 17 ▪ Manganese: 1,100 ▪ Mercury: 0.486 ▪ Selenium: 2
PWSED6	2023/01/19	<ul style="list-style-type: none"> ▪ Arsenic: 9,800 ▪ Iron: 77,000 ▪ Manganese: 44,000 ▪ Mercury: 1.8 	<ul style="list-style-type: none"> ▪ Arsenic: 17 ▪ Iron: 43,766 ▪ Manganese: 1,100 ▪ Mercury: 0.486
PWSED7	2023/01/19	<ul style="list-style-type: none"> ▪ Arsenic: 1,100 ▪ Mercury: 28 	<ul style="list-style-type: none"> ▪ Arsenic: 17 ▪ Mercury: 0.486

Notes:

¹: Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Sediment (freshwater); Table 2

4.5 Summary and Findings

The findings and conclusions presented in this report apply only to the recognized environmental conditions assessed at the Site. Table 8 below summarizes the findings related to groundwater, porewater, and sediment investigations completed as part of the scope of work for this Phase II ESA. The maximum concentration between the two sampling events (June 2022, January 2023) is presented in the table below. The Phase II findings for soil, tailings, waste rock and surface water have been presented in Section 4.1.

Table 8: Phase II ESA Summary of Findings

Phase II ESA Activities		Phase II ESA Findings
Groundwater		
3.	Completion of an additional round of sampling	<ul style="list-style-type: none"> ▪ Manganese impacts were identified at all six (6) of the six wells. ▪ Arsenic impacts were identified at four (4) of the six (6) wells. ▪ In addition to exceedances in arsenic, the following impacts were identified at select wells: <ul style="list-style-type: none"> - Aluminum (Max. Concentration: 920 ug/L) – Jan. 2023 - Arsenic (Max. Concentration: 3,700 ug/L) – Jan. 2023 - Cadmium (Max. Concentration: 1.5 ug/L) – Jan. 2023 - Cobalt (Max. Concentration: 23 ug/L) – June 2022 - Copper (Max. Concentration: 35 ug/L) – Jan. 2023 - Iron (Max. Concentration: 5,600 µg/L) – June 2022 - Manganese (Max. Concentration: 2,900 ug/L) – Jan. 2023
Porewater and Sediment – Assessment		
4.	Collected seven (7) porewater and sediment samples	<u>Porewater (porewater samples only collected in Jan. 2023):</u>

Phase II ESA Activities	Phase II ESA Findings
	<ul style="list-style-type: none"> ▪ Aluminum and arsenic impacts were identified at all seven (7) of the porewater locations, and iron impacts were identified at six (6) of the seven (7) porewater locations. ▪ In addition to these exceedances, the following impacts were also seen at select porewater locations: <ul style="list-style-type: none"> - Aluminum (Max. Concentration: 500 ug/L) - Arsenic (Max. Concentration: 6,800 ug/L) - Cobalt (Max. Concentration: 2.6 ug/L) - Copper (Max. Concentration: 2.4 ug/L) - Iron (Max. Concentration: 7,100 µg/L) - Lead (Max. Concentration: 4.5 µg/L) - Manganese (Max. Concentration: 920 ug/L) - Mercury (Max. Concentration: 0.065 ug/L) - Zinc (Max Concentration: 12 ug/L) <p>Sediment:</p> <p>Upgradient of tailings plume: SED1-SED3, PWSED1</p> <ul style="list-style-type: none"> ▪ Background samples collected. No exceedances noted. <p>Adjacent to tailings plume: SED4-SED8, PWSED2 – PWSED7</p> <ul style="list-style-type: none"> ▪ The following impacts were noted in one or more of the following parameters: <ul style="list-style-type: none"> - Arsenic (Max. Concentration: 9,800 mg/kg) – Jan. 2023 - Iron (Max. Concentration: 77,000 mg/kg) - Jan. 2023 - Manganese (Max. Concentration: 44,000 mg/kg) - Jan. 2023 - Mercury (Max. Concentration: 28 mg/kg) - Jan. 2023 - Selenium (Max. Concentration: 3.5 mg/kg) - Jan. 2023 <p>Downgradient of tailings plume: SED10, SED11</p> <ul style="list-style-type: none"> ▪ Exceedances noted in arsenic (20 mg/kg) and mercury (0.68 mg/kg) for one sample (SED11) – June 2022

The vertical and horizontal extent of soil and groundwater contamination has not yet been determined. Additional work will need to be completed to determine this information, as described in [Section 7.0](#).

5. Summary of Other Relevant Information

Subsequent to the completion of the AECOM (2022) Phase II ESA, AECOM staff have engaged with researchers in various government agencies and academic institutions who have been involved in research activities surrounding metals in the environment associated with historical gold mining activities in NS. These interactions have identified a significant volume of information related to contamination associated with historical mining, including information specific to the Mooseland Site. The following provides a brief summary of select reports recently gathered from various government/academic sources.

5.1 Geological Report on the Early Stages of Development of the Mooseland Gold District

The Mooseland Gold District is one of many past producing Meguma gold deposits occurring in the Meguma Terrane (Horne, R.J. et al, 2004). The district straddles the Mooseland Road approximately 18 km north of Highway 7. Historical workings occur in the area between the Musquodoboit Batholith to the west and the Tangier River Fault to the east and were mainly restricted to the south limb of the Mooseland Anticline. Exploration diamond-drilling by Acadia Minerals in the late 1980s intersected auriferous veins on the east side of the Tangier Fault. The veins are thought to represent the faulted extension of the main Mooseland vein array.

The vein system at Mooseland consists of mainly stratabound veins in slate or metasiltstone intervals of the metasandstone dominated Goldenville Formation. Where two or more distinct veins occur within a slate interval, the term “belt” is used to refer to the stratigraphic interval hosting those veins. Stratigraphy and related structure provide the principal framework for the stratabound veins and, therefore, a detailed cross-section is presented to evaluate the vein system. Although the district extends westward to the Musquodoboit Batholith, cross-cutting relations between the veins and the granite, or associated contact metamorphism, have not been established.

5.2 Environmental Geochemistry of Tailings, Sediments and Surface Waters Collected from 14 Historical Gold Mining Districts in Nova Scotia

Historic gold mining in Nova Scotia produced over 3 million tonnes (t) of tailings (Parsons et al., 2012). During this period, no environmental regulations were in place and tailings were commonly discharged into streams, ponds, rivers, wetlands and surface depressions. This resulted in the formation of tailings flats that can measure up to 1 km² in surface area and several metres in thickness. In some cases, tailings have migrated downstream in rivers and streams for more than 2 km from the mine site.

The tailings contain high concentrations of arsenic and other metals. Arsenic has been measured at concentrations up to 312,000 mg/kg (Parsons et al., 2012), which is approximately 10,000 times the current Nova Scotia guideline for arsenic in soil (31 mg/kg; NSE, 2013). Other chemicals in the tailings that exceed environmental guidelines include mercury, nickel, lead and antimony. Recent land-use changes in the vicinity of historic mine sites, such as residential development, recreational development and shellfish harvesting, have raised concerns about the potential risks that the tailings pose to human health and the environment.

The first environmental investigation associated with historic gold mine tailings in Nova Scotia occurred in 1976, when a resident of Waverley suffered chronic arsenic intoxication after drinking water from a dug well with high arsenic levels. The arsenic concentration in this well was reported to be 5,000 µg/L, which is 500 times higher than the current Canadian Drinking Water Guideline of 10 µg/L. Subsequent investigations found that arsenic can occur

in wells located inside or outside of historic gold districts and can be caused by naturally occurring arsenic in bedrock and historic mining activities.

Since the discovery of arsenic in well water in 1976, there has been extensive environmental work completed on the historic gold mine tailings in Nova Scotia. The purpose of this report is to provide a summary of the environmental work that has been completed to date. The report begins with a brief history of gold mining in Nova Scotia and then discusses the environmental issues associated with the tailings. The standard approach to environmental site management involves a multi-step process that starts with site investigation and follows with risk assessment and risk management. This report follows a similar format, by discussing the environmental work in terms of environmental investigations, followed by risk assessment and risk management activities.

The first confirmed discovery of gold in bedrock in Nova Scotia occurred in Mooseland in 1858, when Captain C. L'Estrange noticed the yellow metal in quartz outcrops while hunting near the Tangier River. Two years later, follow-up prospecting by John Gerrish Pulsiver and others revealed additional gold showings near Mooseland and Tangier, leading to Canada's first gold rush in 1861. Mining and milling activities were carried out intermittently at Mooseland between 1861 and 1934, recovering approximately 3865 troy oz. of gold from 8217 tonnes of crushed rock. In the first year or two, ore at Mooseland was crushed using an arrastra and a rudimentary stamp mill consisting of four wooden stamps. Eventually, these mills were replaced by more efficient 5- to 10-stamp mills and all tailings were discharged into Sluice Brook, or directly into the Tangier River. Surface and underground exploration in the Mooseland district has continued to the present day, including the sinking of a 400-foot shaft in the late 1980s.

Tailings were sampled from seven sites along the west bank of the Tangier River in May and October 2003 near the former Mooseland Gold Mining Company Property. Most of the tailings near the former stamp mill are covered by a thin layer of moss and grasses and are well-oxidized to at least 40 cm depth. Immediately adjacent to the mill site the tailings contain layers of scorodite-bearing hardpan. Closer to the river, the tailings are covered by thick grasses, wetland plants, and are waterlogged and relatively unoxidized. Tailings near the mouth of Sluice Brook are overgrown with alders and difficult to recognize.

The bulk concentrations of arsenic (2580-256,000 mg/kg; mean = 23,300 mg/kg) and mercury (762-30,000 µg/kg; mean = 7040 µg/kg), respectively, are very high in the tailings at Mooseland. The highest arsenic and mercury concentrations are found in hardpan material, which may represent the oxidized remains of sulphide concentrate. The relatively high arsenic and mercury concentrations in these tailings reflects the inefficiency of these early stamp mills.

Associated mapping providing sampling locations of tailings, as well as arsenic and lead tailings concentrations, are presented below (Parsons, 2012).

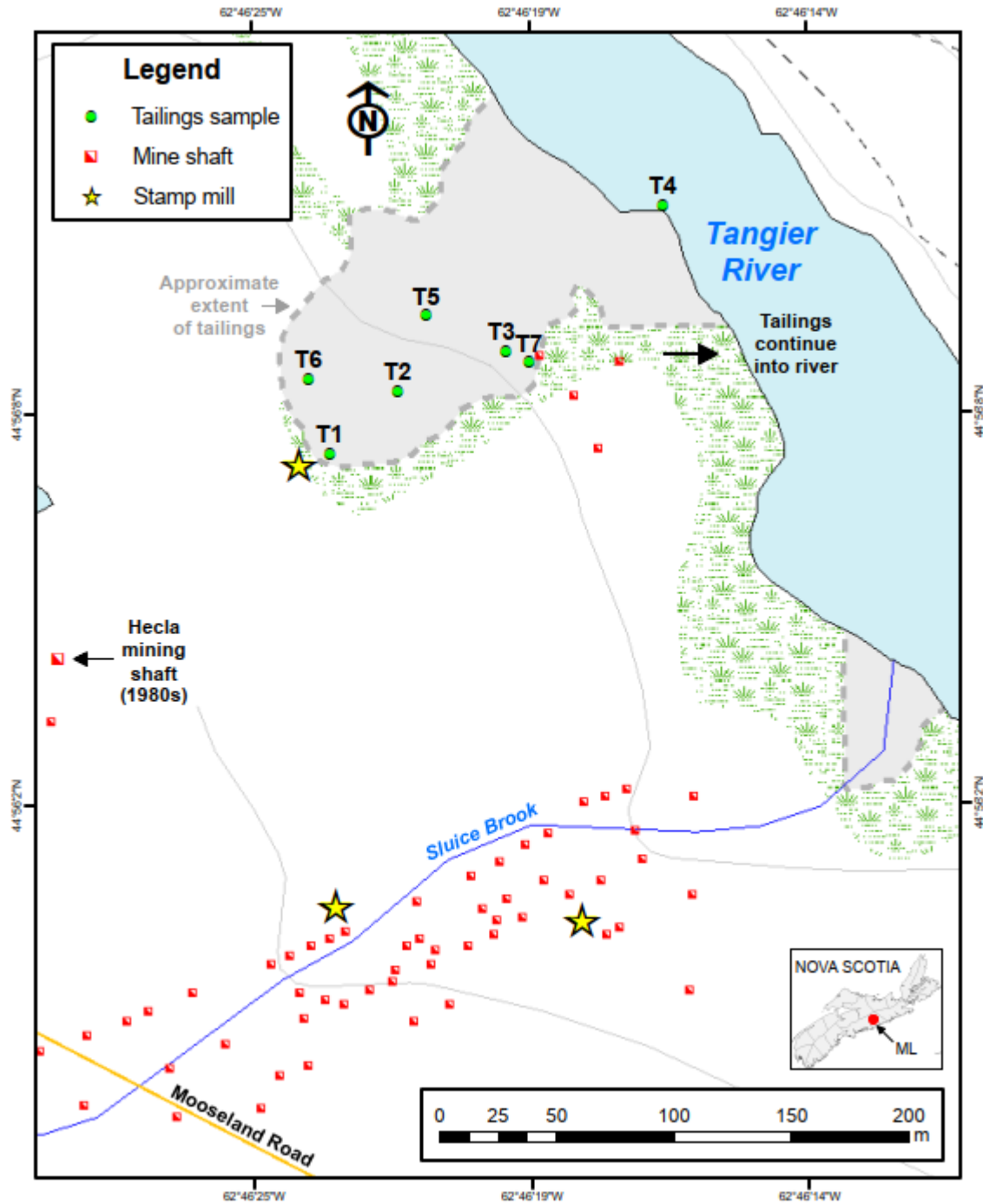


Fig. 59. Location of tailings samples, Mooseland Gold District
 (geographic centre of map (decimal degrees): 44.934766°, -62.772181°)

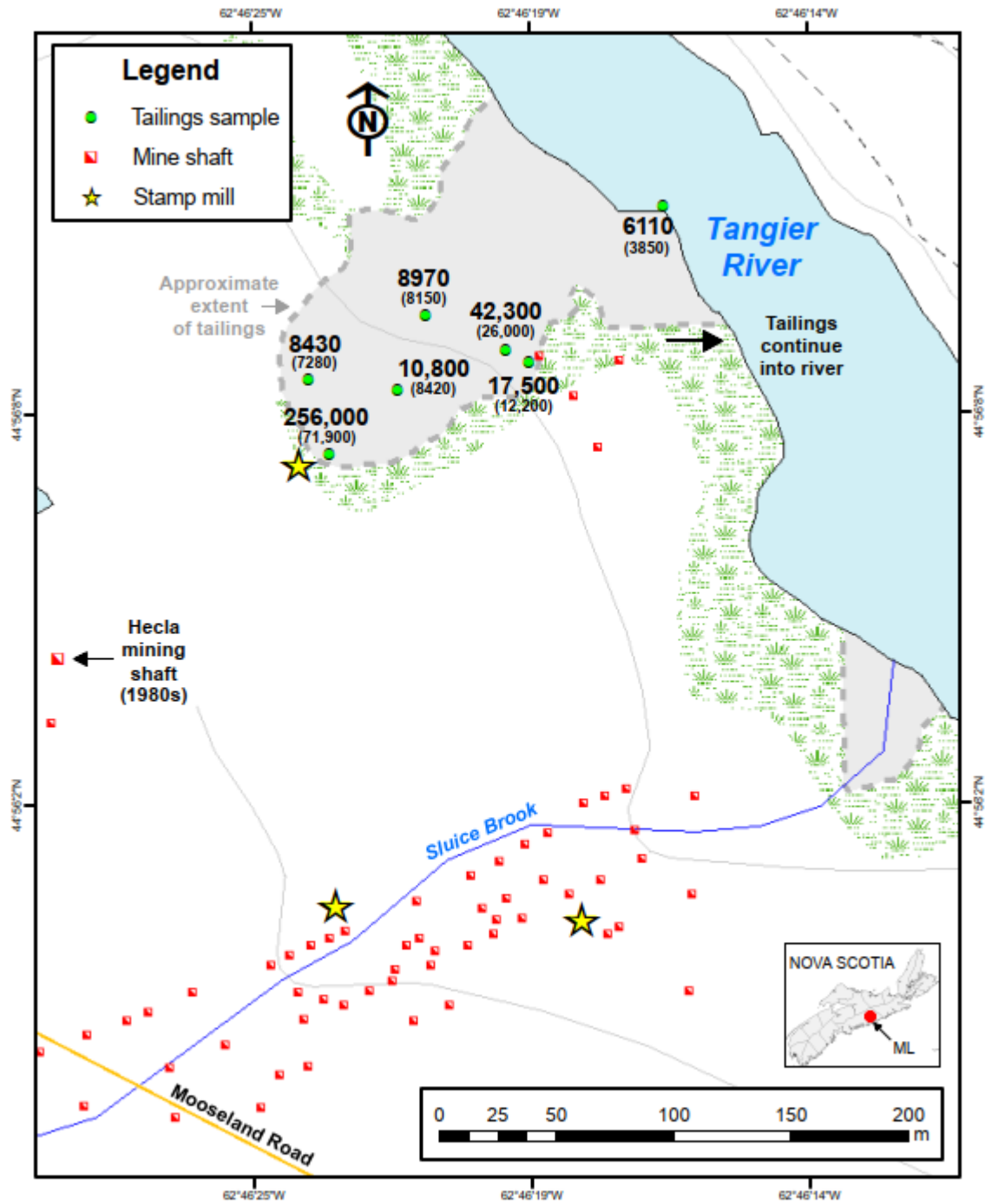


Fig. 61. As concentrations (mg/kg) in Mooseland tailings (maximum and (mean) concentrations; <2 mm size fraction)

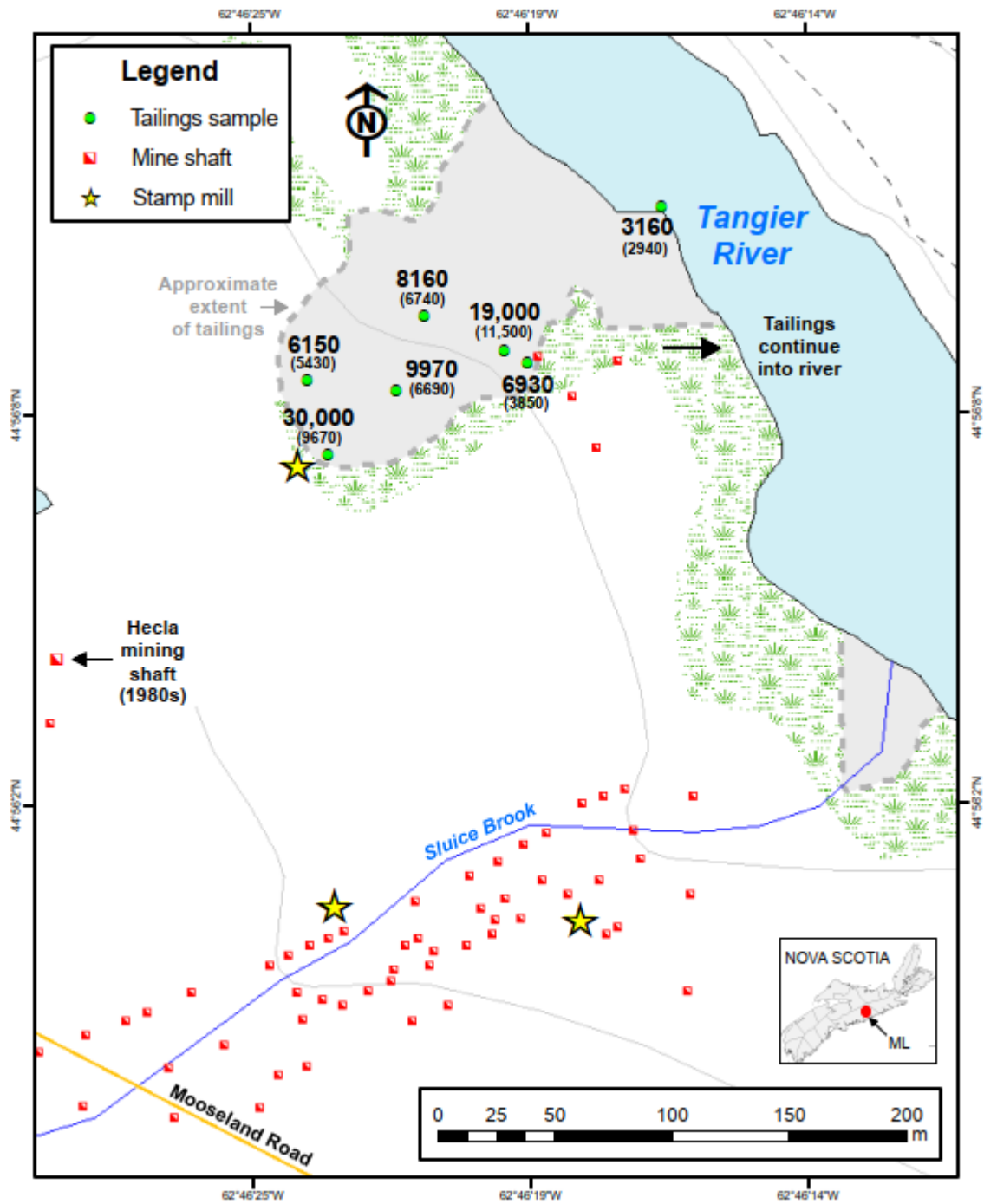
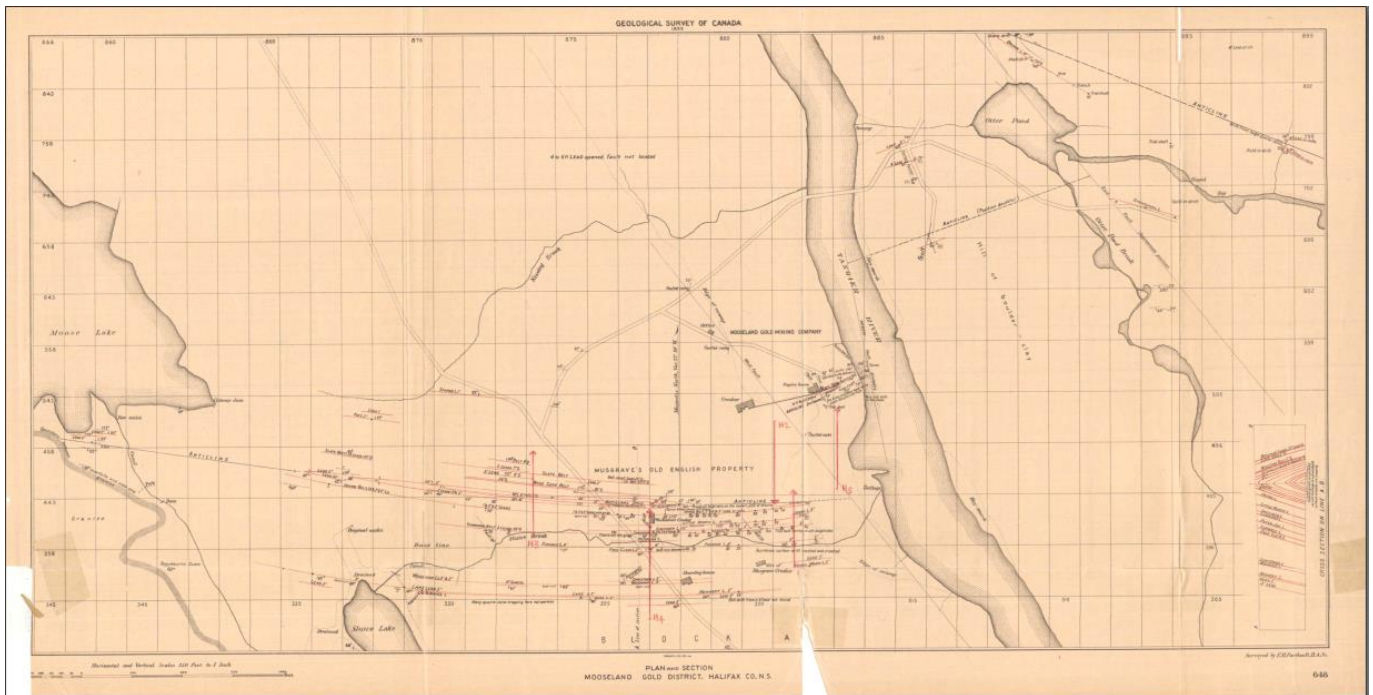


Fig. 62. Hg concentrations ($\mu\text{g}/\text{kg}$) in Mooseland tailings (maximum and (mean) concentrations; <2 mm size fraction)

5.3 Historical Gold Mining Mooseland Area Part of NTS Map Sheet 11D/15, Halifax County, Nova Scotia

Mapping (Smith, P.K. and Goodwin, 2009) illustrates crusher (stamp mill) locations based on historical 1899 Faribault mapping of the Mooseland area overlaid onto more recent aerial photography. It should be noted that original 1899 Faribault mapping also illustrates swampland boundary line at the Mooseland Site during this time.

NSECC staff (Melanie Haggard) recently conveyed that gold mining crusher locations should be a specific focus of the Phase I/II ESA as previous ESAs completed at other NS gold mine sites (i.e. Montague and Goldenville) identified significant metals impacts in soil within the vicinity of historical crusher locations (as identified by Faribault mapping).



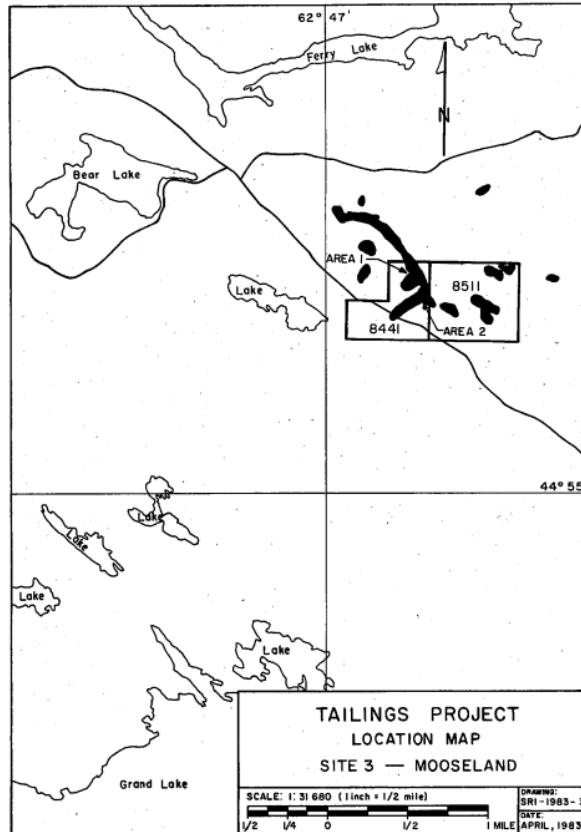
5.4 Mineral Resource (Tailings) Evaluation at Twenty-four Southeastern Nova Scotia Sites

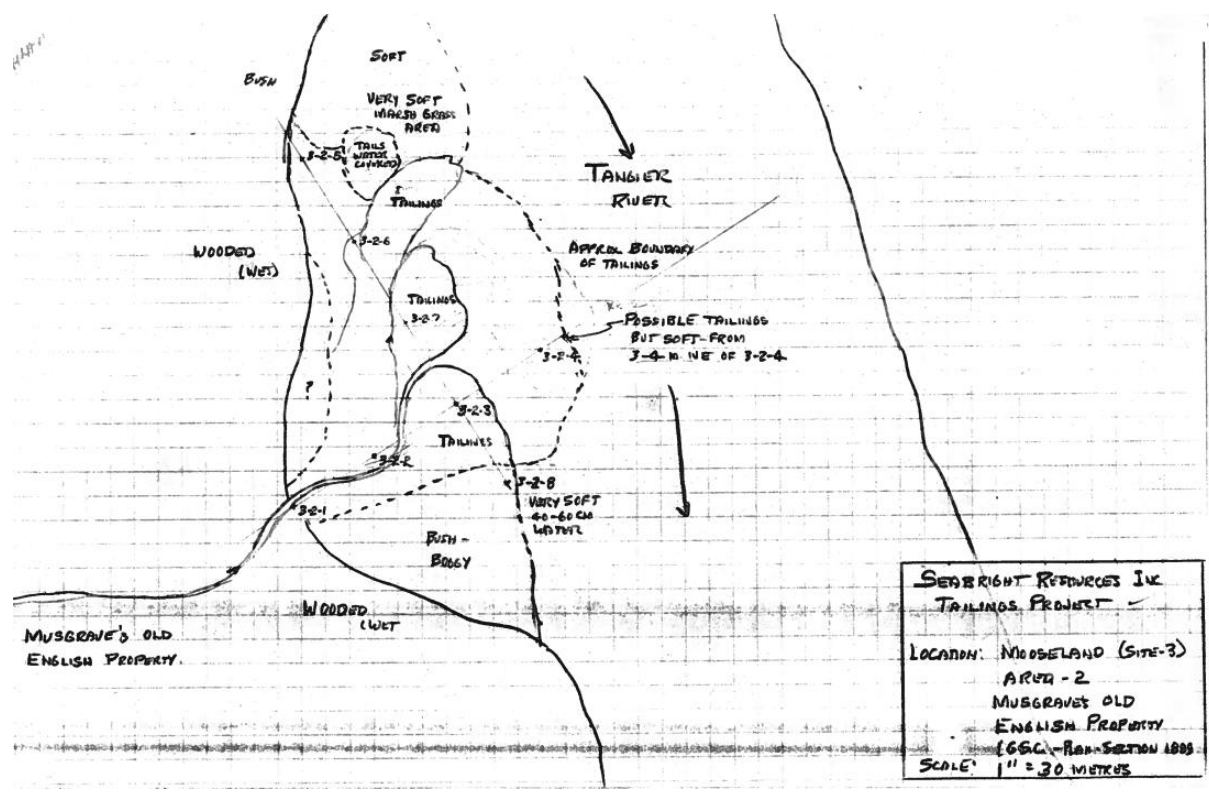
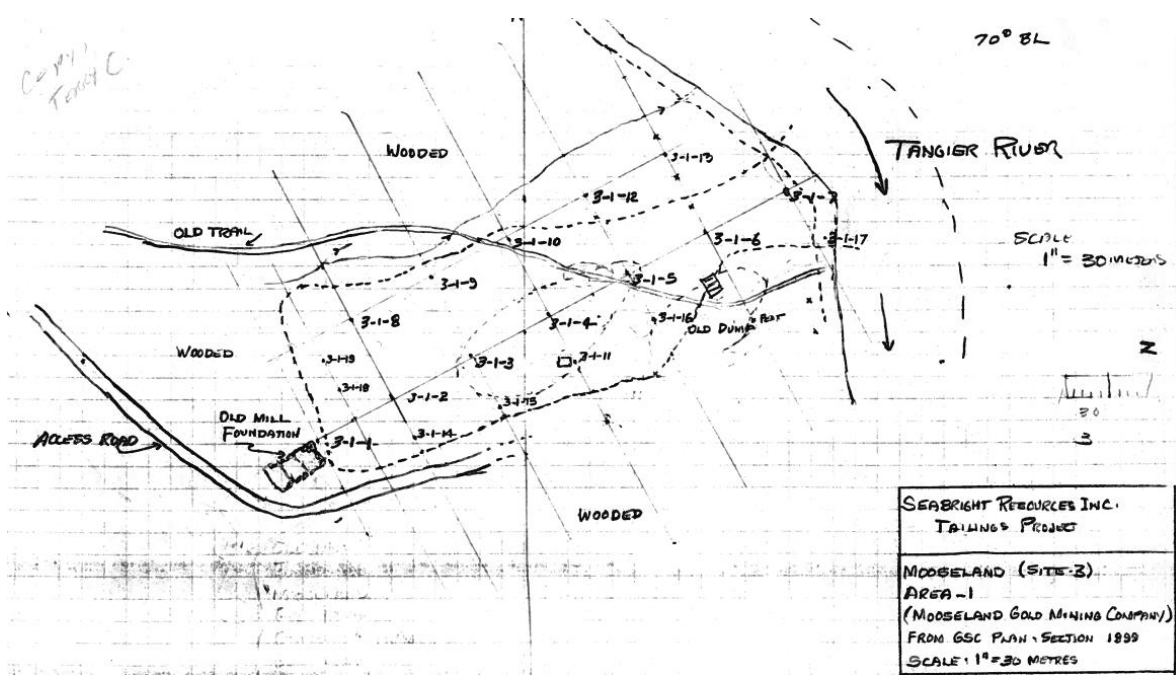
Associated reports and mapping provide tailing locations mapping areas and volumes as presented below (Glover, J.D. and Hale, 1983).

PROVEN RESERVES
SEABRIGHT NOVA SCOTIA TAILINGS

Site Name & Number	Area No.	Depth (cm.)	Cumulative Tonnage (tonne)	Cum. Gold Content (g)	Cum. Gold Content (Oz.)
OLDHAM - Site 2 (Cont'd)	EAST	0-30	2,868.83	3,605.22	127.17
		30-60	5,613.00	4,811.39	169.71
		60-90	3,941.69	2,837.85	100.10
TOTAL			261,930.45	355,348.34	12,534.35
MOOSELAND Site 3	1	0-30	3,710.14	3,670.34	129.47
		30-60	2,547.13	2,615.44	92.26
		60-90	2,070.64	1,535.90	54.18
	2	0-30	2,460.89	4,443.98	156.75
		30-60	4,405.51	7,113.48	250.92
		60-90	1,388.54	2,683.54	94.66
TOTAL			16,582.85	22,062.68	778.24

E-III





6. Preliminary Problem Formulation

All substances/stressors (from both anthropogenic and natural sources) have the potential to cause environmental effects. The magnitude of risk depends on the receptor (person or wildlife) being exposed, the route and magnitude of exposure, and the potential adverse effects of the stressor (its degree of “hazard”).

Where all components are present, the possibility or risk of an adverse effect to the receptor exists. This basic principle forms the basis of risk assessment. If one or more of these three components is absent, then there is no opportunity for a risk of an adverse effect to the receptor. For example, a receptor could be exposed to a chemical, but if that chemical is present at levels below those associated with adverse effects, then no risk of harmful exposure (i.e., adverse effects) would be expected. Alternatively, a hazardous material may be present; however, if there is no way for a receptor to be exposed (i.e., material is in a sealed container), then the receptor is not at risk of exposure to the hazardous material.



The first step in the environmental risk assessment framework is the problem formulation. Problem formulation includes a review and compilation of existing data and a summary of past activities documenting areas of impacts by contaminants in environmental media (soil, water, air, sediment, etc.). Identification of the contaminants of potential concern (COPCs) and the environmental hazards that they may pose to human health or the environment (i.e., threshold toxic response), the potential receptors having contact with the identified contaminants and hazards, and the relevant exposure pathways by which the receptors interact with various environmental media (e.g., air, dust, water, soil, sediment, and food).

The problem formulation integrates this information into a conceptual exposure pathway model for exposure scenarios selected for assessment. This could include current conditions, as well as conceptual remedial options to test what-if scenarios. It also involves an assessment of critical knowledge gaps and their implications in assessing the potential for risks. As new information becomes available the problem formulation may be revised to incorporate new knowledge.

The evaluation steps required prior to conducting a SSRA for substances other than PHCs, under the Regulation and applicable guidance for Remediation, are analogous to the Problem Formulation Stage of an Environmental Risk Assessment, as shown **Figures 2-1** and **2-2** presented in **Section 2.2**.

The Environmental Risk Assessment and the Problem Formulation Stage is integral to the environmental investigation phase of the project and is an iterative process involving data collection and analysis, model development, gaps analysis and further sampling and environmental investigation to verify key assumptions underpinning the SSRA. Additional environmental studies / surveys to gather new evidence to fill critical information and knowledge gaps for refining RA model assumptions and reducing uncertainties may be necessary for the development, implementation, and assessment of appropriate remediation options and or risk management planning. The problem formulation stage may lead to a further preliminary quantitative SSRA involving the development of suitable site-specific target levels (SSTLs) also referred to as site-specific remedial objectives (SSROs) for further informing site management related decisions for the development of a conditional closure risk management plan.

At the time of writing this report, the Problem Formulation is in the preliminary fact-finding phase with the overarching goal of improving the understanding of the study area in its current condition, and provide interpretation of the possible environmental liabilities in terms of exposure risks to humans and the environment. Due to the size

complexity and history of the study area, the completion of the Problem Formulation Stage of the SSRA for the Mooseland Site is anticipated to be a multi-year iterative process consisting of the following:

- Documented actual site data and suitable reference or background data for the potential contaminants of concern (PCOC) relevant to the study area, based on the available Phase I & II ESAs for the Site and surrounding area.
- Documented rationale for the selected COCs carried forward for further evaluation and risk assessment
- Identified all possible operable exposure pathways, including mechanisms of release transport and uptake by which human receptors and ecological receptors may come into contact with COCs in impacted soil groundwater surface water and sediments associated with historical gold mining tailings and waste rock from the Mooseland Site.
- Development of a Conceptual Site Model (CSM) that integrates the available information outlined in the previous bullets.
- Defined relevant study area based on the available information and data analyses.
- Identified knowledge gaps and key information needs; proposed supplemental environmental investigation sampling and analysis and additional environmental studies; developed and executed sampling plans and field programs to address these.
- Documented progress reports and deliverables as per the terms of the agreement for the project.

The work presented in this preliminary problem formulation report and attached memos, with detailed descriptions for additional environmental field programs/ studies for the Mooseland Site, form a foundation for further development of the Problem Formulation stage for the Site.

6.1 Conceptual Site Model

The conceptual site model (CSM) for the Site is critical to understanding the sources from which the contaminants of concern (COCs) originate, the pathways through which these COCs can travel, and the receptors that are potentially exposed to these COCs.

The objective of the CSM is to characterize the surface and subsurface conditions that exist at the Site and determine the COCs and exposure pathways that are drivers of risk of adverse effects to human and ecological receptors associated with excess exposures due to the release, fate and transport of contaminants from sources and surrounding impacted areas. This information can be used to identify risk management strategies to mitigate the sources and minimize the possibility for harmful exposures of human and ecological receptors to contaminant sources and releases of COCs.

For this environmental risk assessment, the following initial list of VECs was identified, based on the preliminary scoping analysis:

- Soil quality
- Groundwater Quality
- Drinking Water Quality
- Surface Water Quality and Sediment Quality
- Air Quality - dust and particulates from exposed tailings
- Freshwater Aquatic Organisms – including Species at Risk for the Region and province of Nova Scotia. [e.g., potentially all taxonomic groups, including primary producers, secondary and tertiary feeding levels - algae, aquatic macrophytes, zooplankton, sport fish, pelagic and bottom feeding fish, reptiles/amphibians, and benthic invertebrates]
- Terrestrial Organisms – including humans, plants (mosses, lichens, fungi) and soil organisms, birds, mammals, reptiles/amphibians

6.1.1 Contaminants of Concern

At the Mooseland Mine Site, the disposition of tailings and waste rock, as well as fugitive particulate deposition, associated with the historic mining activities are the original sources of the PCOCs. The Phase II ESA identified thirteen (13) metals measured in soil exceeding the NSE Tier 1 EQS.

Arsenic and mercury are well known toxic contaminants of concern associated with emissions and wastes released to the environment from historic mineral processing and gold extraction, including waste rock and tailings. At the outset of this project arsenic and mercury have been identified as COCs of primary concern and the focus of this investigation. Other potential COCs (PCOCs) identified through the soil screening evaluation are discussed in the following section.

- Arsenic - in excess of the NSE Tier1 EQS of 10 mg/kg for all of the samples analysed (24/24); and
- Mercury - in excess of the NSE Tier1 EQS of 6.6 mg/kg for 21% of the samples analysed (5/24)

Arsenic is a naturally occurring chemical element found within the residual rock material that was milled and then released as a non-economic by-product of the gold extraction process. The original arsenic in the tailings solids was likely in the form of arsenopyrite (FeAsS). Arsenic can be released from this primary mineral form during oxidation processes, resulting in the formation of oxidation products that include dissolved iron, inorganic arsenic (As^{III} and As^{IV}) and sulphate as well as the solid phase ferric oxyhydroxide, simplified as Fe(OH)₃.

Metallic or elemental mercury was used as an amalgam in the gold extraction process. Although the mercury is typically collected to recover the gold, some release of mercury typically occurs during the process. Elemental mercury (Hg⁰) which is a liquid at room temperature would have been used in the amalgamation process and then burned off to evaporate the mercury, rendering the gold. Liquid elemental mercury (Hg⁰) has a very low solubility in water and limited mobility in the subsurface; however, in the environment mercury undergoes natural transformation and bio-geochemical cycling through microbial and chemical oxidation and reduction processes into inorganic ionic mercury (e.g., mercurous Hg⁺ and mercuric Hg²⁺), and organic mercury (e.g., methylmercury, MeHg). The solubilities of the various forms of mercury play a role in their environmental fate and transport and influences their differential toxicities. In order of solubility in water mercuric Hg has the greatest, followed by organic Hg, mercurous Hg, and least soluble is elemental Hg. Dissolved mercury typically has a very limited mobility in water because of its tendency to sorb onto many types of solids, particularly organic carbon and to form insoluble sulfides which can be biotransformed to more volatile and soluble forms that are bioaccumulated in aquatic and terrestrial food webs. This has important implications in the potential pathways for mercury in the environment.

6.1.2 Additional Potential Contaminants of Concern (PCOCs)

Additionally, eleven (11) potential COCs (PCOCs) for further consideration for SSRA are identified based on the screening evaluation against the NSE Tier 1 EQS for metals of the available analytical data for soil tailings samples collected from areas impacted by historic mining activities at the Mooseland Site specifically,

- aluminum, antimony, beryllium, cadmium, cobalt, iron, lead, manganese, molybdenum, selenium and thallium.

As well, two (2) metals, lithium and rubidium were detected in samples of soil tailings analysed for which no NSE Tier 1 EQS exists. Detailed documentation is provided in the analytical tables presented in [Appendix B](#).

In accordance with the CCME guidance for HHRA these are evaluated against screening criteria derived by other jurisdictions providing they meet the NSE human health targets corresponding to a hazard quotient (HQ) of ≤ 0.2 for non-carcinogenic adverse effects and an Incremental Lifetime Cancer risk of 1×10^{-5} .

Soil tailing data for lithium (min: < 2 mg/kg; max: 74 mg/kg) evaluated for potential risk to human health using the US EPA (2022) Regional Soil Screening value of 16 mg/kg for a HQ =0.10 (adjusted to 32 mg/kg for a HQ= 0.2) indicated an unacceptable risk associated with direct contact with impacted soil for children. No soil criterion was identified for lithium for the protection of ecological receptors at the time of writing this preliminary assessment.

No soil criterion was identified for rubidium (min: 2.7 mg/kg; max: 42 mg/kg) in the hierarchy of health and environmental protection agencies reviewed in this preliminary assessment.

6.1.3 Receptors and Exposure Pathways

From the original tailings and waste rock source areas at the Site, the following release and transport mechanisms and potential exposure pathways to the COCs for human and ecological receptors are illustrated in **Figures 6-1, 6-2** and **6-3** below with short narrative descriptions in the following subsections.

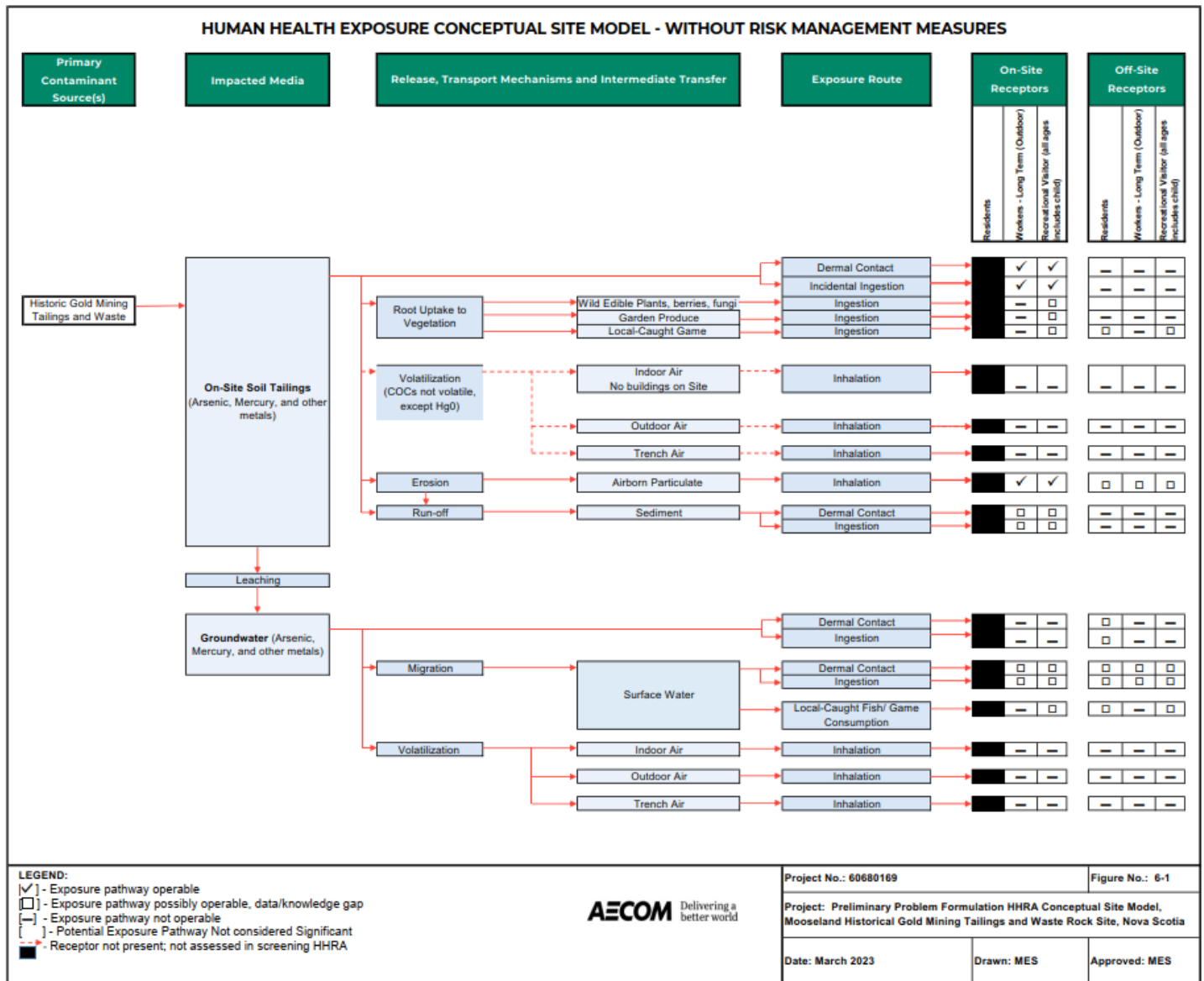


Figure 6-1: Human Health Exposure Conceptual Side Model

Human Receptors and Exposure Pathways (Figure 6-1):

- Soil (including tailings) direct contact with soil through exposed skin and incidental ingestion of soil.
- Leaching from soil, (tailings and waste rock) to potable groundwater
 - Direct contact with impacted groundwater by ingestion (i.e., drinking water, water used in cooking and food preparation) and skin contact (i.e., bathing/ washing and other uses).
 - Groundwater use for watering of livestock and poultry for food
- Inhalation of dusts and respirable particulate material (PM10; PM 2.5) in indoor / outdoor air.
- Leaching from soil, tailings (waste rock) to groundwater and groundwater discharging to surface water and exposure to aquatic life
 - Potential for exposure through consumption of locally caught fish and game
 - Potential for exposure through direct contact with surface water and sediment (i.e., skin contact and incidental ingestion).
- Surface runoff to wetlands and surface water bodies and exposure to terrestrial riparian and aquatic life
 - Potential for exposure through consumption of locally caught fish and game
 - Potential for exposure through direct contact with surface water and sediment (i.e., skin contact and incidental ingestion).
- Plant root uptake and foliar uptake
 - Potential for exposure through consumption of locally harvested edible plants, berries, fungi
 - Potential for exposure through consumption of locally grown produced watered with groundwater

TERRESTRIAL ECOLOGICAL EXPOSURE CONCEPTUAL SITE MODEL - WITHOUT RISK MANAGEMENT MEASURES

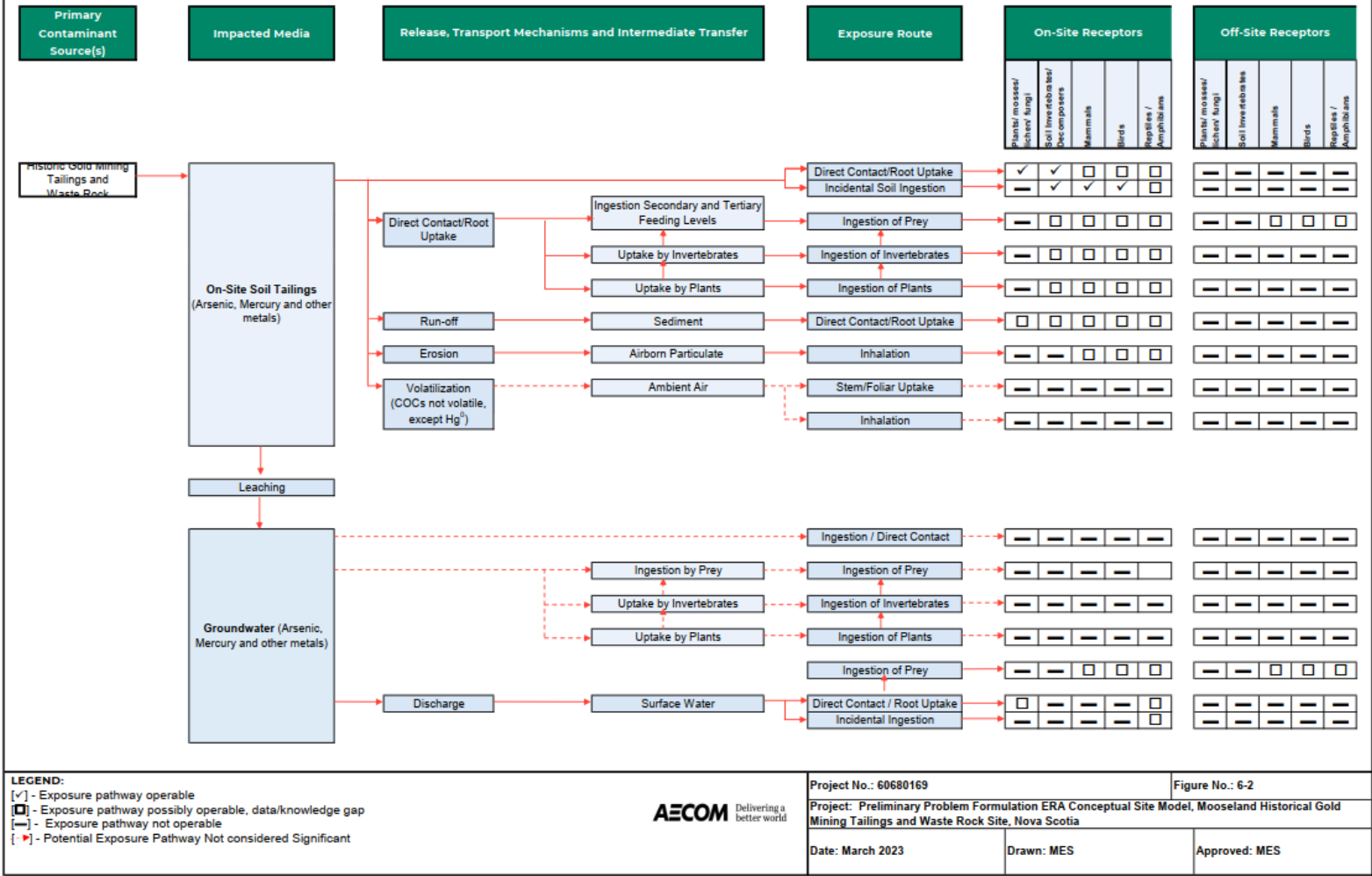


Figure 6-2: Ecological Terrestrial Exposure Conceptual Model

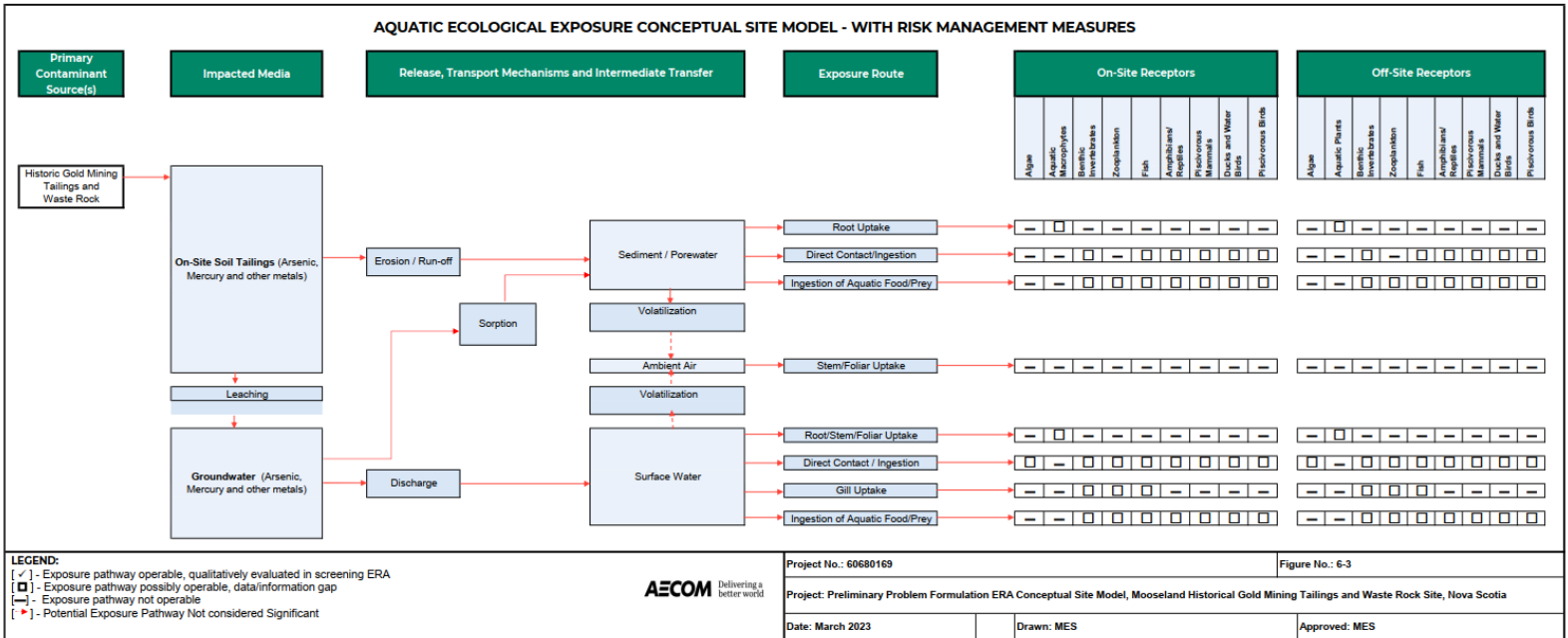


Figure 6-3: Ecological Aquatic Exposure Conceptual Model

Ecological Receptors and Exposure Pathways – Terrestrial (Figure 6-2) and Aquatic (Figure 6-3):

- Soil (including tailings): Plants and soil invertebrates direct contact (dermal and ingestion) with impacted soil
- Ingestion and inhalation of soil/dusts: birds, mammals, reptiles
- Leaching from soil (tailings and waste rock) to groundwater and groundwater discharging to surface water
 - Potential for impacts on surface water quality and sediment quality of ephemeral and permanent surface water bodies used by plants, invertebrates and wildlife - birds, mammals, amphibians, and reptiles (i.e., direct contact, including ingestion)
- Surface runoff to wetlands and surface water bodies
 - Potential impact on surface water quality and sediment quality and exposure to plants, invertebrates and wildlife - birds, mammals, amphibians, reptiles (i.e., direct contact, including ingestion)
- Food web relationships with potential exposures to primary and secondary consumers, Potential exposure to bioaccumulative COCs of birds, mammals, amphibians, and reptiles through ingestion of plants and prey, such as fish-eating birds and mammals and terrestrial food web relationships.

6.1.3.1 Soil Contact / Ingestion

Tailings and waste rock are located on-site and there are currently no barriers (i.e., fencing, asphalt, etc.) to protect human or ecological receptors from coming into contact with the impacted areas. Therefore, the soil contact / ingestion pathway is considered to be operable.

6.1.3.2 Leaching to Potable Water

Based on the results of the Phase I ESA (AECOM, 2022), it was determined that water wells are present within 250 m of the Site. Therefore, the leaching to potable water pathway is considered to be operable.

6.1.3.3 Inhalation of Indoor Air

The Inhalation of indoor air/vapour migration from groundwater to indoor air pathway is not considered to be operable since occupied buildings do not exist within 30 metres of the Site and no buildings exist on the Site.

6.1.3.4 Inhalation of Outdoor Air

The tailings solids are relatively fine grained and are subject to dusting that can be carried with ground-level winds and dispersed along the direction of the prevailing winds. Therefore, the inhalation of outdoor air pathway is considered to be operable.

6.1.3.5 Leaching and Migrating to Off-Site Surface Water

Tailings deposits and associated surface water runoff have been observed on-site to be leading into the Tangier River. Impacts are above the groundwater table, and leaching (from precipitation) to groundwater, and then migrating to surface water. Therefore, the leaching and migrating to off-site surface water pathway is considered to be operable.

7. Additional Proposed Field Programs

7.1 Remediation Components Requiring Additional Data

Environmental investigations completed to-date have identified the following site components which require remedial measures. Some of these components require additional data to further define the remedial options and develop a remedial action plan.

7.1.1 Waste Rock and Tailings

The Phase II Environmental Site Assessment has identified that approximately 10,950 m³ of waste rock contains elevated Arsenic and other metal concentrations that may present an unacceptable risk of elevated exposures to As and other toxic metals through leaching and dust released from waste rock piles for human and ecological receptors. Remedial measures are required to mitigate this risk. Further assessment of the potential risk to human health and ecological health is warranted and further delineation is required to accurately assess the volume of tailings requiring remedial action.

As identified in the Phase I ESA, previous environmental reports estimated 8,217 tonnes of tailings on the Site. The Phase II Environmental Site Assessment has identified that tailings contain elevated Arsenic and Mercury concentrations that may present a human health risk and adverse ecological effects. Remedial measures are required to mitigate this risk. Due to the limited data collected, AECOM cannot confirm the quantity of tailings and has therefore used the previous volume estimated. Further assessment of the potential risk to human health and ecological health is warranted and further delineation is required to accurately assess the volume of tailings requiring remedial action.

7.1.1.1 Additional Waste Rock and Tailings Geochemical Sampling Program

Preliminary Metals Leaching and Acid Rock Drainage data indicate that there is ML/ARD risk associated with the waste rock and tailings. This data is described in the Geochemistry Memo completed for this Site; a copy of this report is provided in [Appendix D](#). Based on the preliminary data, additional waste rock sampling for ML/ARD at this Site should be completed.

The objectives of the additional waste rock sampling program for the Site include:

- Collection of additional surface and subsurface waste rock and tailings samples; and
- Improvement understanding of ARD/ML risk and effect on remediation options selection.

Sampling Methodology:

Using an excavator or other method, collect 2 kg of waste rock and tailings samples from different locations of piles at 0.5- and 1-meter depth. Based on the estimated volumes, an additional three (3) waste rock samples, and three (3) tailings samples should be collected. Each sample should be documented by a sample ID, location, GPS coordinates, photo and a detailed description (complete form – Located in [Appendix D](#)) and stored in tightly sealed sampling bags and stored in lightly lid pails for shipping to laboratory. Complete a chain-of-custody and include with shipmen for laboratory analysis as described below.

Laboratory Analysis:

The samples collected should be submitted to a certified laboratory for the following analysis:

Table 9: Number of Sample per Geochemical Test

Acid Base Accounting	Ultra trace Metal analysis	Shake Flask Extraction (MEND)	X-Ray Diffraction	QEMSCAN *
All	All	All	2 waste rock 2 tails	2 waste rock 2 tails

Notes:

Do Whole Rock Analysis if required for QEMSCAN

Further detail on the static and mineralogical tests is described below:

1. Acid base accounting including:
 - Paste pH
 - Total sulphur by Leco
 - Sulphate sulfur determined by hydrochloric acid leach
 - Sulphide sulphur determined by nitric acid leach
 - Non-extractable sulphur by difference
 - NP determined by Modified Sobek NP
 - Fizz rating
 - Total carbon determined by Leco
 - Total inorganic carbon by Leco
2. Ultra trace metal analysis using an aqua regia digestion followed by ICP-MS
3. MEND shake flask extraction and leachate analysis by ICP-MS including : pH, ORP, conductivity, acidity, total acidity, alkalinity, sulphate, chloride, fluoride, nitrate, nitrite , ammonia and dissolved metals including mercury
4. X-ray diffraction with Rietveld refinement (XRD)
5. Quantitative Evaluation of Minerals by Scanning Electron Microscopy (QEMSCAN)

7.1.1.2 Additional Waste Rock and Tailings Delineation Program

To further refine the remedial quantities for both Waste Rock and Tailings at the Site, additional delineation is required, including understanding the vertical and horizontal extents of the waste rock and tailings areas.

AECOM estimated the depths of waste rock by using the surface grades surrounding the waste rockpile and assuming the original grade under the entire waste rock pile was similar. As the original grade is not known, there remains a level of uncertainty in the quantity of waste rock at the Site. To better estimate the depth of the waste rock pile and refine the remedial quantity, AECOM is recommending a Ground Penetrating Radar (GPR) and Resistivity geophysical investigation be completed on the waste rock pile.

The estimated volume of tailings on the Site was based on previous reporting. AECOM was unable to achieve full delineation of the tailing's areas in the horizontal and vertical directions. All samples collected from the Site were above the NSE Tier 1 EQS for one or more parameters. To further the delineation of tailings requiring remediation, AECOM is recommending that an in-depth background soil sampling program be completed to establish background soil concentrations, which is described below. Additional delineation of waste rock and/or tailing via additional chemical characterization methods should be delayed until background soil conditions/levels are established for the area."

7.1.2 Impacted Soil

The Phase II Environmental Site Assessment has identified impacted soil in many areas of the Site, as delineation has not been achieved, AECOM is unable to accurately assess the volume of contaminated soil requiring remedial action. Based on the limited data and aerial imagery, AECOM is estimating that 90,000 m³ of soil containing elevated Arsenic and Mercury and other metals concentrations that may present a human health risk exists on the Site. Remedial measures may be required to mitigate this risk. Further assessment of the potential risk to human health and ecological health is warranted.

7.1.2.1 Soil Delineation

The estimated volume of impacted soil on the Site was based on a combination of analytical data and visual observation in the field, however AECOM was unable to achieve full delineation of the impact soil areas in the horizontal and vertical directions. All samples collected from the Site were above the NSE Tier 1 EQS for one or more parameters. To further the delineation of impacted soil requiring remediation, AECOM is recommending that an in-depth background soil sampling program be completed which is described below. From this background soil data collection program, AECOM will be able to identify the areas of tailings which are above background concentrations; and therefore, may require remediation. In addition, AECOM is recommending that a Human Health and Ecological Risk Assessment be completed to determine the acceptable levels of contaminants of concern that may remain on Site. The combination of background data and a Site Specific Target Level for contaminant of concern will aid in developing a delineation program for the tailings plumes.

Based on review of historical information described in [Section 3.7.3](#) (Faribault Mapping and associated aerial imagery), additional soil sampling in areas of former crushers is required as there are discrepancies in the mapping from different sources on the precise location of the former crushers. As such, additional soil samples should be collected at all possible former crusher locations to confirm the presence/levels of contaminants of concern. All soil samples should be collected and analyzed for metals and mercury.

7.1.2.2 Background Soil Sampling

To further the understanding of the Site and complete a HHERA, AECOM is recommending that an in-depth soil background sampling program be completed in the vicinity of the Mooseland Site. The following soil background sampling program is based on Parsons and Little Study (2015) titled “Establishing geochemical baselines in forest soils for environmental risk assessment in the Montague and Goldenville gold districts, Nova Scotia, Canada.” As both the Montague and Goldenville sites have similar bedrock characteristics to the Mooseland Site, the following sampling plan is proposed to use the findings identified in the Parsons and Little Study (2015) as baseline values along with completing additional background sampling (based on the Parsons and Little Study (2015) methodology) to verify the assumption and uncertainties.

The main objectives of the Parson and Little (2015) study were to: (1) establish baseline concentrations of As, Hg, and other elements in soils overlying mineralized bedrock within these mine districts; (2) assess the vertical distribution of metal(loid)s in the soil, and the relative contributions of natural versus anthropogenic sources; and (3) evaluate the role of organic carbon, soil grain size, and digestion protocol in controlling metal(loid) concentrations. Results from this 2015 study can be used to support ecosystem and human health risk assessments, and to help guide management actions at historical gold mine districts in Nova Scotia.

Sampling design and field methods based on the Parson and Little (2015) study

Collect sample of the top 0–5 cm of soil (the Public Health (PH) layer) from 40 to 50 locations in the vicinity of Mooseland Site (sample location protocols will be based on further discussions with Michael Parsons and BNS). Restrict most sampling to provincially owned (Crown) land and sites both up-ice and down-ice of the main anticlinal fold hinge to study the effects of glacial dispersion. Soil sample sites are to be positioned in relatively well-drained

areas that were free from any obvious sources of contamination (e.g., garbage, metal scraps, waste rock, etc.). Photographs, coordinates, and detailed descriptions of each sample location will be collected during the field program. Background soil samples will be collected using field protocols similar to the North American Soil Geochemical Landscapes Project (Friske et al. 2013).

At each sample location, plant litter and partially fermented material will be removed from the soil surface, and then a shovel will be used to expose a cross-section of the soil to a depth of at least 10 cm to check for the presence of distinct soil horizons. For the purposes of sampling, the upper boundary of the first layer that supports root growth (the top of the H-horizon, if present) defined the top of the sampling interval (i.e., 0 cm). All equipment in contact with the sample will be either polyethylene or steel, and sampling implements will be thoroughly cleaned between each location. Approximately 1 kg of soil will be collected at each site and pebbles, roots, and any living plant matter will be removed before the sample is placed in a pre-labelled zip-lock bag.

Samples of individual soil horizons (H, Ae, B, and C) will also be collected from 10 sites to evaluate the vertical distribution of elements in the soil profile. These sites will be evenly distributed both up-ice and down-ice of the main anticlinal fold hinge in each district and situated in areas that displayed well-developed soil horizons. Sampling at these locations will begin by clearing plant litter and partially fermented material from the soil surface, then digging a pit at least 60 cm wide and 60 cm deep to provide access to the top of the C-horizon. One-kilogram samples of each horizon will be collected in sequence from the bottom of the pit to the top to minimize cross-contamination during sampling, cleaned of roots and pebbles, then placed in pre-labelled zip-lock bags. Observations on the thickness of each horizon, the colour and texture of the soil, and other site characteristics will be recorded during the field program.

Chemical analyses, laboratory processing and analytical methods will be conducted at a CALA certified laboratory. Applied laboratory methods will be similar to applied in the Parsons and Little Study (2015).

7.1.3 Terrestrial Environment – Plant Survey and Plant Tissue Sampling

To gain an understanding of the terrestrial environment at the Site, two key knowledge gaps that should be investigated as part of the HHERA are:

1. What actual vegetation, including edible plants, berries, fungi, and suitable browse/forage and or habitat occur at the Site.
2. Whether the COCs (and PCOCs) in soil and tailings on-site, specifically As and Hg, and other bioaccumulative metals, are environmentally available and being taken uptake into plant tissues and the implications for the HHERA.

As part of the Problem Formulation, it is recommended that a Site reconnaissance visit, by a Terrestrial Plant Biologist/ Ecologist accompanied by the Risk Assessor and the development of a field vegetation study sampling plan and laboratory analysis of select metal contaminants in plant tissues for execution in the summer of 2023. Propose using a transect survey approach and a gradient design, versus a reference design. This program is to be developed as part of the next steps for the Site.

Additional value could be added by documenting actual site-specific data on types of vegetation and terrestrial habitat available on-site and actual site-specific data of metal concentrations in samples of vegetation collected from the Mooseland Site. This information would be beneficial for verifying key assumptions underpinning the presence of operable exposure pathways connecting human receptors and ecological receptors to select COCs (and PCOCs) in soil and tailings at the site through the potential ingestion of actual plants growing on-site and site-specific data for plant tissues.

For instance, i) documentation of the presence/absence on-site and adjacent of edible plants and berries for human consumption and of browse/forage for herbivorous ecological receptors anticipated to frequent the Mooseland mining study area; and ii) indication of the magnitude of actual concentrations of COCs (and PCOCs) in plant tissues corresponding to soil impacts.

7.1.4 Impacted Surface Water and Porewater

The Phase II Environmental Site Assessment has identified surface water and sediment in the Tangier River impacted by metals. Surface water and sediment concentrations of As and Hg in one or more samples were greater than the corresponding environmental quality criteria indicating possible ecological adverse effects in aquatic organisms and possibly a risk to people and wildlife through eating fish and aquatic prey from surface waters in sediment impacted areas. Further environmental study and risk assessment is warranted for surface water and sediment impacted areas. Remedial measures may be required to mitigate this risk.

7.1.4.1 Aquatic Tissue Sampling – Tangier River

The Phase II ESA identified tailings containing elevated Arsenic (As) and Mercury (Hg) concentrations that may present a human health risk and adverse ecological effects. Remedial measures are required to mitigate this risk. The Phase II ESA also identified surface water and sediment in the Tangier River impacted by elevated concentrations of As and Hg, indicating possible ecological adverse effects in aquatic organisms and possibly a risk to people and wildlife through eating fish and aquatic prey from surface waters in sediment impacted areas. Further environmental study, including background sampling and risk assessment is warranted for surface water and sediment impacted areas.

The Phase II ESA recommended conducting a site-specific Human Health and Ecological Risk Assessment (HHERA). As such a detailed workplan for a 2023 Aquatic Tissues Field Program at the Site to support a site-specific aquatic HHERA has been developed and is included as a standalone memo in **Appendix D**.

7.1.4.2 Continued Surface Water Sampling

Surface water samples should be collected for metals and mercury on a quarterly basis to establish seasonal baseline analytical data. Surface water samples should be collected following standard SOPs from a depth of approximately 5 cm below the water surface. During the surface water sample collection process, the field personnel should locate themselves downstream of the sampling point and as close to the middle of the channel as possible (where safe to do so), thereby minimising disturbance to the stream base and mobilisation of any silts / sediments. Samples should be collected in laboratory supplied containers and kept below a temperature of 10 degrees Celsius once sampled until submission to the laboratory.

A total of fourteen (14) surface water samples locations have been sampled previously by AECOM and should be sampled quarterly to establish seasonal baselines. Surface water samples collected should be submitted for metals analysis.

Surface water sampling locations are shown on **Figure 8, Appendix A**.

7.1.5 Impacted Sediments

To further the delineation of impacted sediment requiring remediation, AECOM is recommending that an in-depth background sediment sampling program be completed. From this background sediment data collection program, AECOM will be able to identify the areas of sediment which are above background concentrations; and therefore, may require remediation. In addition, AECOM is recommending that a Human Health and Ecological Risk Assessment be completed to determine the acceptable levels of contaminants of concern that may remain on Site.

The combination of background data and a Site Specific Target Level for contaminant of concern will aid in developing a delineation program for the impacted sediment.

7.1.6 Impacted Groundwater

The Phase II Environmental Site Assessment (AECOM, 2022) has identified impacted groundwater including metals, specifically As, Co, Mn, Al, and Fe based on limited sampling and analyses. Remedial measures may be required to mitigate any adverse effects on potable ground water quality and with respect to migration to downgradient aquatic organisms. Further assessment of the potential risk to human health and ecological health is warranted. Human health and ecological risks may also be mitigated by taking remedial actions at the source of the impacts (waste rock, tailings, soils, etc.).

Groundwater monitoring and sampling should be done on a quarterly basis establish seasonal baseline analytical data. Groundwater samples should be collected using the methodology summarised in [Section 4.2.3](#). Additional groundwater wells may be warranted based on the results of further Environmental Site Assessment and Human Health and Ecological Risk Assessment. Background groundwater chemistry conditions for the Site are proposed to be established from provincially available sources and the compilation of this data is proposed to be completed as part of the 2023/2024 report.

Groundwater sampling locations are shown on [Figure 7, Appendix A](#).

7.1.7 Hecla Mine Shaft

The Phase I Environmental Site Assessment identified a 120 meter mine shaft known as the Hecla Mine Shaft, the Phase II Environmental Site Assessment potentially identified this flooded shaft. Water inside the flooded shaft was impacted by metals. Remedial measures may be required to mitigate this environmental risk of possible exposures to elevated metals in surface water and potential release and transport to groundwater. In addition, the shaft poses a potential physical risk to human health and the environment.

The former mine shaft appears to have been abandoned in place with no clear records identifying the shaft cover or closure. The shaft is flooded to surface. Historical concerns with the shaft opening included that there are no reports or indications that there is a structurally-sound cover closure of the shaft.

To further assess the integrity of the shaft opening, the shaft should be further inspected. The inspection should include:

- Determining the depth of the Shaft (via underwater camera or other suitable method).
- Determine whether the shaft has been partially backfilled.
- The presence of standing water within this opening would suggest the potential for a) the shaft to be sealed which prevents water from migrating vertically downward, or b) the shaft is flooded to this level.

Based on available information, there is no supporting evidence to confirm that the mine shaft has been adequately decommissioned in conformance with regulatory standards and may represent a safety hazard.

A suitable mine closure design should be completed once the shaft has been adequately investigated.

7.1.8 Debris

Remnants of historical mining activities remain at site, including machine parts, wood and metal debris. An estimated 80 m³ of debris may require management. No detailed classification of the debris has been completed to date. A detailed survey of the material including identifying hazardous waste should be completed.

8. Recommendations and Conclusions

Table 10 below provides a summary of the recommended additional field programs for the Site. The additional field programs are described in detail in [Section 7.0](#).

Table 10: Summary of Recommended Additional Field Programs

Environmental Concern	Recommended Additional Field Programs
Waste Rock and Tailings	<ul style="list-style-type: none"> ▪ Additional geochemical sampling program ▪ Additional delineation program ▪ GPR study of waste rock piles
Impacted Soils	<ul style="list-style-type: none"> ▪ Additional soil delineation ▪ Additional background soil sampling
Terrestrial Environment	<ul style="list-style-type: none"> ▪ Plant survey and plant tissue sampling
Impacted Surface Water and Porewater	<ul style="list-style-type: none"> ▪ Aquatic tissue sampling ▪ Continued surface water and additional background sampling ▪ Additional surface water samples for on-site shaft and pond
Impacted Sediment	<ul style="list-style-type: none"> ▪ Additional sediment delineation ▪ Additional background sediment sampling
Impacted Groundwater	<ul style="list-style-type: none"> ▪ Continued groundwater sampling
Hecla Mine Shaft	<ul style="list-style-type: none"> ▪ Further detailed inspection
Surface Debris	<ul style="list-style-type: none"> ▪ A detailed survey of the material including identifying hazardous waste should be completed

9. References

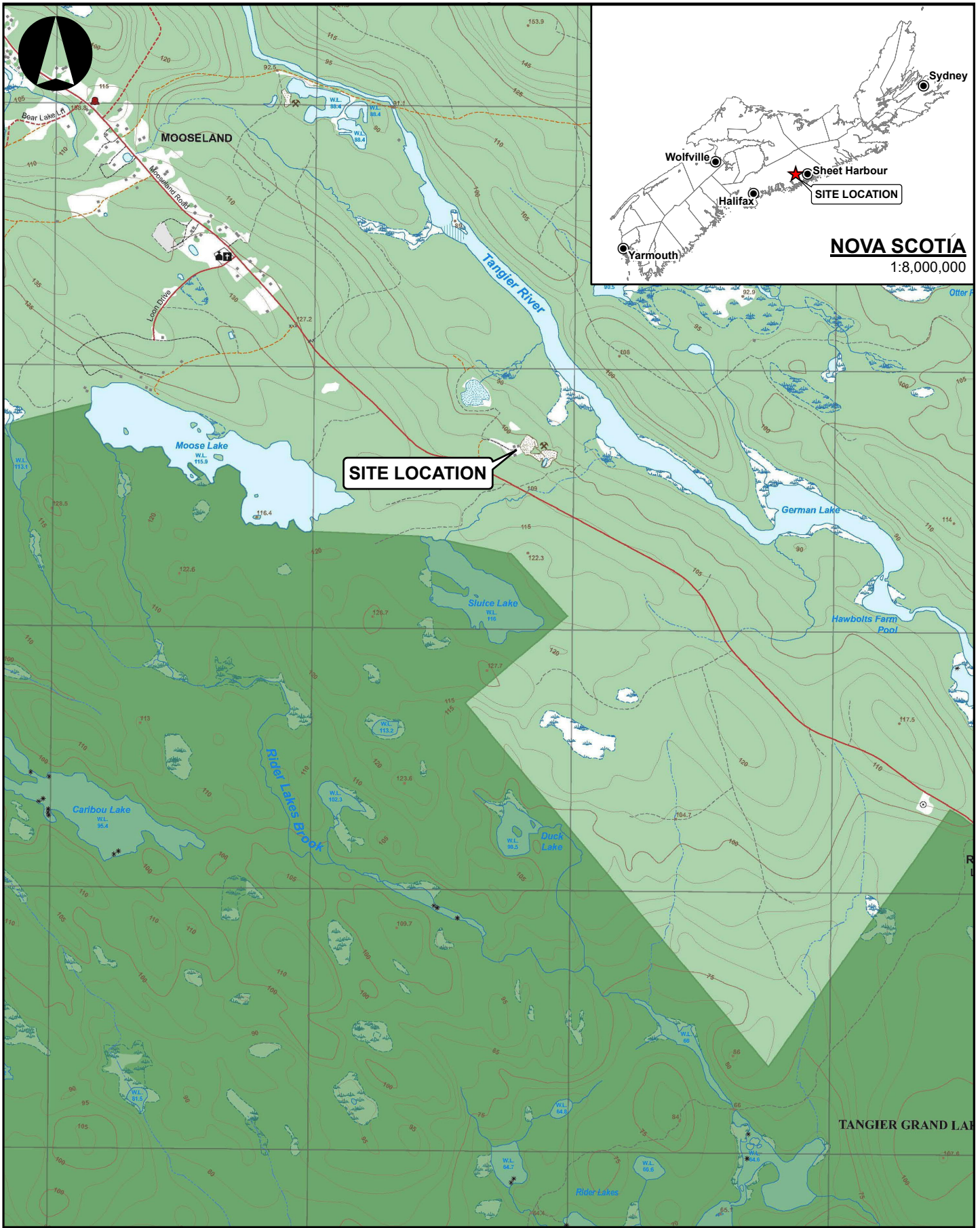
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Appendix A. Figures

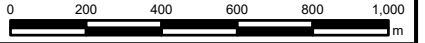


NOVA SCOTIA
1:8,000,000

SITE LOCATION

REFERENCE

LAYER CREDITS: GENOVA, NOVA SCOTIA OPEN DATA



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GENERAL SITE LOCATION MAP

CLIENT NAME:
NOVA SCOTIA LANDS INC.

PROJECT LOCATION:
MOOSELAND MINE SITE

DRAWN BY: PC
CHECKED BY: JS

SCALE: 1:20,000
DATE: 2022-04-04

FIGURE No. 1
PROJECT NO: 60680169

Last saved by: PAIGE CROSSMAN (2022-04-04)
L:\Calgary-CAGY\3\DC\GIS\Nova Scotia\60680169\02_MXD\sh001_60680169_Sitelocation.mxd



Legend	
	PROPERTY BOUNDARY AS SHOWN ON NOVA SCOTIA PROPERTY ONLINE
	PHASE I ESA - AREA OF INTEREST

REFERENCE
NS Property Record Database, Esri World Imagery

0 150 300 450 600
m

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SITE PLAN – PROPERTY BOUNDARY

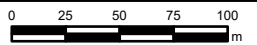
CLIENT NAME: NOVA SCOTIA LANDS INC.	PROJECT LOCATION: MOOSELAND MINE SITE	DRAWN BY: PC	SCALE: 1:20,000	FIGURE No. 2
		CHECKED BY: JS	DATE: 2022-04-04	PROJECT NO: 60680169

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Legend	
	SITE FEATURES
	PROPERTY BOUNDARY AS SHOWN ON NOVA SCOTIA PROPERTY ONLINE

REFERENCE
NS Property Record Database, Esri World Imagery



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SITE PLAN - DETAILS

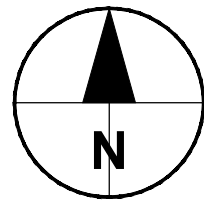
CLIENT NAME:
NOVA SCOTIA LANDS INC.

PROJECT LOCATION:
MOOSELAND MINE SITE

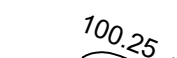


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CHECKED BY: JS

SCALE: 1:3,500
DATE: 2022-09-02

FIGURE No. 3
PROJECT NO: 60680169



LEGEND

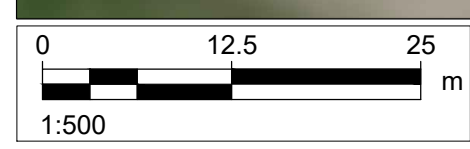
-  CONTOURS (0.25m INTERVAL)
-  APPROXIMATE BUILDINGS
-  APPROXIMATE BUILDINGS (CRUSHERS)

DRAWING NOTES

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS.2010) NOVA SCOTIA ZONE 4. ELEVATIONS ARE IN METRES AND REFERENCED TO MEAN SEA LEVEL.
2. ALL DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
3. TOPOGRAPHIC SURVEY FROM SDMM CANADA.
4. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/ AIRBUS DS, USDA, USGS, AEROGIRD, IGN AND THE GIS
5. BUILDING LOCATIONS ARE APPROXIMATE. DIGITIZED FROM DNR HISTORICAL GOLD MINING NTS SHEET 11D/15



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 Filename: L:\CALGARY-CACGY\3\DCS\GIS\NOVA_SCOTIA\60680169\01_DATA\07_AUTOCAD\2023-08-29\FIGURE 4 - MOOSELAND -WASTE ROCK.DWG



Issue Status: FINAL

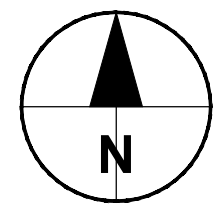
PHASE II ENVIRONMENTAL SITE ASSESSMENT

WASTE ROCK LOCATION PLAN

Nova Scotia Lands Inc, Mooseland
 Project No.: 60680169 Date: 2023-08-30



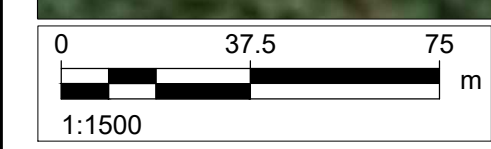
Figure: 4



LEGEND

	MONITORING WELL SOIL SAMPLE
	TAILING SAMPLE
	TAILING DELINEATION SAMPLE
	WASTE ROCK SAMPLE
	HAND AUGER SOIL SAMPLE
	STAMP MILL HAND AUGER SOIL SAMPLE
	SAMPLE EXCEEDS GUIDELINE(S) FOR ONE OR MORE OF THE FOLLOWING PARAMETERS: ARSENIC AND/OR MERCURY
	SAMPLE DOES NOT EXCEED APPLICABLE GUIDELINES
	APPROXIMATE BUILDINGS
	APPROXIMATE BUILDINGS (CRUSHERS)

- DRAWING NOTES**
1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS.2010) NOVA SCOTIA ZONE 4. ELEVATIONS ARE IN METRES AND REFERENCED TO MEAN SEA LEVEL.
 2. ALL DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
 3. TOPOGRAPHIC SURVEY FROM SDMM CANADA.
 4. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/ AIRBUS DS, USDA, USGS, AEROGRIID, IGN AND THE GIS
 5. BUILDING LOCATIONS ARE APPROXIMATE. DIGITIZED FROM DNR HISTORICAL GOLD MINING NTS SHEET 11D/15



Issue Status: FINAL

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 Filename: L:\CALGARY-CACGY\3\DCS\GIS\NOVA_SCOTIA\60680169\01_DATA\07_AUTOCAD\2023-08-29\FIGURE 5 - MOOSELAND - SOIL, TAILINGS AND WASTE ROCK SAMPLE LOCATION PLAN.DWG

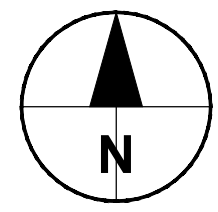
PHASE II ENVIRONMENTAL SITE ASSESSMENT

SOIL, TAILINGS AND WASTE ROCK SAMPLE LOCATION PLAN

Nova Scotia Lands Inc, Mooseland
 Project No.: 60680169 Date: 2023-08-30



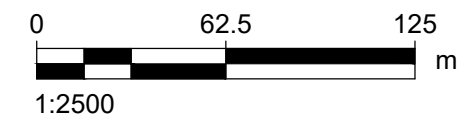
Figure: 5



LEGEND

	BACKGROUND SOIL SAMPLE
	APPROXIMATE BUILDINGS
	APPROXIMATE BUILDINGS (CRUSHERS)

- DRAWING NOTES**
1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS.2010) NOVA SCOTIA ZONE 4. ELEVATIONS ARE IN METRES AND REFERENCED TO MEAN SEA LEVEL.
 2. ALL DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
 3. TOPOGRAPHIC SURVEY FROM SDMM CANADA.
 4. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/ AIRBUS DS, USDA, USGS, AEROGRIID, IGN AND THE GIS
 5. BUILDING LOCATIONS ARE APPROXIMATE. DIGITIZED FROM DNR HISTORICAL GOLD MINING NTS SHEET 11D/15



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 Filename: L:\CALGARY-CACGY\3\DCS\GIS\NOVA_SCOTIA\60680169\01_DATA\07_AUTOCAD\2023-08-29\FIGURE 6 - MOOSELAND - BACKGROUND SOIL SAMPLE LOCATION PLAN.DWG

Issue Status: FINAL

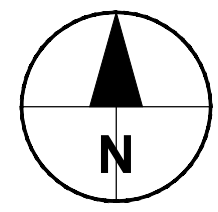
PHASE II ENVIRONMENTAL SITE ASSESSMENT

**BACKGROUND SOIL SAMPLE
LOCATION PLAN**






Nova Scotia Lands Inc, Mooseland
 Project No.: 60680169 Date: 2023-08-30



Figure: 6



LEGEND

-  MONITORING WELL GROUNDWATER ELEVATION
-  GROUNDWATER CONTOUR (2.0m INTERVAL)
-  GROUNDWATER FLOW DIRECTION
-  SAMPLE EXCEEDS GUIDELINES FOR ONE OR MORE METALS PARAMETERS
-  SAMPLE DOES NOT EXCEED GUIDELINES

DRAWING NOTES

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS.2010) NOVA SCOTIA ZONE 4. ELEVATIONS ARE IN METRES AND REFERENCED TO MEAN SEA LEVEL.
2. ALL DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
3. TOPOGRAPHIC SURVEY FROM SDMM CANADA.
4. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/ AIRBUS DS, USDA, USGS, AEROGRIID, IGN AND THE GIS



Issue Status: FINAL

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Filename: C:\01_AECOM\001_PROJECT\13-02-23-2023 MOOSELAND\FIG 7.FIG 8\Figure 7 - MOOSELAND - GROUNDWATER SAMPLE LOCATION AND FLOW DIRECTION PLAN.DWG

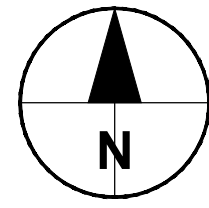
PHASE II ENVIRONMENTAL SITE ASSESSMENT

**GROUNDWATER SAMPLE LOCATION AND FLOW DIRECTION PLAN
JANUARY 13th, 2023**




Nova Scotia Lands Inc, Mooseland
Project No.: 60680169 Date: 2023-03-15



Figure: 7

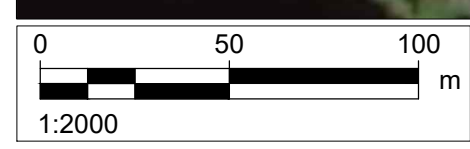


LEGEND

-  SURFACE WATER
-  SAMPLE EXCEEDS GUIDELINES FOR ONE OR MORE METALS PARAMETERS
-  SAMPLE DOES NOT EXCEED GUIDELINES

DRAWING NOTES

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS.2010) NOVA SCOTIA ZONE 4. ELEVATIONS ARE IN METRES AND REFERENCED TO MEAN SEA LEVEL.
2. ALL DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
3. TOPOGRAPHIC SURVEY FROM SDMM CANADA.
4. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/ AIRBUS DS, USDA, USGS, AEROGRIID, IGN AND THE GIS



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 Filename: C:\01_AECOM\001_PROJECT\13-02-23-2023 MOOSELAND\FIG 7, FIG 8\FIGURE 8 - MOOSELAND - SURFACE WATER SAMPLING PROGRAM.DWG

Issue Status: FINAL

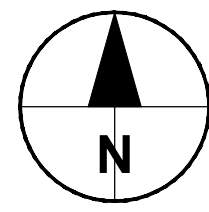
PHASE II ENVIRONMENTAL SITE ASSESSMENT

SURFACE WATER SAMPLING PROGRAM




Nova Scotia Lands Inc, Mooseland
 Project No.: 60680169 Date: 2023-03-15



Figure: 8



LEGEND

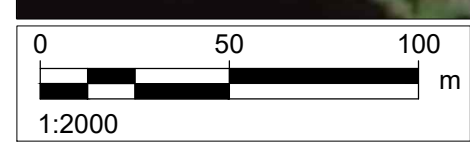
-  POREWATER
-  SAMPLE EXCEEDS GUIDELINES FOR ONE OR MORE METALS PARAMETERS
-  SAMPLE DOES NOT EXCEED GUIDELINES

DRAWING NOTES

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS.2010) NOVA SCOTIA ZONE 4. ELEVATIONS ARE IN METRES AND REFERENCED TO MEAN SEA LEVEL.
2. ALL DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
3. TOPOGRAPHIC SURVEY FROM SDMM CANADA.
4. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/ AIRBUS DS, USDA, USGS, AEROGRIID, IGN AND THE GIS



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Filename: C:\01_AECOM\001_PROJECT\13-02-23-2023 MOOSELAND\FIG 7.FIG 8\Figure 9 - MOOSELAND - POREWATER SAMPLING PROGRAM.DWG



Issue Status: FINAL

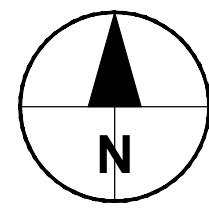
PHASE II ENVIRONMENTAL SITE ASSESSMENT

POREWATER SAMPLING PROGRAM





Nova Scotia Lands Inc, Mooseland
Project No.: 60680169 Date: 2023-03-15



Figure: 9



LEGEND

-  SEDIMENT SAMPLE
-  POREWATER SEDIMENT SAMPLE
-  SAMPLE EXCEEDS GUIDELINES FOR ONE OR MORE METALS PARAMETERS
-  SAMPLE DOES NOT EXCEED APPLICABLE GUIDELINES

DRAWING NOTES

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS.2010) NOVA SCOTIA ZONE 4. ELEVATIONS ARE IN METRES AND REFERENCED TO MEAN SEA LEVEL.
2. ALL DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
3. TOPOGRAPHIC SURVEY FROM SDMM CANADA.
4. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/ AIRBUS DS, USDA, USGS, AERGRID, IGN AND THE GIS



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 Filename: C:\01_AECOM\001_PROJECT\13_02-23-2023_MOOSELAND\FIG 7.FIG 8\Figure 10 - MOOSELAND - SEDIMENT SAMPLING PROGRAM.DWG

Issue Status: FINAL

PHASE II ENVIRONMENTAL SITE ASSESSMENT

SEDIMENT SAMPLING PROGRAM

Nova Scotia Lands Inc, Mooseland
 Project No.: 60680169 Date: 2023-03-15



Figure: 10

Appendix B. Analytical Tables

Mooseland Mine Site - Phase II ESA

Table 1: Soil Analytical Results

Background Samples - Metals



Sample Location Sample Date Sample Depth (m bgs) Type ⁰		BG 1	BG 2	BG 3	BG 4	BG 5	
		6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	
		0.00 - 0.15	0.00 - 0.15	0.00 - 0.15	0.00 - 0.15	0.00 - 0.15	
		N	N	N	N	N	
Parameter	NS-EQS (T1A)/SO/RES/POT/ COARSE ¹	Units					
Aluminum	15400	mg/kg	5000	7600	18000	14000	3600
Antimony	7.5	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Arsenic	10	mg/kg	25	74	26	73	27
Barium	350	mg/kg	9.3	35	22	36	7.8
Beryllium	1	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	NS	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	4300	mg/kg	<50	<50	<50	<50	<50
Cadmium	1	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30
Chromium	220	mg/kg	7.7	3.9	22	20	4.2
Cobalt	22	mg/kg	<1.0	1.8	4.9	11	<1.0
Copper	250	mg/kg	<2.0	5.7	9.7	19	<2.0
Iron	11000	mg/kg	11000	13000	30000	28000	6200
Lead	120	mg/kg	7	35	15	12	7.5
Lithium	NS	mg/kg	<2.0	<2.0	18	24	<2.0
Manganese	360	mg/kg	83	56	520	1100	85
Mercury	6.6	mg/kg	<0.10	0.24	0.12	<0.10	<0.10
Molybdenum	15	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	70	mg/kg	<2.0	4.9	11	20	<2.0
Rubidium	NS	mg/kg	2.2	7.1	11	11	3.6
Selenium	1	mg/kg	<0.50	1.4	1.7	0.55	<0.50
Silver	77	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Strontium	9400	mg/kg	<5.0	13	<5.0	7.4	<5.0
Thallium	1	mg/kg	<0.10	<0.10	0.16	0.11	<0.10
Tin	9400	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium	23	mg/kg	0.37	0.31	0.67	0.87	0.31
Vanadium	39	mg/kg	28	8.5	29	20	18
Zinc	300	mg/kg	5.4	13	42	49	<5.0

Notes:

⁰ Type: N=normal, FD=field duplicate

¹ NS-EQS (T1A)/SO/RES/POT/COARSE: NSE potable residential.

yyyy/mm/dd: year/month/day

mbgs: meters below ground surface

mg/kg: milligrams per kilogram

< :Denotes concentration less than indicated detection limit

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
Table 1: Soil Analytical Results
Metals

Sample Location			MW5 SA1 0-1'	MW5 SA2 1'-3'	MW6 SA1 0-10"	MW6 SA2 1'-2'	MW6 SA3 2'-2'11	S1	S2	S3
Sample Date			6/16/2022	6/16/2022	6/15/2022	6/15/2022	6/15/2022	6/16/2022	6/16/2022	6/16/2022
Sample Depth (m bgs)			0-0.3	0.3-0.9	0-0.25	0.3-0.6	0.6-0.64	0 - 0.10	0 - 0.15	0 - 0.13
Type ⁰			N	N	N	N	N	N	N	N
Parameter	NS-EQS (T1A)/SO/RES/POT/COARSE ¹	Units								
Aluminum	15400	mg/kg	7900	20000	1600	3000	6300	17000	16000	22000
Antimony	7.5	mg/kg	<2.0	<2.0	3.4	7.8	2.6	3	<2.0	2.8
Arsenic	10	mg/kg	13000	1200	6200	6900	3500	4700	170	26000
Barium	350	mg/kg	190	39	9.2	15	41	42	30	180
Beryllium	1	mg/kg	<1.0	1.2	<1.0	<1.0	1	1.1	1	2.4
Bismuth	NS	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	4300	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium	1	mg/kg	2.2	<0.30	<0.30	<0.30	<0.30	0.32	<0.30	2.1
Chromium	220	mg/kg	4.3	20	4.2	7.8	6.3	18	19	12
Cobalt	22	mg/kg	160	5.5	1.8	4.9	2.7	5.8	4.2	450
Copper	250	mg/kg	21	13	5.2	7.2	9.4	24	22	36
Iron	11000	mg/kg	80000	13000	11000	13000	9300	45000	12000	160000
Lead	120	mg/kg	15	27	40	58	31	88	78	58
Lithium	NS	mg/kg	2.1	18	2.7	6.1	4.1	16	16	<2.0
Manganese	360	mg/kg	33000	600	260	270	380	510	230	68000
Mercury	6.6	mg/kg	2.3	11	3.5	6.2	3.2	22	12	1.2
Molybdenum	15	mg/kg	7.8	<2.0	<2.0	<2.0	<2.0	6.9	16	25
Nickel	70	mg/kg	27	11	4.2	15	8.1	15	10	34
Rubidium	NS	mg/kg	6.6	12	4.7	11	7.6	9.8	10	2.7
Selenium	1	mg/kg	1.5	3.8	<0.50	<0.50	2.1	1.9	1.7	3.7
Silver	77	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	0.52	<0.50	<0.50
Strontium	9400	mg/kg	19	9	12	12	22	12	7.5	12
Thallium	1	mg/kg	2	0.16	0.1	0.21	0.1	0.14	0.18	2.6
Tin	9400	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	1	1.4	<1.0
Uranium	23	mg/kg	0.84	2.6	0.21	0.34	0.67	1.3	1.4	2.3
Vanadium	39	mg/kg	7.1	21	5.6	9.8	6.7	31	19	26
Zinc	300	mg/kg	69	26	23	46	25	41	38	65

Notes:
⁰ Type: N=normal, FD=field duplicate
¹ NS-EQS (T1A)/SO/RES/POT/COARSE: NSE potable residential.
 yyyy/mm/dd: year/month/day
 mbgs: meters below ground surface
 mg/kg: milligrams per kilogram
 < :Denotes concentration less than indicated detection limit
 - :Not analyzed or not applicable
 NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
Table 1: Soil Analytical Results
Metals

Sample Location		S4	S5	S6	S7	S8	S8	S9	S10	
Sample Date		6/16/2022	6/16/2022	6/16/2022	6/16/2022	6/16/2022	6/16/2022	6/16/2022	6/16/2022	
Sample Depth (m bgs)		0 - 0.15	0 - 0.15	0.0 - 0.25	0.0 - 0.30	0.00 - 0.15	0.00 - 0.15	0.00 - 0.15	0.03 - 0.18	
Type ⁰		N	N	N	N	N	FD	N	N	
Parameter	NS-EQS (T1A)/SO/RES/POT/COARSE ¹	Units								
Aluminum	15400	mg/kg	13000	13000	17000	3300	23000	25000	15000	20000
Antimony	7.5	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Arsenic	10	mg/kg	12000	1800	450	360	2300	3100	990	2600
Barium	350	mg/kg	200	35	20	6	52	66	26	52
Beryllium	1	mg/kg	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	NS	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	4300	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium	1	mg/kg	3.4	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Chromium	220	mg/kg	8.6	15	19	3.8	24	24	21	28
Cobalt	22	mg/kg	170	1.3	2.3	<1.0	2.6	2.8	11	13
Copper	250	mg/kg	35	8.1	6.5	2.3	22	25	14	16
Iron	11000	mg/kg	90000	28000	27000	8400	34000	37000	26000	39000
Lead	120	mg/kg	34	28	14	3.6	21	17	11	49
Lithium	NS	mg/kg	<2.0	10	12	<2.0	18	20	25	33
Manganese	360	mg/kg	65000	140	180	50	260	280	640	1300
Mercury	6.6	mg/kg	1.1	0.56	0.19	<0.10	0.17	0.12	<0.10	0.68
Molybdenum	15	mg/kg	10	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	70	mg/kg	55	5.2	6.6	<2.0	8.7	8.5	17	14
Rubidium	NS	mg/kg	8.1	9.4	5.9	2.9	20	22	9.5	21
Selenium	1	mg/kg	2.8	1.1	2.1	<0.50	1.6	1.4	0.77	1.3
Silver	77	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Strontium	9400	mg/kg	14	<5.0	<5.0	<5.0	12	14	<5.0	<5.0
Thallium	1	mg/kg	2.1	0.16	0.1	<0.10	0.21	0.25	0.1	0.26
Tin	9400	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1
Uranium	23	mg/kg	1.4	0.75	0.53	0.27	0.99	1	0.94	0.92
Vanadium	39	mg/kg	16	36	29	16	35	35	21	37
Zinc	300	mg/kg	90	18	22	<5.0	37	41	43	48

Notes:
⁰ Type: N=normal, FD=field duplicate
¹ NS-EQS (T1A)/SO/RES/POT/COARSE: NSE potable residential.
 yyyy/mm/dd: year/month/day
 mbgs: meters below ground surface
 mg/kg: milligrams per kilogram
 < :Denotes concentration less than indicated detection limit
 - :Not analyzed or not applicable
 NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
Table 1: Soil Analytical Results
Metals



Sample Location			S11	S12	S12	S13	S14	S15	S16	S17
Sample Date			6/16/2022	6/16/2022	6/16/2022	6/16/2022	6/16/2022	6/16/2022	6/16/2022	6/16/2022
Sample Depth (m bgs)			0.02 - 0.15	0.01 - 0.19	0.01 - 0.19	0.10 - 0.22	0.00 - 0.05	0.00 - 0.05	0.00 - 0.05	0.00 - 0.15
Type ⁰			N	N	FD	N	N	N	N	N
Parameter	NS-EQS (T1A)/SO/RES/POT/COARSE ¹	Units								
Aluminum	15400	mg/kg	22000	21000	21000	28000	7000	8200	16000	22000
Antimony	7.5	mg/kg	7.2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Arsenic	10	mg/kg	9300	470	350	2600	700	2500	2300	1500
Barium	350	mg/kg	93	61	54	60	31	28	53	24
Beryllium	1	mg/kg	1.7	1.1	1.1	1.1	<1.0	<1.0	<1.0	<1.0
Bismuth	NS	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	4300	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium	1	mg/kg	0.5	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Chromium	220	mg/kg	28	29	27	34	12	13	22	24
Cobalt	22	mg/kg	8.2	7	6.5	19	6.1	18	7.3	2.7
Copper	250	mg/kg	43	56	50	26	7.2	6.8	31	12
Iron	11000	mg/kg	45000	25000	24000	41000	13000	21000	20000	31000
Lead	120	mg/kg	43	190	170	23	40	44	64	20
Lithium	NS	mg/kg	74	41	38	32	12	14	35	15
Manganese	360	mg/kg	660	410	380	1500	300	1600	680	200
Mercury	6.6	mg/kg	0.4	5.3	4.8	0.27	10	4.5	23	0.23
Molybdenum	15	mg/kg	<2.0	<2.0	<2.0	<2.0	27	4	<2.0	<2.0
Nickel	70	mg/kg	23	20	19	23	6.3	6.2	14	9.8
Rubidium	NS	mg/kg	42	27	25	20	14	15	30	10
Selenium	1	mg/kg	<0.50	0.95	0.86	1.4	<0.50	<0.50	0.55	1.9
Silver	77	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Strontium	9400	mg/kg	7.8	6.6	6.1	<5.0	5.6	5.9	10	<5.0
Thallium	1	mg/kg	0.44	0.34	0.3	0.25	0.14	0.18	0.33	0.14
Tin	9400	mg/kg	1.3	1.2	<1.0	<1.0	2.7	<1.0	1.4	<1.0
Uranium	23	mg/kg	1.3	1.3	1	1.4	0.4	0.52	1	0.48
Vanadium	39	mg/kg	30	33	31	37	13	16	24	32
Zinc	300	mg/kg	85	78	71	61	25	24	55	34

Notes:
⁰ Type: N=normal, FD=field duplicate
¹ NS-EQS (T1A)/SO/RES/POT/COARSE: NSE potable residential.
 yyyy/mm/dd: year/month/day
 mbgs: meters below ground surface
 mg/kg: milligrams per kilogram
 < :Denotes concentration less than indicated detection limit
 - :Not analyzed or not applicable
 NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
Table 1: Soil Analytical Results
PAHs



Parameter	NS-EQS (T1A)/SO/RES/POT/ COARSE ¹	Units	Sample Location	MW5 SA2 1'-3'	MW6 SA1 0-10"	MW6 SA2 1'-2'
			Sample Date	6/16/2022	6/15/2022	6/15/2022
			Sample Depth (m bgs)	0.3 - 0.5	0.3	0.2 - 0.4
			Type ⁰	N	N	N
Acenaphthene	3900	mg/kg	<0.010	<0.010	<0.010	
Acenaphthylene	4.5	mg/kg	<0.010	<0.010	<0.010	
Anthracene	24000	mg/kg	<0.010	<0.010	<0.010	
Benzo(A)Anthracene	12	mg/kg	<0.010	<0.010	<0.010	
Benzo(A)Pyrene	14	mg/kg	<0.010	<0.010	<0.010	
Benzo(b)Fluoranthene	NS	mg/kg	<0.010	<0.010	<0.010	
Benzo(b+j)fluoranthene	NS	mg/kg	<0.020	<0.020	<0.020	
Benzo(e)pyrene	NS	mg/kg	<0.010	<0.010	<0.010	
Benzo(G,H,I)Perylene	250	mg/kg	<0.010	<0.010	<0.010	
Benzo(k)Fluoranthene	NS	mg/kg	<0.010	<0.010	<0.010	
Chrysene	78	mg/kg	<0.010	<0.010	<0.010	
Dibenzo(A,H)Anthracene	8.8	mg/kg	<0.010	<0.010	<0.010	
Fluoranthene	3500	mg/kg	<0.010	<0.010	0.017	
Fluorene	2700	mg/kg	<0.010	<0.010	<0.010	
Indeno(1,2,3-cd)pyrene	98	mg/kg	<0.010	<0.010	<0.010	
Methylnaphthalene, 1-	30	mg/kg	<0.010	<0.010	<0.010	
Methylnaphthalene, 2-	30	mg/kg	<0.010	<0.010	<0.010	
Naphthalene	2.2	mg/kg	<0.010	<0.010	<0.010	
Perylene	NS	mg/kg	0.25	<0.010	0.021	
Phenanthrene	17	mg/kg	<0.010	<0.010	<0.010	
Pyrene	2100	mg/kg	<0.010	<0.010	0.013	
Benzo[a]pyrene TPE	5.3	mg/kg	<0.03	<0.03	<0.03	
Index of Additive Cancer Risk (IACR)	1	mg/kg	ND	ND	ND	

Notes:

⁰ Type: N=normal, FD=field duplicate

¹ NS-EQS (T1A)/SO/RES/POT/COARSE: NSE potable residential.

yyyy/mm/dd: year/month/day

mbgs: meters below ground surface

mg/kg: milligrams per kilogram

< :Denotes concentration less than indicated detection limit

- :Not analyzed or not applicable

NS: No Standard

ND: Non-Detect

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
 Table 2: Tailings Analytical Results
 Metals



		Sample Location	T1	T2	T3	T4	T4
		Sample Date	6/15/2022	6/15/2022	6/15/2022	6/15/2022	6/15/2022
		Type ⁰	N	N	N	N	FD
Parameter	NS-EQS (T1A)/SO/RES/POT/COARSE ¹	Units					
Aluminum	15400	mg/kg	3300	10000	6100	1600	1700
Antimony	7.5	mg/kg	5	3.6	4.1	4.3	4.8
Arsenic	10	mg/kg	8400	9900	6200	8000	8400
Barium	350	mg/kg	15	47	39	6.5	6.9
Beryllium	1	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	NS	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	4300	mg/kg	<50	<50	<50	<50	<50
Cadmium	1	mg/kg	<0.30	0.41	0.35	<0.30	<0.30
Chromium	220	mg/kg	8.7	21	14	4.7	4.8
Cobalt	22	mg/kg	<1.0	9.2	9.3	<1.0	<1.0
Copper	250	mg/kg	<2.0	13	11	<2.0	<2.0
Iron	11000	mg/kg	13000	24000	23000	11000	12000
Lead	120	mg/kg	35	38	81	34	40
Lithium	NS	mg/kg	4.9	29	13	2.1	2.3
Manganese	360	mg/kg	100	560	630	43	45
Mercury	6.6	mg/kg	1.7	7.9	11	3.8	3.9
Molybdenum	15	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	70	mg/kg	<2.0	20	21	<2.0	<2.0
Rubidium	NS	mg/kg	9.1	36	14	4.2	4.7
Selenium	1	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	77	mg/kg	<0.50	<0.50	0.53	<0.50	<0.50
Strontium	9400	mg/kg	<5.0	15	19	<5.0	<5.0
Thallium	1	mg/kg	0.15	0.33	0.26	<0.10	<0.10
Tin	9400	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium	23	mg/kg	0.24	0.46	0.35	<0.10	<0.10
Vanadium	39	mg/kg	9.8	23	17	5.4	5.9
Zinc	300	mg/kg	9.9	70	65	<5.0	<5.0

Notes:

⁰ Type: N=normal, FD=field duplicate

¹ NS-EQS (T1A)/SO/RES/POT/COARSE: NSE potable residential.

yyyy/mm/dd: year/month/day

mbgs: meters below ground surface

mg/kg: milligrams per kilogram

< :Denotes concentration less than indicated detection limit

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
 Table 2: Tailings Analytical Results
 Metals



Parameter	NS-EQS (T1A)/SO/RES/POT/ COARSE ¹	Units	Sample Location	TD1	TD2	TD3	TD4	TD5	TD6	TD7
			Sample Date	6/15/2022	6/15/2022	6/15/2022	6/15/2022	6/15/2022	6/15/2022	6/15/2022
			Type ⁰	N	N	N	N	N	N	N
Aluminum	15400	mg/kg		12000	8900	20000	22000	14000	6300	6100
Antimony	7.5	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	2.2	10
Arsenic	10	mg/kg		1500	540	1300	2900	3300	4800	22000
Barium	350	mg/kg		45	23	34	42	14	55	45
Beryllium	1	mg/kg		1	<1.0	1.1	<1.0	<1.0	<1.0	<1.0
Bismuth	NS	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	4300	mg/kg		<50	<50	<50	<50	<50	<50	<50
Cadmium	1	mg/kg		0.59	<0.30	0.33	<0.30	<0.30	<0.30	3.3
Chromium	220	mg/kg		9.6	10	19	23	17	9.5	4.9
Cobalt	22	mg/kg		2.2	<1.0	5.3	6.9	1.6	3.1	13
Copper	250	mg/kg		26	9.1	22	16	6.1	5.7	27
Iron	11000	mg/kg		7700	7200	7700	28000	21000	24000	13000
Lead	120	mg/kg		39	34	50	26	19	53	180
Lithium	NS	mg/kg		8.5	9.4	12	19	7.5	4.9	5.4
Manganese	360	mg/kg		380	110	240	430	140	690	210
Mercury	6.6	mg/kg		4.7	3.5	10	0.77	0.47	2.8	3.8
Molybdenum	15	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	70	mg/kg		14	5	8.9	18	5.1	5.5	50
Rubidium	NS	mg/kg		4.1	3.5	6.7	18	4.9	5.4	3.6
Selenium	1	mg/kg		2.5	1.3	4.4	1	0.83	<0.50	<0.50
Silver	77	mg/kg		<0.50	<0.50	0.87	<0.50	<0.50	<0.50	<0.50
Strontium	9400	mg/kg		23	9.2	15	<5.0	<5.0	9.4	15
Thallium	1	mg/kg		0.11	<0.10	0.19	0.18	<0.10	0.12	0.19
Tin	9400	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0	1.4	4.4
Uranium	23	mg/kg		0.86	0.5	1.5	0.49	0.37	0.2	0.24
Vanadium	39	mg/kg		9.4	10	16	28	27	22	8.4
Zinc	300	mg/kg		23	14	32	45	18	24	260

Notes:

⁰ Type: N=normal, FD=field duplicate

¹ NS-EQS (T1A)/SO/RES/POT/COARSE: NSE potable residential.

yyyy/mm/dd: year/month/day

mbgs: meters below ground surface

mg/kg: milligrams per kilogram

< :Denotes concentration less than indicated detection limit

- :Not analyzed or not applicable

NS: No Standard

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Mooseland Mine Site - Phase II ESA
 Table 3: Waste Rock Analytical Results
 Metals



Sample Location Sample Date Type ⁰		WR-1 6/15/2022 N	WR-2 6/15/2022 N
Parameter	Units		
Acid Extractable Aluminum (Al)	mg/kg	5600	5400
Acid Extractable Antimony (Sb)	mg/kg	<20	<20
Acid Extractable Arsenic (As)	mg/kg	210	2700
Acid Extractable Barium (Ba)	mg/kg	<50	<50
Acid Extractable Beryllium (Be)	mg/kg	<20	<20
Acid Extractable Boron (B)	mg/kg	<500	<500
Acid Extractable Cadmium (Cd)	mg/kg	<3.0	<3.0
Acid Extractable Chromium (Cr)	mg/kg	<20	<20
Acid Extractable Cobalt (Co)	mg/kg	<10	<10
Acid Extractable Copper (Cu)	mg/kg	<20	<20
Acid Extractable Iron (Fe)	mg/kg	13000	12000
Acid Extractable Lead (Pb)	mg/kg	<5.0	<5.0
Acid Extractable Manganese (Mn)	mg/kg	210	200
Acid Extractable Mercury (Hg)	mg/kg	<1.0	<1.0
Acid Extractable Molybdenum (Mo)	mg/kg	<20	<20
Acid Extractable Nickel (Ni)	mg/kg	<20	<20
Acid Extractable Selenium (Se)	mg/kg	<5.0	<5.0
Acid Extractable Silver (Ag)	mg/kg	<5.0	<5.0
Acid Extractable Strontium (Sr)	mg/kg	<50	<50
Acid Extractable Thallium (Tl)	mg/kg	<1.0	<1.0
Acid Extractable Tin (Sn)	mg/kg	<20	<20
Acid Extractable Uranium (U)	mg/kg	<1.0	<1.0
Acid Extractable Vanadium (V)	mg/kg	<20	<20
Acid Extractable Zinc (Zn)	mg/kg	<50	<50
Total Sulphur (S)	% g/g	0.097	0.099

Notes:

⁰ Type: N=Normal Sample; FD=Field Duplicate

yyyy/mm/dd: year/month/day

mg/kg: milligrams per kilogram

< :Denotes concentration less than indicated detection limit

Elevated concentrations of aluminum, arsenic, iron and manganese are present in waste rock samples collected from the site.

Mooseland Mine Site - Phase II ESA
Table 4: Groundwater Analytical Results
Metals

Parameter	Sample Location			MW1	MW1	MW1	MW2	MW2	MW3	MW3	MW4	MW4	MW5	MW5
	NS-EQS ¹	NS-EQS ² (freshwater)	Units	6/16/2022 N	6/16/2022 FD	1/13/2023 N	6/16/2022 N	1/13/2023 N	6/16/2022 N	1/13/2023 N	6/16/2022 N	1/13/2023 N	6/16/2022 N	1/19/2023 N
Aluminum	NS	50	ug/l	150	140	70	18	730	63	920	14	<5.0	180	57
Antimony	6	90	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	10	50	ug/l	120	130	490	15	100	9.2	5.4	2.3	<1.0	350	29
Barium	1000	10000	ug/l	11	5.8	12	6.9	10	18	43	20	24	22	7
Beryllium	4	1.5	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.33	<0.10	<0.10	<0.10	<0.10
Bismuth	NS	NS	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	5000	15000	ug/l	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium	5	0.9	ug/l	0.088	0.089	0.39	0.26	1.5	0.18	0.64	0.022	0.022	0.015	0.18
Calcium	NS	NS	ug/l	2200	2300	5100	3600	2800	2100	3700	18000	22000	17000	4100
Chromium	50	89	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt	3.8	10	ug/l	3.1	3.1	5	23	5.5	16	7.1	1.1	<0.40	4.3	1.7
Copper	2000	20	ug/l	5.4	1.9	4.4	2.7	35	5.3	30	4.1	<0.50	3.9	4.6
Iron	NS	3000	ug/l	540	510	1300	1600	1700	890	<50	<50	<50	5600	1700
Lead	5	10	ug/l	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	<0.50	<0.50	0.79	<0.50
Magnesium	NS	NS	ug/l	430	430	890	810	520	640	1200	4300	4300	1500	1200
Manganese	120	4300	ug/l	1600	1700	2900	1400	180	340	890	470	230	1700	780
Molybdenum	70	730	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	100	250	ug/l	8.5	8.3	12	25	14	15	9.6	2.4	<2.0	2.2	<2.0
Phosphorus	NS	NS	ug/l	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Potassium	NS	NS	ug/l	640	640	650	1000	630	840	640	3900	1600	360	160
Selenium	50	10	ug/l	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	NS	2.5	ug/l	<0.10	<0.10	<0.10	<0.10	0.4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	NS	NS	ug/l	13000	13000	15000	13000	10000	4500	4400	6900	5800	4200	4100
Strontium	NS	210000	ug/l	12	12	30	24	18	20	38	48	52	33	18
Thallium	2	8	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tin	2400	NS	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	NS	NS	ug/l	<2.0	<2.0	<2.0	<2.0	50	<2.0	<2.0	<2.0	<2.0	4.4	<2.0
Uranium	20	150	ug/l	<0.10	<0.10	<0.10	<0.10	0.3	<0.10	<0.10	<0.10	0.18	<0.10	<0.10
Vanadium	6.2	1200	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	NS	70	ug/l	11	8.1	18	10	21	16	31	<5.0	<5.0	7.9	21
Mercury	1	0.26	ug/l	-	-	<0.013	-	<0.013	-	<0.013	-	<0.013	-	0.015

⁰ Type: N=Normal Sample; FD=Field Duplicate

¹ Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for an residential property with coarse textured soil and potable groundwater; Table 4A

² Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Groundwater Discharging to Surface Water (>10 m from Surface Water Body - Fresh Water); Table 3

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA: NS-EQS

EXCEEDS CRITERIA: NS-EQS (freshwater)

Parameter	Sample Location		Units	MW6	MW6	MW 6
	NS-EQS ¹	NS-EQS ² (freshwater)		6/16/2022 N	1/13/2023 N	1/13/2023 FD
Aluminum	NS	50	ug/l	42	21	15
Antimony	6	90	ug/l	4.5	3	2.8
Arsenic	10	50	ug/l	1400	3700	2800
Barium	1000	10000	ug/l	4	1.3	1.1
Beryllium	4	1.5	ug/l	<0.10	<0.10	<0.10
Bismuth	NS	NS	ug/l	<2.0	<2.0	<2.0
Boron	5000	15000	ug/l	<50	<50	<50
Cadmium	5	0.9	ug/l	0.018	0.038	0.029
Calcium	NS	NS	ug/l	23000	8100	6800
Chromium	50	89	ug/l	<1.0	<1.0	<1.0
Cobalt	3.8	10	ug/l	4.3	2.4	1.9
Copper	2000	20	ug/l	2.4	1.7	1.1
Iron	NS	3000	ug/l	230	1000	710
Lead	5	10	ug/l	1.1	0.78	0.57
Magnesium	NS	NS	ug/l	3300	2600	2100
Manganese	120	4300	ug/l	400	300	230
Molybdenum	70	730	ug/l	<2.0	<2.0	<2.0
Nickel	100	250	ug/l	9.5	11	9.6
Phosphorus	NS	NS	ug/l	<100	<100	<100
Potassium	NS	NS	ug/l	750	700	490
Selenium	50	10	ug/l	<0.50	<0.50	<0.50
Silver	NS	2.5	ug/l	<0.10	<0.10	<0.10
Sodium	NS	NS	ug/l	7400	5300	4800
Strontium	NS	210000	ug/l	35	14	12
Thallium	2	8	ug/l	<0.10	<0.10	<0.10
Tin	2400	NS	ug/l	<2.0	<2.0	<2.0
Titanium	NS	NS	ug/l	<2.0	<2.0	<2.0
Uranium	20	150	ug/l	<0.10	<0.10	<0.10
Vanadium	6.2	1200	ug/l	<2.0	<2.0	<2.0
Zinc	NS	70	ug/l	9.7	19	16
Mercury	1	0.26	ug/l	-	0.06	0.053

⁰ Type: N=Normal Sample; FD=Field Duplicate

¹ Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for an residential property with coarse textured soil and potable groundwater; Table 4A

² Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Groundwater Discharging to Surface Water (>10 m from Surface Water Body - Fresh Water); Table 3

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA: NS-EQS

EXCEEDS CRITERIA: NS-EQS (freshwater)

Mooseland Mine Site - Phase II ESA
 Table 5: Surface Water Analytical Results
 Metals

Sample Location		SW1	SW2	SW3	SW4	SW4	SW5	SW6	SW7	SW8	SW9	SW10
Sample Date		6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022
Type ⁰		N	N	N	N	FD	N	N	N	N	N	N
Parameter	NS-EQS ¹	Unit	BACKGROUND	BACKGROUND	BACKGROUND							
Aluminum	5	ug/l	230	240	260	240	250	260	280	250	240	250
Antimony	9	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	5	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.1	1.3	2.3
Barium	1000	ug/l	3.1	3.4	3.3	3.2	3.3	3.1	3.5	3.3	2.9	3.2
Beryllium	0.15	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bismuth	NS	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	1500	ug/l	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium	0.09	ug/l	0.019	0.02	0.019	0.016	0.019	0.019	0.02	0.019	0.018	0.016
Calcium	NS	ug/l	640	670	650	650	670	640	700	660	620	640
Chromium	8.9	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt	1	ug/l	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Copper	2	ug/l	<0.50	<0.50	0.5	<0.50	0.65	<0.50	0.51	<0.50	0.56	<0.50
Iron	300	ug/l	530	530	560	530	520	530	580	580	530	570
Lead	1	ug/l	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	NS	ug/l	290	300	300	300	300	300	320	310	290	300
Manganese	430	ug/l	75	77	76	76	76	76	79	79	74	77
Molybdenum	73	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	25	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Phosphorus	NS	ug/l	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Potassium	NS	ug/l	100	110	110	100	110	100	110	110	100	110
Selenium	1	ug/l	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	0.25	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	NS	ug/l	2200	2200	2600	2600	2200	2600	3000	2700	2500	2500
Strontium	21000	ug/l	4.3	4.6	4.6	4.5	4.8	4.5	5	4.7	4.4	4.6
Thallium	0.8	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tin	NS	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	NS	ug/l	3.8	3.8	4	3.4	3.4	4	4.5	4.1	3.6	4.1
Uranium	15	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Vanadium	120	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	7	ug/l	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Notes:

⁰ Type: N=Normal Sample; FD=Field Duplicate

¹ Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Surface Water and Groundwater Discharging to Surface Water; Table 3

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
Table 5: Surface Water Analytical Results
Metals

Parameter	NS-EQS ¹	Unit	Sample Location	SW11	SW12	SW13
			Sample Date	6/20/2022	6/20/2022	6/20/2022
			Type ⁰	N	N	N
Aluminum	5	ug/l		260	37	29
Antimony	9	ug/l		<1.0	<1.0	<1.0
Arsenic	5	ug/l		2.7	8.9	94
Barium	1000	ug/l		3.3	5.4	<1.0
Beryllium	0.15	ug/l		<0.10	<0.10	<0.10
Bismuth	NS	ug/l		<2.0	<2.0	<2.0
Boron	1500	ug/l		<50	<50	<50
Cadmium	0.09	ug/l		0.017	<0.010	<0.010
Calcium	NS	ug/l		670	1900	8700
Chromium	8.9	ug/l		<1.0	<1.0	<1.0
Cobalt	1	ug/l		<0.40	<0.40	<0.40
Copper	2	ug/l		<0.50	0.71	<0.50
Iron	300	ug/l		620	690	69
Lead	1	ug/l		<0.50	<0.50	<0.50
Magnesium	NS	ug/l		310	560	800
Manganese	430	ug/l		80	69	18
Molybdenum	73	ug/l		<2.0	<2.0	<2.0
Nickel	25	ug/l		<2.0	<2.0	<2.0
Phosphorus	NS	ug/l		<100	<100	<100
Potassium	NS	ug/l		110	790	610
Selenium	1	ug/l		<0.50	<0.50	<0.50
Silver	0.25	ug/l		<0.10	<0.10	<0.10
Sodium	NS	ug/l		2600	5200	8600
Strontium	21000	ug/l		4.6	14	37
Thallium	0.8	ug/l		<0.10	<0.10	<0.10
Tin	NS	ug/l		<2.0	<2.0	<2.0
Titanium	NS	ug/l		3.7	<2.0	<2.0
Uranium	15	ug/l		<0.10	<0.10	<0.10
Vanadium	120	ug/l		<2.0	<2.0	<2.0
Zinc	7	ug/l		<5.0	<5.0	<5.0

Notes:

⁰ Type: N=Normal Sample; FD=Field Duplicate

¹ Nova Scotia Environment (NSE) Tier 1
Environmental Quality Standards (EQS) for Surface
Water and Groundwater Discharging to Surface
Water; Table 3

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
Table 6: Porewater Analytical Results
Metals

Parameter	NS-EQS ¹ (freshwater)	Units	Sample Location	PW1	PW2	PW2	PW3	PW4	PW5	PW6	PW7
			Sample Date	1/19/2023	1/19/2023	1/19/2023	1/19/2023	1/19/2023	1/19/2023	1/19/2023	1/19/2023
			Type ⁰	N	N	FD	N	N	N	N	N
Aluminum	5	ug/l		470	290	280	150	79	73	62	500
Antimony	9	ug/l		<1.0	<1.0	<1.0	<1.0	6.2	<1.0	<1.0	<1.0
Arsenic	5	ug/l		7.3	20	20	50	6800	13	9.5	860
Barium	1000	ug/l		7	5.6	6.1	5.9	1.7	4	3.3	5.1
Beryllium	0.15	ug/l		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bismuth	NS	ug/l		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	1500	ug/l		<50	<50	<50	<50	<50	<50	<50	<50
Cadmium	0.09	ug/l		0.02	0.066	0.063	0.011	0.023	0.012	<0.010	0.039
Calcium	NS	ug/l		3400	1900	1800	6200	2600	1000	800	740
Chromium	8.9	ug/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt	1	ug/l		0.55	0.83	0.74	2.6	0.98	1.8	0.87	1
Copper	2	ug/l		1.3	1	0.71	1.4	1.2	0.56	0.99	2.4
Iron	300	ug/l		1000	1600	1600	2200	70	1500	1200	7100
Lead	1	ug/l		3.7	<0.50	<0.50	0.6	<0.50	<0.50	<0.50	4.5
Magnesium	NS	ug/l		800	470	480	2300	1200	380	360	380
Manganese	430	ug/l		98	27	27	240	100	280	920	68
Mercury	0.026	ug/l		<0.013	<0.013	<0.013	0.065	0.065	<0.013	<0.013	0.05
Molybdenum	73	ug/l		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	25	ug/l		<2.0	3	2.7	4.8	2.7	2.6	<2.0	3.1
Phosphorus	NS	ug/l		<100	<100	<100	<100	<100	<100	<100	<100
Potassium	NS	ug/l		<100	<100	<100	410	260	220	340	280
Selenium	1	ug/l		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	0.25	ug/l		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	NS	ug/l		4000	4100	4300	9000	2200	4200	3400	5400
Strontium	21000	ug/l		16	9.9	9.9	44	6.5	6.8	5.5	5.9
Thallium	0.8	ug/l		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tin	NS	ug/l		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	NS	ug/l		10	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	4.3
Uranium	15	ug/l		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Vanadium	120	ug/l		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	7	ug/l		6.8	12	9.2	6.9	6.3	6.2	5	6.7

⁰ Type: N=Normal Sample; FD=Field Duplicate

¹ Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Surface Water and Groundwater Discharging to Surface Water; Table 3 (Freshwater)

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
Table 7: Sediment Analytical Results
Metals

Parameter	Sample Location			Units	SED 1	SED 2	SED 3	SED 4	SED 4
	NS-EQS (T2)/SED ₁	QC REL ²	QC TEL ³		6/20/2022 N	6/20/2022 N	6/20/2022 N	6/20/2022 N	6/20/2022 FD
					BACKGROUND	BACKGROUND	BACKGROUND		
Aluminum	NS	-	-	mg/kg	4100	5200	4700	7300	7900
Antimony	25	-	-	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Arsenic	17	-	-	mg/kg	<2.0	2.9	2.4	8.7	7.3
Barium	NS	-	-	mg/kg	14	21	18	28	29
Beryllium	NS	-	-	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	NS	-	-	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	NS	-	-	mg/kg	<50	<50	<50	<50	<50
Cadmium	3.5	-	-	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30
Chromium	90	-	-	mg/kg	5.1	7	6	9.2	9.7
Cobalt	NS	-	-	mg/kg	2.3	2.4	2.8	3.4	3.6
Copper	197	-	-	mg/kg	2.9	5	3.9	8.9	8.6
Iron	43766	-	-	mg/kg	5400	7100	6200	8700	9200
Lead	91.3	-	-	mg/kg	8.7	14	14	22	22
Lithium	NS	-	-	mg/kg	7.7	8.9	8.6	11	12
Manganese	1100	-	-	mg/kg	170	160	200	230	250
Methyl Mercury	-	0.094	0.17	mg/kg	-	-	-	-	-
Mercury	0.486	-	-	mg/kg	0.1	0.21	0.16	0.25	0.21
Molybdenum	NS	-	-	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	75	-	-	mg/kg	5.9	7.6	6.8	11	11
Rubidium	NS	-	-	mg/kg	2.7	4.2	3.1	5	5.6
Selenium	2	-	-	mg/kg	<0.50	0.65	0.57	1.2	1.1
Silver	0.5	-	-	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Strontium	NS	-	-	mg/kg	5.7	6.8	5.9	8.6	9
Thallium	NS	-	-	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Tin	NS	-	-	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium	NS	-	-	mg/kg	0.27	0.3	0.29	0.48	0.51
Vanadium	NS	-	-	mg/kg	4.8	6.8	6.6	11	11
Zinc	315	-	-	mg/kg	19	21	21	39	39

Notes:

⁰ Type: N=Normal Sample; FD=Field Duplicate

¹ Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Sediment (freshwater); Table 2

² Quebec Threshold Effect Level

³ Quebec Rare Effect Level

yyyy/mm/dd: year/month/day

mg/kg: milligrams per kilogram

< :Denotes concentration less than indicated detection limit

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
Table 7: Sediment Analytical Results
Metals

Parameter	Sample Location			Units	SED 5	SED 6	SED 7	SED 8	SED 10	SED 11
	NS-EQS (T2)/SED ₁	QC REL ²	QC TEL ³		6/20/2022 N	6/20/2022 N	6/20/2022 N	6/20/2022 N	6/20/2022 N	6/20/2022 N
Aluminum	NS	-	-	mg/kg	8600	6100	7800	11000	6500	7400
Antimony	25	-	-	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Arsenic	17	-	-	mg/kg	4.2	5.2	660	450	5.4	20
Barium	NS	-	-	mg/kg	30	21	32	38	19	31
Beryllium	NS	-	-	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	NS	-	-	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	NS	-	-	mg/kg	<50	<50	<50	<50	<50	<50
Cadmium	3.5	-	-	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Chromium	90	-	-	mg/kg	10	7.9	14	15	8.6	9
Cobalt	NS	-	-	mg/kg	3.5	4.6	1.6	3.7	3.5	2.9
Copper	197	-	-	mg/kg	9.3	5.1	7.4	10	2.7	7
Iron	43766	-	-	mg/kg	9200	8500	13000	14000	10000	7900
Lead	91.3	-	-	mg/kg	22	17	13	20	11	21
Lithium	NS	-	-	mg/kg	12	9.9	17	19	16	8.7
Manganese	1100	-	-	mg/kg	230	490	220	300	410	200
Methyl Mercury	-	0.094	0.17	mg/kg	-	-	-	-	-	-
Mercury	0.486	-	-	mg/kg	0.25	0.18	6.1	5.9	0.12	0.68
Molybdenum	NS	-	-	mg/kg	<2.0	<2.0	3	<2.0	<2.0	<2.0
Nickel	75	-	-	mg/kg	12	8.7	5.9	12	9.8	8.7
Rubidium	NS	-	-	mg/kg	5.9	4.5	19	11	2.4	4.8
Selenium	2	-	-	mg/kg	1.3	0.73	<0.50	0.95	<0.50	1.1
Silver	0.5	-	-	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Strontium	NS	-	-	mg/kg	9.3	7.8	10	12	7.8	10
Thallium	NS	-	-	mg/kg	<0.10	<0.10	0.14	<0.10	<0.10	<0.10
Tin	NS	-	-	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium	NS	-	-	mg/kg	0.52	0.4	0.34	0.53	0.45	0.52
Vanadium	NS	-	-	mg/kg	11	8.6	16	16	7.8	9.7
Zinc	315	-	-	mg/kg	36	25	28	45	27	22

Notes:

⁰ Type: N=Normal Sample; FD=Field Duplicate

¹ Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Sediment (freshwater); Table 2

² Quebec Threshold Effect Level

³ Quebec Rare Effect Level

yyyy/mm/dd: year/month/day

mg/kg: milligrams per kilogram

< :Denotes concentration less than indicated detection limit

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
Table 7: Sediment Analytical Results
Metals

Parameter	Sample Location			Sample Date Type ⁰	PWSED1	PWSED2	PWSED2	PWSED3	PWSED4	PWSED5
	NS-EQS (T2)/SED ₁	QC REL ²	QC TEL ³		Units	1/19/2023 N	1/19/2023 N	1/19/2023 FD	1/19/2023 N	1/19/2023 N
Aluminum	NS	-	-	mg/kg	9600	7200	8200	11000	1700	13000
Antimony	25	-	-	mg/kg	<2.0	<2.0	<2.0	<2.0	3.2	<2.0
Arsenic	17	-	-	mg/kg	9.2	120	87	1300	5800	590
Barium	NS	-	-	mg/kg	37	27	22	30	8.4	43
Beryllium	NS	-	-	mg/kg	<1.0	<1.0	<1.0	1	<1.0	1.1
Bismuth	NS	-	-	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	NS	-	-	mg/kg	<50	<50	<50	<50	<50	<50
Cadmium	3.5	-	-	mg/kg	<0.30	<0.30	0.43	0.41	<0.30	0.66
Chromium	90	-	-	mg/kg	16	6.2	3.1	11	5	13
Cobalt	NS	-	-	mg/kg	3.6	1.9	1.5	8.5	<1.0	17
Copper	197	-	-	mg/kg	6.4	19	17	16	<2.0	40
Iron	43766	-	-	mg/kg	12000	5600	2500	10000	9300	15000
Lead	91.3	-	-	mg/kg	35	41	25	43	33	49
Lithium	NS	-	-	mg/kg	15	<2.0	<2.0	16	2.8	<2.0
Manganese	1100	-	-	mg/kg	250	73	54	330	69	3400
Methyl Mercury	-	0.094	0.17	mg/kg	0.00882	0.0222	-	0.0279	0.00069	0.0099
Mercury	0.486	-	-	mg/kg	0.14	2.1	0.73	11	3.2	0.98
Molybdenum	NS	-	-	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	75	-	-	mg/kg	11	9.1	9	27	<2.0	26
Rubidium	NS	-	-	mg/kg	4.9	2.2	<2.0	9.3	4.5	3.3
Selenium	2	-	-	mg/kg	0.59	2.2	1.8	1.2	<0.50	3.5
Silver	0.5	-	-	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Strontium	NS	-	-	mg/kg	11	13	12	32	5.9	22
Thallium	NS	-	-	mg/kg	0.1	<0.10	<0.10	0.12	<0.10	0.14
Tin	NS	-	-	mg/kg	<1.0	1.9	<1.0	1.1	<1.0	1.7
Uranium	NS	-	-	mg/kg	0.66	0.76	0.81	0.74	0.17	2.5
Vanadium	NS	-	-	mg/kg	14	5.3	7.2	11	4.9	13
Zinc	315	-	-	mg/kg	29	10	8.7	43	5.1	36

Notes:

⁰ Type: N=Normal Sample; FD=Field Duplicate

¹ Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Sediment (freshwater); Table 2

² Quebec Threshold Effect Level

³ Quebec Rare Effect Level

yyyy/mm/dd: year/month/day

mg/kg: milligrams per kilogram

< :Denotes concentration less than indicated detection limit

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA

Mooseland Mine Site - Phase II ESA
Table 7: Sediment Analytical Results
Metals

Parameter	NS-EQS (T2)/SED ₁	QC REL ²	QC TEL ³	Units	Sample Location	PWSED6	PWSED7
					Sample Date	1/19/2023	1/19/2023
					Type ⁰	N	N
Aluminum	NS	-	-	mg/kg		7600	12000
Antimony	25	-	-	mg/kg		<2.0	3.2
Arsenic	17	-	-	mg/kg		9800	1100
Barium	NS	-	-	mg/kg		130	36
Beryllium	NS	-	-	mg/kg		<1.0	<1.0
Bismuth	NS	-	-	mg/kg		<2.0	<2.0
Boron	NS	-	-	mg/kg		<50	<50
Cadmium	3.5	-	-	mg/kg		2.1	<0.30
Chromium	90	-	-	mg/kg		5.6	18
Cobalt	NS	-	-	mg/kg		80	1.6
Copper	197	-	-	mg/kg		23	18
Iron	43766	-	-	mg/kg		77000	16000
Lead	91.3	-	-	mg/kg		27	46
Lithium	NS	-	-	mg/kg		<2.0	23
Manganese	1100	-	-	mg/kg		44000	250
Methyl Mercury	-	0.094	0.17	mg/kg		0.0188	0.0191
Mercury	0.486	-	-	mg/kg		1.8	28
Molybdenum	NS	-	-	mg/kg		6.7	3.5
Nickel	75	-	-	mg/kg		36	7.7
Rubidium	NS	-	-	mg/kg		5	16
Selenium	2	-	-	mg/kg		1.9	<0.50
Silver	0.5	-	-	mg/kg		<0.50	<0.50
Strontium	NS	-	-	mg/kg		14	7.4
Thallium	NS	-	-	mg/kg		0.61	0.2
Tin	NS	-	-	mg/kg		<1.0	<1.0
Uranium	NS	-	-	mg/kg		0.85	0.63
Vanadium	NS	-	-	mg/kg		12	21
Zinc	315	-	-	mg/kg		63	38

Notes:

⁰ Type: N=Normal Sample; FD=Field Duplicate

¹ Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Sediment (freshwater); Table 2

² Quebec Threshold Effect Level

³ Quebec Rare Effect Level

yyyy/mm/dd: year/month/day

mg/kg: milligrams per kilogram

< :Denotes concentration less than indicated detection limit

- :Not analyzed or not applicable

NS: No Standard

EXCEEDS CRITERIA

Appendix C. Laboratory Certificates of Analysis



Your Project #: 60680169
 Site Location: MOOSELAND
 Your C.O.C. #: N/A

Attention: Rory McNeil

AECOM Canada Ltd
 1701 Hollis St
 SH400
 Halifax, NS
 CANADA B3J 3M8

Report Date: 2023/01/25
 Report #: R7483556
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C315420

Received: 2023/01/17, 09:20

Sample Matrix: Ground Water
 # Samples Received: 6

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Mercury - Dissolved (CVAA,LL)	6	2023/01/23	2023/01/24	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Diss. MS (as rec'd)	2	N/A	2023/01/20	ATL SOP 00058	EPA 6020B R2 m
Metals Water Diss. MS (as rec'd)	4	N/A	2023/01/23	ATL SOP 00058	EPA 6020B R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas 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 Bureau Veritas, 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.



Your Project #: 60680169
Site Location: MOOSELAND
Your C.O.C. #: N/A

Attention: Rory McNeil

AECOM Canada Ltd
1701 Hollis St
SH400
Halifax , NS
CANADA B3J 3M8

Report Date: 2023/01/25
Report #: R7483556
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C315420

Received: 2023/01/17, 09:20

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas
25 Jan 2023 10:17:04

Please direct all questions regarding this Certificate of Analysis to:

Marie Muise, Key Account Specialist
Email: Marie.MUISE@bureauveritas.com
Phone# (902)420-0203 Ext:253

=====

This report has been generated and distributed using a secure automated process.

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Suzanne Rogers, General Manager responsible for Nova Scotia Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C315420
Report Date: 2023/01/25

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND
Sampler Initials: DB

MERCURY BY COLD VAPOUR AA (GROUND WATER)

Bureau Veritas ID		UVE588	UVE589	UVE590	UVE591	UVE592	UVE593		
Sampling Date		2023/01/13	2023/01/13	2023/01/13	2023/01/13	2023/01/13	2023/01/13		
COC Number		N/A	N/A	N/A	N/A	N/A	N/A		
	UNITS	MW 1	MW 2	MW 3	MW 4	MW 6	DUP 1	RDL	QC Batch
Metals									
Dissolved Mercury (Hg)	ug/L	<0.013	<0.013	<0.013	<0.013	0.060	0.053	0.013	8463506
RDL = Reportable Detection Limit									
QC Batch = Quality Control Batch									



BUREAU
VERITAS

Bureau Veritas Job #: C315420
Report Date: 2023/01/25

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND
Sampler Initials: DB

ELEMENTS BY ICP/MS (GROUND WATER)

Bureau Veritas ID		UVE588		UVE589		UVE590		UVE591		
Sampling Date		2023/01/13		2023/01/13		2023/01/13		2023/01/13		
COC Number		N/A		N/A		N/A		N/A		
	UNITS	MW 1	RDL	MW 2	MW 2 Lab-Dup	RDL	MW 3	MW 4	RDL	QC Batch
Metals										
Dissolved Aluminum (Al)	ug/L	70	5.0	730	710	5.0	920	<5.0	5.0	8460090
Dissolved Antimony (Sb)	ug/L	<1.0	1.0	<1.0	<1.0	1.0	<1.0	<1.0	1.0	8460090
Dissolved Arsenic (As)	ug/L	490	1.0	100	110	1.0	5.4	<1.0	1.0	8460090
Dissolved Barium (Ba)	ug/L	12	1.0	10	11	1.0	43	24	1.0	8460090
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	<0.10	<0.10	0.10	0.33	<0.10	0.10	8460090
Dissolved Bismuth (Bi)	ug/L	<2.0	2.0	<2.0	<2.0	2.0	<2.0	<2.0	2.0	8460090
Dissolved Boron (B)	ug/L	<50	50	<50	<50	50	<50	<50	50	8460090
Dissolved Cadmium (Cd)	ug/L	0.39	0.010	1.5	1.5	0.010	0.64	0.022	0.010	8460090
Dissolved Calcium (Ca)	ug/L	5100	100	2800	2800	100	3700	22000	100	8460090
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	<1.0	<1.0	1.0	<1.0	<1.0	1.0	8460090
Dissolved Cobalt (Co)	ug/L	5.0	0.40	5.5	5.9	0.40	7.1	<0.40	0.40	8460090
Dissolved Copper (Cu)	ug/L	4.4	0.50	35	35	0.50	30	<0.50	0.50	8460090
Dissolved Iron (Fe)	ug/L	1300	50	1700	1700	50	<50	<50	50	8460090
Dissolved Lead (Pb)	ug/L	<0.50	0.50	1.6	1.7	0.50	<0.50	<0.50	0.50	8460090
Dissolved Magnesium (Mg)	ug/L	890	100	520	540	100	1200	4300	100	8460090
Dissolved Manganese (Mn)	ug/L	2900	2.0	180	190	2.0	890	230	2.0	8460090
Dissolved Molybdenum (Mo)	ug/L	<2.0	2.0	<2.0	<2.0	2.0	<2.0	<2.0	2.0	8460090
Dissolved Nickel (Ni)	ug/L	12	2.0	14	14	2.0	9.6	<2.0	2.0	8460090
Dissolved Phosphorus (P)	ug/L	<100	100	<100	<100	100	<100	<100	100	8460090
Dissolved Potassium (K)	ug/L	650	100	630	620	100	640	1600	100	8460090
Dissolved Selenium (Se)	ug/L	<0.50	0.50	<0.50	<0.50	0.50	<0.50	<0.50	0.50	8460090
Dissolved Silver (Ag)	ug/L	<0.10	0.10	0.40	0.51	0.10	<0.10	<0.10	0.10	8460090
Dissolved Sodium (Na)	ug/L	15000	100	10000	10000	100	4400	5800	100	8460090
Dissolved Strontium (Sr)	ug/L	30	2.0	18	18	2.0	38	52	2.0	8460090
Dissolved Thallium (Tl)	ug/L	<0.10	0.10	<0.10	<0.10	0.10	<0.10	<0.10	0.10	8460090
Dissolved Tin (Sn)	ug/L	<2.0	2.0	<2.0	<2.0	2.0	<2.0	<2.0	2.0	8460090
Dissolved Titanium (Ti)	ug/L	<2.0	2.0	50	49	20	<2.0	<2.0	2.0	8460090
Dissolved Uranium (U)	ug/L	<0.10	0.10	0.30	0.32	0.10	<0.10	0.18	0.10	8460090
Dissolved Vanadium (V)	ug/L	<2.0	2.0	<2.0	<2.0	2.0	<2.0	<2.0	2.0	8460090
Dissolved Zinc (Zn)	ug/L	18	5.0	21	20	5.0	31	<5.0	5.0	8460090
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										
Lab-Dup = Laboratory Initiated Duplicate										



BUREAU
VERITAS

Bureau Veritas Job #: C315420
Report Date: 2023/01/25

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND
Sampler Initials: DB

ELEMENTS BY ICP/MS (GROUND WATER)

Bureau Veritas ID		UVE592	UVE593		
Sampling Date		2023/01/13	2023/01/13		
COC Number		N/A	N/A		
	UNITS	MW 6	DUP 1	RDL	QC Batch
Metals					
Dissolved Aluminum (Al)	ug/L	21	15	5.0	8460090
Dissolved Antimony (Sb)	ug/L	3.0	2.8	1.0	8460090
Dissolved Arsenic (As)	ug/L	3700	2800	10	8460090
Dissolved Barium (Ba)	ug/L	1.3	1.1	1.0	8460090
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	8460090
Dissolved Bismuth (Bi)	ug/L	<2.0	<2.0	2.0	8460090
Dissolved Boron (B)	ug/L	<50	<50	50	8460090
Dissolved Cadmium (Cd)	ug/L	0.038	0.029	0.010	8460090
Dissolved Calcium (Ca)	ug/L	8100	6800	100	8460090
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	8460090
Dissolved Cobalt (Co)	ug/L	2.4	1.9	0.40	8460090
Dissolved Copper (Cu)	ug/L	1.7	1.1	0.50	8460090
Dissolved Iron (Fe)	ug/L	1000	710	50	8460090
Dissolved Lead (Pb)	ug/L	0.78	0.57	0.50	8460090
Dissolved Magnesium (Mg)	ug/L	2600	2100	100	8460090
Dissolved Manganese (Mn)	ug/L	300	230	2.0	8460090
Dissolved Molybdenum (Mo)	ug/L	<2.0	<2.0	2.0	8460090
Dissolved Nickel (Ni)	ug/L	11	9.6	2.0	8460090
Dissolved Phosphorus (P)	ug/L	<100	<100	100	8460090
Dissolved Potassium (K)	ug/L	700	490	100	8460090
Dissolved Selenium (Se)	ug/L	<0.50	<0.50	0.50	8460090
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	0.10	8460090
Dissolved Sodium (Na)	ug/L	5300	4800	100	8460090
Dissolved Strontium (Sr)	ug/L	14	12	2.0	8460090
Dissolved Thallium (Tl)	ug/L	<0.10	<0.10	0.10	8460090
Dissolved Tin (Sn)	ug/L	<2.0	<2.0	2.0	8460090
Dissolved Titanium (Ti)	ug/L	<2.0	<2.0	2.0	8460090
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	8460090
Dissolved Vanadium (V)	ug/L	<2.0	<2.0	2.0	8460090
Dissolved Zinc (Zn)	ug/L	19	16	5.0	8460090
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					



GENERAL COMMENTS

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

Package 1	0.0°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C315420
Report Date: 2023/01/25

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND
Sampler Initials: DB

QUALITY ASSURANCE REPORT

QA/QC								
Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8460090	JHY	Matrix Spike [UVE589-01]	Dissolved Aluminum (Al)	2023/01/23		NC	%	80 - 120
			Dissolved Antimony (Sb)	2023/01/23	97	%	80 - 120	
			Dissolved Arsenic (As)	2023/01/23	NC	%	80 - 120	
			Dissolved Barium (Ba)	2023/01/23	103	%	80 - 120	
			Dissolved Beryllium (Be)	2023/01/23	102	%	80 - 120	
			Dissolved Bismuth (Bi)	2023/01/23	96	%	80 - 120	
			Dissolved Boron (B)	2023/01/23	99	%	80 - 120	
			Dissolved Cadmium (Cd)	2023/01/23	93	%	80 - 120	
			Dissolved Calcium (Ca)	2023/01/23	105	%	80 - 120	
			Dissolved Chromium (Cr)	2023/01/23	97	%	80 - 120	
			Dissolved Cobalt (Co)	2023/01/23	94	%	80 - 120	
			Dissolved Copper (Cu)	2023/01/23	93	%	80 - 120	
			Dissolved Iron (Fe)	2023/01/23	NC	%	80 - 120	
			Dissolved Lead (Pb)	2023/01/23	100	%	80 - 120	
			Dissolved Magnesium (Mg)	2023/01/23	107	%	80 - 120	
			Dissolved Manganese (Mn)	2023/01/23	NC	%	80 - 120	
			Dissolved Molybdenum (Mo)	2023/01/23	99	%	80 - 120	
			Dissolved Nickel (Ni)	2023/01/23	96	%	80 - 120	
			Dissolved Phosphorus (P)	2023/01/23	113	%	80 - 120	
			Dissolved Potassium (K)	2023/01/23	104	%	80 - 120	
			Dissolved Selenium (Se)	2023/01/23	97	%	80 - 120	
			Dissolved Silver (Ag)	2023/01/23	96	%	80 - 120	
			Dissolved Sodium (Na)	2023/01/23	103	%	80 - 120	
			Dissolved Strontium (Sr)	2023/01/23	103	%	80 - 120	
			Dissolved Thallium (Tl)	2023/01/23	99	%	80 - 120	
			Dissolved Tin (Sn)	2023/01/23	103	%	80 - 120	
			Dissolved Titanium (Ti)	2023/01/23	62 (1)	%	80 - 120	
			Dissolved Uranium (U)	2023/01/23	105	%	80 - 120	
Dissolved Vanadium (V)	2023/01/23	101	%	80 - 120				
Dissolved Zinc (Zn)	2023/01/23	98	%	80 - 120				
8460090	JHY	Spiked Blank	Dissolved Aluminum (Al)	2023/01/20		102	%	80 - 120
			Dissolved Antimony (Sb)	2023/01/20	101	%	80 - 120	
			Dissolved Arsenic (As)	2023/01/20	95	%	80 - 120	
			Dissolved Barium (Ba)	2023/01/20	105	%	80 - 120	
			Dissolved Beryllium (Be)	2023/01/20	100	%	80 - 120	
			Dissolved Bismuth (Bi)	2023/01/20	99	%	80 - 120	
			Dissolved Boron (B)	2023/01/20	102	%	80 - 120	
			Dissolved Cadmium (Cd)	2023/01/20	92	%	80 - 120	
			Dissolved Calcium (Ca)	2023/01/20	101	%	80 - 120	
			Dissolved Chromium (Cr)	2023/01/20	99	%	80 - 120	
			Dissolved Cobalt (Co)	2023/01/20	95	%	80 - 120	
			Dissolved Copper (Cu)	2023/01/20	96	%	80 - 120	
			Dissolved Iron (Fe)	2023/01/20	101	%	80 - 120	
			Dissolved Lead (Pb)	2023/01/20	101	%	80 - 120	
			Dissolved Magnesium (Mg)	2023/01/20	102	%	80 - 120	
			Dissolved Manganese (Mn)	2023/01/20	103	%	80 - 120	
			Dissolved Molybdenum (Mo)	2023/01/20	105	%	80 - 120	
			Dissolved Nickel (Ni)	2023/01/20	96	%	80 - 120	
			Dissolved Phosphorus (P)	2023/01/20	107	%	80 - 120	
			Dissolved Potassium (K)	2023/01/20	98	%	80 - 120	
Dissolved Selenium (Se)	2023/01/20	96	%	80 - 120				
Dissolved Silver (Ag)	2023/01/20	97	%	80 - 120				
Dissolved Sodium (Na)	2023/01/20	99	%	80 - 120				



BUREAU
VERITAS

Bureau Veritas Job #: C315420
Report Date: 2023/01/25

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND
Sampler Initials: DB

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
				Dissolved Strontium (Sr)	2023/01/20		102	%	80 - 120
				Dissolved Thallium (Tl)	2023/01/20		101	%	80 - 120
				Dissolved Tin (Sn)	2023/01/20		102	%	80 - 120
				Dissolved Titanium (Ti)	2023/01/20		107	%	80 - 120
				Dissolved Uranium (U)	2023/01/20		105	%	80 - 120
				Dissolved Vanadium (V)	2023/01/20		101	%	80 - 120
				Dissolved Zinc (Zn)	2023/01/20		99	%	80 - 120
8460090	JHY		Method Blank	Dissolved Aluminum (Al)	2023/01/23	<5.0		ug/L	
				Dissolved Antimony (Sb)	2023/01/23	<1.0		ug/L	
				Dissolved Arsenic (As)	2023/01/23	<1.0		ug/L	
				Dissolved Barium (Ba)	2023/01/23	<1.0		ug/L	
				Dissolved Beryllium (Be)	2023/01/23	<0.10		ug/L	
				Dissolved Bismuth (Bi)	2023/01/23	<2.0		ug/L	
				Dissolved Boron (B)	2023/01/23	<50		ug/L	
				Dissolved Cadmium (Cd)	2023/01/23	<0.010		ug/L	
				Dissolved Calcium (Ca)	2023/01/23	<100		ug/L	
				Dissolved Chromium (Cr)	2023/01/23	<1.0		ug/L	
				Dissolved Cobalt (Co)	2023/01/23	<0.40		ug/L	
				Dissolved Copper (Cu)	2023/01/23	<0.50		ug/L	
				Dissolved Iron (Fe)	2023/01/23	<50		ug/L	
				Dissolved Lead (Pb)	2023/01/23	<0.50		ug/L	
				Dissolved Magnesium (Mg)	2023/01/23	<100		ug/L	
				Dissolved Manganese (Mn)	2023/01/23	<2.0		ug/L	
				Dissolved Molybdenum (Mo)	2023/01/23	<2.0		ug/L	
				Dissolved Nickel (Ni)	2023/01/23	<2.0		ug/L	
				Dissolved Phosphorus (P)	2023/01/23	<100		ug/L	
				Dissolved Potassium (K)	2023/01/23	<100		ug/L	
				Dissolved Selenium (Se)	2023/01/23	<0.50		ug/L	
				Dissolved Silver (Ag)	2023/01/23	<0.10		ug/L	
				Dissolved Sodium (Na)	2023/01/23	<100		ug/L	
				Dissolved Strontium (Sr)	2023/01/23	<2.0		ug/L	
				Dissolved Thallium (Tl)	2023/01/23	<0.10		ug/L	
				Dissolved Tin (Sn)	2023/01/23	<2.0		ug/L	
				Dissolved Titanium (Ti)	2023/01/23	<2.0		ug/L	
				Dissolved Uranium (U)	2023/01/23	<0.10		ug/L	
				Dissolved Vanadium (V)	2023/01/23	<2.0		ug/L	
				Dissolved Zinc (Zn)	2023/01/23	<5.0		ug/L	
8460090	JHY		RPD [UVE589-01]	Dissolved Aluminum (Al)	2023/01/23	2.7		%	20
				Dissolved Antimony (Sb)	2023/01/23	NC		%	20
				Dissolved Arsenic (As)	2023/01/23	2.8		%	20
				Dissolved Barium (Ba)	2023/01/23	6.8		%	20
				Dissolved Beryllium (Be)	2023/01/23	NC		%	20
				Dissolved Bismuth (Bi)	2023/01/23	NC		%	20
				Dissolved Boron (B)	2023/01/23	NC		%	20
				Dissolved Cadmium (Cd)	2023/01/23	4.0		%	20
				Dissolved Calcium (Ca)	2023/01/23	1.0		%	20
				Dissolved Chromium (Cr)	2023/01/23	NC		%	20
				Dissolved Cobalt (Co)	2023/01/23	6.4		%	20
				Dissolved Copper (Cu)	2023/01/23	0.23		%	20
				Dissolved Iron (Fe)	2023/01/23	2.2		%	20
				Dissolved Lead (Pb)	2023/01/23	1.6		%	20
				Dissolved Magnesium (Mg)	2023/01/23	3.5		%	20
				Dissolved Manganese (Mn)	2023/01/23	1.1		%	20



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Molybdenum (Mo)	2023/01/23	NC		%	20
			Dissolved Nickel (Ni)	2023/01/23	1.6		%	20
			Dissolved Phosphorus (P)	2023/01/23	NC		%	20
			Dissolved Potassium (K)	2023/01/23	2.2		%	20
			Dissolved Selenium (Se)	2023/01/23	NC		%	20
			Dissolved Silver (Ag)	2023/01/23	NC		%	20
			Dissolved Sodium (Na)	2023/01/23	0.034		%	20
			Dissolved Strontium (Sr)	2023/01/23	0.49		%	20
			Dissolved Thallium (Tl)	2023/01/23	NC		%	20
			Dissolved Tin (Sn)	2023/01/23	NC		%	20
			Dissolved Titanium (Ti)	2023/01/23	1.8		%	20
			Dissolved Uranium (U)	2023/01/23	6.3		%	20
			Dissolved Vanadium (V)	2023/01/23	NC		%	20
			Dissolved Zinc (Zn)	2023/01/23	1.8		%	20
8463506	EPU	Matrix Spike	Dissolved Mercury (Hg)	2023/01/24		104	%	80 - 120
8463506	EPU	Spiked Blank	Dissolved Mercury (Hg)	2023/01/24		101	%	80 - 120
8463506	EPU	Method Blank	Dissolved Mercury (Hg)	2023/01/24	<0.013		ug/L	
8463506	EPU	RPD	Dissolved Mercury (Hg)	2023/01/24	NC		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the 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).

(1) Matrix Spike exceeds acceptance limits, probable matrix interference.



BUREAU
VERITAS

Bureau Veritas Job #: C315420
Report Date: 2023/01/25

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND
Sampler Initials: DB

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Mike MacGillivray, Scientific Specialist (Inorganics)

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



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CHAIN OF CUSTODY RECORD

ENV COC - 00016v3

Page 1 of 1

Invoice Information		Invoice to (requires report) <input type="checkbox"/>		Report Information (if differs from invoice)				Project Information				LAB USE ONLY - PLACE STICKER HERE																								
Company:	Aecan		Company:					Quotation #:					LAB USE ONLY - PLACE STICKER HERE C315420																							
Contact Name:	Rory McNeil		Contact Name:					P.O. #/ AFE#:																												
Street Address:			Street Address:					Project #:	60680169																											
City:	Halifax	Prov:		City:		Prov:		Site #:																												
Phone:	902-792-2367		Phone:					Site Location:	Mooseland NS																											
Email:	Rory.McNeil@Aecan.com		Email:					Site Location Province:	NS																											
Copies:			Copies:					Sampled By:	A Buxton																											
Regulatory Criteria **Specify matrix for each regulation: surface water (SW)/groundwater (GW)/tap water/sewage/effluent/seawater/potable water/non-potable water/tissue/soil/sludge/metal Regulation: _____ Matrix: _____ **Matrix: _____ ***Matrix: _____ SAMPLES MUST BE KEPT COOL (<10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS												Regular Turnaround Time (TAT) <input checked="" type="checkbox"/> 5 to 7 Day <input type="checkbox"/> 10 Day Rush Turnaround Time (TAT) Surcharges apply <input type="checkbox"/> Same Day <input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Day <input type="checkbox"/> 3 Day <input type="checkbox"/> 4 Day																								
Sample Identification	Date Sampled			Time (24hr)		Matrix	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	# OF CONTAINERS SUBMITTED	HOLD - DO NOT ANALYZE	Date Required:			Comments		
	YY	MM	DD	HH	MM																										YY	MM	DD			
1 MW1	23	01	13	PM		GW	✓	✓																												
2 MW2							✓	✓																												
3 MW3							✓	✓																												
4 MW4							✓	✓																												
5 MW6							✓	✓																												
6 Dup 1							✓	✓																												
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10																																				
11																																				
12																																				
*UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS AND CONDITIONS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS OR BY CALLING THE LABORATORY LISTED ABOVE TO OBTAIN A COPY																																				
LAB USE ONLY		Yes	No	LAB USE ONLY		Yes	No	LAB USE ONLY		Yes	No	LAB USE ONLY		Yes	No	LAB USE ONLY		Yes	No	LAB USE ONLY		Yes	No	LAB USE ONLY		Yes	No	LAB USE ONLY		Yes	No	LAB USE ONLY		Yes	No	Temperature reading by:
Seal present				Seal present				Seal present				Seal present				Seal present				Seal present				Seal present												
Seal intact				Seal intact				Seal intact				Seal intact				Seal intact				Seal intact				Seal intact												
Cooling media present				Cooling media present				Cooling media present				Cooling media present				Cooling media present				Cooling media present				Cooling media present												
Relinquished by: (Signature/ Print)		Date			Time		Received by: (Signature/ Print)		Date			Time		Special instructions																						
1 <i>[Signature]</i>		YY	MM	DD	HH	MM	1 <i>[Signature]</i>		YY	MM	DD	HH	MM																							
2		23	01	17	8	10	2 <i>[Signature]</i>																													

2023 JAN 17 9:20



Bureau Veritas - Partial/Rush Results

Your Project #: 60680169
Site Location: MOOSELAND
Your C.O.C. #: N/A

Attention: Rory McNeil

AECOM Canada Ltd
1701 Hollis St
SH400
Halifax, NS
CANADA B3J 3M8

Report Date: 2023/02/01
Report #: R7492656
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BUREAU VERITAS JOB #: C319309

Received: 2023/01/20, 09:16

Sample Matrix: Sediment
Samples Received: 7

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Metals Solids Acid Extr. ICPMS	7	2023/01/30	2023/01/31	ATL SOP 00058	EPA 6020B R2 m

Sample Matrix: Water
Samples Received: 9

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Mercury - Dissolved (CVAA,LL)	7	2023/01/25	2023/01/25	ATL SOP 00026	EPA 245.1 R3 m
Mercury - Dissolved (CVAA,LL)	2	2023/01/26	2023/01/26	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Diss. MS (as rec'd)	6	N/A	2023/01/24	ATL SOP 00058	EPA 6020B R2 m
Metals Water Diss. MS (as rec'd)	3	N/A	2023/01/25	ATL SOP 00058	EPA 6020B R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas 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 Bureau Veritas, results relate to the supplied samples tested.

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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.



Bureau Veritas - Partial/Rush Results

Your Project #: 60680169
Site Location: MOOSELAND
Your C.O.C. #: N/A

Attention: Rory McNeil

AECOM Canada Ltd
1701 Hollis St
SH400
Halifax , NS
CANADA B3J 3M8

Report Date: 2023/02/01
Report #: R7492656
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BUREAU VERITAS JOB #: C319309
Received: 2023/01/20, 09:16

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas
01 Feb 2023 13:04:47

Please direct all questions regarding this Certificate of Analysis to:
Marie Muise, Key Account Specialist
Email: Marie.MUISE@bureauveritas.com
Phone# (902)420-0203 Ext:253
=====

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For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Suzanne Rogers, General Manager responsible for Nova Scotia Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

ELEMENTS BY ATOMIC SPECTROSCOPY (SEDIMENT)

Bureau Veritas ID		UVZ334	UVZ342	UVZ343		UVZ344		UVZ345		
Sampling Date		2023/01/19	2023/01/19	2023/01/19		2023/01/19		2023/01/19		
COC Number		N/A	N/A	N/A		N/A		N/A		
	UNITS	PWSEDDUP1	PWSED1	PWSED2	RDL	PWSED3	RDL	PWSED4	RDL	QC Batch
Metals										
Acid Extractable Aluminum (Al)	mg/kg	8200	9600	7200	10	11000	10	1700	10	8476003
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	2.0	<2.0	2.0	3.2	2.0	8476003
Acid Extractable Arsenic (As)	mg/kg	87	9.2	120	2.0	1300	20	5800	200	8476003
Acid Extractable Barium (Ba)	mg/kg	22	37	27	5.0	30	5.0	8.4	5.0	8476003
Acid Extractable Beryllium (Be)	mg/kg	<1.0	<1.0	<1.0	1.0	1.0	1.0	<1.0	1.0	8476003
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	8476003
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	50	<50	50	<50	50	8476003
Acid Extractable Cadmium (Cd)	mg/kg	0.43	<0.30	<0.30	0.30	0.41	0.30	<0.30	0.30	8476003
Acid Extractable Chromium (Cr)	mg/kg	3.1	16	6.2	2.0	11	2.0	5.0	2.0	8476003
Acid Extractable Cobalt (Co)	mg/kg	1.5	3.6	1.9	1.0	8.5	1.0	<1.0	1.0	8476003
Acid Extractable Copper (Cu)	mg/kg	17	6.4	19	2.0	16	2.0	<2.0	2.0	8476003
Acid Extractable Iron (Fe)	mg/kg	2500	12000	5600	50	10000	50	9300	50	8476003
Acid Extractable Lead (Pb)	mg/kg	25	35	41	0.50	43	0.50	33	0.50	8476003
Acid Extractable Lithium (Li)	mg/kg	<2.0	15	<2.0	2.0	16	2.0	2.8	2.0	8476003
Acid Extractable Manganese (Mn)	mg/kg	54	250	73	2.0	330	2.0	69	2.0	8476003
Acid Extractable Mercury (Hg)	mg/kg	0.73	0.14	2.1	0.10	11	0.10	3.2	0.10	8476003
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	8476003
Acid Extractable Nickel (Ni)	mg/kg	9.0	11	9.1	2.0	27	2.0	<2.0	2.0	8476003
Acid Extractable Rubidium (Rb)	mg/kg	<2.0	4.9	2.2	2.0	9.3	2.0	4.5	2.0	8476003
Acid Extractable Selenium (Se)	mg/kg	1.8	0.59	2.2	0.50	1.2	0.50	<0.50	0.50	8476003
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	8476003
Acid Extractable Strontium (Sr)	mg/kg	12	11	13	5.0	32	5.0	5.9	5.0	8476003
Acid Extractable Thallium (Tl)	mg/kg	<0.10	0.10	<0.10	0.10	0.12	0.10	<0.10	0.10	8476003
Acid Extractable Tin (Sn)	mg/kg	<1.0	<1.0	1.9	1.0	1.1	1.0	<1.0	1.0	8476003
Acid Extractable Uranium (U)	mg/kg	0.81	0.66	0.76	0.10	0.74	0.10	0.17	0.10	8476003
Acid Extractable Vanadium (V)	mg/kg	7.2	14	5.3	2.0	11	2.0	4.9	2.0	8476003
Acid Extractable Zinc (Zn)	mg/kg	8.7	29	10	5.0	43	5.0	5.1	5.0	8476003
RDL = Reportable Detection Limit QC Batch = Quality Control Batch										

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

ELEMENTS BY ATOMIC SPECTROSCOPY (SEDIMENT)

Bureau Veritas ID		UVZ346		UVZ347		
Sampling Date		2023/01/19		2023/01/19		
COC Number		N/A		N/A		
	UNITS	PWSED5	RDL	PWSED6	RDL	QC Batch
Metals						
Acid Extractable Aluminum (Al)	mg/kg	13000	10	7600	10	8476003
Acid Extractable Antimony (Sb)	mg/kg	<2.0	2.0	<2.0	2.0	8476003
Acid Extractable Arsenic (As)	mg/kg	590	20	9800	200	8476003
Acid Extractable Barium (Ba)	mg/kg	43	5.0	130	5.0	8476003
Acid Extractable Beryllium (Be)	mg/kg	1.1	1.0	<1.0	1.0	8476003
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	2.0	<2.0	2.0	8476003
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	8476003
Acid Extractable Cadmium (Cd)	mg/kg	0.66	0.30	2.1	0.30	8476003
Acid Extractable Chromium (Cr)	mg/kg	13	2.0	5.6	2.0	8476003
Acid Extractable Cobalt (Co)	mg/kg	17	1.0	80	1.0	8476003
Acid Extractable Copper (Cu)	mg/kg	40	2.0	23	2.0	8476003
Acid Extractable Iron (Fe)	mg/kg	15000	50	77000	50	8476003
Acid Extractable Lead (Pb)	mg/kg	49	0.50	27	0.50	8476003
Acid Extractable Lithium (Li)	mg/kg	<2.0	2.0	<2.0	2.0	8476003
Acid Extractable Manganese (Mn)	mg/kg	3400	2.0	44000	2.0	8476003
Acid Extractable Mercury (Hg)	mg/kg	0.98	0.10	1.8	0.10	8476003
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	2.0	6.7	2.0	8476003
Acid Extractable Nickel (Ni)	mg/kg	26	2.0	36	2.0	8476003
Acid Extractable Rubidium (Rb)	mg/kg	3.3	2.0	5.0	2.0	8476003
Acid Extractable Selenium (Se)	mg/kg	3.5	0.50	1.9	0.50	8476003
Acid Extractable Silver (Ag)	mg/kg	<0.50	0.50	<0.50	0.50	8476003
Acid Extractable Strontium (Sr)	mg/kg	22	5.0	14	5.0	8476003
Acid Extractable Thallium (Tl)	mg/kg	0.14	0.10	0.61	0.10	8476003
Acid Extractable Tin (Sn)	mg/kg	1.7	1.0	<1.0	1.0	8476003
Acid Extractable Uranium (U)	mg/kg	2.5	0.10	0.85	0.10	8476003
Acid Extractable Vanadium (V)	mg/kg	13	2.0	12	2.0	8476003
Acid Extractable Zinc (Zn)	mg/kg	36	5.0	63	5.0	8476003
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

MERCURY BY COLD VAPOUR AA (WATER)

Bureau Veritas ID		UVZ332	UVZ333	UVZ335	UVZ336	UVZ337	UVZ338	UVZ339		
Sampling Date		2023/01/19	2023/01/19	2023/01/19	2023/01/19	2023/01/19	2023/01/19	2023/01/19		
COC Number		N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	UNITS	MW5	PWDUP1	PW1	PW2	PW3	PW4	PW5	RDL	QC Batch

Metals										
Dissolved Mercury (Hg)	ug/L	0.015	<0.013	<0.013	<0.013	0.065	0.065	<0.013	0.013	8467781
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										

Bureau Veritas ID		UVZ340	UVZ341		
Sampling Date		2023/01/19	2023/01/19		
COC Number		N/A	N/A		
	UNITS	PW6	PW7	RDL	QC Batch

Metals					
Dissolved Mercury (Hg)	ug/L	<0.013	0.050	0.013	8468537
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

Bureau Veritas - Partial/Rush Results



BUREAU VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

ELEMENTS BY ICP/MS (WATER)

Bureau Veritas ID		UVZ332	UVZ333	UVZ335	UVZ336	UVZ337		UVZ338		
Sampling Date		2023/01/19	2023/01/19	2023/01/19	2023/01/19	2023/01/19		2023/01/19		
COC Number		N/A	N/A	N/A	N/A	N/A		N/A		
	UNITS	MW5	PWDUP1	PW1	PW2	PW3	RDL	PW4	RDL	QC Batch

Metals										
Dissolved Aluminum (Al)	ug/L	57	280	470	290	150	5.0	79	5.0	8465735
Dissolved Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6.2	1.0	8465735
Dissolved Arsenic (As)	ug/L	29	20	7.3	20	50	1.0	6800	100	8465735
Dissolved Barium (Ba)	ug/L	7.0	6.1	7.0	5.6	5.9	1.0	1.7	1.0	8465735
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Bismuth (Bi)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Boron (B)	ug/L	<50	<50	<50	<50	<50	50	<50	50	8465735
Dissolved Cadmium (Cd)	ug/L	0.18	0.063	0.020	0.066	0.011	0.010	0.023	0.010	8465735
Dissolved Calcium (Ca)	ug/L	4100	1800	3400	1900	6200	100	2600	100	8465735
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	1.0	8465735
Dissolved Cobalt (Co)	ug/L	1.7	0.74	0.55	0.83	2.6	0.40	0.98	0.40	8465735
Dissolved Copper (Cu)	ug/L	4.6	0.71	1.3	1.0	1.4	0.50	1.2	0.50	8465735
Dissolved Iron (Fe)	ug/L	1700	1600	1000	1600	2200	50	70	50	8465735
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	3.7	<0.50	0.60	0.50	<0.50	0.50	8465735
Dissolved Magnesium (Mg)	ug/L	1200	480	800	470	2300	100	1200	100	8465735
Dissolved Manganese (Mn)	ug/L	780	27	98	27	240	2.0	100	2.0	8465735
Dissolved Molybdenum (Mo)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Nickel (Ni)	ug/L	<2.0	2.7	<2.0	3.0	4.8	2.0	2.7	2.0	8465735
Dissolved Phosphorus (P)	ug/L	<100	<100	<100	<100	<100	100	<100	100	8465735
Dissolved Potassium (K)	ug/L	160	<100	<100	<100	410	100	260	100	8465735
Dissolved Selenium (Se)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	0.50	8465735
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Sodium (Na)	ug/L	4100	4300	4000	4100	9000	100	2200	100	8465735
Dissolved Strontium (Sr)	ug/L	18	9.9	16	9.9	44	2.0	6.5	2.0	8465735
Dissolved Thallium (Tl)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Titanium (Ti)	ug/L	<2.0	<2.0	10	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Zinc (Zn)	ug/L	21	9.2	6.8	12	6.9	5.0	6.3	5.0	8465735

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

ELEMENTS BY ICP/MS (WATER)

Bureau Veritas ID		UVZ339	UVZ340		UVZ341		
Sampling Date		2023/01/19	2023/01/19		2023/01/19		
COC Number		N/A	N/A		N/A		
	UNITS	PW5	PW6	RDL	PW7	RDL	QC Batch
Metals							
Dissolved Aluminum (Al)	ug/L	73	62	5.0	500	5.0	8465735
Dissolved Antimony (Sb)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	8465735
Dissolved Arsenic (As)	ug/L	13	9.5	1.0	860	10	8465735
Dissolved Barium (Ba)	ug/L	4.0	3.3	1.0	5.1	1.0	8465735
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Bismuth (Bi)	ug/L	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Boron (B)	ug/L	<50	<50	50	<50	50	8465735
Dissolved Cadmium (Cd)	ug/L	0.012	<0.010	0.010	0.039	0.010	8465735
Dissolved Calcium (Ca)	ug/L	1000	800	100	740	100	8465735
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	8465735
Dissolved Cobalt (Co)	ug/L	1.8	0.87	0.40	1.0	0.40	8465735
Dissolved Copper (Cu)	ug/L	0.56	0.99	0.50	2.4	0.50	8465735
Dissolved Iron (Fe)	ug/L	1500	1200	50	7100	50	8465735
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	0.50	4.5	0.50	8465735
Dissolved Magnesium (Mg)	ug/L	380	360	100	380	100	8465735
Dissolved Manganese (Mn)	ug/L	280	920	2.0	68	2.0	8465735
Dissolved Molybdenum (Mo)	ug/L	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Nickel (Ni)	ug/L	2.6	<2.0	2.0	3.1	2.0	8465735
Dissolved Phosphorus (P)	ug/L	<100	<100	100	<100	100	8465735
Dissolved Potassium (K)	ug/L	220	340	100	280	100	8465735
Dissolved Selenium (Se)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	8465735
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Sodium (Na)	ug/L	4200	3400	100	5400	100	8465735
Dissolved Strontium (Sr)	ug/L	6.8	5.5	2.0	5.9	2.0	8465735
Dissolved Thallium (Tl)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Tin (Sn)	ug/L	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Titanium (Ti)	ug/L	<2.0	<2.0	2.0	4.3	2.0	8465735
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Vanadium (V)	ug/L	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Zinc (Zn)	ug/L	6.2	5.0	5.0	6.7	5.0	8465735
RDL = Reportable Detection Limit QC Batch = Quality Control Batch							

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

GENERAL COMMENTS

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

Package 1	3.3°C
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Results relate only to the items tested.

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

QUALITY ASSURANCE REPORT

Bureau Veritas - Partial/Rush Results

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8465735	JHY	Matrix Spike	Dissolved Aluminum (Al)	2023/01/24	96	%	80 - 120		
			Dissolved Antimony (Sb)	2023/01/24	97	%	80 - 120		
			Dissolved Arsenic (As)	2023/01/24	92	%	80 - 120		
			Dissolved Barium (Ba)	2023/01/24	96	%	80 - 120		
			Dissolved Beryllium (Be)	2023/01/24	98	%	80 - 120		
			Dissolved Bismuth (Bi)	2023/01/24	95	%	80 - 120		
			Dissolved Boron (B)	2023/01/24	95	%	80 - 120		
			Dissolved Cadmium (Cd)	2023/01/24	99	%	80 - 120		
			Dissolved Calcium (Ca)	2023/01/24	NC	%	80 - 120		
			Dissolved Chromium (Cr)	2023/01/24	96	%	80 - 120		
			Dissolved Cobalt (Co)	2023/01/24	97	%	80 - 120		
			Dissolved Copper (Cu)	2023/01/24	94	%	80 - 120		
			Dissolved Iron (Fe)	2023/01/24	101	%	80 - 120		
			Dissolved Lead (Pb)	2023/01/24	97	%	80 - 120		
			Dissolved Magnesium (Mg)	2023/01/24	100	%	80 - 120		
			Dissolved Manganese (Mn)	2023/01/24	96	%	80 - 120		
			Dissolved Molybdenum (Mo)	2023/01/24	100	%	80 - 120		
			Dissolved Nickel (Ni)	2023/01/24	98	%	80 - 120		
			Dissolved Phosphorus (P)	2023/01/24	101	%	80 - 120		
			Dissolved Potassium (K)	2023/01/24	98	%	80 - 120		
			Dissolved Selenium (Se)	2023/01/24	97	%	80 - 120		
			Dissolved Silver (Ag)	2023/01/24	95	%	80 - 120		
			Dissolved Sodium (Na)	2023/01/24	100	%	80 - 120		
			Dissolved Strontium (Sr)	2023/01/24	94	%	80 - 120		
			Dissolved Thallium (Tl)	2023/01/24	97	%	80 - 120		
			Dissolved Tin (Sn)	2023/01/24	96	%	80 - 120		
			Dissolved Titanium (Ti)	2023/01/24	97	%	80 - 120		
			Dissolved Uranium (U)	2023/01/24	102	%	80 - 120		
			Dissolved Vanadium (V)	2023/01/24	97	%	80 - 120		
			Dissolved Zinc (Zn)	2023/01/24	98	%	80 - 120		
8465735	JHY	Spiked Blank	Dissolved Aluminum (Al)	2023/01/24	104	%	80 - 120		
			Dissolved Antimony (Sb)	2023/01/24	94	%	80 - 120		
			Dissolved Arsenic (As)	2023/01/24	95	%	80 - 120		
			Dissolved Barium (Ba)	2023/01/24	98	%	80 - 120		
			Dissolved Beryllium (Be)	2023/01/24	98	%	80 - 120		
			Dissolved Bismuth (Bi)	2023/01/24	93	%	80 - 120		
			Dissolved Boron (B)	2023/01/24	92	%	80 - 120		
			Dissolved Cadmium (Cd)	2023/01/24	101	%	80 - 120		
			Dissolved Calcium (Ca)	2023/01/24	100	%	80 - 120		
			Dissolved Chromium (Cr)	2023/01/24	99	%	80 - 120		
			Dissolved Cobalt (Co)	2023/01/24	100	%	80 - 120		
			Dissolved Copper (Cu)	2023/01/24	99	%	80 - 120		
			Dissolved Iron (Fe)	2023/01/24	104	%	80 - 120		
			Dissolved Lead (Pb)	2023/01/24	100	%	80 - 120		
			Dissolved Magnesium (Mg)	2023/01/24	104	%	80 - 120		
			Dissolved Manganese (Mn)	2023/01/24	100	%	80 - 120		
			Dissolved Molybdenum (Mo)	2023/01/24	97	%	80 - 120		
			Dissolved Nickel (Ni)	2023/01/24	101	%	80 - 120		
			Dissolved Phosphorus (P)	2023/01/24	103	%	80 - 120		
			Dissolved Potassium (K)	2023/01/24	102	%	80 - 120		
Dissolved Selenium (Se)	2023/01/24	100	%	80 - 120					
Dissolved Silver (Ag)	2023/01/24	98	%	80 - 120					
Dissolved Sodium (Na)	2023/01/24	103	%	80 - 120					
Dissolved Strontium (Sr)	2023/01/24	100	%	80 - 120					



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

QUALITY ASSURANCE REPORT(CONT'D)

Bureau Veritas - Partial/Rush Results

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Thallium (Tl)	2023/01/24		95	%	80 - 120
			Dissolved Tin (Sn)	2023/01/24		93	%	80 - 120
			Dissolved Titanium (Ti)	2023/01/24		101	%	80 - 120
			Dissolved Uranium (U)	2023/01/24		104	%	80 - 120
			Dissolved Vanadium (V)	2023/01/24		99	%	80 - 120
			Dissolved Zinc (Zn)	2023/01/24		99	%	80 - 120
8465735	JHY	Method Blank	Dissolved Aluminum (Al)	2023/01/24	<5.0		ug/L	
			Dissolved Antimony (Sb)	2023/01/24	<1.0		ug/L	
			Dissolved Arsenic (As)	2023/01/24	<1.0		ug/L	
			Dissolved Barium (Ba)	2023/01/24	<1.0		ug/L	
			Dissolved Beryllium (Be)	2023/01/24	<0.10		ug/L	
			Dissolved Bismuth (Bi)	2023/01/24	<2.0		ug/L	
			Dissolved Boron (B)	2023/01/24	<50		ug/L	
			Dissolved Cadmium (Cd)	2023/01/24	<0.010		ug/L	
			Dissolved Calcium (Ca)	2023/01/24	<100		ug/L	
			Dissolved Chromium (Cr)	2023/01/24	<1.0		ug/L	
			Dissolved Cobalt (Co)	2023/01/24	<0.40		ug/L	
			Dissolved Copper (Cu)	2023/01/24	<0.50		ug/L	
			Dissolved Iron (Fe)	2023/01/24	<50		ug/L	
			Dissolved Lead (Pb)	2023/01/24	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2023/01/24	<100		ug/L	
			Dissolved Manganese (Mn)	2023/01/24	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2023/01/24	<2.0		ug/L	
			Dissolved Nickel (Ni)	2023/01/24	<2.0		ug/L	
			Dissolved Phosphorus (P)	2023/01/24	<100		ug/L	
			Dissolved Potassium (K)	2023/01/24	<100		ug/L	
			Dissolved Selenium (Se)	2023/01/24	<0.50		ug/L	
			Dissolved Silver (Ag)	2023/01/24	<0.10		ug/L	
			Dissolved Sodium (Na)	2023/01/24	<100		ug/L	
			Dissolved Strontium (Sr)	2023/01/24	<2.0		ug/L	
			Dissolved Thallium (Tl)	2023/01/24	<0.10		ug/L	
			Dissolved Tin (Sn)	2023/01/24	<2.0		ug/L	
			Dissolved Titanium (Ti)	2023/01/24	<2.0		ug/L	
			Dissolved Uranium (U)	2023/01/24	<0.10		ug/L	
			Dissolved Vanadium (V)	2023/01/24	<2.0		ug/L	
			Dissolved Zinc (Zn)	2023/01/24	<5.0		ug/L	
8465735	JHY	RPD	Dissolved Aluminum (Al)	2023/01/24	0.17		%	20
			Dissolved Antimony (Sb)	2023/01/24	NC		%	20
			Dissolved Arsenic (As)	2023/01/24	5.1		%	20
			Dissolved Barium (Ba)	2023/01/24	1.5		%	20
			Dissolved Beryllium (Be)	2023/01/24	6.2		%	20
			Dissolved Bismuth (Bi)	2023/01/24	NC		%	20
			Dissolved Boron (B)	2023/01/24	NC		%	20
			Dissolved Cadmium (Cd)	2023/01/24	1.8		%	20
			Dissolved Calcium (Ca)	2023/01/24	0.31		%	20
			Dissolved Chromium (Cr)	2023/01/24	NC		%	20
			Dissolved Cobalt (Co)	2023/01/24	NC		%	20
			Dissolved Copper (Cu)	2023/01/24	2.7		%	20
			Dissolved Iron (Fe)	2023/01/24	NC		%	20
			Dissolved Lead (Pb)	2023/01/24	NC		%	20
			Dissolved Magnesium (Mg)	2023/01/24	1.2		%	20
			Dissolved Manganese (Mn)	2023/01/24	0.29		%	20
			Dissolved Molybdenum (Mo)	2023/01/24	NC		%	20
			Dissolved Nickel (Ni)	2023/01/24	NC		%	20



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

QUALITY ASSURANCE REPORT(CONT'D)

Bureau Veritas - Partial/Rush Results

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Phosphorus (P)	2023/01/24	NC		%	20
			Dissolved Potassium (K)	2023/01/24	0.16		%	20
			Dissolved Selenium (Se)	2023/01/24	NC		%	20
			Dissolved Silver (Ag)	2023/01/24	NC		%	20
			Dissolved Sodium (Na)	2023/01/24	0.22		%	20
			Dissolved Strontium (Sr)	2023/01/24	0.27		%	20
			Dissolved Thallium (Tl)	2023/01/24	NC		%	20
			Dissolved Tin (Sn)	2023/01/24	NC		%	20
			Dissolved Titanium (Ti)	2023/01/24	NC		%	20
			Dissolved Uranium (U)	2023/01/24	1.4		%	20
			Dissolved Vanadium (V)	2023/01/24	NC		%	20
			Dissolved Zinc (Zn)	2023/01/24	0.83		%	20
8467781	EPU	Matrix Spike	Dissolved Mercury (Hg)	2023/01/25		105	%	80 - 120
8467781	EPU	Spiked Blank	Dissolved Mercury (Hg)	2023/01/25		102	%	80 - 120
8467781	EPU	Method Blank	Dissolved Mercury (Hg)	2023/01/25	<0.013		ug/L	
8467781	EPU	RPD	Dissolved Mercury (Hg)	2023/01/25	NC		%	20
8468537	EPU	Matrix Spike [UVZ341-02]	Dissolved Mercury (Hg)	2023/01/26		98	%	80 - 120
8468537	EPU	Spiked Blank	Dissolved Mercury (Hg)	2023/01/26		97	%	80 - 120
8468537	EPU	Method Blank	Dissolved Mercury (Hg)	2023/01/26	<0.013		ug/L	
8468537	EPU	RPD [UVZ340-02]	Dissolved Mercury (Hg)	2023/01/26	NC		%	20
8476003	JHY	Matrix Spike	Acid Extractable Antimony (Sb)	2023/01/31		80	%	75 - 125
			Acid Extractable Arsenic (As)	2023/01/31		94	%	75 - 125
			Acid Extractable Barium (Ba)	2023/01/31		NC	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/01/31		91	%	75 - 125
			Acid Extractable Bismuth (Bi)	2023/01/31		75	%	75 - 125
			Acid Extractable Boron (B)	2023/01/31		87	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/01/31		97	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/01/31		NC	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/01/31		92	%	75 - 125
			Acid Extractable Copper (Cu)	2023/01/31		NC	%	75 - 125
			Acid Extractable Lead (Pb)	2023/01/31		NC	%	75 - 125
			Acid Extractable Lithium (Li)	2023/01/31		93	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/01/31		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2023/01/31		97	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/01/31		NC	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/01/31		NC	%	75 - 125
			Acid Extractable Rubidium (Rb)	2023/01/31		92	%	75 - 125
			Acid Extractable Selenium (Se)	2023/01/31		96	%	75 - 125
			Acid Extractable Silver (Ag)	2023/01/31		97	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/01/31		89	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/01/31		94	%	75 - 125
			Acid Extractable Tin (Sn)	2023/01/31		NC	%	75 - 125
			Acid Extractable Uranium (U)	2023/01/31		95	%	75 - 125
			Acid Extractable Vanadium (V)	2023/01/31		NC	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/01/31		NC	%	75 - 125
8476003	JHY	Spiked Blank	Acid Extractable Antimony (Sb)	2023/01/31		94	%	75 - 125
			Acid Extractable Arsenic (As)	2023/01/31		94	%	75 - 125
			Acid Extractable Barium (Ba)	2023/01/31		91	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/01/31		92	%	75 - 125
			Acid Extractable Bismuth (Bi)	2023/01/31		94	%	75 - 125
			Acid Extractable Boron (B)	2023/01/31		94	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/01/31		95	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/01/31		94	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/01/31		94	%	75 - 125



BUREAU VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

QUALITY ASSURANCE REPORT(CONT'D)

Bureau Veritas - Partial/Rush Results

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Copper (Cu)	2023/01/31		94	%	75 - 125
			Acid Extractable Lead (Pb)	2023/01/31		94	%	75 - 125
			Acid Extractable Lithium (Li)	2023/01/31		94	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/01/31		96	%	75 - 125
			Acid Extractable Mercury (Hg)	2023/01/31		97	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/01/31		96	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/01/31		95	%	75 - 125
			Acid Extractable Rubidium (Rb)	2023/01/31		93	%	75 - 125
			Acid Extractable Selenium (Se)	2023/01/31		97	%	75 - 125
			Acid Extractable Silver (Ag)	2023/01/31		94	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/01/31		92	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/01/31		97	%	75 - 125
			Acid Extractable Tin (Sn)	2023/01/31		96	%	75 - 125
			Acid Extractable Uranium (U)	2023/01/31		94	%	75 - 125
			Acid Extractable Vanadium (V)	2023/01/31		95	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/01/31		97	%	75 - 125
8476003	JHY	Method Blank	Acid Extractable Aluminum (Al)	2023/01/31	<10		mg/kg	
			Acid Extractable Antimony (Sb)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Arsenic (As)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Barium (Ba)	2023/01/31	<5.0		mg/kg	
			Acid Extractable Beryllium (Be)	2023/01/31	<1.0		mg/kg	
			Acid Extractable Bismuth (Bi)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Boron (B)	2023/01/31	<50		mg/kg	
			Acid Extractable Cadmium (Cd)	2023/01/31	<0.30		mg/kg	
			Acid Extractable Chromium (Cr)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Cobalt (Co)	2023/01/31	<1.0		mg/kg	
			Acid Extractable Copper (Cu)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Iron (Fe)	2023/01/31	<50		mg/kg	
			Acid Extractable Lead (Pb)	2023/01/31	<0.50		mg/kg	
			Acid Extractable Lithium (Li)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Manganese (Mn)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Mercury (Hg)	2023/01/31	<0.10		mg/kg	
			Acid Extractable Molybdenum (Mo)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Nickel (Ni)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Rubidium (Rb)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Selenium (Se)	2023/01/31	<0.50		mg/kg	
			Acid Extractable Silver (Ag)	2023/01/31	<0.50		mg/kg	
			Acid Extractable Strontium (Sr)	2023/01/31	<5.0		mg/kg	
			Acid Extractable Thallium (Tl)	2023/01/31	<0.10		mg/kg	
			Acid Extractable Tin (Sn)	2023/01/31	<1.0		mg/kg	
			Acid Extractable Uranium (U)	2023/01/31	<0.10		mg/kg	
			Acid Extractable Vanadium (V)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Zinc (Zn)	2023/01/31	<5.0		mg/kg	
8476003	JHY	RPD	Acid Extractable Aluminum (Al)	2023/01/31	0.29		%	35
			Acid Extractable Antimony (Sb)	2023/01/31	1.2		%	35
			Acid Extractable Arsenic (As)	2023/01/31	1.1		%	35
			Acid Extractable Barium (Ba)	2023/01/31	1.3		%	35
			Acid Extractable Beryllium (Be)	2023/01/31	NC		%	35
			Acid Extractable Bismuth (Bi)	2023/01/31	0.97		%	35
			Acid Extractable Boron (B)	2023/01/31	NC		%	35
			Acid Extractable Cadmium (Cd)	2023/01/31	0.60		%	35
			Acid Extractable Chromium (Cr)	2023/01/31	13		%	35
			Acid Extractable Cobalt (Co)	2023/01/31	3.2		%	35
			Acid Extractable Copper (Cu)	2023/01/31	194 (1)		%	35



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Iron (Fe)	2023/01/31	1.6		%	35
			Acid Extractable Lead (Pb)	2023/01/31	9.2		%	35
			Acid Extractable Lithium (Li)	2023/01/31	0.84		%	35
			Acid Extractable Manganese (Mn)	2023/01/31	3.4		%	35
			Acid Extractable Mercury (Hg)	2023/01/31	NC		%	35
			Acid Extractable Molybdenum (Mo)	2023/01/31	6.7		%	35
			Acid Extractable Nickel (Ni)	2023/01/31	1.7		%	35
			Acid Extractable Rubidium (Rb)	2023/01/31	4.3		%	35
			Acid Extractable Selenium (Se)	2023/01/31	1.7		%	35
			Acid Extractable Silver (Ag)	2023/01/31	NC		%	35
			Acid Extractable Strontium (Sr)	2023/01/31	12		%	35
			Acid Extractable Thallium (Tl)	2023/01/31	NC		%	35
			Acid Extractable Tin (Sn)	2023/01/31	15		%	35
			Acid Extractable Uranium (U)	2023/01/31	2.0		%	35
			Acid Extractable Vanadium (V)	2023/01/31	8.2		%	35
			Acid Extractable Zinc (Zn)	2023/01/31	46 (1)		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the 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).

(1) Poor RPD due to sample inhomogeneity. Verified by repeat digestion and analysis.

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Colleen Acker, B.Sc, Scientific Service Specialist

Janah Rhyno, Metals Supervisor-Bedford



Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

Bureau Veritas - Partial/Rush Results



Bureau Veritas - Partial/Rush Results

Your Project #: 60680169
Site Location: MOOSELAND
Your C.O.C. #: N/A

Attention: Rory McNeil

AECOM Canada Ltd
1701 Hollis St
SH400
Halifax, NS
CANADA B3J 3M8

Report Date: 2023/02/01
Report #: R7492921
Version: 2 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BUREAU VERITAS JOB #: C319309

Received: 2023/01/20, 09:16

Sample Matrix: Sediment
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Metals Solids Acid Extr. ICPMS	1	2023/01/30	2023/01/31	ATL SOP 00058	EPA 6020B R2 m

Remarks:
Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas 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 Bureau Veritas, 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.



Bureau Veritas - Partial/Rush Results

Your Project #: 60680169
Site Location: MOOSELAND
Your C.O.C. #: N/A

Attention: Rory McNeil

AECOM Canada Ltd
1701 Hollis St
SH400
Halifax , NS
CANADA B3J 3M8

Report Date: 2023/02/01
Report #: R7492921
Version: 2 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BUREAU VERITAS JOB #: C319309

Received: 2023/01/20, 09:16

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas
01 Feb 2023 15:33:32

Please direct all questions regarding this Certificate of Analysis to:
Marie Muise, Key Account Specialist
Email: Marie.MUISE@bureauveritas.com
Phone# (902)420-0203 Ext:253
=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Suzanne Rogers, General Manager responsible for Nova Scotia Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

ELEMENTS BY ATOMIC SPECTROSCOPY (SEDIMENT)

Bureau Veritas ID		UWL779		
Sampling Date		2023/01/19		
COC Number		N/A		
	UNITS	PWSED7	RDL	QC Batch
Metals				
Acid Extractable Aluminum (Al)	mg/kg	12000	10	8476003
Acid Extractable Antimony (Sb)	mg/kg	3.2	2.0	8476003
Acid Extractable Arsenic (As)	mg/kg	1100	20	8476003
Acid Extractable Barium (Ba)	mg/kg	36	5.0	8476003
Acid Extractable Beryllium (Be)	mg/kg	<1.0	1.0	8476003
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	2.0	8476003
Acid Extractable Boron (B)	mg/kg	<50	50	8476003
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	0.30	8476003
Acid Extractable Chromium (Cr)	mg/kg	18	2.0	8476003
Acid Extractable Cobalt (Co)	mg/kg	1.6	1.0	8476003
Acid Extractable Copper (Cu)	mg/kg	18	2.0	8476003
Acid Extractable Iron (Fe)	mg/kg	16000	50	8476003
Acid Extractable Lead (Pb)	mg/kg	46	0.50	8476003
Acid Extractable Lithium (Li)	mg/kg	23	2.0	8476003
Acid Extractable Manganese (Mn)	mg/kg	250	2.0	8476003
Acid Extractable Mercury (Hg)	mg/kg	28	0.10	8476003
Acid Extractable Molybdenum (Mo)	mg/kg	3.5	2.0	8476003
Acid Extractable Nickel (Ni)	mg/kg	7.7	2.0	8476003
Acid Extractable Rubidium (Rb)	mg/kg	16	2.0	8476003
Acid Extractable Selenium (Se)	mg/kg	<0.50	0.50	8476003
Acid Extractable Silver (Ag)	mg/kg	<0.50	0.50	8476003
Acid Extractable Strontium (Sr)	mg/kg	7.4	5.0	8476003
Acid Extractable Thallium (Tl)	mg/kg	0.20	0.10	8476003
Acid Extractable Tin (Sn)	mg/kg	<1.0	1.0	8476003
Acid Extractable Uranium (U)	mg/kg	0.63	0.10	8476003
Acid Extractable Vanadium (V)	mg/kg	21	2.0	8476003
Acid Extractable Zinc (Zn)	mg/kg	38	5.0	8476003
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

GENERAL COMMENTS

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

Package 1	3.3°C
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Results relate only to the items tested.

Bureau Veritas - Partial/Rush Results



BUREAU VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

QUALITY ASSURANCE REPORT

Bureau Veritas - Partial/Rush Results

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8476003	JHY	Matrix Spike	Acid Extractable Antimony (Sb)	2023/01/31		80	%	75 - 125
			Acid Extractable Arsenic (As)	2023/01/31		94	%	75 - 125
			Acid Extractable Barium (Ba)	2023/01/31		NC	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/01/31		91	%	75 - 125
			Acid Extractable Bismuth (Bi)	2023/01/31		75	%	75 - 125
			Acid Extractable Boron (B)	2023/01/31		87	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/01/31		97	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/01/31		NC	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/01/31		92	%	75 - 125
			Acid Extractable Copper (Cu)	2023/01/31		NC	%	75 - 125
			Acid Extractable Lead (Pb)	2023/01/31		NC	%	75 - 125
			Acid Extractable Lithium (Li)	2023/01/31		93	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/01/31		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2023/01/31		97	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/01/31		NC	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/01/31		NC	%	75 - 125
			Acid Extractable Rubidium (Rb)	2023/01/31		92	%	75 - 125
			Acid Extractable Selenium (Se)	2023/01/31		96	%	75 - 125
			Acid Extractable Silver (Ag)	2023/01/31		97	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/01/31		89	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/01/31		94	%	75 - 125
			Acid Extractable Tin (Sn)	2023/01/31		NC	%	75 - 125
			Acid Extractable Uranium (U)	2023/01/31		95	%	75 - 125
Acid Extractable Vanadium (V)	2023/01/31		NC	%	75 - 125			
Acid Extractable Zinc (Zn)	2023/01/31		NC	%	75 - 125			
8476003	JHY	Spiked Blank	Acid Extractable Antimony (Sb)	2023/01/31		94	%	75 - 125
			Acid Extractable Arsenic (As)	2023/01/31		94	%	75 - 125
			Acid Extractable Barium (Ba)	2023/01/31		91	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/01/31		92	%	75 - 125
			Acid Extractable Bismuth (Bi)	2023/01/31		94	%	75 - 125
			Acid Extractable Boron (B)	2023/01/31		94	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/01/31		95	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/01/31		94	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/01/31		94	%	75 - 125
			Acid Extractable Copper (Cu)	2023/01/31		94	%	75 - 125
			Acid Extractable Lead (Pb)	2023/01/31		94	%	75 - 125
			Acid Extractable Lithium (Li)	2023/01/31		94	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/01/31		96	%	75 - 125
			Acid Extractable Mercury (Hg)	2023/01/31		97	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/01/31		96	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/01/31		95	%	75 - 125
			Acid Extractable Rubidium (Rb)	2023/01/31		93	%	75 - 125
			Acid Extractable Selenium (Se)	2023/01/31		97	%	75 - 125
			Acid Extractable Silver (Ag)	2023/01/31		94	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/01/31		92	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/01/31		97	%	75 - 125
			Acid Extractable Tin (Sn)	2023/01/31		96	%	75 - 125
			Acid Extractable Uranium (U)	2023/01/31		94	%	75 - 125
Acid Extractable Vanadium (V)	2023/01/31		95	%	75 - 125			
Acid Extractable Zinc (Zn)	2023/01/31		97	%	75 - 125			
8476003	JHY	Method Blank	Acid Extractable Aluminum (Al)	2023/01/31	<10		mg/kg	
			Acid Extractable Antimony (Sb)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Arsenic (As)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Barium (Ba)	2023/01/31	<5.0		mg/kg	



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

QUALITY ASSURANCE REPORT(CONT'D)

Bureau Veritas - Partial/Rush Results

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Beryllium (Be)	2023/01/31	<1.0		mg/kg	
			Acid Extractable Bismuth (Bi)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Boron (B)	2023/01/31	<50		mg/kg	
			Acid Extractable Cadmium (Cd)	2023/01/31	<0.30		mg/kg	
			Acid Extractable Chromium (Cr)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Cobalt (Co)	2023/01/31	<1.0		mg/kg	
			Acid Extractable Copper (Cu)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Iron (Fe)	2023/01/31	<50		mg/kg	
			Acid Extractable Lead (Pb)	2023/01/31	<0.50		mg/kg	
			Acid Extractable Lithium (Li)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Manganese (Mn)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Mercury (Hg)	2023/01/31	<0.10		mg/kg	
			Acid Extractable Molybdenum (Mo)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Nickel (Ni)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Rubidium (Rb)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Selenium (Se)	2023/01/31	<0.50		mg/kg	
			Acid Extractable Silver (Ag)	2023/01/31	<0.50		mg/kg	
			Acid Extractable Strontium (Sr)	2023/01/31	<5.0		mg/kg	
			Acid Extractable Thallium (Tl)	2023/01/31	<0.10		mg/kg	
			Acid Extractable Tin (Sn)	2023/01/31	<1.0		mg/kg	
			Acid Extractable Uranium (U)	2023/01/31	<0.10		mg/kg	
			Acid Extractable Vanadium (V)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Zinc (Zn)	2023/01/31	<5.0		mg/kg	
8476003	JHY	RPD	Acid Extractable Aluminum (Al)	2023/01/31	0.29		%	35
			Acid Extractable Antimony (Sb)	2023/01/31	1.2		%	35
			Acid Extractable Arsenic (As)	2023/01/31	1.1		%	35
			Acid Extractable Barium (Ba)	2023/01/31	1.3		%	35
			Acid Extractable Beryllium (Be)	2023/01/31	NC		%	35
			Acid Extractable Bismuth (Bi)	2023/01/31	0.97		%	35
			Acid Extractable Boron (B)	2023/01/31	NC		%	35
			Acid Extractable Cadmium (Cd)	2023/01/31	0.60		%	35
			Acid Extractable Chromium (Cr)	2023/01/31	13		%	35
			Acid Extractable Cobalt (Co)	2023/01/31	3.2		%	35
			Acid Extractable Copper (Cu)	2023/01/31	194 (1)		%	35
			Acid Extractable Iron (Fe)	2023/01/31	1.6		%	35
			Acid Extractable Lead (Pb)	2023/01/31	9.2		%	35
			Acid Extractable Lithium (Li)	2023/01/31	0.84		%	35
			Acid Extractable Manganese (Mn)	2023/01/31	3.4		%	35
			Acid Extractable Mercury (Hg)	2023/01/31	NC		%	35
			Acid Extractable Molybdenum (Mo)	2023/01/31	6.7		%	35
			Acid Extractable Nickel (Ni)	2023/01/31	1.7		%	35
			Acid Extractable Rubidium (Rb)	2023/01/31	4.3		%	35
			Acid Extractable Selenium (Se)	2023/01/31	1.7		%	35
			Acid Extractable Silver (Ag)	2023/01/31	NC		%	35
			Acid Extractable Strontium (Sr)	2023/01/31	12		%	35
			Acid Extractable Thallium (Tl)	2023/01/31	NC		%	35
			Acid Extractable Tin (Sn)	2023/01/31	15		%	35
			Acid Extractable Uranium (U)	2023/01/31	2.0		%	35
			Acid Extractable Vanadium (V)	2023/01/31	8.2		%	35



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Zinc (Zn)	2023/01/31	46 (1)		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the 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).

(1) Poor RPD due to sample inhomogeneity. Verified by repeat digestion and analysis.

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/01

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Colleen Acker, B.Sc, Scientific Service Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

Bureau Veritas - Partial/Rush Results



Your Project #: 60680169
 Site Location: MOOSELAND
 Your C.O.C. #: N/A

Attention: Rory McNeil

AECOM Canada Ltd
 1701 Hollis St
 SH400
 Halifax, NS
 CANADA B3J 3M8

Report Date: 2023/02/23
 Report #: R7520079
 Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C319309

Received: 2023/01/20, 09:16

Sample Matrix: Sediment
 # Samples Received: 8

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Metals Solids Acid Extr. ICPMS	8	2023/01/30	2023/01/31	ATL SOP 00058	EPA 6020B R2 m
Methyl Mercury Soil (sub from Bedford) (1)	8	2023/02/22	2023/02/23		

Sample Matrix: Water
 # Samples Received: 9

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Mercury - Dissolved (CVAA,LL)	7	2023/01/25	2023/01/25	ATL SOP 00026	EPA 245.1 R3 m
Mercury - Dissolved (CVAA,LL)	2	2023/01/26	2023/01/26	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Diss. MS (as rec'd)	6	N/A	2023/01/24	ATL SOP 00058	EPA 6020B R2 m
Metals Water Diss. MS (as rec'd)	3	N/A	2023/01/25	ATL SOP 00058	EPA 6020B R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas 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 Bureau Veritas, 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 Flett Research Ltd., 440 DeSalaberry Ave., Winnipeg, MB, R2L0Y7



Your Project #: 60680169
Site Location: MOOSELAND
Your C.O.C. #: N/A

Attention: Rory McNeil

AECOM Canada Ltd
1701 Hollis St
SH400
Halifax, NS
CANADA B3J 3M8

Report Date: 2023/02/23
Report #: R7520079
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C319309
Received: 2023/01/20, 09:16

Encryption Key

Matthew Godkin
Sample Receiver 1
23 Feb 2023 15:13:02

Please direct all questions regarding this Certificate of Analysis to:
Marie Muise, Key Account Specialist
Email: Marie.MUISE@bureauveritas.com
Phone# (902)420-0203 Ext:253

=====

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RESULTS OF ANALYSES OF SEDIMENT

Bureau Veritas ID		UVZ334	UVZ342	UVZ343	UVZ344	UVZ345	UVZ346	
Sampling Date		2023/01/19	2023/01/19	2023/01/19	2023/01/19	2023/01/19	2023/01/19	
COC Number		N/A	N/A	N/A	N/A	N/A	N/A	
	UNITS	PWSEDDUP1	PWSED1	PWSED2	PWSED3	PWSED4	PWSED5	QC Batch

Subcontracted Analysis								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	8494101

QC Batch = Quality Control Batch

Bureau Veritas ID		UVZ347	UWL779	
Sampling Date		2023/01/19	2023/01/19	
COC Number		N/A	N/A	
	UNITS	PWSED6	PWSED7	QC Batch

Subcontracted Analysis				
Subcontract Parameter	N/A	ATTACHED	ATTACHED	8494101

QC Batch = Quality Control Batch



ELEMENTS BY ATOMIC SPECTROSCOPY (SEDIMENT)

Bureau Veritas ID		UVZ334	UVZ342	UVZ343		UVZ344		UVZ345		
Sampling Date		2023/01/19	2023/01/19	2023/01/19		2023/01/19		2023/01/19		
COC Number		N/A	N/A	N/A		N/A		N/A		
	UNITS	PWSEDDUP1	PWSED1	PWSED2	RDL	PWSED3	RDL	PWSED4	RDL	QC Batch
Metals										
Acid Extractable Aluminum (Al)	mg/kg	8200	9600	7200	10	11000	10	1700	10	8476003
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	2.0	<2.0	2.0	3.2	2.0	8476003
Acid Extractable Arsenic (As)	mg/kg	87	9.2	120	2.0	1300	20	5800	200	8476003
Acid Extractable Barium (Ba)	mg/kg	22	37	27	5.0	30	5.0	8.4	5.0	8476003
Acid Extractable Beryllium (Be)	mg/kg	<1.0	<1.0	<1.0	1.0	1.0	1.0	<1.0	1.0	8476003
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	8476003
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	50	<50	50	<50	50	8476003
Acid Extractable Cadmium (Cd)	mg/kg	0.43	<0.30	<0.30	0.30	0.41	0.30	<0.30	0.30	8476003
Acid Extractable Chromium (Cr)	mg/kg	3.1	16	6.2	2.0	11	2.0	5.0	2.0	8476003
Acid Extractable Cobalt (Co)	mg/kg	1.5	3.6	1.9	1.0	8.5	1.0	<1.0	1.0	8476003
Acid Extractable Copper (Cu)	mg/kg	17	6.4	19	2.0	16	2.0	<2.0	2.0	8476003
Acid Extractable Iron (Fe)	mg/kg	2500	12000	5600	50	10000	50	9300	50	8476003
Acid Extractable Lead (Pb)	mg/kg	25	35	41	0.50	43	0.50	33	0.50	8476003
Acid Extractable Lithium (Li)	mg/kg	<2.0	15	<2.0	2.0	16	2.0	2.8	2.0	8476003
Acid Extractable Manganese (Mn)	mg/kg	54	250	73	2.0	330	2.0	69	2.0	8476003
Acid Extractable Mercury (Hg)	mg/kg	0.73	0.14	2.1	0.10	11	0.10	3.2	0.10	8476003
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	8476003
Acid Extractable Nickel (Ni)	mg/kg	9.0	11	9.1	2.0	27	2.0	<2.0	2.0	8476003
Acid Extractable Rubidium (Rb)	mg/kg	<2.0	4.9	2.2	2.0	9.3	2.0	4.5	2.0	8476003
Acid Extractable Selenium (Se)	mg/kg	1.8	0.59	2.2	0.50	1.2	0.50	<0.50	0.50	8476003
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	8476003
Acid Extractable Strontium (Sr)	mg/kg	12	11	13	5.0	32	5.0	5.9	5.0	8476003
Acid Extractable Thallium (Tl)	mg/kg	<0.10	0.10	<0.10	0.10	0.12	0.10	<0.10	0.10	8476003
Acid Extractable Tin (Sn)	mg/kg	<1.0	<1.0	1.9	1.0	1.1	1.0	<1.0	1.0	8476003
Acid Extractable Uranium (U)	mg/kg	0.81	0.66	0.76	0.10	0.74	0.10	0.17	0.10	8476003
Acid Extractable Vanadium (V)	mg/kg	7.2	14	5.3	2.0	11	2.0	4.9	2.0	8476003
Acid Extractable Zinc (Zn)	mg/kg	8.7	29	10	5.0	43	5.0	5.1	5.0	8476003
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										



ELEMENTS BY ATOMIC SPECTROSCOPY (SEDIMENT)

Bureau Veritas ID		UVZ346		UVZ347		UWL779		
Sampling Date		2023/01/19		2023/01/19		2023/01/19		
COC Number		N/A		N/A		N/A		
	UNITS	PWSED5	RDL	PWSED6	RDL	PWSED7	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	13000	10	7600	10	12000	10	8476003
Acid Extractable Antimony (Sb)	mg/kg	<2.0	2.0	<2.0	2.0	3.2	2.0	8476003
Acid Extractable Arsenic (As)	mg/kg	590	20	9800	200	1100	20	8476003
Acid Extractable Barium (Ba)	mg/kg	43	5.0	130	5.0	36	5.0	8476003
Acid Extractable Beryllium (Be)	mg/kg	1.1	1.0	<1.0	1.0	<1.0	1.0	8476003
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	2.0	<2.0	2.0	<2.0	2.0	8476003
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	<50	50	8476003
Acid Extractable Cadmium (Cd)	mg/kg	0.66	0.30	2.1	0.30	<0.30	0.30	8476003
Acid Extractable Chromium (Cr)	mg/kg	13	2.0	5.6	2.0	18	2.0	8476003
Acid Extractable Cobalt (Co)	mg/kg	17	1.0	80	1.0	1.6	1.0	8476003
Acid Extractable Copper (Cu)	mg/kg	40	2.0	23	2.0	18	2.0	8476003
Acid Extractable Iron (Fe)	mg/kg	15000	50	77000	50	16000	50	8476003
Acid Extractable Lead (Pb)	mg/kg	49	0.50	27	0.50	46	0.50	8476003
Acid Extractable Lithium (Li)	mg/kg	<2.0	2.0	<2.0	2.0	23	2.0	8476003
Acid Extractable Manganese (Mn)	mg/kg	3400	2.0	44000	2.0	250	2.0	8476003
Acid Extractable Mercury (Hg)	mg/kg	0.98	0.10	1.8	0.10	28	0.10	8476003
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	2.0	6.7	2.0	3.5	2.0	8476003
Acid Extractable Nickel (Ni)	mg/kg	26	2.0	36	2.0	7.7	2.0	8476003
Acid Extractable Rubidium (Rb)	mg/kg	3.3	2.0	5.0	2.0	16	2.0	8476003
Acid Extractable Selenium (Se)	mg/kg	3.5	0.50	1.9	0.50	<0.50	0.50	8476003
Acid Extractable Silver (Ag)	mg/kg	<0.50	0.50	<0.50	0.50	<0.50	0.50	8476003
Acid Extractable Strontium (Sr)	mg/kg	22	5.0	14	5.0	7.4	5.0	8476003
Acid Extractable Thallium (Tl)	mg/kg	0.14	0.10	0.61	0.10	0.20	0.10	8476003
Acid Extractable Tin (Sn)	mg/kg	1.7	1.0	<1.0	1.0	<1.0	1.0	8476003
Acid Extractable Uranium (U)	mg/kg	2.5	0.10	0.85	0.10	0.63	0.10	8476003
Acid Extractable Vanadium (V)	mg/kg	13	2.0	12	2.0	21	2.0	8476003
Acid Extractable Zinc (Zn)	mg/kg	36	5.0	63	5.0	38	5.0	8476003
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								



MERCURY BY COLD VAPOUR AA (WATER)

Bureau Veritas ID		UVZ332	UVZ333	UVZ335	UVZ336	UVZ337	UVZ338	UVZ339		
Sampling Date		2023/01/19	2023/01/19	2023/01/19	2023/01/19	2023/01/19	2023/01/19	2023/01/19		
COC Number		N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	UNITS	MW5	PWDUP1	PW1	PW2	PW3	PW4	PW5	RDL	QC Batch

Metals										
Dissolved Mercury (Hg)	ug/L	0.015	<0.013	<0.013	<0.013	0.065	0.065	<0.013	0.013	8467781
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										

Bureau Veritas ID		UVZ340	UVZ340	UVZ341		
Sampling Date		2023/01/19	2023/01/19	2023/01/19		
COC Number		N/A	N/A	N/A		
	UNITS	PW6	PW6 Lab-Dup	PW7	RDL	QC Batch
Metals						
Dissolved Mercury (Hg)	ug/L	<0.013	<0.013	0.050	0.013	8468537
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						
Lab-Dup = Laboratory Initiated Duplicate						



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/23

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

ELEMENTS BY ICP/MS (WATER)

Bureau Veritas ID		UVZ332	UVZ333	UVZ335	UVZ336	UVZ337		UVZ338		
Sampling Date		2023/01/19	2023/01/19	2023/01/19	2023/01/19	2023/01/19		2023/01/19		
COC Number		N/A	N/A	N/A	N/A	N/A		N/A		
	UNITS	MW5	PWDUP1	PW1	PW2	PW3	RDL	PW4	RDL	QC Batch

Metals										
Dissolved Aluminum (Al)	ug/L	57	280	470	290	150	5.0	79	5.0	8465735
Dissolved Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6.2	1.0	8465735
Dissolved Arsenic (As)	ug/L	29	20	7.3	20	50	1.0	6800	100	8465735
Dissolved Barium (Ba)	ug/L	7.0	6.1	7.0	5.6	5.9	1.0	1.7	1.0	8465735
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Bismuth (Bi)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Boron (B)	ug/L	<50	<50	<50	<50	<50	50	<50	50	8465735
Dissolved Cadmium (Cd)	ug/L	0.18	0.063	0.020	0.066	0.011	0.010	0.023	0.010	8465735
Dissolved Calcium (Ca)	ug/L	4100	1800	3400	1900	6200	100	2600	100	8465735
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	1.0	8465735
Dissolved Cobalt (Co)	ug/L	1.7	0.74	0.55	0.83	2.6	0.40	0.98	0.40	8465735
Dissolved Copper (Cu)	ug/L	4.6	0.71	1.3	1.0	1.4	0.50	1.2	0.50	8465735
Dissolved Iron (Fe)	ug/L	1700	1600	1000	1600	2200	50	70	50	8465735
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	3.7	<0.50	0.60	0.50	<0.50	0.50	8465735
Dissolved Magnesium (Mg)	ug/L	1200	480	800	470	2300	100	1200	100	8465735
Dissolved Manganese (Mn)	ug/L	780	27	98	27	240	2.0	100	2.0	8465735
Dissolved Molybdenum (Mo)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Nickel (Ni)	ug/L	<2.0	2.7	<2.0	3.0	4.8	2.0	2.7	2.0	8465735
Dissolved Phosphorus (P)	ug/L	<100	<100	<100	<100	<100	100	<100	100	8465735
Dissolved Potassium (K)	ug/L	160	<100	<100	<100	410	100	260	100	8465735
Dissolved Selenium (Se)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	0.50	8465735
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Sodium (Na)	ug/L	4100	4300	4000	4100	9000	100	2200	100	8465735
Dissolved Strontium (Sr)	ug/L	18	9.9	16	9.9	44	2.0	6.5	2.0	8465735
Dissolved Thallium (Tl)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Titanium (Ti)	ug/L	<2.0	<2.0	10	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Zinc (Zn)	ug/L	21	9.2	6.8	12	6.9	5.0	6.3	5.0	8465735

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



ELEMENTS BY ICP/MS (WATER)

Bureau Veritas ID		UVZ339	UVZ340		UVZ341		
Sampling Date		2023/01/19	2023/01/19		2023/01/19		
COC Number		N/A	N/A		N/A		
	UNITS	PW5	PW6	RDL	PW7	RDL	QC Batch
Metals							
Dissolved Aluminum (Al)	ug/L	73	62	5.0	500	5.0	8465735
Dissolved Antimony (Sb)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	8465735
Dissolved Arsenic (As)	ug/L	13	9.5	1.0	860	10	8465735
Dissolved Barium (Ba)	ug/L	4.0	3.3	1.0	5.1	1.0	8465735
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Bismuth (Bi)	ug/L	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Boron (B)	ug/L	<50	<50	50	<50	50	8465735
Dissolved Cadmium (Cd)	ug/L	0.012	<0.010	0.010	0.039	0.010	8465735
Dissolved Calcium (Ca)	ug/L	1000	800	100	740	100	8465735
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	8465735
Dissolved Cobalt (Co)	ug/L	1.8	0.87	0.40	1.0	0.40	8465735
Dissolved Copper (Cu)	ug/L	0.56	0.99	0.50	2.4	0.50	8465735
Dissolved Iron (Fe)	ug/L	1500	1200	50	7100	50	8465735
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	0.50	4.5	0.50	8465735
Dissolved Magnesium (Mg)	ug/L	380	360	100	380	100	8465735
Dissolved Manganese (Mn)	ug/L	280	920	2.0	68	2.0	8465735
Dissolved Molybdenum (Mo)	ug/L	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Nickel (Ni)	ug/L	2.6	<2.0	2.0	3.1	2.0	8465735
Dissolved Phosphorus (P)	ug/L	<100	<100	100	<100	100	8465735
Dissolved Potassium (K)	ug/L	220	340	100	280	100	8465735
Dissolved Selenium (Se)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	8465735
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Sodium (Na)	ug/L	4200	3400	100	5400	100	8465735
Dissolved Strontium (Sr)	ug/L	6.8	5.5	2.0	5.9	2.0	8465735
Dissolved Thallium (Tl)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Tin (Sn)	ug/L	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Titanium (Ti)	ug/L	<2.0	<2.0	2.0	4.3	2.0	8465735
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	8465735
Dissolved Vanadium (V)	ug/L	<2.0	<2.0	2.0	<2.0	2.0	8465735
Dissolved Zinc (Zn)	ug/L	6.2	5.0	5.0	6.7	5.0	8465735
RDL = Reportable Detection Limit QC Batch = Quality Control Batch							



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VERITAS

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GENERAL COMMENTS

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

Package 1	3.3°C
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Results relate only to the items tested.



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AECOM Canada Ltd
Client Project #: 60680169
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QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8465735	JHY	Matrix Spike	Dissolved Aluminum (Al)	2023/01/24	96	%	80 - 120		
			Dissolved Antimony (Sb)	2023/01/24	97	%	80 - 120		
			Dissolved Arsenic (As)	2023/01/24	92	%	80 - 120		
			Dissolved Barium (Ba)	2023/01/24	96	%	80 - 120		
			Dissolved Beryllium (Be)	2023/01/24	98	%	80 - 120		
			Dissolved Bismuth (Bi)	2023/01/24	95	%	80 - 120		
			Dissolved Boron (B)	2023/01/24	95	%	80 - 120		
			Dissolved Cadmium (Cd)	2023/01/24	99	%	80 - 120		
			Dissolved Calcium (Ca)	2023/01/24	NC	%	80 - 120		
			Dissolved Chromium (Cr)	2023/01/24	96	%	80 - 120		
			Dissolved Cobalt (Co)	2023/01/24	97	%	80 - 120		
			Dissolved Copper (Cu)	2023/01/24	94	%	80 - 120		
			Dissolved Iron (Fe)	2023/01/24	101	%	80 - 120		
			Dissolved Lead (Pb)	2023/01/24	97	%	80 - 120		
			Dissolved Magnesium (Mg)	2023/01/24	100	%	80 - 120		
			Dissolved Manganese (Mn)	2023/01/24	96	%	80 - 120		
			Dissolved Molybdenum (Mo)	2023/01/24	100	%	80 - 120		
			Dissolved Nickel (Ni)	2023/01/24	98	%	80 - 120		
			Dissolved Phosphorus (P)	2023/01/24	101	%	80 - 120		
			Dissolved Potassium (K)	2023/01/24	98	%	80 - 120		
			Dissolved Selenium (Se)	2023/01/24	97	%	80 - 120		
			Dissolved Silver (Ag)	2023/01/24	95	%	80 - 120		
			Dissolved Sodium (Na)	2023/01/24	100	%	80 - 120		
			Dissolved Strontium (Sr)	2023/01/24	94	%	80 - 120		
			Dissolved Thallium (Tl)	2023/01/24	97	%	80 - 120		
			Dissolved Tin (Sn)	2023/01/24	96	%	80 - 120		
			Dissolved Titanium (Ti)	2023/01/24	97	%	80 - 120		
			Dissolved Uranium (U)	2023/01/24	102	%	80 - 120		
			Dissolved Vanadium (V)	2023/01/24	97	%	80 - 120		
			Dissolved Zinc (Zn)	2023/01/24	98	%	80 - 120		
8465735	JHY	Spiked Blank	Dissolved Aluminum (Al)	2023/01/24	104	%	80 - 120		
			Dissolved Antimony (Sb)	2023/01/24	94	%	80 - 120		
			Dissolved Arsenic (As)	2023/01/24	95	%	80 - 120		
			Dissolved Barium (Ba)	2023/01/24	98	%	80 - 120		
			Dissolved Beryllium (Be)	2023/01/24	98	%	80 - 120		
			Dissolved Bismuth (Bi)	2023/01/24	93	%	80 - 120		
			Dissolved Boron (B)	2023/01/24	92	%	80 - 120		
			Dissolved Cadmium (Cd)	2023/01/24	101	%	80 - 120		
			Dissolved Calcium (Ca)	2023/01/24	100	%	80 - 120		
			Dissolved Chromium (Cr)	2023/01/24	99	%	80 - 120		
			Dissolved Cobalt (Co)	2023/01/24	100	%	80 - 120		
			Dissolved Copper (Cu)	2023/01/24	99	%	80 - 120		
			Dissolved Iron (Fe)	2023/01/24	104	%	80 - 120		
			Dissolved Lead (Pb)	2023/01/24	100	%	80 - 120		
			Dissolved Magnesium (Mg)	2023/01/24	104	%	80 - 120		
			Dissolved Manganese (Mn)	2023/01/24	100	%	80 - 120		
			Dissolved Molybdenum (Mo)	2023/01/24	97	%	80 - 120		
			Dissolved Nickel (Ni)	2023/01/24	101	%	80 - 120		
			Dissolved Phosphorus (P)	2023/01/24	103	%	80 - 120		
			Dissolved Potassium (K)	2023/01/24	102	%	80 - 120		
			Dissolved Selenium (Se)	2023/01/24	100	%	80 - 120		
			Dissolved Silver (Ag)	2023/01/24	98	%	80 - 120		
			Dissolved Sodium (Na)	2023/01/24	103	%	80 - 120		
			Dissolved Strontium (Sr)	2023/01/24	100	%	80 - 120		



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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Thallium (Tl)	2023/01/24		95	%	80 - 120
			Dissolved Tin (Sn)	2023/01/24		93	%	80 - 120
			Dissolved Titanium (Ti)	2023/01/24		101	%	80 - 120
			Dissolved Uranium (U)	2023/01/24		104	%	80 - 120
			Dissolved Vanadium (V)	2023/01/24		99	%	80 - 120
			Dissolved Zinc (Zn)	2023/01/24		99	%	80 - 120
8465735	JHY	Method Blank	Dissolved Aluminum (Al)	2023/01/24	<5.0		ug/L	
			Dissolved Antimony (Sb)	2023/01/24	<1.0		ug/L	
			Dissolved Arsenic (As)	2023/01/24	<1.0		ug/L	
			Dissolved Barium (Ba)	2023/01/24	<1.0		ug/L	
			Dissolved Beryllium (Be)	2023/01/24	<0.10		ug/L	
			Dissolved Bismuth (Bi)	2023/01/24	<2.0		ug/L	
			Dissolved Boron (B)	2023/01/24	<50		ug/L	
			Dissolved Cadmium (Cd)	2023/01/24	<0.010		ug/L	
			Dissolved Calcium (Ca)	2023/01/24	<100		ug/L	
			Dissolved Chromium (Cr)	2023/01/24	<1.0		ug/L	
			Dissolved Cobalt (Co)	2023/01/24	<0.40		ug/L	
			Dissolved Copper (Cu)	2023/01/24	<0.50		ug/L	
			Dissolved Iron (Fe)	2023/01/24	<50		ug/L	
			Dissolved Lead (Pb)	2023/01/24	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2023/01/24	<100		ug/L	
			Dissolved Manganese (Mn)	2023/01/24	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2023/01/24	<2.0		ug/L	
			Dissolved Nickel (Ni)	2023/01/24	<2.0		ug/L	
			Dissolved Phosphorus (P)	2023/01/24	<100		ug/L	
			Dissolved Potassium (K)	2023/01/24	<100		ug/L	
			Dissolved Selenium (Se)	2023/01/24	<0.50		ug/L	
			Dissolved Silver (Ag)	2023/01/24	<0.10		ug/L	
			Dissolved Sodium (Na)	2023/01/24	<100		ug/L	
			Dissolved Strontium (Sr)	2023/01/24	<2.0		ug/L	
			Dissolved Thallium (Tl)	2023/01/24	<0.10		ug/L	
			Dissolved Tin (Sn)	2023/01/24	<2.0		ug/L	
			Dissolved Titanium (Ti)	2023/01/24	<2.0		ug/L	
			Dissolved Uranium (U)	2023/01/24	<0.10		ug/L	
			Dissolved Vanadium (V)	2023/01/24	<2.0		ug/L	
			Dissolved Zinc (Zn)	2023/01/24	<5.0		ug/L	
8465735	JHY	RPD	Dissolved Aluminum (Al)	2023/01/24	0.17		%	20
			Dissolved Antimony (Sb)	2023/01/24	NC		%	20
			Dissolved Arsenic (As)	2023/01/24	5.1		%	20
			Dissolved Barium (Ba)	2023/01/24	1.5		%	20
			Dissolved Beryllium (Be)	2023/01/24	6.2		%	20
			Dissolved Bismuth (Bi)	2023/01/24	NC		%	20
			Dissolved Boron (B)	2023/01/24	NC		%	20
			Dissolved Cadmium (Cd)	2023/01/24	1.8		%	20
			Dissolved Calcium (Ca)	2023/01/24	0.31		%	20
			Dissolved Chromium (Cr)	2023/01/24	NC		%	20
			Dissolved Cobalt (Co)	2023/01/24	NC		%	20
			Dissolved Copper (Cu)	2023/01/24	2.7		%	20
			Dissolved Iron (Fe)	2023/01/24	NC		%	20
			Dissolved Lead (Pb)	2023/01/24	NC		%	20
			Dissolved Magnesium (Mg)	2023/01/24	1.2		%	20
			Dissolved Manganese (Mn)	2023/01/24	0.29		%	20
			Dissolved Molybdenum (Mo)	2023/01/24	NC		%	20
			Dissolved Nickel (Ni)	2023/01/24	NC		%	20



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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Phosphorus (P)	2023/01/24	NC		%	20
			Dissolved Potassium (K)	2023/01/24	0.16		%	20
			Dissolved Selenium (Se)	2023/01/24	NC		%	20
			Dissolved Silver (Ag)	2023/01/24	NC		%	20
			Dissolved Sodium (Na)	2023/01/24	0.22		%	20
			Dissolved Strontium (Sr)	2023/01/24	0.27		%	20
			Dissolved Thallium (Tl)	2023/01/24	NC		%	20
			Dissolved Tin (Sn)	2023/01/24	NC		%	20
			Dissolved Titanium (Ti)	2023/01/24	NC		%	20
			Dissolved Uranium (U)	2023/01/24	1.4		%	20
			Dissolved Vanadium (V)	2023/01/24	NC		%	20
			Dissolved Zinc (Zn)	2023/01/24	0.83		%	20
8467781	EPU	Matrix Spike	Dissolved Mercury (Hg)	2023/01/25		105	%	80 - 120
8467781	EPU	Spiked Blank	Dissolved Mercury (Hg)	2023/01/25		102	%	80 - 120
8467781	EPU	Method Blank	Dissolved Mercury (Hg)	2023/01/25	<0.013		ug/L	
8467781	EPU	RPD	Dissolved Mercury (Hg)	2023/01/25	NC		%	20
8468537	EPU	Matrix Spike [UVZ341-02]	Dissolved Mercury (Hg)	2023/01/26		98	%	80 - 120
8468537	EPU	Spiked Blank	Dissolved Mercury (Hg)	2023/01/26		97	%	80 - 120
8468537	EPU	Method Blank	Dissolved Mercury (Hg)	2023/01/26	<0.013		ug/L	
8468537	EPU	RPD [UVZ340-02]	Dissolved Mercury (Hg)	2023/01/26	NC		%	20
8476003	JHY	Matrix Spike	Acid Extractable Antimony (Sb)	2023/01/31		80	%	75 - 125
			Acid Extractable Arsenic (As)	2023/01/31		94	%	75 - 125
			Acid Extractable Barium (Ba)	2023/01/31		NC	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/01/31		91	%	75 - 125
			Acid Extractable Bismuth (Bi)	2023/01/31		75	%	75 - 125
			Acid Extractable Boron (B)	2023/01/31		87	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/01/31		97	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/01/31		NC	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/01/31		92	%	75 - 125
			Acid Extractable Copper (Cu)	2023/01/31		NC	%	75 - 125
			Acid Extractable Lead (Pb)	2023/01/31		NC	%	75 - 125
			Acid Extractable Lithium (Li)	2023/01/31		93	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/01/31		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2023/01/31		97	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/01/31		NC	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/01/31		NC	%	75 - 125
			Acid Extractable Rubidium (Rb)	2023/01/31		92	%	75 - 125
			Acid Extractable Selenium (Se)	2023/01/31		96	%	75 - 125
			Acid Extractable Silver (Ag)	2023/01/31		97	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/01/31		89	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/01/31		94	%	75 - 125
			Acid Extractable Tin (Sn)	2023/01/31		NC	%	75 - 125
			Acid Extractable Uranium (U)	2023/01/31		95	%	75 - 125
			Acid Extractable Vanadium (V)	2023/01/31		NC	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/01/31		NC	%	75 - 125
8476003	JHY	Spiked Blank	Acid Extractable Antimony (Sb)	2023/01/31		94	%	75 - 125
			Acid Extractable Arsenic (As)	2023/01/31		94	%	75 - 125
			Acid Extractable Barium (Ba)	2023/01/31		91	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/01/31		92	%	75 - 125
			Acid Extractable Bismuth (Bi)	2023/01/31		94	%	75 - 125
			Acid Extractable Boron (B)	2023/01/31		94	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/01/31		95	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/01/31		94	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/01/31		94	%	75 - 125



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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Copper (Cu)	2023/01/31		94	%	75 - 125
			Acid Extractable Lead (Pb)	2023/01/31		94	%	75 - 125
			Acid Extractable Lithium (Li)	2023/01/31		94	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/01/31		96	%	75 - 125
			Acid Extractable Mercury (Hg)	2023/01/31		97	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/01/31		96	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/01/31		95	%	75 - 125
			Acid Extractable Rubidium (Rb)	2023/01/31		93	%	75 - 125
			Acid Extractable Selenium (Se)	2023/01/31		97	%	75 - 125
			Acid Extractable Silver (Ag)	2023/01/31		94	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/01/31		92	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/01/31		97	%	75 - 125
			Acid Extractable Tin (Sn)	2023/01/31		96	%	75 - 125
			Acid Extractable Uranium (U)	2023/01/31		94	%	75 - 125
			Acid Extractable Vanadium (V)	2023/01/31		95	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/01/31		97	%	75 - 125
8476003	JHY	Method Blank	Acid Extractable Aluminum (Al)	2023/01/31	<10		mg/kg	
			Acid Extractable Antimony (Sb)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Arsenic (As)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Barium (Ba)	2023/01/31	<5.0		mg/kg	
			Acid Extractable Beryllium (Be)	2023/01/31	<1.0		mg/kg	
			Acid Extractable Bismuth (Bi)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Boron (B)	2023/01/31	<50		mg/kg	
			Acid Extractable Cadmium (Cd)	2023/01/31	<0.30		mg/kg	
			Acid Extractable Chromium (Cr)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Cobalt (Co)	2023/01/31	<1.0		mg/kg	
			Acid Extractable Copper (Cu)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Iron (Fe)	2023/01/31	<50		mg/kg	
			Acid Extractable Lead (Pb)	2023/01/31	<0.50		mg/kg	
			Acid Extractable Lithium (Li)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Manganese (Mn)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Mercury (Hg)	2023/01/31	<0.10		mg/kg	
			Acid Extractable Molybdenum (Mo)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Nickel (Ni)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Rubidium (Rb)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Selenium (Se)	2023/01/31	<0.50		mg/kg	
			Acid Extractable Silver (Ag)	2023/01/31	<0.50		mg/kg	
			Acid Extractable Strontium (Sr)	2023/01/31	<5.0		mg/kg	
			Acid Extractable Thallium (Tl)	2023/01/31	<0.10		mg/kg	
			Acid Extractable Tin (Sn)	2023/01/31	<1.0		mg/kg	
			Acid Extractable Uranium (U)	2023/01/31	<0.10		mg/kg	
			Acid Extractable Vanadium (V)	2023/01/31	<2.0		mg/kg	
			Acid Extractable Zinc (Zn)	2023/01/31	<5.0		mg/kg	
8476003	JHY	RPD	Acid Extractable Aluminum (Al)	2023/01/31	0.29		%	35
			Acid Extractable Antimony (Sb)	2023/01/31	1.2		%	35
			Acid Extractable Arsenic (As)	2023/01/31	1.1		%	35
			Acid Extractable Barium (Ba)	2023/01/31	1.3		%	35
			Acid Extractable Beryllium (Be)	2023/01/31	NC		%	35
			Acid Extractable Bismuth (Bi)	2023/01/31	0.97		%	35
			Acid Extractable Boron (B)	2023/01/31	NC		%	35
			Acid Extractable Cadmium (Cd)	2023/01/31	0.60		%	35
			Acid Extractable Chromium (Cr)	2023/01/31	13		%	35
			Acid Extractable Cobalt (Co)	2023/01/31	3.2		%	35
			Acid Extractable Copper (Cu)	2023/01/31	194 (1)		%	35



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Iron (Fe)	2023/01/31	1.6		%	35
			Acid Extractable Lead (Pb)	2023/01/31	9.2		%	35
			Acid Extractable Lithium (Li)	2023/01/31	0.84		%	35
			Acid Extractable Manganese (Mn)	2023/01/31	3.4		%	35
			Acid Extractable Mercury (Hg)	2023/01/31	NC		%	35
			Acid Extractable Molybdenum (Mo)	2023/01/31	6.7		%	35
			Acid Extractable Nickel (Ni)	2023/01/31	1.7		%	35
			Acid Extractable Rubidium (Rb)	2023/01/31	4.3		%	35
			Acid Extractable Selenium (Se)	2023/01/31	1.7		%	35
			Acid Extractable Silver (Ag)	2023/01/31	NC		%	35
			Acid Extractable Strontium (Sr)	2023/01/31	12		%	35
			Acid Extractable Thallium (Tl)	2023/01/31	NC		%	35
			Acid Extractable Tin (Sn)	2023/01/31	15		%	35
			Acid Extractable Uranium (U)	2023/01/31	2.0		%	35
			Acid Extractable Vanadium (V)	2023/01/31	8.2		%	35
			Acid Extractable Zinc (Zn)	2023/01/31	46 (1)		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the 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).

(1) Poor RPD due to sample inhomogeneity. Verified by repeat digestion and analysis.



BUREAU
VERITAS

Bureau Veritas Job #: C319309
Report Date: 2023/02/23

AECOM Canada Ltd
Client Project #: 60680169
Site Location: MOOSELAND

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Colleen Acker, B.Sc, Scientific Service Specialist

Janah Rhyno, Metals Supervisor-Bedford



Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

Automated Statchk

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

Methyl Mercury Results

Flett Research Ltd.

440 DeSalabery Ave. Winnipeg, MB R2L 0Y7
 Fax/Phone (204) 667-2505

E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Bureau Veritas - Bedford: C319309

200 Bluewater Road, Suite 105
 Bedford, NS B4B 1G9

Date Received: January 25, 2023 and January 26, 2023
Sampling Date: January 19, 2023
Date Issued: February 21, 2023

Matrix: Sediment/Soil (dry)

Transaction ID: 1004
PO/Contract No.:
Date Analyzed: February 17, 2023
Analyst(s): Xiang W.

Analytical Method: M10241: Methyl Mercury in Sediment by Distillation, Aqueous Ethylation, Purge and Trap, and CVAFS - Tekran 2700 Mercury Analyser (Version 2)

Comments: Prior to analysis, a subsample of each wet sediment sample was freeze-dried. Some of the samples contained a large proportion of roots. If possible the roots were excluded from sub-samples taken for freeze drying but in many cases it was not possible to exclude them.

Once dry it was easier to exclude the roots from the sub-samples taken for analysis.

For sample PWSED7, duplicate subsamples of the wet sediment (DupA1 and Dup A2) were freeze-dried and then analysed to account for variability caused by the subsampling procedure.

Detection Limit: The method detection limit (MDL) for this method is 0.04 ng/dry g. The MDL is the minimum concentration that can be reported with 99% confidence that the measured concentration exceeds zero and is based on the distillation of 50 mg of dry sample and the analysis of 1mL of a 13mL distillate.

For reporting purpose samples are flagged when the dry concentration is below the methods minimum level (ML= 0.15 ng/g).
 As concentration rises above the MDL confidence that the analyte is present approaches 100% at and above the ML.

Estimated Uncertainty: Overall method uncertainty is expected to decrease as analyte concentration increases. When methyl mercury concentrations exceed the 0.2 ng/g the estimated uncertainty is ±26%. Method uncertainty is expressed at a 95% confidence level of (k=2).

Results authorized by Dr. Robert J. Flett, Chief Scientist

Blanks		Pg of CH ₃ Hg in the Ethylation Blank	Mean Gross Peak Area	CH ₃ Hg in the Ethylation Blank (ng/L)	Volume of solution in EPA vial is 30mL						
Ethylation blank (H ₂ O+Reagents)		0.20	9.41		0.007						
Mean Eth. Blank (last 30 runs)		0.15									
Net Pg CH ₃ Hg in the Method Blank (Eth. Blank subtracted)		Gross Peak Area	Equivalent CH ₃ Hg in the Method Blank (ng/g) (Eth. Blank subtracted)	Uses the Mean/Weight of all the samples in the batch							
Method Blank 1		0.39	28.21	0.153							
Method Blank 2		0.24	20.73	0.088							
Method Blank 3		0.18	17.85	0.067							
Mean Method Blank				0.103							
Mean Calibration Factor (area units / pg)		47.8 ± 2.9 %RSD									
QUALITY DATA	Spike Recovery Matrix Spike (MS) and Matrix Spike Duplicate (MSD)		Sample ID (Details)	Sample Type	Gross Peak Area	Weight of Distillate added to the Ethylation EPA Vial (g)	Total Weight of Distillate (g)	Weight of Sample added to the distiller (g)	% CH ₃ Hg Recovery Used for Calculations	Net CH ₃ Hg as Hg (ng/g)	CH ₃ Hg Recovery (%)
	UVZ334-02R (PWSEDDUP1)		MS1		8709.85	0.50	13.28	0.020	100%	240.02	92.5
			MS1D		8010.71	0.50	13.60	0.021	100%	216.67	99.3
			Mean of Spike Recoveries								95.9
QC Samples	Reference Material (RM)		FRES02 (23.9 ng/g)	(beginning of run)	2649.17	0.495	13.305	0.06050	100%	24.8	103.8
				(end of run)	2574.84	0.498	13.305	0.06050	100%	23.9	100.3
			Mean of RM Recoveries							24.4	102.1
Alternate Source Standard (A.S.S)		A.S.S.-Alfa ID1301 (1000 ng/L)			1514.03			100%	1049	104.9	
LAB ID	Sampling Details	Sample ID	Date Sampled	Time Sampled	Sample Type	Gross Peak Area	Weight of Distillate added to EPA Vial (g) =Vpd	Total Weight of the Distillate (g) = VTd	Weight of Dry Sample added to the distiller (g)	% CH ₃ Hg Recovery Used for Calculations	Net CH ₃ Hg as Hg in the sample (ng/g dry wt.) (Ethylation & Method Blank subtracted) [Recovery corrected] As Analyzed
113193	UVZ334-02R	PWSEDDUP1	January 19, 2023			343.94	0.502	13.443	0.0213	95.9%	8.82
113194	UVZ342-02R	PWSED1	January 19, 2023			247.02	0.502	13.439	0.0222	95.9%	5.91
113195	UVZ343-02R	PWSED2	January 19, 2023			860.85	0.506	13.439	0.0219	95.9%	22.2
113196	UVZ344-02R	PWSED3	January 19, 2023			1139.57	0.501	13.464	0.0235	95.9%	27.9
113197	UVZ345-02R	PWSED4	January 19, 2023			413.28	0.501	13.375	0.0322	95.9%	0.69
113198	UVZ346-02R	PWSED5	January 19, 2023			371.91	0.502	13.416	0.0206	95.9%	9.90
113199	UVZ347-02R	PWSED6	January 19, 2023			706.93	0.501	13.428	0.0213	95.9%	18.8
113457	UWL779-02R	PWSED7	January 19, 2023		DupA1	2056.02	0.500	13.568	0.0686	95.9%	17.6
113457sub	UWL779-02R	PWSED7	January 19, 2023		DupA2	2251.58	0.507	13.445	0.0675	95.9%	19.1

Q:\Clients A-L\Bureau Veritas - Bedford\2023\1004\Methyl Mercury\MTSEDD021723XW1.s

* : See 'Comments' section above for discussion.

This test report shall not be reproduced, except in full, without written approval of the laboratory.
 Note: Results relate only to the samples tested and as received.

Dup : Duplicate - two subsamples of the same sample carried through the analytical procedure in an identical manner.



Appendix D. Field Memos

Cory MacPhee
Project Manager
Build Nova Scotia Inc.
Harbourside Place
45 Wabana Court
Sydney, Nova Scotia, Canada

March 1, 2023

Project #
60680169

Dear Mr. MacPhee:

Subject: Mooseland Mine Sites – Acid Rock Drainage and Metal leaching Screening of Mooseland Waste Rock and Tailings

Introduction

AECOM Canada Ltd. (AECOM) was retained by Build Nova Scotia Inc. (BNS) to complete a Phase II Environmental Site Assessment (ESA) for the former Mooseland Mine Site located in Mooseland, Nova Scotia. To understand the acid rock drainage and metal leaching (ARD/ML) associated with the waste rock and tailings present at the Site and support remedial options analysis, two waste rock and one tailings samples were collected and sent to an accredited laboratory of geochemical testing. This technical memorandum summarizes the results of the ARD/ML screening.

Methodology




Two waste rock and one tailings samples were collected from the Site and send to Bureau Veritas in Burnaby, British Columbia for geochemical testing. The description of the samples is provided in Table 1 and their locations are shown in Figure 1, Appendix A. Laboratory testing included Acid-base accounting (ABA), ultra trace metal analysis, X-ray diffraction (XRD) and shake flask extraction (SFE). These tests are used for:

- ABA tests are used to determine the ratio of potentially acid generating and potentially acid consuming minerals in a sample and determine its acid potential.
- Ultra metal analysis is used to determine the solid phase metal content of the sample.
- XRD is used to determine the mineral composition and the sulphides and carbonates percentage contents.
- SFE test is used to determine the concentrations of readily soluble constituents that may be released in the short term via leaching by meteoric water (MEND, 2009).

The samples were classified into the one of the three categories below using the neutralization potential ratio (NPR) which is the ratio of the Modified Sobek NP (NP) over acid potential (AP) calculated from the total sulphur content (MEND, 2009):

- $NPR < 1$: the sample is considered potentially acid generating (PAG);
- $1 \leq NPR \leq 2$: the samples is considered uncertain potential for acid generation; and
- $NPR > 2$: the samples is considered not potentially acid generating (non-PAG).

Table 1: Description of Waste Rock and Tailings Samples

Sample ID	Material Type	Depth	Description	Photo
WR1	Waste Rock	Surface	Grey boulders and cobbles with some orange staining	
WR2	Waste Rock	Surface	Grey boulders and cobbles with some orange staining	
MW6 SA1 0-10"	Tailings	0-25 cm	Orange/Brown Oxidized Tailings	

Results and Discussion

The results of the static and mineralogical tests are discussed below, and laboratory reports are compiled in Appendix B.

1.1.1 Waste Rock

The waste rock consisted of two samples labelled WR-1 and WR-2. WR-1 was primarily composed of quartz (57.3 wt.%), aluminosilicates (42.3 wt.%; biotite, clinocllore, K-feldpsar, plagioclase, and illite-muscovite) and trace carbonates (0.4 wt.% calcite). Sulphide minerals were not identified in this sample. WR-2 consisted mainly of quartz (40 wt.%) and aluminosilicates (58.1 wt.%; biotite, clinocllore, K-feldpsar, plagioclase, and illite-muscovite). Contrary to WR-1, WR-2 did not contain any carbonate mineral, but 1.9 wt.% of the sample consisted of sulphides (e.g., arsenopyrite)

The ABA results showed that total sulphur ranged between 0.13 to 0.59 wt.% with the total sulphur in WR-2 being higher than WR-1 due to the presence of arsenopyrite. Total sulphur consisted mainly of non extractable sulphur as the sulphate sulphur and sulphide sulphur contents were low (<0.01 – 0.02 wt.%; <0.01 – 0.05 wt.%, respectively). The AP was conservatively calculated using total sulphur and ranged between 4.1 and 18.4 kg CaCO₃/t. The NP of the samples was comparable and ranged between 10.9 and 12 kg CaCO₃/t. The NPR calculated as the ratio of NP to AP ranged between 0.7 and 2.7 and indicated that WR-1 was non-PAG (NPR = 2.7) and WR-2 was PAG (NPR = 0.7).

To determine if the samples were depleted or enriched in metals, ultra trace metal results were compared to ten times (10x) the average crustal abundance value (Price, 1997) as per standard ARD/ML practice outlined in MEND (2009). The results showed that the concentration of arsenic was higher than the 10x the crustal abundance in both samples, while tellurium and gold were higher than the 10x the crustal abundance in only one sample (Appendix B). The concentration of arsenic was particularly elevated (40 to 400 times higher than the 10x the crustal abundance value), especially in WR-2 likely due to the presence of arsenopyrite.

The SFE test returned a circumneutral pH (7.67 - 8.89), low concentrations of sulphate (8.6 – 17 mg/L), acidity (<0.5 and 1.2 mg/L CaCO₃) and the alkalinity was higher than acidity (23 – 34 mg/L CaCO₃). Electric conductivity (EC), total dissolved solids (TDS), nitrate and carbonates species were also low (Appendix B). Sulphate levels in WR-2 were observed to be approximately twice the concentration in WR-1 due to its higher sulphur content.

The results of the SFE were compared to the Nova Scotia Tier I Environmental Quality Standards for the protection of freshwater aquatic life (EQS FAL; Nova Scotia Environment, 2021) to identify which elements may be released at concentration levels potentially exceeding the guidelines. Fluoride, aluminum and arsenic exceeded their respective guidelines in both samples and chromium, iron and lead only exceeded in the PAG sample WR-2. While the exceedances of the guidelines by fluoride, chromium, iron and lead were relatively marginal (1.1 to 3 times the guidelines), aluminum and arsenic significantly exceeded their respective guidelines. Arsenic concentrations were eighteen (18) times to two orders of magnitude higher than the guideline (0.005 mg/L) and aluminum concentrations were 5-7 times the guideline in both samples. This data suggests high potential of metal leaching from these samples. WR-2 had elevated total suspended solids (TSS) concentration (4,875 mg/L) indicating a potential for TSS issues from WR-2.

1.1.2 Tailings

The tailing sample (MW6 SA1 0-10") was predominantly composed of quartz (~86 wt.%) and minor amount of aluminosilicates (~14 wt.%: illite-muscovite, kaolinite, orthoclase, and albite). Sulphide and carbonate minerals were not identified in the sample indicating a geochemically inert material.

The ABA showed that all sulphur species were below the detection limit suggesting that acid generation is not expected, and the sample was classified as non-PAG (NPR = 63). Ultra trace metal analysis showed high arsenic (4,590 ppm), chromium (259 ppm) and mercury (2.9 ppm) in the sample. The pH of the SFE leachate was mildly acidic (6.23) and the concentration of constituents were in majority below the detection limit or very low, except notably TSS (1,333 mg/L), arsenic (4.08 mg/L) and mercury (0.00053 mg/L). Comparison of the SFE data against the Nova Scotia EQS FAL showed that arsenic, copper, iron, lead and mercury exceeded their guidelines. Copper, iron, lead and mercury concentrations were 4, 1.6, 2.8 and 20 times higher than their guidelines, respectively, and leachable arsenic concentration was 816 times the arsenic guideline. These data suggest high potential for metal leaching from this tailings sample like the waste rock.

Summary

The results of static and mineralogical tests show that the waste rock had variable potential for acid generation depending on sampling location and composition, while the tailings sample had low potential for acid generation. However, there is high potential for metal leaching associated with these samples. In particular, arsenic, aluminum, TSS and mercury may be released at high concentrations when exposed to leaching. Therefore, the waste rock and tailings should be managed in a manner to prevent leaching by meteoric water and the subsequent release of metals into the receiving environment. It is highly recommended to collect additional samples from the waste rock and tailings to ensure that a representative number of samples had been tested and refine the understanding of the ARD/ML risk.

The results of this testing will help inform the Remedial Option Analysis and indicate that the waste rock and tailings on-Site should be managed, the results are not expected to change the chosen remedial option. However, additional data should be collected to confirm that all materials on Site have been properly characterized for ARD/ML risk prior to finalizing remedial options.

Recommendations

To further refine this dataset and the knowledge of the extent of ARD/ML and based on the volume of waste rock and tailings on Site, AECOM recommends collecting three (3) additional waste rock samples and three (3) additional tailings samples from the Site. A sampling plan describing sampling methods and procedures in line with industry standards for the collection of waste rock and tailings samples will be developed for this program. The samples will be submitted to the laboratory for:

- ABA testing
- Ultra metal analysis
- XRD analysis
- SFE testing

To understand the effects of weathering on the waste rock and tailings geochemical conditions, AECOM recommends collecting these samples from various locations and depth in the waste rock piles and tailings deposits.

Closing

We trust that this assessment meets your need at this time. Should you have any questions, please contact the undersigned.

Sincerely,
AECOM Canada Ltd.

A handwritten signature in black ink, appearing to read 'Cheibany', is written over a horizontal line.

Cheibany Ould Elemine, PhD. P.Geo.

Senior Geochemist, Environment, Canada

A handwritten signature in black ink, appearing to read 'Rory McNeil', is written in a cursive style.

Rory McNeil, P.Eng.

Project Manager, Environment, Canada

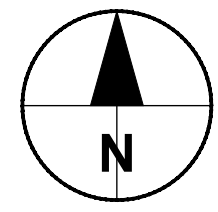
References

Mine Effluent Neutral Drainage (MEND). 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1. CANMET – Mining and Mineral Science Laboratories, Smithers, BC.

Nova Scotia Environment. 2021. Nova Scotia Tier I Environmental Quality Standards (EQS) for Surface Water and Groundwater Discharging to Surface Water ($\mu\text{g/L}$). September 2021.

Price, W.A. 1997. Draft Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia.

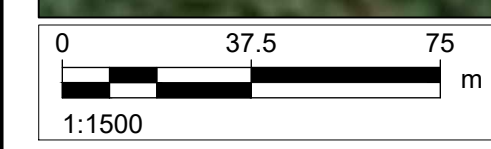
Appendix A – Figures



LEGEND

	MONITORING WELL SOIL SAMPLE
	TAILING SAMPLE
	TAILING DELINEATION SAMPLE
	WASTE ROCK SAMPLE
	HAND AUGER SOIL SAMPLE
	STAMP MILL HAND AUGER SOIL SAMPLE
	SAMPLE EXCEEDS GUIDELINE(S) FOR ONE OR MORE OF THE FOLLOWING PARAMETERS: ARSENIC AND/OR MERCURY

- DRAWING NOTES**
1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS.2010) NOVA SCOTIA ZONE 4. ELEVATIONS ARE IN METRES AND REFERENCED TO MEAN SEA LEVEL.
 2. ALL DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
 3. TOPOGRAPHIC SURVEY FROM SDMM CANADA.
 4. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/ AIRBUS DS, USDA, USGS, AEROGRIID, IGN AND THE GIS



Issue Status: DRAFT

Last saved by: DOBRER(2022-10-07) Last PictId: 2022-10-07
 Filename: C:\01_AECOM\001_PROJECT\13_SEAL_HARBOUR_UPDATED_SOIL_SAMPLES\09-29-2022\10-07-2022\FIGURE 5 - MOOSELAND - SOIL TAILINGS AND WASTE ROCK SAMPLE LOCATION PLAN.DWG

PHASE II ENVIRONMENTAL SITE ASSESSMENT

SOIL, TAILINGS AND WASTE ROCK SAMPLE LOCATION PLAN

Nova Scotia Lands Inc, Mooseland
 Project No.: 60680169 Date: 2022-10-07



Figure: 1

Appendix B – Laboratory Reports



Table 1: ABA Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Paste pH	Total Carbon	CO ₂	CaCO ₃ Equiv.	Total S	HCl Extractable Sulphur	HNO ₃ Extractable Sulphur	Non Extractable Sulphur (by diff.)	Acid Generation Potential	Mod. ABA Neutralization Potential	Fizz Rating	Net Neutralization Potential	Neutralization Potential Ratio
	Units	pH Units	wt%	wt%	Kg CaCO ₃ /T	wt%	wt%	wt%	wt%	Kg CaCO ₃ /T	Kg CaCO ₃ /T	N/A	Kg CaCO ₃ /T	N/A
AWX684	WR-1	9.40	0.09	0.12	2.7	0.13	<0.01	<0.01	0.13	<0.3	10.3	SLIGHT	10.3	#N/A
AWX685	WR-2	8.77	0.13	<0.08	<1.8	0.59	0.02	0.05	0.52	1.6	8.40	NONE	6.80	5.3
<i>Detection Limits</i>		N/A	0.02	0.08	1.8	0.02	0.01	0.01	0.02	0.3	N/A	0.1	0.1	N/A
<i>Bureau Veritas SOP #</i>		BBY0SOP	LECO	LECO	BBY WI-00033	LECO	BBY ARD-00009	BBY ARD-00009	BBY WI-00033	BBY WI-00033	BBY0SOP-00020	BBY0SOP-00	BBY WI-00033	BBY WI-00033

Notes:

Lawrence, R.W. 1991. Acid Rock Drainage Prediction Manual

Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M. (March 1978). Field and Laboratory Methods Applicable to Overburden and Minesoils, Report EPA-600/2-78-054, U.S. National Technical Information Service Report PB-280 495 pages 46-47.

References:

Acid Generation Potential = HNO₃ Extractable Sulphide Sulphur*31.25

CaCO₃ Equivalency = Carbonate Carbon (CO₂)*(100/44)*10

Fizz Rating - Reference method used is based on NP method.

HCl Extractable Sulphur and HNO₃ Extractable Sulphur is based on a modified version of ASTM Method D 2492-02

HCl Extractable Sulphur is based on a modified version of ASTM Method D 2492-02

Mod. ABA Neutralization Potential - MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.

Net Neutralization Potential = (Modified ABA Neutralization Potential)-(Acid Generation Potential (HNO₃ Extr))

Neutralization Potential Ratio = (Neutralization Potential)/(Acid Generation Potential)

Non Extractable Sulphur = (Total Sulphur)-(HCl Extractable Sulphate Sulphur)-(HNO₃ Extractable Sulphide Sulphur)

Paste pH - Field and Laboratory Methods Applicable to Overburdens and Minesoils, (EPA 600 / 2-78-054, March 1978).

Total sulphur, total carbon & carbonate carbon (CO₂, HCl direct method) by Leco done at Bureau Veritas Commodities Canada



Table 2: ABA QAQC Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Duplicate QC Sample ID	Paste pH Reported	Paste pH Dup	CO2 Reported	CO2 Dup	HCl Extractable Sulphur Reported	HCl Extractable Sulphur Dup	HNO3 Extractable Sulphur Reported	HNO3 Extractable Sulphur Dup	Mod. ABA Neutralization Potential Reported	Mod. ABA Neutralization Potential Dup	Fizz Rating Reported	Fizz Rating Dup
	Units	pH Units	pH Units	wt%	wt%	wt%	wt%	wt%	wt%	Kg CaCO3/T	Kg CaCO3/T	N/A	N/A
AWX684 Dup	WR-1	9.40	9.39			<0.01	<0.01	<0.01	<0.01	10.3	9.50	SLIGHT	SLIGHT
AWX685 Dup	WR-2			<0.08	<0.08								

Reference Material QC

Reference Material	Paste pH	Total Carbon	CO2	Total S	HCl Extractable Sulphur	HNO3 Extractable Sulphur	Mod. ABA Neutralization Potential Reported
RMATSS-2021 HNX (A640072) (0.12 wt%)						0.09	57
KZK-1ModS Slight (A688813) (58.9 Kg CaCO3/T)							
Paste pH - 8.91 (A7056491) (8.91 pH Units)	8.99						
ARD REF MAT GS311-1 (A750825) (1.02 wt%)		1.07		2.14			
ARD REF MAT GS311-1 (A750825) (2.33 wt%)			3.34		0.59		
CO2 COO2 (A751007) (3.3 wt%)							
RMATSS-2021 HCX (A640072) (0.72 wt%)					<0.01		
Blank QC							
Method Blank						<0.01	
Method Blank							-0.30
Method Blank		<0.02					
Method Blank			<0.08		<0.02		



Client:

AECOM Canada Ltd

Page 3 of 5

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Mo	Cu	Pb	Zn
	Units	ppm	ppm	ppm	ppm
AWX684	WR-1	0.61	15.7	8.76	37.9
AWX685	WR-2	0.69	33.4	22.0	64.3
QA/QC					
Blanks					
Method Blank					
Method Blank					
Method Blank		<0.01	<0.01	<0.01	<0.1
Reference Material					
BVGEO01 % (A750912)					
True Values BVGEO01 %					
Percent Difference (A750912)					
Reference Material					
BVGEO01 PPB (A750918)					
True Values BVGEO01 PPB					
Percent Difference (A750918)					
Reference Material					
BVGEO01 PPM (A750928)		9.75	4225.66	176.23	1660.2
True Values BVGEO01 PPM		10.8	4415	187	1741
Percent Difference (A750928)		-9.7	-4.3	-5.8	-4.6
Reference Material					
OREAS262 % (A750912)					
True Values OREAS262 %					
Percent Difference (A750912)					
Reference Material					
OR262 PPB (A750918)					
True Values OR262 PPB					
Percent Difference (A750918)					
Reference Material					
OREAS262 PPM (A750928)		0.58	105.06	52.72	143.5
True Values OREAS262 PPM		0.68	118	56	154
Percent Difference (A750928)		-14.7	-11.0	-5.9	-6.8
Detection Limits		0.01	0.01	0.01	0.1
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Ag	Ni	Co	Mn
	Units	ppb	ppm	ppm	ppm
AWX684	WR-1	83	19.4	7.3	433
AWX685	WR-2	353	31.0	11.5	512
QA/QC					
Blanks					
Method Blank					
Method Blank		<2			
Method Blank			<0.1	<0.1	<1
Reference Material					
BVGEO01 % (A750912)					
True Values BVGEO01 %					
Percent Difference (A750912)					
Reference Material					
BVGEO01 PPB (A750918)		2636			
True Values BVGEO01 PPB		2530			
Percent Difference (A750918)		4.2			
Reference Material					
BVGEO01 PPM (A750928)			155.9	23.5	693
True Values BVGEO01 PPM			163	25	733
Percent Difference (A750928)			-4.4	-6.0	-5.5
Reference Material					
OREAS262 % (A750912)					
True Values OREAS262 %					
Percent Difference (A750912)					
Reference Material					
OR262 PPB (A750918)		439			
True Values OR262 PPB		450			
Percent Difference (A750918)		-2.4			
Reference Material					
OREAS262 PPM (A750928)			56.7	24.6	504
True Values OREAS262 PPM			62	26.9	530
Percent Difference (A750928)			-8.5	-8.6	-4.9
Detection Limits		2	0.1	0.1	1
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Fe	As	U	Au
	Units	%	ppm	ppm	ppb
AWX684	WR-1	2.03	726	0.7	120
AWX685	WR-2	3.45	8000	1.0	35.3
QA/QC					
Blanks					
Method Blank		<0.01			
Method Blank					<0.2
Method Blank			<0.1	<0.1	
Reference Material					
BVGEO01 % (A750912)		3.57			
True Values BVGEO01 %		3.7			
Percent Difference (A750912)		-3.5			
Reference Material					
BVGEO01 PPB (A750918)					191.4
True Values BVGEO01 PPB					219
Percent Difference (A750918)					-12.6
Reference Material					
BVGEO01 PPM (A750928)			120.6	3.5	
True Values BVGEO01 PPM			121	3.77	
Percent Difference (A750928)			-0.3	-7.2	
Reference Material					
OREAS262 % (A750912)		3.06			
True Values OREAS262 %		3.284			
Percent Difference (A750912)		-6.8			
Reference Material					
OR262 PPB (A750918)					50.5
True Values OR262 PPB					72
Percent Difference (A750918)					-29.9
Reference Material					
OREAS262 PPM (A750928)			35.5	1.1	
True Values OREAS262 PPM			35.8	1.22	
Percent Difference (A750928)			-0.8	-9.8	
Detection Limits		0.01	0.1	0.05	0.2
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

**Table 3: Ultratrace Metals Test Results for
project MOOSELAND PHASE II FIELD
SAMPLING**

BV Labs Sample No	Sample ID	Th	Sr	Cd	Sb
	Units	ppm	ppm	ppm	ppm
AWX684	WR-1	5.2	8.9	0.05	0.25
AWX685	WR-2	7.6	11.5	0.14	1.68
QA/QC					
Blanks					
Method Blank					
Method Blank					
Method Blank		<0.1	<0.5	<0.01	<0.02
Reference Material					
BVGEO01 % (A750912)					
True Values BVGEO01 %					
Percent Difference (A750912)					
Reference Material					
BVGEO01 PPB (A750918)					
True Values BVGEO01 PPB					
Percent Difference (A750918)					
Reference Material					
BVGEO01 PPM (A750928)		14.4	57.6	6.45	2.16
True Values BVGEO01 PPM		14.4	55	6.5	2.2
Percent Difference (A750928)		0.0	4.7	-0.8	-1.8
Reference Material					
OREAS262 % (A750912)					
True Values OREAS262 %					
Percent Difference (A750912)					
Reference Material					
OR262 PPB (A750918)					
True Values OR262 PPB					
Percent Difference (A750918)					
Reference Material					
OREAS262 PPM (A750928)		8.8	33	0.64	2.03
True Values OREAS262 PPM		9.33	36	0.61	3.39
Percent Difference (A750928)		-5.7	-8.3	4.9	-40.1
Detection Limits		0.1	0.5	0.01	0.02
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Bi	V	Ca	P
	Units	ppm	ppm	%	%
AWX684	WR-1	0.21	30	0.29	0.044
AWX685	WR-2	0.76	37	0.22	0.056
QA/QC					
Blanks					
Method Blank				<0.01	<0.001
Method Blank					
Method Blank		<0.02	<2		
Reference Material					
BVGEO01 % (A750912)				1.27	0.074
True Values BVGEO01 %				1.3219	0.0727
Percent Difference (A750912)				-3.9	1.8
Reference Material					
BVGEO01 PPB (A750918)					
True Values BVGEO01 PPB					
Percent Difference (A750918)					
Reference Material					
BVGEO01 PPM (A750928)		23.96	70		
True Values BVGEO01 PPM		25.6	73		
Percent Difference (A750928)		-6.4	-4.1		
Reference Material					
OREAS262 % (A750912)				2.75	0.037
True Values OREAS262 %				2.98	0.04
Percent Difference (A750912)				-7.7	-7.5
Reference Material					
OR262 PPB (A750918)					
True Values OR262 PPB					
Percent Difference (A750918)					
Reference Material					
OREAS262 PPM (A750928)		0.93	20		
True Values OREAS262 PPM		0.98	22.5		
Percent Difference (A750928)		-5.1	-11.1		
Detection Limits		0.002	2	0.01	0.001
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	La	Cr	Mg	Ba
	Units	ppm	ppm	%	ppm
AWX684	WR-1	17.8	167	0.60	63.5
AWX685	WR-2	20.9	134	0.95	139
QA/QC					
Blanks					
Method Blank				<0.01	
Method Blank					
Method Blank		<0.5	<0.5		<0.5
Reference Material					
BVGEO01 % (A750912)				1.24	
True Values BVGEO01 %				1.2963	
Percent Difference (A750912)				-4.3	
Reference Material					
BVGEO01 PPB (A750918)					
True Values BVGEO01 PPB					
Percent Difference (A750918)					
Reference Material					
BVGEO01 PPM (A750928)		25.8	158.1		337.2
True Values BVGEO01 PPM		25.9	171		340
Percent Difference (A750928)		-0.4	-7.5		-0.8
Reference Material					
OREAS262 % (A750912)				1.09	
True Values OREAS262 %				1.17	
Percent Difference (A750912)				-6.8	
Reference Material					
OR262 PPB (A750918)					
True Values OR262 PPB					
Percent Difference (A750918)					
Reference Material					
OREAS262 PPM (A750928)		15.8	38.1		240.2
True Values OREAS262 PPM		15.9	41.7		248
Percent Difference (A750928)		-0.6	-8.6		-3.1
Detection Limits		0.5	0.5	0.01	0.5
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Ti	B	Al	Na
	Units	%	ppm	%	%
AWX684	WR-1	0.090	<20	1.09	0.051
AWX685	WR-2	0.150	<20	1.88	0.046
QA/QC					
Blanks					
Method Blank		<0.001		<0.01	<0.001
Method Blank					
Method Blank			<20		
Reference Material					
BVGEO01 % (A750912)		0.225		2.18	0.183
True Values BVGEO01 %		0.233		2.347	0.1924
Percent Difference (A750912)		-3.4		-7.1	-4.9
Reference Material					
BVGEO01 PPB (A750918)					
True Values BVGEO01 PPB					
Percent Difference (A750918)					
Reference Material					
BVGEO01 PPM (A750928)					
True Values BVGEO01 PPM					
Percent Difference (A750928)					
Reference Material					
OREAS262 % (A750912)		0.003		1.15	0.061
True Values OREAS262 %		0.003		1.204	0.071
Percent Difference (A750912)		0.0		-4.5	-14.1
Reference Material					
OR262 PPB (A750918)					
True Values OR262 PPB					
Percent Difference (A750918)					
Reference Material					
OREAS262 PPM (A750928)					
True Values OREAS262 PPM					
Percent Difference (A750928)					
Detection Limits		0.001	20	0.01	0.001
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	K	W	Sc	TI
	Units	%	ppm	ppm	ppm
AWX684	WR-1	0.51	0.8	3.4	0.20
AWX685	WR-2	1.16	3.8	4.8	0.45
QA/QC					
Blanks					
Method Blank		<0.01			
Method Blank					
Method Blank			<0.1	<0.1	<0.02
Reference Material					
BVGEO01 % (A750912)		0.83			
True Values BVGEO01 %		0.89			
Percent Difference (A750912)		-6.7			
Reference Material					
BVGEO01 PPB (A750918)					
True Values BVGEO01 PPB					
Percent Difference (A750918)					
Reference Material					
BVGEO01 PPM (A750928)			3.5	6.1	0.58
True Values BVGEO01 PPM			3.5	5.97	0.62
Percent Difference (A750928)			0.0	2.2	-6.5
Reference Material					
OREAS262 % (A750912)		0.29			
True Values OREAS262 %		0.295			
Percent Difference (A750912)		-1.7			
Reference Material					
OR262 PPB (A750918)					
True Values OR262 PPB					
Percent Difference (A750918)					
Reference Material					
OREAS262 PPM (A750928)			<0.1	3.1	0.44
True Values OREAS262 PPM			0.13	3.24	0.47
Percent Difference (A750928)			-100.0	-4.3	-6.4
Detection Limits		0.01	0.05	0.1	0.02
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Hg	Se	Te	Ga
	Units	ppb	ppm	ppm	ppm
AWX684	WR-1	15	<0.1	<0.02	4.8
AWX685	WR-2	12	<0.1	0.17	6.6
QA/QC					
Blanks					
Method Blank					
Method Blank		7			
Method Blank			<0.1	<0.02	<0.1
Reference Material					
BVGEO01 % (A750912)					
True Values BVGEO01 %					
Percent Difference (A750912)					
Reference Material					
BVGEO01 PPB (A750918)		87			
True Values BVGEO01 PPB		100			
Percent Difference (A750918)		-13.0			
Reference Material					
BVGEO01 PPM (A750928)			4.8	1.03	7.2
True Values BVGEO01 PPM			4.84	1.02	7.37
Percent Difference (A750928)			-0.8	1.0	-2.3
Reference Material					
OREAS262 % (A750912)					
True Values OREAS262 %					
Percent Difference (A750912)					
Reference Material					
OR262 PPB (A750918)		158			
True Values OR262 PPB		170			
Percent Difference (A750918)		-7.1			
Reference Material					
OREAS262 PPM (A750928)			0.3	0.22	3.8
True Values OREAS262 PPM			0.4	0.23	3.73
Percent Difference (A750928)			-25.0	-4.3	1.9
Detection Limits		5	0.1	0.02	0.1
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

**Table 3: Ultratrace Metals Test Results for
project MOOSELAND PHASE II FIELD
SAMPLING**

BV Labs Sample No	Sample ID	S
	Units	%
AWX684	WR-1	0.13
AWX685	WR-2	0.56
QA/QC		
Blanks		
Method Blank		<0.02
Method Blank		
Method Blank		
Reference Material		
BVGE001 % (A750912)		0.67
True Values BVGE001 %		0.6655
Percent Difference (A750912)		0.7
Reference Material		
BVGE001 PPB (A750918)		
True Values BVGE001 PPB		
Percent Difference (A750918)		
Reference Material		
BVGE001 PPM (A750928)		
True Values BVGE001 PPM		
Percent Difference (A750928)		
Reference Material		
OREAS262 % (A750912)		0.25
True Values OREAS262 %		0.253
Percent Difference (A750912)		-1.2
Reference Material		
OR262 PPB (A750918)		
True Values OR262 PPB		
Percent Difference (A750918)		
Reference Material		
OREAS262 PPM (A750928)		
True Values OREAS262 PPM		
Percent Difference (A750928)		
Detection Limits		0.02
Bureau Veritas SOP #		AQ250



Client:

AECOM Canada Ltd

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Table 4: MEND SFE Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Sample Weight	Volume Used	pH	EC
	Units	g	ml	pH Units	uS/cm
AWX684	WR-1	250	750	8.89	94
AWX685	WR-2	249	750	7.67	115
QAQC					
Duplicates					
AWX684 Dup	WR-1			8.82	95
Blanks					
AWX683	SFE BLANK	0	750	5.94	<1
AWX683 Dup	SFE BLANK				
Detection Limits				N/A	1
Bureau Veritas SOP #		BBY0SOP-000	BY0SOP-000	BY0SOP-000	BBY0SOP-0000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO2+NO3) minus Nitrite(NO2)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	SO4	Acidity to pH4.5	Acidity to pH8.3
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	8.6	<0.5	<0.5
AWX685	WR-2	17.0	<0.5	1.2
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.5	<0.5	<0.5
AWX683 Dup	SFE BLANK	<0.5		
Detection Limits		0.5	0.5	0.5
Bureau Veritas SOP #		BBY6SOP-0006	BY6SOP-0003	BBY6SOP-00037

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Total Alkalinity	Bicarbonate
	Units	mg/L	mg/L
AWX684	WR-1	23	27
AWX685	WR-2	24	30
QAQC			
Duplicates			
AWX684 Dup	WR-1		
Blanks			
AWX683	SFE BLANK	<0.5	<0.5
AWX683 Dup	SFE BLANK		
Detection Limits		0.5	0.5
Bureau Veritas SOP #	BB	BBY6SOP-00026	BY6SOP-0002

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Carbonate	Hydroxide	Fluoride
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	<0.5	<0.5	0.17
AWX685	WR-2	<0.5	<0.5	0.13
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.5	<0.5	<0.01
AWX683 Dup	SFE BLANK			
Detection Limits		0.5	0.5	0.01
Bureau Veritas SOP #		BBBY6SOP-0002	BBBY6SOP-0002	BBBY6SOP-0004

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Chloride	Total Organic Carbon	Dissolved Organic Carbon
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	2.8	2.0	2.1
AWX685	WR-2	2.7	2.0	3.1
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.5	0.5	<0.5
AWX683 Dup	SFE BLANK	<0.5		
Detection Limits		0.5	0.5	0.5
Bureau Veritas SOP #		BBY6SOP-000	BBY WI-0003	BBY6SOP-00010

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

Anions = Dissolved Sulphate*2/96+Total
Alkalinity*60/100*2/60 Cations = Dissolved
Aluminum*3/27+Dissolved
Calcium*2/40.08+Dissolved
Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved
Magnesium*2/24.3+Dissolved
Manganese*2/54.9+Dissolved
Potassium*1/39.1+Dissolved
Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

Table 4: MEND SFE Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Nitrate-N	Nitrite-N	Total Dissolved Phosphorus
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	<0.2	<0.05	0.036
AWX685	WR-2	<0.2	<0.05	0.192
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.2	<0.05	<0.005
AWX683 Dup	SFE BLANK		<0.05	
Detection Limits		0.02	0.005	0.005
Bureau Veritas SOP #	BB\	AB SOP-0000	BBY6SOP-00033	

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Total Ammonia	Total Dissolved Solids	Total Suspended Solids
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	0.283	66	140
AWX685	WR-2	0.255	50	4875
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.005	20	1
AWX683 Dup	SFE BLANK	<0.005	18	
Detection Limits		0.005	10	2
Bureau Veritas SOP #	BB\			

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

Anions = Dissolved Sulphate*2/96+Total
Alkalinity*60/100*2/60 Cations = Dissolved
Aluminum*3/27+Dissolved
Calcium*2/40.08+Dissolved
Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved
Magnesium*2/24.3+Dissolved
Manganese*2/54.9+Dissolved
Potassium*1/39.1+Dissolved
Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Hardness CaCO3	Dissolved Aluminum (Al)	Dissolved Antimony (Sb)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	20.8	0.486	0.000217
AWX685	WR-2	28.6	0.659	0.000435
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.50	0.00151	<0.000020
AWX683 Dup	SFE BLANK			
Detection Limits		0.50	0.00050	0.000020
Bureau Veritas SOP #		BB3BY WI-00033	BY7SOP-0000	BY7SOP-0000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Arsenic (As)	Dissolved Barium (Ba)	Dissolved Beryllium (Be)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	0.0907	0.00183	<0.000010
AWX685	WR-2	0.537	0.00531	0.000035
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	0.000022	0.000021	<0.000010
AWX683 Dup	SFE BLANK			
Detection Limits		0.000020	0.000020	0.000010
Bureau Veritas SOP #		BBBY7SOP-0000	BBBY7SOP-0000	BBBY7SOP-0000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Bismuth (Bi)	Dissolved Boron (B)	Dissolved Cesium (Cs)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	<0.0000050	<0.050	0.000269
AWX685	WR-2	0.0000344	<0.050	0.000398
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.0000050	<0.050	<0.000050
AWX683 Dup	SFE BLANK			
Detection Limits		0.0000050	0.050	0.000050
Bureau Veritas SOP #		BBBY7SOP-0000	BBBY7SOP-0000	BBBY7SOP-0000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Cadmium (Cd)	Dissolved Calcium (Ca)	Dissolved Chromium (Cr)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	<0.0000050	7.36	0.00032
AWX685	WR-2	0.0000154	8.49	0.00213
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.0000050	<0.050	0.00015
AWX683 Dup	SFE BLANK			
Detection Limits		0.0000050	0.050	0.00010
Bureau Veritas SOP #		BBBY7SOP-0006	BBBY7SOP-0000	BBBY7SOP-0000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Cobalt (Co)	Dissolved Copper (Cu)	Dissolved Lanthanum (La)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	0.0000869	0.000854	0.000122
AWX685	WR-2	0.000268	0.00116	0.00124
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.0000050	0.000095	<0.000050
AWX683 Dup	SFE BLANK			
Detection Limits		0.0000050	0.000050	0.000050
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Iron (Fe)	Dissolved Lead (Pb)	Dissolved Lithium (Li)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	0.0306	0.0000656	0.00631
AWX685	WR-2	0.895	0.00166	0.00393
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.0010	0.0000070	<0.00050
AWX683 Dup	SFE BLANK			
Detection Limits		0.0010	0.0000050	0.00050
Bureau Veritas SOP #		BBBY7SOP-00003	BBBY7SOP-00002	BBBY7SOP-00002

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Magnesium (Mg)	Dissolved Manganese (Mn)	Dissolved Phosphorus (P)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	0.583	0.00557	0.0173
AWX685	WR-2	1.79	0.0798	0.0396
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.050	0.000063	0.0022
AWX683 Dup	SFE BLANK			
Detection Limits		0.050	0.000050	0.0020
Bureau Veritas SOP #	BB	BY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Molybdenum (Mo)	Dissolved Nickel (Ni)	Dissolved Potassium (K)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	0.000249	0.00101	5.96
AWX685	WR-2	0.000223	0.00145	10.0
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.000050	0.000149	<0.050
AWX683 Dup	SFE BLANK			
Detection Limits		0.000050	0.000020	0.050
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Rubidium (Rb)	Dissolved Selenium (Se)	Dissolved Silicon (Si)	Dissolved Silver (Ag)
	Units	mg/L	mg/L	mg/L	mg/L
AWX684	WR-1	0.00958	0.000150	2.20	<0.0000050
AWX685	WR-2	0.0159	0.000189	2.47	0.0000166
QAQC					
Duplicates					
AWX684 Dup	WR-1				
Blanks					
AWX683	SFE BLANK	<0.000050	<0.000040	<0.10	<0.0000050
AWX683 Dup	SFE BLANK				
Detection Limits		0.000050	0.000040	0.10	0.0000050
Bureau Veritas SOP #		BBBY7SOP-0006	BY7SOP-0006	BY7SOP-0006	BY7SOP-0006

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total
- Alkalinity*60/100*2/60 Cations = Dissolved
- Aluminum*3/27+Dissolved
- Calcium*2/40.08+Dissolved
- Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved
- Magnesium*2/24.3+Dissolved
- Manganese*2/54.9+Dissolved
- Potassium*1/39.1+Dissolved
- Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Sodium (Na)	Dissolved Strontium (Sr)	Dissolved Sulphur (S)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	3.59	0.0145	<10
AWX685	WR-2	2.75	0.0147	<10
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.050	<0.000050	<10
AWX683 Dup	SFE BLANK			
Detection Limits		0.050	0.000050	10
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Tellurium (Te)	Dissolved Thallium (Tl)	Dissolved Thorium (Th)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	<0.000020	0.0000198	<0.000050
AWX685	WR-2	<0.000020	0.0000359	0.000323
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.000020	<0.0000020	<0.000050
AWX683 Dup	SFE BLANK			
Detection Limits		0.000020	0.0000020	0.000050
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Tin (Sn)	Dissolved Titanium (Ti)	Dissolved Tungsten (W)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	<0.00020	0.00323	0.000471
AWX685	WR-2	<0.00020	0.0459	0.000657
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.00020	<0.00050	<0.000010
AWX683 Dup	SFE BLANK			
Detection Limits		0.00020	0.00050	0.000010
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Uranium (U)	Dissolved Vanadium (V)	Dissolved Zinc (Zn)
	Units	mg/L	mg/L	mg/L
AWX684	WR-1	0.0000987	0.00135	0.00074
AWX685	WR-2	0.0000650	0.00144	0.00322
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.0000020	<0.00020	0.00070
AWX683 Dup	SFE BLANK			
Detection Limits		0.0000020	0.00020	0.00010
Bureau Veritas SOP #	BB	BBY7SOP-00002	BY7SOP-0000	BY7SOP-0000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

Table 4: MEND SFE Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Dissolved Zirconium (Zr)	Dissolved Mercury (Hg)	Anion Sum
	Units	mg/L	mg/L	N/A
AWX684	WR-1	<0.00010	<0.000050	0.73
AWX685	WR-2	0.00034	<0.000050	0.92
QAQC				
Duplicates				
AWX684 Dup	WR-1			
Blanks				
AWX683	SFE BLANK	<0.00010	<0.000050	
AWX683 Dup	SFE BLANK			
Detection Limits		0.00010	0.000050	
Bureau Veritas SOP #		BBY7SOP-0000	BY7SOP-00002	BBY WI-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Cation Sum	Balance %
	Units	N/A	N/A
AWX684	WR-1	0.80	4.72
AWX685	WR-2	1.07	7.70
QAQC			
Duplicates			
AWX684 Dup	WR-1		
Blanks			
AWX683	SFE BLANK		
AWX683 Dup	SFE BLANK		
Detection Limits			
Bureau Veritas SOP #		BBY WI-000	BBY WI-00033

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

ve.

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

AECOM Canada Ltd

Page 5 of 6

Table 5: Sample List Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample ID	Client Sample ID	Sample Form	Dry Weight Received (kg)
AWX684	WR-1	Waste Rock	4.60
AWX685	WR-2	Waste Rock	5.19
Total Weight			9.79
Total Samples Received			2

Note:

BVM File: VAN22002397



Table 5: Sample Summary for project MOOSELAND PHASE II FIELD SAMPLING

AECOM Canada Ltd, MOOSELAND PHASE II FIELD SAMPLING
Page 5 of 5

Date Samples Rec'd by BV Labs: 2 sample were rec'd on 28-JUN-2022

Sample Prep Conducted by BV Labs: YES

Date of Analysis: MENDSFE: 18-AUG-2022
NP-MABA: 18/19-AUG-2022
SO4HCLV: 16-AUG-2022
SO4HNO3V: 16-AUG-2022
PPHARD: 26-AUG-2022

Date Reported: 11-Oct-22

Client:	AECOM Canada Ltd
Client Project Name:	MOOSELAND PHASE II FIELD SAMPLING
Client Project No:	N/A
ARD Project #:	N/A
BV Labs Job No:	C249362
Contact Person:	Rory McNeil: rory.mcneil@aecom.com
E-mail Address:	Rory McNeil: rory.mcneil@aecom.com David Bugden: David.Bugden@Aecom.com

Data Validated by:	Tim O'Hearn
Position:	Senior Scientific Specialist, ARD

Sample Storage

Sample rejects (and selected test residues where applicable) have been archived
Standard archive protocol is archiving for samples for 3 months after testing is complete.
If archiving is required past 3 months a fee will be required.

QUANTITATIVE PHASE ANALYSIS OF TWO POWDER SAMPLES USING THE RIETVELD METHOD AND X-RAY POWDER DIFFRACTION DATA

Project: C249362 - Mooseland Phase II Field Sampling

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August 19, 2022

EXPERIMENTAL METHOD

The 2 samples of **Project C249362 - Mooseland Phase II Field Sampling** were reduced to the optimum grain-size range for quantitative X-ray analysis (<10 μm) by grinding under ethanol in a vibratory McCrone XRD Mill (Retsch GmbH, Germany) for 10 minutes. Continuous-scan X-ray powder-diffraction data were collected over a range of $3\text{-}80^\circ 2\theta$ with $\text{CoK}\alpha$ radiation on a Bruker D8 Advance Bragg-Brentano diffractometer equipped with an Fe filter foil, 0.6 mm (0.3°) divergence slit, incident- and diffracted-beam Soller slits and a LynxEye-XE detector. The long fine-focus Co X-ray tube was operated at 35 kV and 40 mA, using a take-off angle of 6° .

RESULTS

The X-ray diffractograms were analyzed using the International Centre for Diffraction Database PDF-4+ and Search-Match software by Bruker. X-ray powder-diffraction data of the samples were refined with Rietveld program Topas 4.2 (Bruker AXS). The results of quantitative phase analysis by Rietveld refinements are given in Table 1. These amounts represent the relative amounts of crystalline phases normalized to 100%. The Rietveld refinement plots are shown in Figures 1-2.

Table 1. Results of quantitative phase analysis (wt.%)

Mineral	Ideal Formula	1_AWX684_WR-1	2_AWX685_WR-2
Arsenopyrite	FeAsS		1.9
Biotite	$K(Mg,Fe^{2+})_3AlSi_3O_{10}(OH)_2$	4.7	9.5
Calcite	CaCO ₃	0.4 ?	
Clinocllore	$(Mg,Fe^{2+})_5Al(Si_3Al)O_{10}(OH)_8$	2.9	3.6
Illite-Muscovite 2M1	$K_{0.65}Al_{2.0}(Al_{0.65}Si_{3.35}O_{10})(OH)_2-KAl_2(AlSi_3O_{10})(OH)_2$	6.9	22.0
K-feldspar (orthoclase)	KAlSi ₃ O ₈	5.5	3.9
Plagioclase (albite; albite, calcian)	NaAlSi ₃ O ₈ -CaAl ₂ Si ₂ O ₈	22.3	19.1
Quartz	SiO ₂	57.3	40.0
Total		100.0	100.0

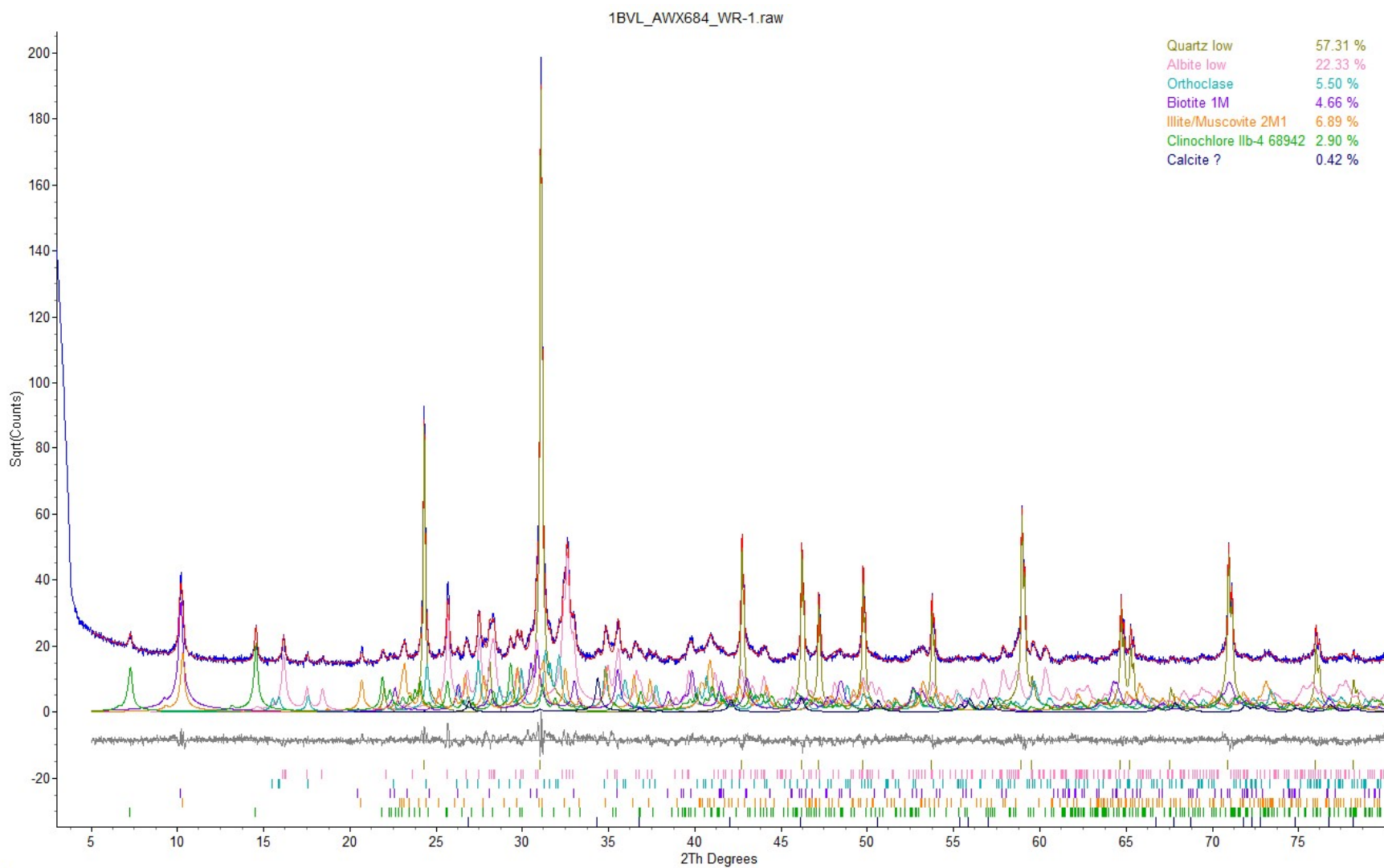


Figure 1. Rietveld refinement plot of sample **BV Labs – 1_AWX684_WR-1** (blue line - observed intensity at each step; red line - calculated pattern; solid grey line below - difference between observed and calculated intensities; vertical bars - positions of all Bragg reflections). Coloured lines are individual diffraction patterns of all phases.

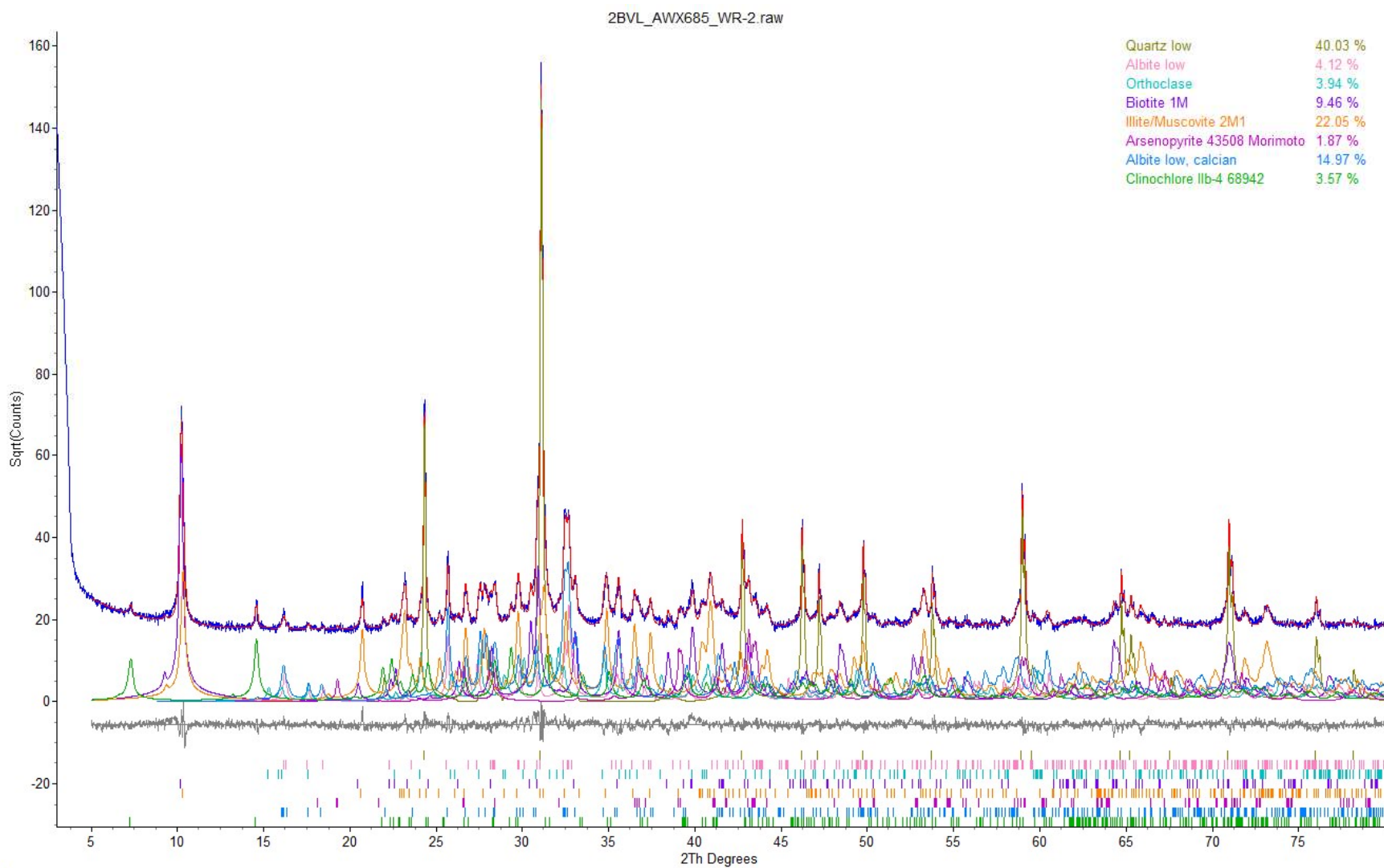


Figure 2. Rietveld refinement plot of sample **BV Labs – 2_AWX685_WR-2** (blue line - observed intensity at each step; red line - calculated pattern; solid grey line below - difference between observed and calculated intensities; vertical bars - positions of all Bragg reflections). Coloured lines are individual diffraction patterns of all phases.



Table 1: ABA Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Paste pH	Total Carbon	CO2	CaCO3 Equiv.	Total S	HCl Extractable Sulphur	HNO3 Extractable Sulphur	Non Extractable Sulphur (by diff.)	Acid Generation Potential	Mod. ABA Neutralization Potential	Fizz Rating	Net Neutralization Potential	Neutralization Potential Ratio
	Units	pH Units	wt%	wt%	Kg CaCO3/T	wt%	wt%	wt%	wt%	Kg CaCO3/T	Kg CaCO3/T	N/A	Kg CaCO3/T	N/A
AWX911	MW6 SA1 0-10"	7.09	0.12	<0.08	<1.8	<0.02	<0.01	<0.01	<0.02	<0.3	1.50	NONE	1.50	#N/A
Detection Limits		N/A	0.02	0.08	1.8	0.02	0.01	0.01	0.02	0.3	N/A	N/A	N/A	0.1
Bureau Veritas SOP #		BBY0SOP	LECO	LECO	BBY WI-00033	LECO	BBY ARD-00009	BBY ARD-00009	BBY WI-00033	BBY WI-00033	BBY0SOP-00020	BBY0SOP-00	BBY WI-00033	BBY WI-00033

Notes:

Lawrence, R.W. 1991. Acid Rock Drainage Prediction Manual

Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M. (March 1978), Field and Laboratory Methods Applicable to Overburden and Minesoils, Report EPA-600/2-78-054, U.S. National Technical Information Service Report PB-280 495 pages 46-47.

References:

Acid Generation Potential = HNO3 Extractable Sulphide Sulphur*31.25

CaCO3 Equivalency = Carbonate Carbon (CO2)*(100/44)*10

Fizz Rating - Reference method used is based on NP method.

HCl Extractable Sulphur and HNO3 Extractable Sulphur is based on a modified version of ASTM Method D 2492-02

HCl Extractable Sulphur is based on a modified version of ASTM Method D 2492-02

Mod. ABA Neutralization Potential - MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.

Net Neutralization Potential = (Modified ABA Neutralization Potential)-(Acid Generation Potential (HNO3 Extr))

Neutralization Potential Ratio = (Neutralization Potential)/(Acid Generation Potential)

Non Extractable Sulphur = (Total Sulphur)-(HCl Extractable Sulphate Sulphur)-(HNO3 Extractable Sulphide Sulphur)

Paste pH - Field and Laboratory Methods Applicable to Overburdens and Minesoils, (EPA 600 / 2-78-054, March 1978).

Total sulphur, total carbon & carbonate carbon (CO2; HCl direct method) by Leco done at Bureau Veritas Commodities Canada



Table 2: ABA QAQC Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Duplicate QC		Paste pH Reported	Paste pH Dup				HCl Extractable Sulphur Reported	HCl Extractable Sulphur Dup	HNO3 Extractable Sulphur Reported	HNO3 Extractable Sulphur Dup	Mod. ABA Neutralization Potential Reported	Mod. ABA Neutralization Potential Reported Dup	Fizz Rating Reported	Fizz Rating Dup
	Sample ID	Units													
AWX911 Dup	MW6 SA1 0-10"		7.09	7.11				<0.01	<0.01	<0.01	<0.01	1.50	1.30	NONE	NONE

Reference Material QC

	Paste pH
Units	pH Units

Reference Material

KZK-1 HNO3 SO4-S (A640073) (0.37 wt%)	
Paste pH - 8.91 (A698406) (8.91 pH Units)	8.91
KZK-1 ModS Slight (A708924) (58 g Kg CaCO3/T)	
ARD REF MAT GS311-1 (A738107) (1.02 wt%)	1.07
ARD REF MAT GS311-1 (A738107) (2.95 wt%)	3.34
CO2 COO2 (A738110) (3.3 wt%)	2.14
RMATSS-2021 HCX (A640072) (0.72 wt%)	0.52

Blank QC

Method Blank	<0.01
Method Blank	<0.01
Method Blank	<0.01
Method Blank	<0.01
Method Blank	<0.01
Method Blank	<0.01
Method Blank	<0.01

Total Carbon	CO2	Total S	HCl Extractable Sulphur
wt%	wt%	wt%	wt%

HNO3 Extractable Sulphur
wt%

Mod. ABA Neutralization Potential Reported
Kg CaCO3/T

1.07

3.34

2.14

0.52

0.28

58.80

<0.01

<0.02

<0.02

<0.01

0

<0.08



Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Mo	Cu	Pb	Zn
	Units	ppm	ppm	ppm	ppm
AWX911	MW6 SA1 0-10"	0.75	7.16	42.1	22.2
QA/QC					
Blanks					
Method Blank					
Method Blank					
Method Blank		<0.01	<0.01	<0.01	<0.1
Reference Material					
BVGEO01 % (A738112)					
True Values BVGEO01 %					
Percent Difference (A738112)					
Reference Material					
BVGEO01 PPB (A738117)					
True Values BVGEO01 PPB					
Percent Difference (A738117)					
Reference Material					
BVGEO01 PPM (A738144)		9.75	4225.66	176.23	1660.2
True Values BVGEO01 PPM		10.8	4415	187	1741
Percent Difference (A738144)		-9.7	-4.3	-5.8	-4.6
Reference Material					
OREAS262 % (A738112)					
True Values OREAS262 %					
Percent Difference (A738112)					
Reference Material					
OR262 PPB (A738117)					
True Values OR262 PPB					
Percent Difference (A738117)					
Reference Material					
OREAS262 PPM (A738144)		0.58	105.06	52.72	143.5
True Values OREAS262 PPM		0.68	118	56	154
Percent Difference (A738144)		-14.7	-11.0	-5.9	-6.8
Detection Limits		0.01	0.01	0.01	0.1
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Ag	Ni	Co	Mn
	Units	ppb	ppm	ppm	ppm
AWX911	MW6 SA1 0-10"	211	10.2	2.3	221
QA/QC					
Blanks					
Method Blank					
Method Blank		<2			
Method Blank			<0.1	<0.1	<1
Reference Material					
BVGEO01 % (A738112)					
True Values BVGEO01 %					
Percent Difference (A738112)					
Reference Material					
BVGEO01 PPB (A738117)		2636			
True Values BVGEO01 PPB		2530			
Percent Difference (A738117)		4.2			
Reference Material					
BVGEO01 PPM (A738144)			155.9	23.5	693
True Values BVGEO01 PPM			163	25	733
Percent Difference (A738144)			-4.4	-6.0	-5.5
Reference Material					
OREAS262 % (A738112)					
True Values OREAS262 %					
Percent Difference (A738112)					
Reference Material					
OR262 PPB (A738117)		439			
True Values OR262 PPB		450			
Percent Difference (A738117)		-2.4			
Reference Material					
OREAS262 PPM (A738144)			56.7	24.6	504
True Values OREAS262 PPM			62	26.9	530
Percent Difference (A738144)			-8.5	-8.6	-4.9
Detection Limits		2	0.1	0.1	1
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



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Client:

**Table 3: Ultratrace Metals Test Results for
project MOOSELAND PHASE II FIELD
SAMPLING**

BV Labs Sample No	Sample ID	Fe	As	U	Au
	Units	%	ppm	ppm	ppb
AWX911	MW6 SA1 0-10"	1.18	4590	0.2	384
QA/QC					
Blanks					
Method Blank		<0.01			
Method Blank					<0.2
Method Blank			<0.1	<0.05	
Reference Material					
BVGEO01 % (A738112)		3.57			
True Values BVGEO01 %		3.7			
Percent Difference (A738112)		-3.5			
Reference Material					
BVGEO01 PPB (A738117)					191.4
True Values BVGEO01 PPB					219
Percent Difference (A738117)					-12.6
Reference Material					
BVGEO01 PPM (A738144)			3.57	3.5	
True Values BVGEO01 PPM			121	3.77	
Percent Difference (A738144)			-97.0	-7.2	
Reference Material					
OREAS262 % (A738112)		3.06			
True Values OREAS262 %		3.284			
Percent Difference (A738112)		-6.8			
Reference Material					
OR262 PPB (A738117)					50.5
True Values OR262 PPB					72
Percent Difference (A738117)					-29.9
Reference Material					
OREAS262 PPM (A738144)			3.06	1.1	
True Values OREAS262 PPM			35.8	1.22	
Percent Difference (A738144)			-91.5	-9.8	
Detection Limits		0.01	0.1	0.05	0.2
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



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Client:

**Table 3: Ultratrace Metals Test Results for
project MOOSELAND PHASE II FIELD
SAMPLING**

BV Labs Sample No	Sample ID	Th	Sr	Cd	Sb
	Units	ppm	ppm	ppm	ppm
AWX911	MW6 SA1 0-10"	1.9	15.2	0.19	1.83
QA/QC					
Blanks					
Method Blank					
Method Blank					
Method Blank		<0.1	<0.5	<0.01	<0.02
Reference Material					
BVGEO01 % (A738112)					
True Values BVGEO01 %					
Percent Difference (A738112)					
Reference Material					
BVGEO01 PPB (A738117)					
True Values BVGEO01 PPB					
Percent Difference (A738117)					
Reference Material					
BVGEO01 PPM (A738144)		14.4	57.6	6.45	2.16
True Values BVGEO01 PPM		14.4	55	6.5	2.2
Percent Difference (A738144)		0.0	4.7	-0.8	-1.8
Reference Material					
OREAS262 % (A738112)					
True Values OREAS262 %					
Percent Difference (A738112)					
Reference Material					
OR262 PPB (A738117)					
True Values OR262 PPB					
Percent Difference (A738117)					
Reference Material					
OREAS262 PPM (A738144)		8.8	33	0.64	2.03
True Values OREAS262 PPM		9.33	36	0.61	3.39
Percent Difference (A738144)		-5.7	-8.3	4.9	-40.1
Detection Limits		0.1	0.5	0.01	0.02
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



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**Table 3: Ultratrace Metals Test Results for
project MOOSELAND PHASE II FIELD
SAMPLING**

BV Labs Sample No	Sample ID	Bi	V	Ca	P
	Units	ppm	ppm	%	%
AWX911	MW6 SA1 0-10"	0.82	8	0.14	0.029
QA/QC					
Blanks					
Method Blank				<0.01	<0.001
Method Blank					
Method Blank		<0.002	<2		
Reference Material					
BVGEO01 % (A738112)				1.75	0.074
True Values BVGEO01 %				1.3219	0.0727
Percent Difference (A738112)				32.4	1.8
Reference Material					
BVGEO01 PPB (A738117)					
True Values BVGEO01 PPB					
Percent Difference (A738117)					
Reference Material					
BVGEO01 PPM (A738144)		23.96	70		
True Values BVGEO01 PPM		25.6	73		
Percent Difference (A738144)		-6.4	-4.1		
Reference Material					
OREAS262 % (A738112)				2.75	0.037
True Values OREAS262 %				2.98	0.04
Percent Difference (A738112)				-7.7	-7.5
Reference Material					
OR262 PPB (A738117)					
True Values OR262 PPB					
Percent Difference (A738117)					
Reference Material					
OREAS262 PPM (A738144)		0.93	20		
True Values OREAS262 PPM		0.98	22.5		
Percent Difference (A738144)		-5.1	-11.1		
Detection Limits		0.002	2	0.01	0.001
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



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Client:

**Table 3: Ultratrace Metals Test Results for
project MOOSELAND PHASE II FIELD
SAMPLING**

BV Labs Sample No	Sample ID	La	Cr	Mg	Ba
	Units	ppm	ppm	%	ppm
AWX911	MW6 SA1 0-10"	8.2	259	0.10	32.4
QA/QC					
Blanks					
Method Blank				<0.01	
Method Blank					
Method Blank		<0.5	<0.5		<0.5
Reference Material					
BVGEO01 % (A738112)				1.24	
True Values BVGEO01 %				1.2963	
Percent Difference (A738112)				-4.3	
Reference Material					
BVGEO01 PPB (A738117)					
True Values BVGEO01 PPB					
Percent Difference (A738117)					
Reference Material					
BVGEO01 PPM (A738144)		25.8	158.1		337.2
True Values BVGEO01 PPM		25.9	171		340
Percent Difference (A738144)		-0.4	-7.5		-0.8
Reference Material					
OREAS262 % (A738112)				1.09	
True Values OREAS262 %				1.17	
Percent Difference (A738112)				-6.8	
Reference Material					
OR262 PPB (A738117)					
True Values OR262 PPB					
Percent Difference (A738117)					
Reference Material					
OREAS262 PPM (A738144)		15.8	38.1		240.2
True Values OREAS262 PPM		15.9	41.7		248
Percent Difference (A738144)		-0.6	-8.6		-3.1
Detection Limits		0.5	0.5	0.01	0.5
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Ti	B	Al	Na
	Units	%	ppm	%	%
AWX911	MW6 SA1 0-10"	0.012	<20	0.43	0.016
QA/QC					
Blanks					
Method Blank		<0.001		<0.01	<0.001
Method Blank					
Method Blank			<20		
Reference Material					
BVGEO01 % (A738112)		0.225		2.18	0.183
True Values BVGEO01 %		0.233		2.347	0.1924
Percent Difference (A738112)		-3.4		-7.1	-4.9
Reference Material					
BVGEO01 PPB (A738117)					
True Values BVGEO01 PPB					
Percent Difference (A738117)					
Reference Material					
BVGEO01 PPM (A738144)					
True Values BVGEO01 PPM					
Percent Difference (A738144)					
Reference Material					
OREAS262 % (A738112)		0.003		1.15	0.061
True Values OREAS262 %		0.003		1.204	0.071
Percent Difference (A738112)		0.0		-4.5	-14.1
Reference Material					
OR262 PPB (A738117)					
True Values OR262 PPB					
Percent Difference (A738117)					
Reference Material					
OREAS262 PPM (A738144)					
True Values OREAS262 PPM					
Percent Difference (A738144)					
Detection Limits		0.001	20	0.01	0.001
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



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Client:

**Table 3: Ultratrace Metals Test Results for
project MOOSELAND PHASE II FIELD
SAMPLING**

BV Labs Sample No	Sample ID	K	W	Sc	Tl
	Units	%	ppm	ppm	ppm
AWX911	MW6 SA1 0-10"	0.18	0.4	1.4	0.13
QA/QC					
Blanks					
Method Blank		<0.01			
Method Blank					
Method Blank			<0.05	<0.1	<0.02
Reference Material					
BVGEO01 % (A738112)		0.83			
True Values BVGEO01 %		0.89			
Percent Difference (A738112)		-6.7			
Reference Material					
BVGEO01 PPB (A738117)					
True Values BVGEO01 PPB					
Percent Difference (A738117)					
Reference Material					
BVGEO01 PPM (A738144)			3.5	6.1	0.58
True Values BVGEO01 PPM			3.5	5.97	0.62
Percent Difference (A738144)			0.0	2.2	-6.5
Reference Material					
OREAS262 % (A738112)		0.29			
True Values OREAS262 %		0.295			
Percent Difference (A738112)		-1.7			
Reference Material					
OR262 PPB (A738117)					
True Values OR262 PPB					
Percent Difference (A738117)					
Reference Material					
OREAS262 PPM (A738144)			<0.1	3.1	0.44
True Values OREAS262 PPM			0.13	3.24	0.47
Percent Difference (A738144)			-100.0	-4.3	-6.4
Detection Limits		0.01	0.05	0.1	0.02
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Hg	Se	Te	Ga
	Units	ppb	ppm	ppm	ppm
AWX911	MW6 SA1 0-10"	2910	<0.1	0.10	1.6
QA/QC					
Blanks					
Method Blank					
Method Blank		7			
Method Blank			<0.1	<0.02	<0.1
Reference Material					
BVGEO01 % (A738112)					
True Values BVGEO01 %					
Percent Difference (A738112)					
Reference Material					
BVGEO01 PPB (A738117)		87			
True Values BVGEO01 PPB		100			
Percent Difference (A738117)		-13.0			
Reference Material					
BVGEO01 PPM (A738144)			4.8	1.03	7.2
True Values BVGEO01 PPM			4.84	1.02	7.37
Percent Difference (A738144)			-0.8	1.0	-2.3
Reference Material					
OREAS262 % (A738112)					
True Values OREAS262 %					
Percent Difference (A738112)					
Reference Material					
OR262 PPB (A738117)		158			
True Values OR262 PPB		170			
Percent Difference (A738117)		-7.1			
Reference Material					
OREAS262 PPM (A738144)			0.3	0.22	3.8
True Values OREAS262 PPM			0.4	0.23	3.73
Percent Difference (A738144)			-25.0	-4.3	1.9
Detection Limits		5	0.1	0.02	0.1
Bureau Veritas SOP #		AQ250	AQ250	AQ250	AQ250



Client:

Table 3: Ultratrace Metals Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	S
	Units	%
AWX911	MW6 SA1 0-10"	<0.02
QA/QC		
Blanks		
Method Blank		<0.02
Method Blank		
Method Blank		
Reference Material		
BVGEO01 % (A738112)		0.67
True Values BVGEO01 %		0.6655
Percent Difference (A738112)		0.7
Reference Material		
BVGEO01 PPB (A738117)		
True Values BVGEO01 PPB		
Percent Difference (A738117)		
Reference Material		
BVGEO01 PPM (A738144)		
True Values BVGEO01 PPM		
Percent Difference (A738144)		
Reference Material		
OREAS262 % (A738112)		0.25
True Values OREAS262 %		0.253
Percent Difference (A738112)		-1.2
Reference Material		
OR262 PPB (A738117)		
True Values OR262 PPB		
Percent Difference (A738117)		
Reference Material		
OREAS262 PPM (A738144)		
True Values OREAS262 PPM		
Percent Difference (A738144)		
Detection Limits		0.02
Bureau Veritas SOP #		AQ250



Client:

AECOM Canada Ltd

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Table 4: MEND SFE Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample No	Sample ID	Sample Weight	Volume Used	pH	EC
	Units	g	ml	pH Units	uS/cm
*AWX911	MW6 SA1 0-10"	250	750	6.23	14
QAQC					
Duplicates					
AWX911 Dup	MW6 SA1 0-10"			6.25	14
Blanks					
AWX909	SFE BLANK	0	750	5.68	<1
AWX909 Dup	SFE BLANK				
Detection Limits				N/A	1
Bureau Veritas SOP #					

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	SO4	Acidity to pH4.5	Acidity to pH8.3
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	<0.5	<0.5	2.7
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.5	<0.5	<0.5
AWX909 Dup	SFE BLANK			
Detection Limits		0.5	0.5	0.5
Bureau Veritas SOP #		BBY6SOP-000	BY6SOP-0003	BY6SOP-00037

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total
 Alkalinity*60/100*2/60 Cations = Dissolved
 Aluminum*3/27+Dissolved
 Calcium*2/40.08+Dissolved
 Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved
 Magnesium*2/24.3+Dissolved
 Manganese*2/54.9+Dissolved
 Potassium*1/39.1+Dissolved
 Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Total Alkalinity	Bicarbonate
	Units	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	1.3	1.6
QAQC			
Duplicates			
AWX911 Dup	MW6 SA1 0-10"		
Blanks			
AWX909	SFE BLANK	<0.5	<0.5
AWX909 Dup	SFE BLANK		
Detection Limits		0.5	0.5
Bureau Veritas SOP #	BB	BBY6SOP-00026	BY6SOP-0002

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
 Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Carbonate	Hydroxide	Fluoride
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	<0.5	<0.5	0.03
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.5	<0.5	<0.01
AWX909 Dup	SFE BLANK			
Detection Limits		0.5	0.5	0.01
Bureau Veritas SOP #		BBBY6SOP-0002	BY6SOP-0002	BY6SOP-0004

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

- Anions = Dissolved Sulphate*2/96+Total
- Alkalinity*60/100*2/60 Cations = Dissolved
- Aluminum*3/27+Dissolved
- Calcium*2/40.08+Dissolved
- Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved
- Magnesium*2/24.3+Dissolved
- Manganese*2/54.9+Dissolved
- Potassium*1/39.1+Dissolved
- Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Chloride	Nitrate-N	Nitrite-N
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	0.9	<0.2	<0.05
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.5	<0.2	<0.05
AWX909 Dup	SFE BLANK			
Detection Limits		0.5	0.02	0.005
Bureau Veritas SOP #		BBY6SOP-000	BBY WI-0003	BBY6SOP-00010

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
 Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Total Dissolved Phosphorus	Total Ammonia	Total Dissolved Solids
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	1.46	0.026	16
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.005	<0.005	<10
AWX909 Dup	SFE BLANK	<0.005	<0.005	<10
Detection Limits		0.005	0.005	10
Bureau Veritas SOP #	BB\	AB SOP-0000	Y6SOP-0000	

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Total Suspended Solids	Total Organic Carbon	Dissolved Organic Carbon
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	1333	5.7	3.6
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	3.6	0.51	<0.5
AWX909 Dup	SFE BLANK			
Detection Limits		2	0.5	0.5
Bureau Veritas SOP #	BB33			

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total
Alkalinity*60/100*2/60 Cations = Dissolved
Aluminum*3/27+Dissolved
Calcium*2/40.08+Dissolved
Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved
Magnesium*2/24.3+Dissolved
Manganese*2/54.9+Dissolved
Potassium*1/39.1+Dissolved
Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Hardness CaCO3	Dissolved Aluminum (Al)	Dissolved Antimony (Sb)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	2.72	0.0349	0.00261
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.50	0.00113	<0.000020
AWX909 Dup	SFE BLANK			
Detection Limits		0.50	0.00050	0.000020
Bureau Veritas SOP #		BB3BY WI-00033	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO2+NO3) minus Nitrite(NO2)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
 Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Arsenic (As)	Dissolved Barium (Ba)	Dissolved Beryllium (Be)	Dissolved Bismuth (Bi)
	Units	mg/L	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	4.08	0.00057	<0.00010	0.000066
QAQC					
Duplicates					
AWX911 Dup	MW6 SA1 0-10"				
Blanks					
AWX909	SFE BLANK	<0.000020	0.000031	<0.000010	<0.0000050
AWX909 Dup	SFE BLANK				
Detection Limits		0.000020	0.000020	0.000010	0.0000050
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

- Anions = Dissolved Sulphate*2/96+Total
- Alkalinity*60/100*2/60 Cations = Dissolved
- Aluminum*3/27+Dissolved
- Calcium*2/40.08+Dissolved
- Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved
- Magnesium*2/24.3+Dissolved
- Manganese*2/54.9+Dissolved
- Potassium*1/39.1+Dissolved
- Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Boron (B)	Dissolved Cesium (Cs)	Dissolved Cadmium (Cd)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	<0.50	<0.00050	<0.000050
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.050	<0.000050	<0.0000050
AWX909 Dup	SFE BLANK			
Detection Limits		0.050	0.000050	0.0000050
Bureau Veritas SOP #		BBBY7SOP-0000	BBBY7SOP-0000	BBBY7SOP-0000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
 Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Calcium (Ca)	Dissolved Chromium (Cr)	Dissolved Cobalt (Co)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	1.09	<0.0010	0.000632
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.050	<0.00010	<0.0000050
AWX909 Dup	SFE BLANK			
Detection Limits		0.050	0.00010	0.0000050
Bureau Veritas SOP #		BBY7SOP-0000	BBY7SOP-0000	BBY7SOP-0000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
 Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Copper (Cu)	Dissolved Lanthanum (La)	Dissolved Iron (Fe)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	0.00801	<0.00050	0.489
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.000050	<0.000050	<0.0010
AWX909 Dup	SFE BLANK			
Detection Limits		0.000050	0.000050	0.0010
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
 Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Lead (Pb)	Dissolved Lithium (Li)	Dissolved Magnesium (Mg)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	0.00281	<0.0050	<0.50
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	0.0000067	<0.00050	<0.050
AWX909 Dup	SFE BLANK			
Detection Limits		0.0000050	0.00050	0.050
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total
 Alkalinity*60/100*2/60 Cations = Dissolved
 Aluminum*3/27+Dissolved
 Calcium*2/40.08+Dissolved
 Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved
 Magnesium*2/24.3+Dissolved
 Manganese*2/54.9+Dissolved
 Potassium*1/39.1+Dissolved
 Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Manganese (Mn)	Dissolved Phosphorus (P)	Dissolved Molybdenum (Mo)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	0.0455	0.058	<0.00050
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.000050	0.0020	<0.000050
AWX909 Dup	SFE BLANK			
Detection Limits		0.000050	0.0020	0.000050
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Nickel (Ni)	Dissolved Potassium (K)	Dissolved Rubidium (Rb)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	0.00350	<0.50	0.00154
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	0.000031	<0.050	<0.000050
AWX909 Dup	SFE BLANK			
Detection Limits		0.000020	0.050	0.000050
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Selenium (Se)	Dissolved Silicon (Si)	Dissolved Silver (Ag)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	<0.00040	<1.0	<0.000050
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.000040	<0.10	<0.0000050
AWX909 Dup	SFE BLANK			
Detection Limits		0.000040	0.10	0.0000050
Bureau Veritas SOP #		BBBY7SOP-0000	BY7SOP-0000	BY7SOP-0000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Sodium (Na)	Dissolved Strontium (Sr)	Dissolved Sulphur (S)	Dissolved Tellurium (Te)
	Units	mg/L	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	0.99	0.00242	<100	<0.00020
QAQC					
Duplicates					
AWX911 Dup	MW6 SA1 0-10"				
Blanks					
AWX909	SFE BLANK	<0.050	<0.000050	<10	<0.000020
AWX909 Dup	SFE BLANK				
Detection Limits		0.050	0.000050	10	0.000020
Bureau Veritas SOP #		BBBY7SOP-0006	BY7SOP-0006	BY7SOP-0006	BY7SOP-0006

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total
 Alkalinity*60/100*2/60 Cations = Dissolved
 Aluminum*3/27+Dissolved
 Calcium*2/40.08+Dissolved
 Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved
 Magnesium*2/24.3+Dissolved
 Manganese*2/54.9+Dissolved
 Potassium*1/39.1+Dissolved
 Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Thallium (Tl)	Dissolved Thorium (Th)	Dissolved Tin (Sn)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	0.000051	<0.00050	<0.0020
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.0000020	<0.000050	<0.00020
AWX909 Dup	SFE BLANK			
Detection Limits		0.0000020	0.000050	0.00020
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Titanium (Ti)	Dissolved Tungsten (W)	Dissolved Uranium (U)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	<0.0050	<0.00010	0.000023
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.00050	<0.000010	<0.0000020
AWX909 Dup	SFE BLANK			
Detection Limits		0.00050	0.000010	0.0000020
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Vanadium (V)	Dissolved Zinc (Zn)	Dissolved Zirconium (Zr)
	Units	mg/L	mg/L	mg/L
*AWX911	MW6 SA1 0-10"	<0.0020	0.0125	<0.0010
QAQC				
Duplicates				
AWX911 Dup	MW6 SA1 0-10"			
Blanks				
AWX909	SFE BLANK	<0.00020	0.00016	<0.00010
AWX909 Dup	SFE BLANK			
Detection Limits		0.00020	0.00010	0.00010
Bureau Veritas SOP #		BBBY7SOP-000	BY7SOP-000	BY7SOP-000

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

- Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
- Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Dissolved Mercury (Hg)	Anion Sum
	Units	mg/L	N/A
*AWX911	MW6 SA1 0-10"	0.00053	0.05
QAQC			
Duplicates			
AWX911 Dup	MW6 SA1 0-10"		
Blanks			
AWX909	SFE BLANK	<0.000050	
AWX909 Dup	SFE BLANK		
Detection Limits		0.000050	
Bureau Veritas SOP #	BB	BBY7SOP-00002	BBY WI-00033

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total Alkalinity*60/100*2/60
 Cations = Dissolved Aluminum*3/27+Dissolved Calcium*2/40.08+Dissolved Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved Magnesium*2/24.3+Dissolved Manganese*2/54.9+Dissolved Potassium*1/39.1+Dissolved Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

**Table 4: MEND SFE Test Results for project
MOOSELAND PHASE II FIELD SAMPLING**

BV Labs Sample No	Sample ID	Cation Sum	Balance %
	Units	N/A	N/A
*AWX911	MW6 SA1 0-10"	0.12	39.88
QAQC			
Duplicates			
AWX911 Dup	MW6 SA1 0-10"		
Blanks			
AWX909	SFE BLANK		
AWX909 Dup	SFE BLANK		
Detection Limits			
Bureau Veritas SOP #		BBBY WI-00033	BBBY WI-00033

Notes:

Calculated parameter based on the concentration of Nitrate plus Nitrite(NO₂+NO₃) minus Nitrite(NO₂)

*Sample was diluted 10x due to high concentration of As

References:

Anions = Dissolved Sulphate*2/96+Total
 Alkalinity*60/100*2/60 Cations = Dissolved
 Aluminum*3/27+Dissolved
 Calcium*2/40.08+Dissolved
 Copper*2/63.5+Dissolved Iron*2/55.8+Dissolved
 Magnesium*2/24.3+Dissolved
 Manganese*2/54.9+Dissolved
 Potassium*1/39.1+Dissolved
 Sodium*1/23+Dissolved Zinc*2/65.4

Hardness = (Calcium*2.497) + (Magnesium*4.118)



Client:

AECOM Canada Ltd

Page 5 of 6

Table 5: Sample List Test Results for project MOOSELAND PHASE II FIELD SAMPLING

BV Labs Sample ID	Client Sample ID	Sample Form	Dry Weight Received (kg)
AWX911	MW6 SA1 0-10"	Waste Rock	7.2770
Total Weight			7.28
Total Samples Received			1.00

Note:

BVM File: VAN22002524



Table 6: Sample Summary for project MOOSELAND PHASE II FIELD SAMPLING

AECOM Canada Ltd, MOOSELAND PHASE II FIELD SAMPLING

Page 6 of 6

Date Samples Rec'd by BV Labs: 1 sample were rec'd on 8-Aug-22

Sample Prep Conducted by BV Labs: YES

Date of Analysis: NP-MABA: 24/25-Aug-22
PPHARD: 26-Aug-22
SO4HCLV/SO4HNO3V: 23-Aug-22
MENDSFE: 24-Aug-22

Date Reported: 4-Oct-22

Client:	AECOM Canada Ltd
Client Project Name:	MOOSELAND PHASE II FIELD SAMPLING
Client Project No:	N/A
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BV Labs Job No:	C249386
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Sample Storage

Sample rejects (and selected test residues where applicable) have been archived
Standard archive protocol is archiving for samples for 3 months after testing is complete.
If archiving is required past 3 months a fee will be required.

**QUANTITATIVE PHASE ANALYSIS OF ONE POWDER SAMPLE USING THE
RIETVELD METHOD AND X-RAY POWDER DIFFRACTION DATA**

Project: C249386 - Mooseland Phase II Field Sampling

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August 26, 2022

EXPERIMENTAL METHOD

The 1 sample of **Project C249386 - Mooseland Phase II Field Sampling** was reduced to the optimum grain-size range for quantitative X-ray analysis ($<10\ \mu\text{m}$) by grinding under ethanol in a vibratory McCrone XRD Mill (Retsch GmbH, Germany) for 10 minutes. Continuous-scan X-ray powder-diffraction data were collected over a range of $3\text{-}80^\circ 2\theta$ with $\text{CoK}\alpha$ radiation on a Bruker D8 Advance Bragg-Brentano diffractometer equipped with an Fe filter foil, $0.6\ \text{mm}$ (0.3°) divergence slit, incident- and diffracted-beam Soller slits and a LynxEye-XE detector. The long fine-focus Co X-ray tube was operated at 35 kV and 40 mA, using a take-off angle of 6° .

RESULTS

The X-ray diffractogram was analyzed using the International Centre for Diffraction Database PDF-4 and Search-Match software by Bruker. X-ray powder-diffraction data of the sample were refined with Rietveld program Topas 4.2 (Bruker AXS). The results of quantitative phase analysis by Rietveld refinements are given in Table 1. These amounts represent the relative amounts of crystalline phases normalized to 100%. The Rietveld refinement plot is shown in Figure 1.

Table 1. Results of quantitative phase analysis (wt.%); Project: C249386 – Mooseland Phase II Field Sampling

Mineral	Ideal Formula	1_AWX911_MW6 SA1 0-10”
Illite-Muscovite 2M1	$K_{0.65}Al_{2.0}(Al_{0.65}Si_{3.35}O_{10})(OH)_2$ - $KAl_2(AlSi_3O_{10})(OH)_2$	6.0
Kaolinite	$Al_2Si_2O_5(OH)_4$	0.9
K-feldspar (orthoclase)	$KAlSi_3O_8$	3.5
Plagioclase (albite)	$NaAlSi_3O_8$ - $CaAl_2Si_2O_8$	3.7
Quartz	SiO_2	85.9
Total		100.0

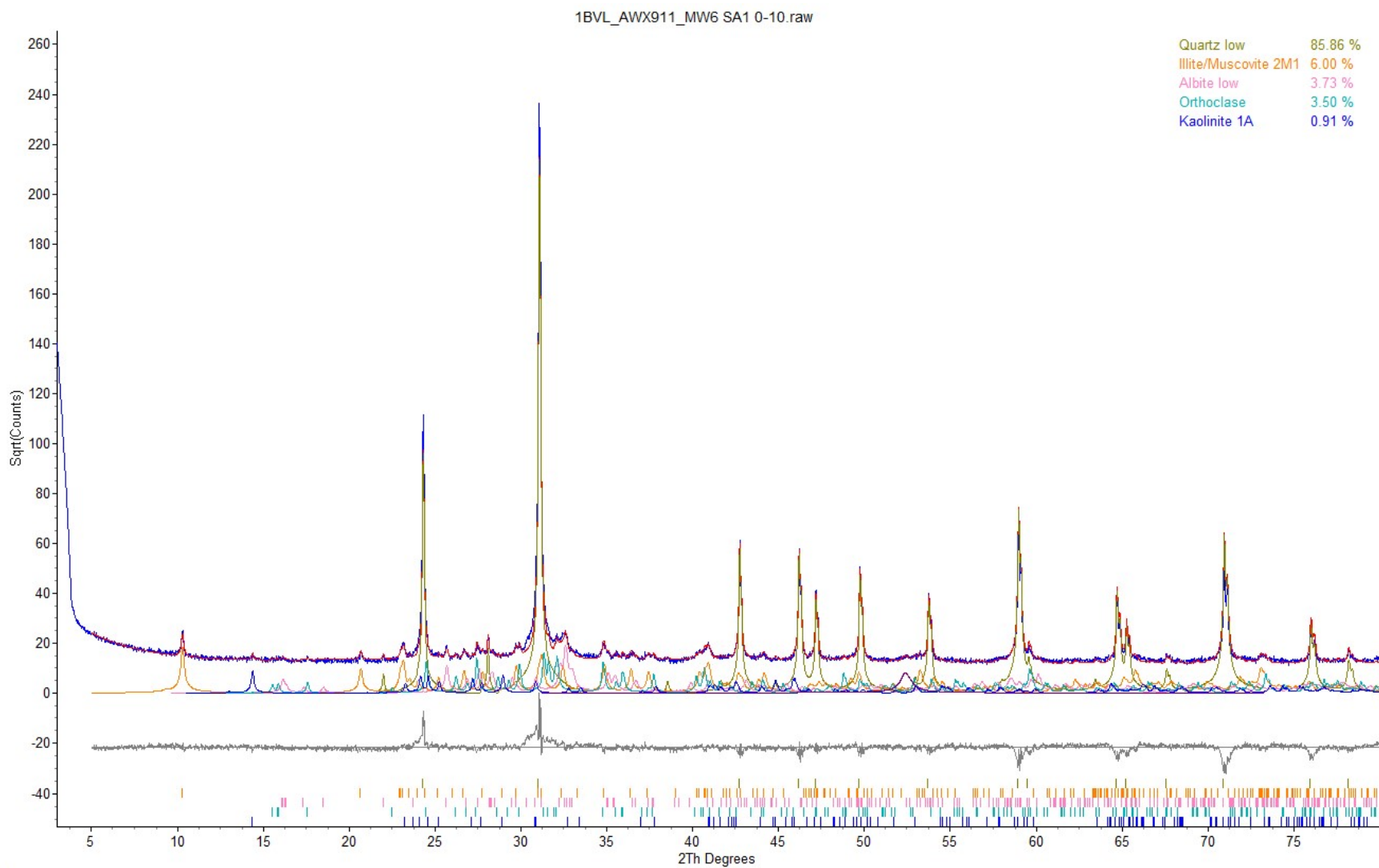


Figure 1. Rietveld refinement plot of sample **BV Labs - 1_AWX911_MW6 SA1 0-10** (blue line - observed intensity at each step; red line - calculated pattern; solid grey line below - difference between observed and calculated intensities; vertical bars - positions of all Bragg reflections). Coloured lines are individual diffraction patterns of all phases.

2023 Detailed Scope of Work for an Aquatic Tissues Field Program at the Mooseland Mine Site

Human Health and Ecological Risk Assessment

Build Nova Scotia

Project number: 60680169

March 2023

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1 Introduction

1.1 Background

The former Mooseland Mine Site (the Site) is a historic gold mine located at the civic address of 3630 Mooseland Road in Mooseland, NS (PID: 41019332). The Site is located in an area of historic mining activity in the Mooseland gold district. Mining and milling activities have been carried out intermittently in the area between 1861 and 1934. During operations, tailings from mining activities were discharged into nearby waterbodies including Sluice Brook and the Tangier River. It is estimated that 8,217 tonnes of tailings remain on the Site.

AECOM Canada Ltd. (AECOM) completed Phase I and II Environmental Site Assessments (ESA) of the Site for Build Nova Scotia (BNS). The Phase II ESA identified tailings containing elevated Arsenic (As) and Mercury (Hg) concentrations that may present a human health risk and adverse ecological effects, as well as impacts to surface water and sediments in the Tangier River.

Further environmental study and a quantitative Human Health and Ecological Risk Assessment (HHERA) is recommended to further understand extent and magnitude of contamination associated with the Site and to understand potential risks to humans and the environment as a result of exposure to site-derived contaminants.

To support a quantitative risk assessment, AECOM is pleased to provide BNS with the following detailed workplan for the proposed 2023 Aquatic Tissues Field Program at the Site to support the site-specific HHERA.

1.2 Purpose and Objectives

The Purpose of the proposed field program is to collect site-specific data related on contaminant uptake and concentrations into biotic tissues within the aquatic environment. The data-use objectives of this program are to provide a defensible estimate of substances of interest in fish tissues potentially being consumed by local populations, and to form a preliminary site-specific aquatic food-web model. This will be achieved through the collection of aquatic tissues from waterbodies with known Site-related impacts for analysis of contaminants of concern (COCs).

The objectives of the proposed field program are:

1. to collect aquatic tissue samples for analysis of COC concentrations by analytical laboratories
2. to acquire tissue chemistry datasets for four media types: benthic invertebrates, benthic feeding fish, forage fish, and sport fish
3. to provide a preliminary understanding of COC exposure to humans and ecological receptors, including the type and distribution of COC impacts and the magnitude of COCs in aquatic organisms

This report provides regional and Site background information for aquatic resources to support the planning of the aquatic tissues field program (Section 2) and details the proposed field study for collecting aquatic tissues from Site-impacted waterbodies (Section 3).

2 Information Review in Support of Aquatic Tissues Field Study

The following information has been summarized from publicly available reports, databases and other information sources, and is provided here to inform the study design for the aquatic tissues field program for the Site (Section 3).

2.1 Study Area

The former Mooseland Mine Site is a historic mine site located at the civic address of 3630 Mooseland Road in Mooseland, NS (PID: 41019332), which is approximately 24 km north of the town of Tangier, NS. This property is in a remote location, which spans 349.6 hectares (864.0 acres). This parcel of land is almost entirely undeveloped, except for a roadway (Mooseland Road) running through it (northwest to southeast), and sparse historical mining-related infrastructure (where the Site is situated). The Site is accessible by vehicle along Mooseland Road. The provincial Tangier Grand Lake Wilderness Area is located southwest of the Site and the Tangier River is located northeast of the Site (Appendix A, Figure 1).

The Site is positioned in the Eastern Interior Ecodistrict (440), which is characterized by highly visible bedrock in areas where the glacial till is very thin, and thick softwood forests where the till is thick (DNR, 2015). Ecodistrict 440 forests are primarily coniferous with overstory dominated by red spruce (*Picea rubens*), black spruce (*Picea mariana*), white pine (*Pinus strobus*), and balsam fir (*Abies balsamea*). On-site vegetation consists of a mixture of forest and shrubland. Sparse or stressed vegetation was noted in the areas of historic tailings and waste rock along the western bank of the Tangier River (AECOM, 2022). The elevation of the Site ranges between approximately 90-110 meters above sea level (masl), with a typical elevation of approximately 100 masl. Elevation tends to slope northeast towards the Tangier River where it flattens with a relatively consistent elevation of approximately 90 masl. Groundwater flow is expected to follow the regional topography, towards the Tangier River (northeast), located adjacent to the Site.

2.2 Contaminants of Concern

Historically, Mooseland Mine tailings were deposited on the banks of the Tangier River within the Site boundary. From investigations of on-site tailings, surface water, and sediment/soils, the Phase II ESA for the Site identified the primary contaminants of concern (COCs) for the aquatic portion of the Site as mercury¹ (Hg) and arsenic (As). Additionally, eleven (11) potential COCs (PCOCs) for further consideration were identified based available analytical data for soil tailings samples collected from areas impacted by historic mining activities at the Mooseland Site specifically, aluminum, antimony, beryllium, cadmium, cobalt, iron, lead, manganese, molybdenum, selenium and thallium.

Heavy metals, like mercury and arsenic, that are often found in tailings, may bioaccumulate or biomagnify in biota, and can cause toxicity. Bioaccumulation and biomagnification of COCs has bearing on the proposed field study design, as fish feeding guild, fish age (size) and trophic position all influence COC concentration in tissues.

2.3 Fish and Fish Habitat

2.3.1 Aquatic Features

The Site is on the banks of the Tangier River in Halifax County (Appendix A, Figure 1), within the 368 km² Tangier River Watershed. In the river segments closest to the Site, the Tangier River is classified as a small river (based on drainage area²) with a low gradient (<0.1% slope), cool temperature (19-21°C³) and low alkalinity (≤20 mg/L CaCO₃) (NCC 2019, NCC 2023). The Tangier River flows southeast past the Site towards German Lake and Hawbolts Farm Pool, then continues on as Tangier River, in and out of lakes, ultimately entering the Atlantic Ocean, near the

¹ Mercury occurs in a number of chemical forms in the environment. In fish, mercury is largely present as methylmercury (Bloom 1992). Thus, while the term “mercury” is often used generically in the context of fish, it is generally implicit that methylmercury is the specific form present unless stated otherwise.

² NCC 2019 defines a small river as having an upstream drainage area ≥100 km² and <518 km².

³ Mean summer temperature June, July, August, 1990-2016 (NCC 2019).

community of Tangier.⁴ From desktop study, the Tangier River is expected to have surface connectivity year-round and support fish communities with no fish passage barriers between the Site and the Atlantic Ocean.

Other bodies of water were documented on or near the Site during the Phase II ESA (AECOM, 2022) including the following:

- Sluice Brook - located on-site and originates from Sluice Lake (within provincial Tangier Grand Wilderness Area), located at the northwest border of the Site. Topographic maps indicate that Sluice Brook flows northeast into a wetland area on-site, and eventually into Tangier River. Historically, tailings had been deposited directly into this waterbody. It is unclear at this time if Sluice Brook is fish-bearing.
- Wetland areas - present on-site, adjacent to the Tangier River (identified as a swamp based on Nova Scotia Significant Species and Habitats Database), as well as north, northwest, and east of the Site.
- Moose Lake - located at the northwest border of the property boundary and does not appear to have surface connectivity to the Tangier River. There are no known records of tailings deposits to Moose Lake.
- On-site ponded waterbodies - located southeast and northwest of the Quonset huts. May be flooded former mine shafts. Neither waterbody has surface connectivity to the Tangier, nor is expected to be fish-bearing.
- Tributary of the Tangier River - located northwest of the Site.

2.3.2 Fish Species

Publicly available fish presence records were consulted to determine fish species with the potential to be found in waterbodies on or downstream of the Site (NSDFA, 2019; Stantec, 2018; DFO, 1986).⁵ Many of Nova Scotia's major rivers, including the Tangier, originate in the Eastern Interior Ecodistrict and support critical populations of fish species, including Atlantic salmon (*Salmo salar*) (DNR, 2015). The list of species with the potential to be present in the Tangier River system are provided in Table 1. For further information on individual species and their potential for inclusion in the proposed aquatic tissues field program, see Section 2.4.1.

⁴ Waterbody names for Tangier River segments varies depending on the resource consulted and include German Lake, Hawbolts Farm Pool, River Lake and Tangier River. Here we use Tangier River universally for the waterbody.

⁵ Touquoy Mine is located northwest of the Mooseland Mine Site within the same watershed and was a valuable resource for aquatics information, including a baseline fish survey (in Scraggy Lake) conducted in 2017.

Table 1. Fish species with documented presence in the Tangier River Watershed

Species	Scientific Name	Documented in river segments proximate to Site ¹
Alewife	<i>Alosa pseudoharengus</i>	Yes
American eel	<i>Anguilla rostrata</i>	Yes
Atlantic salmon	<i>Salmo salar</i>	
Banded killifish	<i>Fundulus diaphanous</i>	Yes
Brown bullhead	<i>Ameiurus nebulosus</i>	Yes
Brown trout	<i>Salmo trutta</i>	Yes (stocked)
Brook trout	<i>Salvelinus fontinalis</i>	Yes
Common shiner	<i>Notropis cornutus</i>	
Creek chub	<i>Semotilus atromaculatus</i>	
Golden shiner	<i>Notemigonus crysoleucas</i>	Yes
Lake chub	<i>Couesius plumbeus</i>	Yes
Lake whitefish	<i>Coregonus clupeaformis</i>	
Ninespine stickleback	<i>Pungitius pungitius</i>	Yes
Northern redbelly dace	<i>Phoxinus eos</i>	
Rainbow trout	<i>Salmo gairdneri</i>	
Smallmouth bass ²	<i>Micropterus dolomieu</i>	
White perch	<i>Morone americana</i>	Yes
White sucker	<i>Catostomus commersonii</i>	Yes
Yellow perch	<i>Perca flavescens</i>	Yes

¹ From NSDFA 2019, search terms: Tangier River, River Lake (downstream of Site), Grassy Lake (upstream of Site), Ferry Lake (upstream of Site)
²invasive alien species

Source: NSDFA, 2019; Stantec, 2018; Alexander, Kerekes, Sabean, 1986

2.3.2.1 Special Protections Species

There are no species at risk (SAR) species listed on Schedule 1 of the federal *Species at Risk Act* or critical habitat for those species within the Project Area (DFO aquatic Species at Risk map, accessed Feb 2023); however, there are two species of special conservation concern (SOCC) listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) that have the potential to occur within the Site area of influence: Atlantic salmon (*Salmo salar*) and American eel (*Anguilla rostrata*). In addition, brook trout (*Salvelinus fontinalis*) are listed as “sensitive” by the Nova Scotia Department of Natural Resources (NSDNR), though there is a provincial recreational fishery for this species. For further information on each species with conservation protections, see Section 2.4.1.

2.3.2.2 Invasive Fish Species

The two aquatic invasive alien species in freshwater ecosystems of greatest concern in Nova Scotia are the Chain Pickerel (*Esox niger*) and Smallmouth Bass (*Micropterus dolomieu*). Any instances of either of these species must be euthanized and reported to the province. As these species are consumed by humans, and therefore are of interest to the site-specific risk assessment if available as potential catch to recreational fishers in the watershed, if these species are caught during the proposed field program they should be used for tissue specimen.

2.3.2.3 Fish Consumption Advisories

The Nova Scotia Department of Environment and Climate Change has a fish consumption advisory in place province-wide for certain fish species due to mercury levels in fish tissues (NSDECC, n.d).⁶ These species include brook trout, yellow perch, white perch, chain pickerel, and smallmouth bass.

2.3.2.4 Regional Fish Tissue Datasets

A review of available data for aquatic species tissue chemistry was conducted to assess the range of concentrations in targeted fish, shellfish and benthic invertebrates from background and contaminated waterbodies of Nova Scotia (NS). Data collected focused on the following criteria:

- Published and unpublished data
- Targeted fish species, shellfish, and benthic invertebrates
- Tissue type specified (i.e., wholebody, muscle, etc.)
- As and Hg tissue concentrations with unit of measure provided
- Collected from NS waterbodies
- Tissue collected in the year 2000 onwards

Province-wide data was collated and tabulated. This dataset and data sources are provided in Appendix D to the draft Updated Phase II ESA report (AECOM 2023). Data specific to the Tangier watershed was limited to just one study by Stantec (2019) where muscle and wholebody tissue concentrations for As and Hg were reported from white sucker and yellow perch in Scraggy Lake (upstream of the Site). Tissue concentrations in Scraggy Lake, which is considered to be an impacted waterbody, are provide in Table 2.

Table 2. Scraggy Lake (of the Tangier Watershed) aquatic tissue chemistry data (concentration provided in mg/kg wet weight).

Site	Species	Tissue Type	As	Hg
Impacted - FF	White sucker	Wholebody	0.073-0.13	0.115-0.167
	Yellow Perch	Muscle tissue	0.023-0.053	0.311-0.463
		Wholebody	0.04-0.16	0.15-0.25
Impacted - NF	White sucker	Wholebody	0.0826-0.187	0.182-0.348
	Yellow perch	Muscle tissue	0.039-0.070	0.661-0.815
		Wholebody	0.037-0.136	0.335-0.581

Notes: NF = near field. FF = far field

2.4 Proposed Media and Species for Aquatic Tissues Field Study

Here we outline the rationale for collecting aquatic media for a proposed field program in support of a Site-specific HHERA. Tissue samples will be analysed for metals concentrations including mercury and arsenic, Site COCs. For discussion of Site COCs and their behaviour in biotic tissues, see Section 2.2.

Benthic Invertebrates (benthos): infaunal invertebrates (invertebrates living within the substrate) are in direct contact with the river bottom/lake bottom substrate. In the case of the Site, the river substrate may include historic mine tailings. Measuring benthos COC concentrations investigates the pathway of contaminant transfer from abiotic

⁶ <https://novascotia.ca/nse/fish-consumption-advisory.asp>

media (porewater and sediment) to biotic media (invertebrates) to inform an understanding of the possibility of contaminant exposure to higher trophic levels feeding on benthos. For the aquatic tissues field program, we recommend the collection of composite (all taxa) samples of benthic macroinvertebrates for tissue metals analysis. Additionally, we recommend paired sediment and porewater sampling for low-level metals chemistry analysis.

Benthic Feeding Fish: fish that feed in, at, or near the river or lake bottom are by definition, benthic feeding. These fish may be prey (smaller/younger individuals) consumed by birds, wildlife or other fish, and/or may be eaten by humans (larger/older individuals). This feeding guild is of particular interest for the HHERA as the Site tailings located on the shore of the Tangier River are considered to be the primary source of contaminants to the aquatic food web. For the aquatic tissues field program, we recommend the collection of whole-body samples from benthic feeding fish for targeted species for chemistry analysis.

Forage Fish: forage fish are prey fish commonly consumed by avifauna, wildlife and other fish. They are fish small in size, on account of species or life stage (juvenile). Forage fish can be found in the pelagic or benthic food web, which impacts relative exposure to abiotic media (water column vs bottom substrate), what they feed on, and what feeds on them. Measuring forage fish COC concentrations will inform an understanding of the possibility of contaminant exposure for higher trophic levels feeding on forage fish (such as piscivorous birds, wildlife and fishes). For the aquatic tissues field program, we recommend the collection of composite (multiple fish) samples of forage fish from the near-shore environment for chemistry analysis.

Sport Fish: sport fish are fish targeted by recreational fishers. Sport fish are usually large-bodied fish, often upper trophic level species, and preferentially consumed by humans. COC exposure and uptake occurs largely through bioaccumulation and food-web transfer. Measuring sport fish COC concentrations will provide an understanding of the contaminant exposure to humans as well as other ecological receptors consuming upper trophic level fish species. For the aquatic tissues field program, we recommend the collection of muscle (fillet) samples from sport fish for targeted species for chemistry analysis.

2.4.1 Targeted Species

2.4.1.1 Criteria

Criteria for individual fish species inclusion in the proposed aquatic tissues field program includes the following:

- Human Health Risk (benthic feeding fish and sport fish)
 - Species consumed by humans
 - Known regional sport fish (targeted by recreational fishers in the region)
 - Potential to have high COC tissue concentrations due to close contact with contaminated media (benthic environment), bioaccumulation (long lived species) and biomagnification (species at top of the food chain)
 - Expected to be present in the Tangier River segments proximate to Site
 - Upper trophic level invasive species, as lethal sampling is required.
- Ecological Risk (benthic feeding fish and forage fish)
 - Species consumed by piscivorous fish, avifauna and wildlife
 - High site fidelity (residency at capture site for large proportion of life cycle)
 - Situated in benthic food web (close contact with contaminant source)
 - Expected to be present in the Tangier River segments proximate to site
 - Upper trophic level invasive species, as lethal sampling is required.

A selection of fish species identified in the Tangier River have been investigated for potential inclusion in the HHERA, based on regional data availability, life history characteristics, and presence in the Tangier River segments proximate to the Site. As discussed above, fish have been loosely divided into three categories: benthic feeders, forage fish, and sport fish. The rationale for collecting (or not collecting) each species is provided below, in Table 3.

Table 3. Summary of Proposed Target Fish Species by Feeding Guild.

Fish Feeding Guild	Target Species	Comment
Benthic Feeding Fish (Support ecological and human health risk assessment)	American eel, Brown bullhead, White sucker	Species are in the benthic foodweb and also happen to be in recreational fishery. Species selected depends on catch numbers and sizes. A range of fish sizes should be collected. Historical chemistry data is available for White sucker.
Forage Fish (Support ecological risk assessment)	Banded killifish, Golden Shiner, Lake chub, Ninespine stickleback, Creek chub, Common shiner	Can collect all species (combined as composite samples). If catch numbers are high, could submit composites as species-specific.
Sport Fish (Support human health risk assessment)	Brook trout, Brown trout, White perch, Yellow perch Invasive Species: Smallmouth bass, Chain pickerel	Species are targeted in recreational fishery. Species selected depends on catch numbers and sizes. Note that invasive species are prime candidates; however, it is not expected as a high catch in the Tangier watershed. A range of fish sizes should be collected. Historical chemistry data is available for Yellow perch.

2.4.1.2 Benthic Feeding Fish

American eel (*Anguilla rostrata*): are catadromous, spending the majority of their lives in freshwater and moving to the ocean to spawn. Migrating elvers (juvenile eel) are bottom dwellers and spend most of their time burrowed or hidden, including directly into soft bottom sediments (Tomie, 2011). American eel are frequently found in watercourses that offer structural complexity and shade in the form of coarse woody debris, rocks, in-stream vegetation for daytime cover, and an available food source of forage fish, invertebrates, molluscs and vegetation. American eel is part of the Nova Scotia recreational fishery (sport fish for human consumption), and it is legal to use American eel as a bait fish to capture other sport fish.

American eel are listed as “threatened” by COSEWIC but are not protected under Schedule 1 of SARA, and, while other maritime provinces do afford this species protections, Nova Scotia does not. The Nova Scotia Angler’s handbook does not permit the capture of American eel <53 cm and maximum bag limit of 10 fish (Due to this species close contact with bottom substrate and residency in the freshwater system for much of the lifecycle, American eel are recommended as a targeted species for the 2023 field program.

Brown bullhead (*Ameiurus nebulosus*): are bottom dwellers that prefer sluggish and warm water in slow-moving streams, ponds, and lakes with abundant aquatic vegetation. They are resistant to increased levels of pollution and tolerant of low oxygen concentrations and temperatures up to 31.6 °C (Scott and Crossman, 1973). They are considered omnivorous night-feeders and will forage on all types of plant and animal materials that they locate. Brown bullhead is part of the Nova Scotia recreational fishery (sport fish for human consumption) though it is not legal to use brown bullhead as a bait fish to capture other sport fish. Due to this species close contact with bottom substrate and residency in the freshwater system for their entire lifecycle, brown bullhead is recommended as a targeted species for the 2023 field program.

White sucker (*Catostomus commersonii*): are generalist bottom dwellers found in warm, shallow water areas of lakes, rivers, and quiet streams. They feed on the lake/riverbed on worms, clams, insect larvae and occasionally fish eggs (DFO, 2016). White suckers spawn in May-June when they migrate into small streams and tributaries with water temperatures of 10-18°C. Adults leave spawning grounds after a short period of time and return to the river or lake which they originated from (Scott and Crossman 1973). White suckers are known to be able to survive adverse water conditions that other fish species cannot tolerate and are often used as environmental monitors for toxic chemicals (DFO, 2016). Brook trout, Atlantic salmon and other piscivores feed on white sucker (DFO, 2016). While they are not widely targeted by anglers white sucker is part of the Nova Scotia recreational fishery (sport fish for human consumption). It is legal to use white sucker as a bait fish to capture other sport fish. Historical chemistry data is

available for white sucker in the watershed (see Section 2.3.2). Due to this species close contact with bottom substrate and residency in the freshwater system for their entire lifecycle, White sucker are recommended as a targeted species for the 2023 field program.

2.4.1.3 Forage Fish

Alewife (*Alosa pseudoharengus*): aka kiack, kyack, sawbelly, mooneye and gaspereau. An anadromous or landlocked species of pelagic fish, with a typical adult reaching 30 cm fork length. Adults spend multiple years at sea before returning to natal streams in the spring to spawn. Commercial and sport fisheries target this species during upstream migration, as a baitfish for other fisheries, and for human consumption. As this species is expected to inhabit the Site for only a fraction of its lifecycle, alewife is not recommended as a targeted species for the 2023 field program.

Banded killifish (*Fundulus diaphanous*): are freshwater habitat generalists found within the quiet waters of lakes, ponds, and sluggish streams, tolerating a broad temperature, salinity, and DO range (COSEWIC, 2014). Seasonal movement by the species has not been documented, and it is not considered migratory (COSEWIC, 2014).

Golden Shiner (*Notemigonus crysoleucas*): are habitat generalists, primarily found in schooling, well vegetated lakes and extensive shallows (Scott and Crossman 1973). This species forages on plankton, macroalgae, aquatic insects, and sometimes molluscs. It is widely used by anglers as a bait fish.

Lake chub (*Couesius plumbeus*): are a common fish of lakes and rivers, preferring cool, clear water and gravel bottomed streams and lake edges. When inhabiting lakes and larger rivers, schools of lake chub will undergo spawning migrations to shallow areas of slow tributary streams in the spring, with seasonal movements occasionally being extensive (Scott and Crossman 1973).

Ninespine stickleback (*Pungitius pungitius*): are found in both brackish waters and the shallow areas of freshwater lakes and ponds. In rivers and streams, the species is generally found in sluggish, cool pools where there is plenty of aquatic vegetation. Spawning habitat is primarily characterized by shallow depths, low velocity, dense aquatic vegetation, and mud and silt substrates (Scott and Crossman 1973).

2.4.1.4 Sport Fish

Atlantic Salmon (*Salmo salar*): are a species of salmonid divided into unique populations based on genetic distinction and range. The Southern Upland (SU) population occupies rivers of mainland Nova Scotia, including the Tangier River watershed (DFO, 2013). The SU Population has experienced significant reductions over recent decades, with present adult abundance declining 88-99% compared to observed abundances in the 1980s (DFO, 2013).

The SU Atlantic salmon population have been assessed as endangered by COSEWIC in 2010 and the Atlantic salmon recreational fishery is closed year-round to retention or catch and release in Nova Scotia Salmon Fishing Region 20 (eastern shore), where the Site is situated (Nova Scotia Ministry of Fisheries and Aquaculture). There is no known record of Atlantic salmon occurring in the Tangier watershed in recent years. Due to their conservation status Atlantic salmon are not recommended as a targeted species for the 2023 field program, as tissue sampling requires lethal sampling techniques.

Brook trout (*Salvelinus fontinalis*): are a migratory species of salmonid, though they are not typically anadromous. Brook trout require free passage along streams to move between areas of use within a freshwater system, including spawning grounds, overwintering areas, and summer rearing areas. In Nova Scotia, mature brook trout migrate to spawn in lakes or streams in the fall. Brook trout spawning sites are usually near groundwater upwelling or spring seeps and within a lake or stream with gravel substrate (NSDAF, 2005). Brook trout feed on aquatic benthic invertebrate (such as mayflies and stoneflies), with adult brook trout also feeding on juvenile fish of their own species or others. Brook trout seldom live longer than 5 years and in Nova Scotia, their average length in brooks and rivers is 25 to 30 cm weighing less than 1 kg (NSDNR, n.d.).

Brook trout are listed as “sensitive” by the Nova Scotia Department of Natural Resources (NSDNR). The open-water recreational fishery (retention with bag limits) is open April 1 – August 30, with a closure September 1-30, for spawning. This is a sought-after sport fish with documented presence in Tangier River segments proximate to the Site. For these reasons, it is recommended as a targeted species for the 2023 field program.

Brown trout (*Salmo trutta*): Brown trout are indigenous to Europe, North Africa and western Asia, but over the last century have been globally introduced and now has a world-wide distribution. Both anadromous and freshwater populations exist, though it is unclear what forms live in the Tangier watershed. Fish live up to 20 years, but a life span <10 years is more common. Brown trout are opportunistic carnivores. Insect larvae are important for the young in streams, while littoral epibenthos in lakes and fish are most important for large trout.

This species has a reputation as fine food and good sport. Brown trout were stocked in the Tangier River by the province of Nova Scotia in the 1970s, but it is unclear if the species persists in the watershed. There are no conservation protections for Brown trout and the open-water recreational fishery (retention with bag limits) occurs April 1 – September 30. Depending on catch, it is recommended as a targeted species for the 2023 field program. Brown trout is of the same genus (*Salmo*) as Atlantic salmon. The Nova Scotia angler's handbook provides a key of distinguishing characteristics between the two species.

Yellow perch (*Perca flavescens*): are a schooling, shallow water fish that can adapt to a wide variety of warm or cool habitats. Most yellow perch do not appear to migrate, but some do in patterns which tend to be short and local (Brown et al., 2009). Adults and juveniles are found in large lakes, small ponds, or gentle rivers but are most abundant in clear, highly vegetated lakes (1-10 m depth) that have muck, sand, or gravel bottoms (DFO, 2018). Yellow perch directly compete with trout and salmonid species for planktonic food and prey on the juveniles of other fish species (DFO, 2018). Anglers target this species for its tasty flesh, but it does not grow to a particularly large size (~30 cm). It is not legal to use yellow perch as a bait fish to capture other sport fish. Historical chemistry data is available for white sucker in the watershed (see Section 2.3.2).

White perch (*Morone americana*): lives in fresh, salt, and brackish waters and feeds mainly on aquatic insects and fishes. White perch spawn in lakes and live to the age of 7. Anglers target this species in lakes, though small and stunted populations are common in freshwater resident populations. Sea-run populations tend to have larger fish. It is not legal to use white perch as a bait fish to capture other sport fish.

2.5 Permitting

2.5.1 Federal

Prior to conducting a fish collection survey, a federal License to Fish Finfish for Scientific Purposes under Section 52 of the fishery regulations in the Maritimes region, issued by Department of Fisheries and Oceans (DFO) is to be obtained. This is required under provisions of the *Fisheries Act*. There is no application fee, and the estimated processing time is up to 30 days. Additionally, the license holder must notify DFO before fishing activities commence, as outlined in the license. All field staff must read and understand the conditions of the license and are required to have a hard copy of the license during all fish collection surveys.

2.5.2 Provincial

A provincial fishing license is required for fishing effort that employs angling to catch fish (except salmon, which is federal jurisdiction) in freshwater in Nova Scotia. The seasonal (annual) license is valid from April 1 of the current year to March of the next year. A general fishing license report card is to be submitted within 7 days of the end of the fishing season (August 31). The seasonal license costs \$35 is issued immediately.

For works occurring on Crown Land, a Letter of Authority is required from the Department of Natural Resources and Renewables prior to the field program.

2.5.3 Management and Enforcement

The management of marine and sea-going (anadromous) Atlantic salmon, striped bass, eel, shad, mackerel, sturgeon, gaspereau, Atlantic whitefish and smelt is the responsibility of the DFO. The Nova Scotia Department of Fisheries and Aquaculture manages all other freshwater fish species. Enforcement falls under the jurisdiction of the DFO and Nova Scotia Environment.

The following size limit and bag restrictions from the Nova Scotia Angler's Handbook are in place for target species mentioned in Section 2.4.1;

- American eel: less than 53 cm from nose to tail not permitted to keep and maximum bag limit of 10 fish
- Brook trout and brown trout: maximum bag limit of 5 fish
- Landlocked salmon: minimum size limit not less than 35 cm, maximum size limit greater than 63 cm not permitted to keep; maximum bag limit of 2 fish
- White perch, yellow perch, brown bullhead, and white sucker: maximum bag limit of 25 fish

2.6 Critical Timing Windows

The Site is located within the provincial Halifax and Lunenburg Counties Recreational Fishing Area 3. The Nova Scotia recreational fishing handbook provides fishing regulations for sport fishing in freshwater (NSDFA, 2022); relevant regulations are as follows:

- Recreational fishery open-water season **April 1-September 30** (Nova Scotia Ministry of Fisheries and Aquaculture)
- Brook trout (aka speckled trout) recreational fishery **closed September 1-30** (Nova Scotia Ministry of Fisheries and Aquaculture)
- Atlantic salmon recreational fishery **closed year-round**, including catch & release (DFO; Salmon Fishing Area 20 – Eastern Shore)
- Timing window of **June 1 – September 30** to conduct projects in or around water for the province of Nova Scotia (DFO)

3 Aquatic Tissues Field Study

The Tangier River runs adjacent to the Site and has known Site-related impacts from historical gold mining (ESA Phase 1 and 2, AECOM 2022). Known Site related contaminant sources in the aquatic environment are mine tailings deposits in the Tangier River.⁷

The purpose of the proposed field study is to collect aquatic tissues for chemistry analysis in samples collected upstream, adjacent and downstream of the Site. This information will inform the Site-specific Human Health and Ecological Risk Assessment (HHERA) by investigating contaminant transfer pathways and uptake of metals, in particular mercury and arsenic, in sediments and the water column into benthic and pelagic aquatic organisms. The following provides the details for a fish and aquatic invertebrate tissue sampling program to be conducted in the Tangier River⁸, with samples submitted to an analytical laboratory for metals analyses.

3.1 Field Program Design

Field sampling locations are provided in Appendix A, Figure 2 and a summary of the field program organized by sampling location and media type is provided in Table 4 and Table 5. Tissue samples will be collected from the Tangier River (upstream, adjacent and downstream of the Site) and media to be collected includes benthic invertebrates, benthic feeding fish, forage fish, and sport fish. Targeted fish species are identified in Table 3.

This field study is exploratory and is not designed to meet statistical significance. Sample locations, media type and sample numbers as outlined are a guideline and are relatively low to allow for multiple media and species to be investigated at a preliminary level while being conscious of budget and numbers of fish sacrificed.

The field program is designed to be flexible, with options for alternative target species, methods for capture, etc., so field crews can pivot with field conditions. The field program as detailed herein should give the field crews the tools and information needed to complete a program that will be successful in meeting the Project objective of collecting aquatic tissues samples for analysis of metals concentrations by analytical laboratories in support of a site-specific HHERA.

⁷ Waterbody names for Tangier River segments varies depending on the resource consulted and include German Lake, Hawbolts Farm Pool, and Tangier River. Here we use Tangier River universally for the waterbody.

⁸ Investigation of other waterbodies is not recommended at this time as this is a preliminary investigation, focused on areas of known contamination.

Table 4. Field sample number and type organized by location and media.

Location	Media	Sample		
		Type	Number	
Upstream of Site (Control)	sediment	composite	1	
	benthic invertebrates	composite	1	
	fish	benthic feeding ¹	wholebody	5
		forage ²	composite	3
		sport ³	muscle	5
On-Site (Tailings Area)	sediment	composite	2	
	benthic invertebrates	composite	2	
	fish	benthic feeding ¹	wholebody	5
		forage ²	composite	6
		sport ³	muscle	5
Downstream 1 (Near Field)	sediment	composite	1	
	benthic invertebrates	composite	1	
	fish	benthic feeding ¹	wholebody	5
		forage ²	composite	3
		sport ³	muscle	5
Downstream 2 (Far Field)	sediment	composite	1	
	benthic invertebrates	composite	1	
	fish	benthic feeding ¹	wholebody	5
		forage ²	composite	3
		sport ³	muscle	5
total:			65	

Notes:

¹ Benthic feeding fish target species = American eel. Alternative target species= brown bullhead, white sucker.

² Forage fish species = banded killifish, golden shiner, lake chub, ninespine stickleback, creek chub, common shiner.

³ Sport fish target species = Brook trout or white perch (choose 1). Alternative target species = brown trout, yellow perch. If invasive species (bass and pickerel) captured, collect muscle sample.

Table 5. Sample summary

Sample #s	n	Field duplicate n
sediment	5	1
benthos	5	-
benthic feeding	20	-
forage	15	-
sport	20	2

3.2 Field Effort & Schedule

The proposed program is planned for spring/summer of 2023 to coincide with the open-water season and least risk window for fish reasonably expected to be present in the watershed. Two field crews, made up of 2-3 people per crew, would conduct the field program primarily from boat, with some work conducted onshore. To realize efficiencies in mobilization, field crew travel times, and de-mobilization, it is recommended that the program described here for

Mooseland, and the sister program for BNS's Gold Brook Lake and Seal Harbour Mine Site be organized so the two programs occur consecutively. From a technical/scientific study design perspective, there is no preference as to which program occurs first.

3.2.1 Field Preparation

3.2.1.1 Permitting

- Apply for DFO License to Fish Finfish for Scientific Purposes under Section 52 of the fishery regulations in the Maritimes region. This is required under provisions of the *Fisheries Act*. There is no application fee, and the estimated processing time is up to 30 days.
- If angling is anticipated as a form of fishing effort, apply for a provincial recreational fishing license. The seasonal (annual) license is valid from April 1 of the current year to March of the next year. A general fishing license report card is to be submitted within 7 days of the end of the fishing season (August 31). The seasonal license costs \$35 and is issued immediately.
- As the work is occurring on Crown Land, submit a request for a Letter of Authority from the Department of Natural Resources and Renewables prior to the field program.

3.2.1.1.1 Additional Requirements

Tagged Fish: Some species of fish (trout, smallmouth bass and Atlantic) have provincial tagging programs in place. If captured fish are observed to have a tag, the provincial government has a reporting framework that should be adhered to.

Invasive Species: if smallmouth bass or chain pickerel are captured, the provincial government has a reporting framework that should be adhered to.

Reporting requirements for tagged and invasive fish are provided in the provincial angling handbook (NSDFA, 2022).

3.2.1.2 Documents in Support of Field Program

- Preparation of an AECOM H&S plan and any BNS H&S requirements. See Section 3.5.
- Preparation of field maps and GPS coordinates loaded into field devices.
- Preparation of field data sheets (supplemental data, fish data, benthic invertebrate data [with porewater and sediment])

3.2.1.3 Field Gear Mobilization

There are potentially extensive gear needs for this program. Fishing and field equipment will need organizing in advance to determine if any repairs, purchases or rentals are required.

If the field crew is traveling by air, the fishing gear will require advance shipping to Site. Alternatively, if the field crew travel by land, field gear can travel with the crew to the Site so long as the vehicle(s) can accommodate. At this time, it is anticipated that the field crew would travel by land.

3.2.1.4 Analytical Laboratory

Coordinate with analytical laboratory for:

- Data quality objectives (DQOs),
- Sampling containers and preservatives (if needed)
- Sample labelling,
- Sample storage/ shipping and
- Chain of custody procedures

3.2.2 Field Program

The expected level of effort for each of the two field crews is 5-days (including travel) plus 2-days contingency, depending on the abundance of fish and conditions, with a breakdown provided below.

Note, the field crew must notify DFO before fishing activities commence, as outlined in the Fish Finfish for Scientific Purposes license. All field staff must read and understand the conditions of the license and are required to have a hard copy of the license during all fish collection surveys.

Field Crew 1 (Sport fish and benthic feeding fish): This is a proposed schedule only and is subject to change.

- Day 1: Travel Day, gear mobilization, H&S briefing
- Day 2: H&S tailgate, field reconnaissance to explore species of fish present and suitable gear types. Possible gear types include angling, gill netting, minnow trapping, Alaska traps, fyke netting, eel pots, beach seining, grab sampling, etc.
- Day 3: H&S tailgate, depending on the outcome of reconnaissance, set gear and/or begin angling at a sampling location. If gear needs monitoring, stay on-site and while waiting to retrieve, angle or assist Field crew #2 (recommended that Field Crew #1 focus Day 3 efforts as same sampling location that Field Crew #2 will be collecting benthic invertebrates from). Throughout day, check gear and process fish as necessary. Could set up fish hold (Rubbermaid totes with aeration, in shade) and batch process fish (this may also be beneficial if target fish species not yet chosen), being cognizant that separating species may be necessary to prevent predation within the hold. Note that fish processing must occur onshore/solid ground for accurate weight measurements.
- Day 4: H&S tailgate, depending on the outcome of Day 3, set gear and/or begin angling at the same or next sampling location. If gear needs monitoring, stay on-site and angle or assist Field crew #2 (recommended that Field Crew #1 focus Day 4 efforts as same sampling location that Field Crew #2 will be collecting benthic invertebrates from). Throughout day, check gear and process fish as necessary. Could set up fish hold and batch process fish.
- Day 5: H&S tailgate, depending on the outcome of Day 4, set gear and/or begin angling at a same or next sampling location. Try new fishing techniques if needed. If gear needs monitoring, stay on-site and angle or assist Field crew #2 (recommended that Field Crew #1 focus Day 5 efforts as same sampling location that Field Crew #2 will be collecting benthic invertebrates from). Throughout day, check gear and process fish as necessary. Could set up fish hold and batch process fish.
- Day 6: Contingency (weather day or additional sample collection time)
- Day 7: Contingency (weather day or additional sample collection time)
- Day 8: Travel Day, gear de-mobilization

Field Crew 2 (Forage fish, benthic invertebrates & sediment): This is a proposed schedule only and is subject to change. *Note that benthos & forage fish team should work from area of least contamination to most contamination. *Clean hands/Dirty hands* procedures will need to be developed (similar to that described in USEPA Method 1669 (USEPA 1996)) and followed by Field Crew 2 for sediment sampling.

- Day 1: Travel Day, gear mobilization, H&S briefing.
- Day 2: H&S tailgate, field reconnaissance to explore species of fish present and suitable gear types. Possible gear types include angling, gill netting, minnow trapping, fyke netting, eel pots, beach seining, kick netting, grab sampling, etc.
- Day 3: H&S tailgate, AM Set minnow traps in all three sampling locations (by boat), mid-day benthos sampling. PM minnow trap retrieval and fish processing.
- Day 4: H&S tailgate, AM Set minnow traps (if necessary), mid-day benthos sampling, PM minnow trap retrieval and fish processing. If no minnow trapping (samples collected day 1) then duration of day spent benthos sampling. If at the end of Day 4 have not collected all forage fish samples, leave minnow traps in to soak overnight.
- Day 5: H&S tailgate, collect overnight minnow traps (if set) and process forage fish. Remainder of day's activities TBD depending on status of sample collection for forage fish and benthos.
- If forage fish samples still outstanding, try alternative sampling methods (beach seine or backpack electrofishing).

- If benthos samples still outstanding continue to collect.
- Day 6: Contingency (weather day or additional sample collection time)
- Day 7: Contingency (weather day or additional sample collection time)
- Day 8: Travel Day, gear de-mobilization, sample confirmations and shipment

3.3 Field Methods

Standard operating procedures are provided for the proposed program in Appendix C. Below is a summary of field procedures.

3.3.1 Data Collection, Sample Handling & Volume Requirements

Field Collection:

- Supplemental data collection: location (name and UTM), date/time, field crew, water quality parameters; environmental conditions (temperature, cloud cover, wind, wave, precipitation); fishing method, effort, catch; sediment characteristics (colour, grain size, odor, organics).
- Tissue data collection: Fish (sample ID, species, length, weight, DELTs, tissue type [WB/muscle/composite]), Benthic Invertebrates (sample ID, number of grabs, grain size, odor, organics, notable invertebrates [taxa/prevalence])
- Sample collection/labelling/storage/shipping

Laboratory Analysis:

- Total metals (including arsenic)
- Total mercury
- Moisture %
- Total methylmercury (for archive)
- Arsenic speciation (for archive)
- Fish age (for archive)

3.3.1.1 Sample Processing and Volume

3.3.1.1.1 Chemistry

Tissue and sediment chemistry analysis will be conducted by CALA certified laboratory. Preliminary lab quotes from ALS and Bureau Veritas for total metals including arsenic, mercury, and methylmercury analysis in tissues as well as Brooks Applied Labs (BAL; located in the USA) for arsenic speciation analysis are provided in Appendix B.

The following information is summarized from information provided by ALS for tissue weight requirements. Tissue weight requirements for analyses may be an important field planning consideration, as achieving minimum weight, especially for benthic invertebrates, may be time consuming.

- For routine tissue digestion and extraction, the laboratory recommended wet weight (ww) requirement for tissue analyses is **5 g ww** for metals (including mercury) and **5g ww** for methylmercury.
- For micro tissue digestion and extraction, the laboratory recommended wet weight (ww) requirement for tissue analyses is **2 g ww** for metals (including mercury) and **0.5g ww** for methylmercury.
- Comparing micro digestion against routine digestion:
 - the limits of reporting (LOR) for arsenic and lead increase slightly but there is no change for mercury or methylmercury.
 - the cost per sample differs by only \$10 (< 10 %).

- Arsenic speciation analysis (conducted by BAL) will require sample wet weight of **10 g ww**. These samples can be archived for analysis at a later date.

3.3.1.1.2 Fish Age

AECOM maintains an in-house fish aging laboratory out of Quebec, with capacity to age fin, scale and otolith structures, at an approximate rate of one structure per hour. Age structures can be archived for analysis at a later date.

3.3.2 Benthic Invertebrate Tissue

Benthic invertebrate sampling (with paired sediment and porewater sampling) will be conducted as follows:

- Collect bulk samples of macro invertebrates from each sampling locations (Appendix A, Figure 2; Table 4).
- Samples will be collected by bulk-grab sampler (petit-ponar or the like).
- Grab sampler can be deployed from boat or shore. If onshore, shovel will work just as well. Method, location (i.e., on-shore or near-shore), and sample depth (i.e., top 20 cm) should be standardized across sampling sites.
- As collected, sediment should be placed in sieve tray, bucket or bag with 500µm mesh size, and sieved using lake/river water.
- Once sieved down, macro invertebrates can be picked out by hand/forceps and collected into lab-supplied sample container. Do not wash invertebrates.
- One (1) composite sample will be collected from each location (likely requiring multiple grab samples to achieve sample volume requirements).
- Collect a sediment sample from each benthic sampling area:
 - Place contents of a grab/shovel full into a bowl (same depth as benthos). Homogenize. Place in sampling container(s) and follow laboratory procedure for headspace/preservative/hold temperature.
- Sample volume requirements for tissue chemistry and sediment chemistry provided in Section 3.3.1
- Sample processing and shipping requirements to be verified by the analytical laboratory

3.3.3 Forage Fish Tissue

Forage fish (small-bodied fish consumed by piscivorous birds, wildlife and other fish) tissue sampling will be conducted as follows:

- Collect composite (>1 fish/sample) samples of whole-body fish from each sampling location (Appendix A, Figure 2; Table 4). Samples made up of multiple fish from multiple species.
 - If fish are captured in abundance, separate by species and submit species-specific forage fish composite samples to the lab.
- Use baited G-minnow or Alaska traps and/or electrofishing and/or beach seine to collect forage fish.
- Samples may be submitted as whole fish, possibly as composite (multiple fish per sample) to achieve required sample volume. Do not fillet.
- For all fish caught, record species, weight and fork length, and external health assessment for DELTs (deformities, erosions, lesions, tumours). Alternatively, batch weigh, and record fork length of representative individuals, if fish catch numbers are high.
- Do not fillet. Fish are to be submitted as whole fish.
- Sample volume requirements for tissue chemistry and sediment chemistry provided in Section 3.3.1.
- Sample processing and shipping requirements to be verified by the analytical laboratory.

3.3.4 Benthic Feeding Fish and Sport Fish Tissue

Sampling of targeted species of benthic feeding fish and sport fish (large-bodied fish) will be conducted as follows:

- Collect fillet (muscle) samples for targeted fish species for benthic feeding fish and sport fish from each sampling location (Appendix A, Figure 2; Table 4).
- Use angling, gill nets, eel pots, fyke nets, Alaska traps and/or electrofishing to capture large-bodied fish:
 - Fishing gear/method to be determined based on-Site reconnaissance (see Section 3.2.1)
- Record species, weight and fork length, and external health assessment for DELTs (deformities, erosions, lesions, tumours) of individual sport fish collected. This includes bycatch (non-target) species that are not retained for sampling. Take pictures of representative fish for each species.
 - Any non-target fish should be released back to the waterbody they were captured from, with the exception of invasive species (see instructions below).
- Collect muscle sample from the area anterior to the dorsal fin, with skin and bone removed
- Collect age structure
- Sample volume requirements for tissue chemistry and sediment chemistry provided in Section 3.3.1
- Sample processing and shipping requirements to be verified by the analytical laboratory

3.3.4.1 Invasive species and tagged fish

Tagged Fish: Some species of fish (trout, smallmouth bass and Atlantic) have provincial tagging programs in place. If captured fish are observed to have a tag, the provincial government has a reporting framework that should be adhered to.

Invasive Species: If smallmouth bass or chain pickerel are captured, euthanize and report to the provincial government. Collect a muscle sample from the invasives for the BNS program.

Reporting requirements for tagged and invasive fish are provided in the provincial angling handbook (NSDFA, 2022).

3.4 Quality Assurance and Quality Control (QA/QC)

Quality Assurance (QA) for the field program comprises the practices employed (e.g., use of experienced field staff, use of standard sampling procedures, and using of field data sheets) to collect scientifically defensible samples meeting pre-defined data quality objectives (DQOs). Quality Control (QC) are measures taken to verify that the specific DQOs (e.g., limits for bias and precision) are met. Combined, these elements help ensure that data collected are representative of the material or populations being sampled, are of known quality, have sufficient laboratory precision to be highly repeatable, are properly documented, and are scientifically defensible.

3.4.1 Field

The Mooseland Mine aquatic tissues field program QA/QC program requires that field samples be collected in accordance with standard methods and best practices, and in accordance with analytical laboratory requirements. QA for Mooseland Mine aquatic tissues field program will include these items:

- Specific work instructions and established technical protocols for all field crew including:
 - Staffing program with appropriately qualified and trained personnel for sample collection
 - This may include program-specific training
 - Hosting pre-field meetings
 - Use of standard operating procedures (SOPs) for field sampling
 - Use of equipment decontamination procedures
 - Use of equipment appropriate to the task that allow for accurate and precise measurements/sample collection

- Use of laboratory Chain of Custody (CofC) forms
- Specific work instructions and established protocols for data management, analysis and reporting, and senior review at appropriate milestones.

Field QC samples will consist of collecting field duplicates for sport fish (opposite fillet) and sediment for laboratory analysis at a rate of approximately 10% (1 in 10 samples collected in duplicate). DQOs for field duplicate is a Relative Percent Difference (RPD) between original and duplicate sample of <40% when concentrations are higher than 10x method detection limit (MDL); this applies to all sample types (i.e., fish tissue or invertebrate tissue). RPD values are calculated by comparing the original result to the duplicate sample. The equation used to calculate an RPD is:

$$RPD = (A - B) / ((A + B) / 2) \times 100$$

where: A = analytical result; B = duplicate result.

RPD values may be either positive or negative, and ideally should provide a mix of the two, clustered around zero. RPDs are not calculated for cases where one of the samples (i.e., either A or B in equation above) is below detection and the other is not. The duplicate sample can be plus or minus up to X% (X being the pre-determined DQO) of the original concentration and be 'acceptable', recognizing several factors including but not limited to sample heterogeneity, variance and precision of the instrumentation, calibration and user / operator variability (CCME 2016).

3.4.2 Analytical Laboratory

For quality assurance, Mooseland Mine Project will use CALA accredited laboratories to provide analytical services for tissue chemistry analyses. CALA accredited laboratories have their own specific QAQC procedures. Generic QC checks used to assess laboratory data quality is provided below for reference:

- Detection Limits (DL) – changes to DLs may be needed when the planned DLs are unattainable (e.g., due to low signal/noise ratios or variable replicate recoveries); while these changes can lead to unusable data, the modified DLs are often still acceptable and would not affect the utility of the data.
- Laboratory Duplicates –test reproducibility of laboratory results. DQOs were used to assess RPDs; for most parameters the DQO is an RPD of less than X% between duplicate samples.
- Method blanks (MB) – test for false positives. The MBs should meet the DQO of less than the DL.
- Laboratory Control Samples (LCS) / Certified Reference Material (CRM) / Internal Reference Material (IRM) – test for accuracy of the method against known standards.

3.5 Health and Safety

AECOM is committed to providing safe and healthy workplaces for AECOM employees and associated subcontractors. To do this, we focus on minimizing incidents and injuries, complying with all Occupational Health and Safety and environmental legislation, and reducing our impact on the environment.

Specific to this assignment, AECOM will:

- Prepare a Safe Work Plan including a site-specific risk assessment process that includes an overview of the tasks to be performed, the risks, and associated standard operating procedures applicable to the project (it must be stressed that the HASP is a "living" document, and is to be updated throughout the course of the works should circumstances dictate).
- AECOM employees will follow the Toxic and Hazardous Substances procedure (S3AM-110-PR1) developed by AECOM when working on a contaminated site (mercury, lead, arsenic), including specific exposure limit and action level for specified contaminant [S3NA-110-PR1 Toxic and Hazardous Substances \(aecom.com\)](#).
- Complete all relevant training prior to starting field work as required by AECOM. A systematic review of necessary training will be conducted to ensure field staff are adequately trained to conduct the field work as described.

- Conduct all fieldwork in accordance with AECOM SOPs. Have all AECOM team members and associated subcontractors review SOP documents specific to the tasks to be performed, including, but not limited to:
 - Boating safe work practices
 - Working on and near water
 - Toxic and hazardous substances
 - Remote work
 - Wildlife, plants, and insects
- Conduct regular health and safety meetings and site briefings prior to, and during, the proposed program
- Empower all project team members to provide instruction to stop work, reassess risks, and control measures should conditions dictate

4 References

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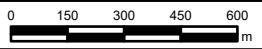
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Appendix A Figures



Legend	
	PROPERTY BOUNDARY AS SHOWN ON NOVA SCOTIA PROPERTY ONLINE
	PHASE I ESA - AREA OF INTEREST
	TANGIER GRAND LAKE WILDERNESS AREA

REFERENCE
NS Property Record Database, Nova Scotia Open Data, Esri World Imagery



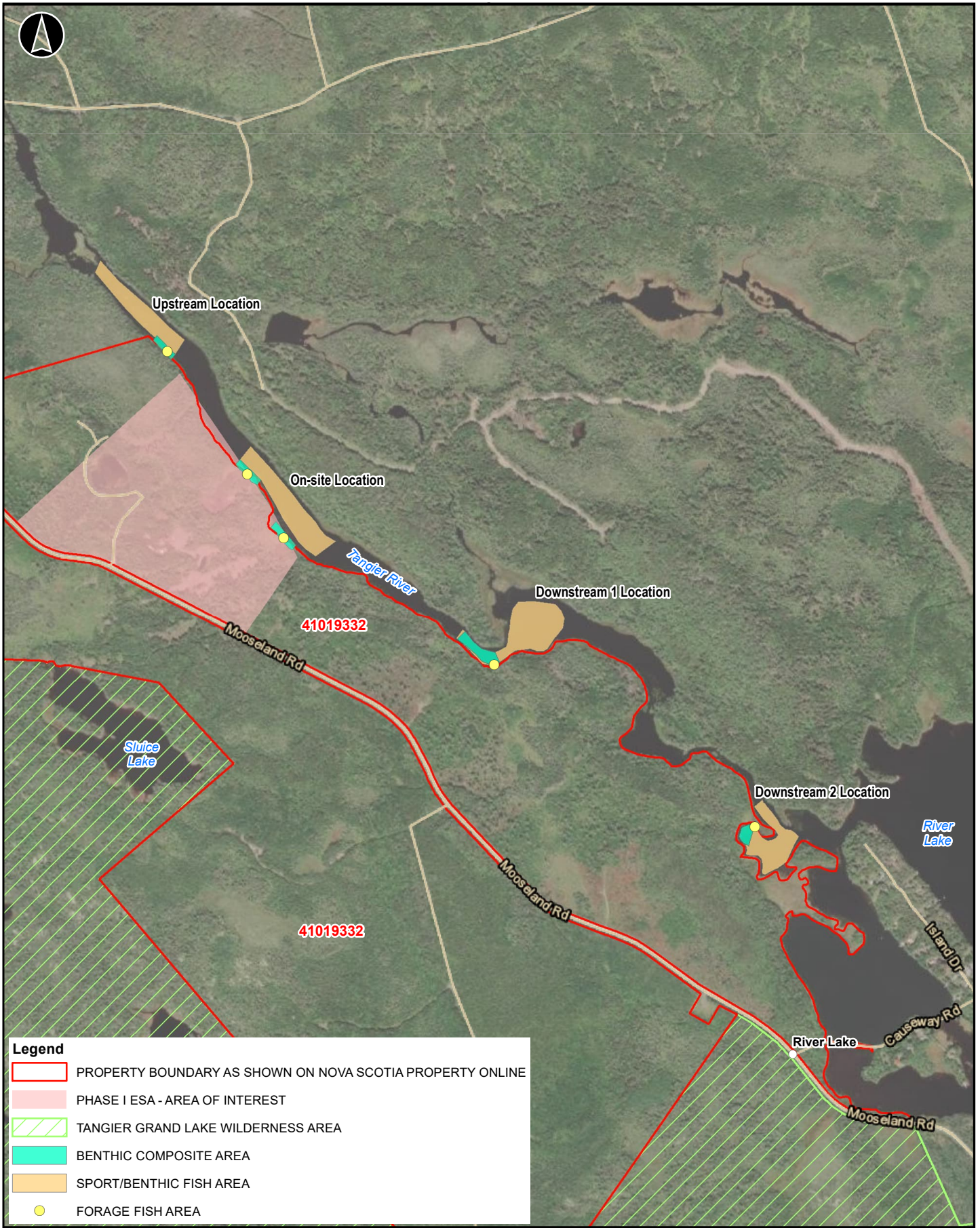
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GENERAL SITE LOCATION

CLIENT NAME: NOVA SCOTIA LANDS INC.	PROJECT LOCATION: MOOSELAND MINE SITE	DRAWN BY: PC	SCALE: 1:20,000	FIGURE No. 1
		CHECKED BY: KM	DATE: 2023-03-07	PROJECT NO: 60680169

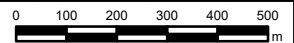
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Legend

- PROPERTY BOUNDARY AS SHOWN ON NOVA SCOTIA PROPERTY ONLINE
- PHASE I ESA - AREA OF INTEREST
- TANGIER GRAND LAKE WILDERNESS AREA
- BENTHIC COMPOSITE AREA
- SPORT/BENTHIC FISH AREA
- FORAGE FISH AREA

REFERENCE
NS Property Record Database, Nova Scotia Open Data, Esri World Imagery



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**AQUATIC TISSUES FIELD PROGRAM
SAMPLING LOCATIONS**

CLIENT NAME:
NOVA SCOTIA LANDS INC.

PROJECT LOCATION:
MOOSELAND MINE SITE

DRAWN BY: PC
CHECKED BY: KM

SCALE: 1:15,000
DATE: 2023-03-07

FIGURE No. 2
PROJECT NO: 60680169

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Appendix B Laboratory Quotes

ALS Vancouver Tissue Analysis Details

Tissue Preparation and Analysis	Routine Tissue Digestion/Extraction Metals			Micro Tissue Digestion Metals			Biopsy Tissue Digestion Metals		
	LOR mg/kg dry wt	LOR mg/kg wet wt	ALS List Pricing	LOR mg/kg dry wt	LOR mg/kg wet wt	ALS List Pricing	LOR mg/kg dry wt	LOR mg/kg wet wt	ALS List Pricing
Sample Preparation									
Sample Dissection	-	-	\$125/hour	-	-	\$125/hour	-	-	-
Sample Homogenization	-	-	Included ¹	-	-	Included ¹	-	-	-
Sample Digestion²									
Routine Tissue Digestion	-	-	\$20.00	-	-	-	-	-	-
Micro & Biopsy Tissue Digestion	-	-	-	-	-	\$50.00	-	-	\$50.00
Moisture Content & Lipids									
Moisture	-	0.5%	\$5.00	-	2%	\$5.00	-	2%	\$5.00
Lipids	-	0.5% wwt	\$30.00	-	-	\$30.00	-	-	-
Metals Analysis									
Metals Package									
Aluminum	2	0.4	\$165.00	5	1	\$175.00	5	1	\$175.00
Antimony	0.01	0.002		0.01	0.002		0.02	0.004	
Arsenic	0.02	0.004		0.03	0.006		0.05	0.01	
Barium	0.05	0.01		0.05	0.01		0.05	0.01	
Beryllium	0.01	0.002		0.01	0.002		0.01	0.002	
Bismuth	0.01	0.002		0.01	0.002		0.01	0.002	
Boron	1	0.2		1	0.2		1	0.2	
Cadmium	0.005	0.001		0.01	0.002		0.01	0.002	
Calcium	20	4		20	4		20	4	
Cesium	0.005	0.001		0.005	0.001		0.005	0.001	
Chromium	0.05	0.01		0.2	0.04		0.2	0.04	
Cobalt	0.02	0.004		0.02	0.004		0.02	0.004	
Copper	0.1	0.02		0.2	0.04		0.2	0.04	
Iron	3	0.6		5	1		5	1	
Lead	0.02	0.004		0.05	0.01		0.05	0.01	
Lithium	0.5	0.1		0.5	0.1		0.5	0.1	
Magnesium	2	0.4		2	0.4		2	0.4	
Manganese	0.05	0.01		0.05	0.01		0.05	0.01	
Molybdenum	0.02	0.004		0.04	0.008		0.04	0.008	
Nickel	0.2	0.04		0.2	0.04		0.2	0.04	
Phosphorus	10	2		10	2		10	2	
Potassium	20	4		20	4		20	4	
Rubidium	0.05	0.01		0.05	0.01		0.05	0.01	
Selenium	0.05	0.01		0.1	0.02		0.1	0.02	
Sodium	20	4		20	4		20	4	
Strontium	0.05	0.01		0.1	0.02		0.1	0.02	
Tellurium	0.02	0.004		0.02	0.004		0.02	0.004	
Thallium	0.002	0.0004		0.002	0.0004		0.002	0.0004	
Tin	0.1	0.02	0.1	0.02	0.1	0.02			
Uranium	0.002	0.0004	0.002	0.0004	0.002	0.0004			
Vanadium	0.1	0.02	0.1	0.02	0.1	0.02			
Zinc	0.5	0.1	1	0.2	1	0.2			
Zirconium	0.2	0.04	0.2	0.04	0.2	0.04			
Additional Metals									
Mercury ⁵	0.005	0.001	\$20.00	0.005	0.001	\$20.00	0.01	0.002	\$20.00
Silver ^{3,6}	0.005	0.001	\$50.00	0.005	0.001	\$70.00	0.005	0.001	\$70.00
Titanium ^{4,6}	0.25	0.05	\$50.00	0.5	0.1	\$70.00	0.5	0.1	\$70.00
Sulfur ^{5,6}	100	20	Contact ALS	100	20	Contact ALS	100	20	Contact ALS
Thorium ^{5,6}	0.03	0.006		0.03	0.006		0.1	0.02	
Methyl Mercury ⁷	0.005	0.001	\$250.00	0.005	0.001	\$250.00	-	-	-
Notes									
Please note that the Limits of Reporting listed above are subject to change due to interferences that may be present within a submitted sample.									
1. Sample Homogenization costs are included with the tissue digestion/extraction price, with the exception of large volume samples (i.e. >300 grams of sample submitted). In these cases, homogenization costs will be billed at \$125.00/hour.									
2. Please note that the required tissue digestion will depend on the weight of sample submitted and available for analysis. Refer to the ALS Minimum Recommended Submission Weight for each digestion. The appropriate digestion price will apply.									
3. Silver is not part of the metals packages listed above. If Silver analysis is required, it must be requested separately and may require the submission of additional sample volume if the concentration is high (solubility/stability issues). Add additional charge for silver.									
4. Titanium is not part of the metals packages listed above. If Titanium analysis is required, please contact the lab for further details. Mechanical homogenization equipment contains titanium blades, therefore manual homogenization is required which can result in less precision. Add additional charge for titanium.									
5. Sulfur & Thorium are not part of the metals packages listed above. If Sulfur and/or Thorium analysis are required, they must be requested separately.									
6. Mercury, Titanium, Sulfur & Thorium can be analyzed from the same digestion as the Metals Package. Silver may also be analyzed from the same digestion, but will depend on the concentration of Silver present in the sample.									
7. Methyl Mercury requires a separate digestion and analysis.									

Sample Weight Requirements for Tissue Analysis

Analysis ¹⁰	Routine Digestion/Extraction ¹			Micro Digestion ²			Biopsy Digestion ³	
	Minimum Sample Weight Required for Digestion ⁵ g (dry)	Minimum Sample Weight Required for Digestion ^{4,5} g (wet)	Minimum Recommended Submission Weight ^{6,7} g (wet)	Minimum Sample Weight Required for Digestion ⁵ g (dry)	Minimum Sample Weight Required for Digestion ^{4,5} g (wet)	Minimum Recommended Submission Weight ^{6,7} g (wet)	Minimum Sample Weight Required for Digestion ⁵ g (dry)	Minimum Sample Weight Required for Digestion ^{4,5,8} g (wet)
Trace Metals								
Moisture Content	---	0.5	5	---	0.5 - 1	2	---	0.05
Metals Scan (CCMS)	0.1	0.5		0.04	0.2		0.01	0.05
Mercury								
Methyl Mercury	0.4	1	5	0.04	0.1	0.5	NA	NA
Trace Organics								
Lipid Content	---	2	10	---	---	---	NA	NA
PAH ⁹	1	5	10	---	---	---	NA	NA
Notes								
NA = Not Available								
1. Routine Digestion: These digestion and analysis procedures are used for the majority of tissue samples submitted for analysis, and provide lower Limits of Reporting for some metals.								
2. Micro Digestion: These digestion and analysis procedures are designed for the analysis of low weight samples, and are used for samples where less than 0.5 g wet (or 0.1 g dry) is available for the digestion.								
3. Biopsy Digestion: These digestion and analysis procedures are designed for the analysis of biopsy plugs, or very low weight samples. Laboratory Replicates and any re-digestions of the original sample cannot be carried out on biopsy samples. Limits of Reporting will be adjusted accordingly for sample weights lower than 0.05 g wet (or 0.01 g dry).								
4. The wet sample weights listed in the table above are based on a typical tissue moisture content of 80%. If the submitted samples contain, or are suspected to contain, >80% moisture, then additional sample weight will be required to meet quoted Limits of Reporting.								
5. The sample weights listed for analysis are for one single digestion and/or analysis, and do not include additional sample weight required for Lab Replicates, or potential re-analyses, homogenization losses, container transfer losses, or potential freeze/thaw losses. Homogenization losses vary, but in general are typically 20%, but depend on the nature of the sample, the sample weight, and the type of homogenization equipment used.								
6. It is recommended that more than the minimum required sample weight be submitted for analysis to account for the factors identified in Note 5 above.								
7. In cases where less than the Minimum Recommended Submission Weights are submitted for analysis, ALS will contact the client and discuss various options for analysis.								
8. It is recommended that Biopsy sample results be reported on a dry weight basis only as the wet weight of the sample during analysis may not be representative of the wet weight when sampled, due to drying. If Moisture Content analysis is required, it can be performed by drying the sample in the digestion tube at <60°C prior to digestion.								
9. Selected Organic parameter analyses can be combined for sample extraction and analysis. Please contact ALS to discuss your specific analytical requirements prior to sampling.								
10. Additional analysis methods are available, please contact ALS to discuss your specific analytical requirements.								



Name Mike Sanborn **Quote No.** AEC-VN2201
Company Aecom **Date** 12/8/22
Phone 250 389 3424 **Project Name** Atlantic Canada Stamp Mills
Email mike.sanborn@aecom.com **Quote Expiration** 3/9/23

Code	Description	Quantity	Unit Cost	Total Cost
Matrix: Tissue				
STA301	MeHg via EPA Method 1630, Modified	13	\$275.00	\$3,575.00
STA000	Inorganic As Analysis by IC-ICP-CRC-MS	9	\$350.00	\$3,150.00
Matrix: Soil/Sediment				
SSA301	MeHg via EPA Method 1630, Modified	6	\$300.00	\$1,800.00
Other Charges:				
TPH003	Fish Filleting - 1 fillet/fish	TBD	\$12.00	TBD
TPH018	Fish Homogenization <12" ; whole or fillet	TBD	\$25.00	TBD
TPH010	Bivalve Shucking and Homogenization	TBD	\$35.00	TBD
TPH011	Macro Invert Homogenization	TBD	\$25.00	TBD

Payment terms are net 30 days and all prices are quoted in US dollars unless otherwise negotiated by both parties and specified in the LSA or contract. Additional 4% fee for payment by credit card may apply.

Quotation Total (USD): \$8,525.00

Discounts/Surcharges (included in unit costs above):	Charge
Surcharge for Turn-around Time (Business Days): 20	0%
Surcharge for Deliverables (Reporting Level): Standard	0%

Project Scope:

There is an 8-sample minimum for service STA000 and a 5-sample minimum per each other analysis for each sample delivery group (SDG); please refer to our Minimum Quantity terms specified in the laboratory services agreement (LSA) for further details. The quoted prices include the report deliverables (via e-mailed PDF) and the turnaround time (TAT) noted above in the *Discounts/Surcharges* section. Sample containers (1 per billable sample) are shipped at no additional charge within the continental United States provided adequate notice is given to use ground shipping.

Preservation, Storage, and Holding Time:

Parameter	Matrix	Method	Min. Mass/Volume	Recommended Container	Recommended Preservation	Holding time
Total Metals	Wet Sed/Soil	EPA Method 1630, Modified	20 g	4-oz. glass or plastic wide mouth jars	0-4 °C during shipment; ≤ 4 °C in lab	1 year
Total Metals or Species	Wet Tissue	Various	10 g	4-oz. glass or plastic wide mouth jars, zip-type plastic bags, or plastic wrap	0-4 °C during shipment; ≤ -18 °C in lab	1 year



Quote No. AEC-VN2201 (continued)

Important Notes:

Soil Import: Soil samples imported from outside of the US may require special handling, disposal, and dedicated storage. The client MUST label the package as containing regulated soils, and the samples must be shipped on ice. A copy of the Brooks Applied Labs (BAL) US Dept. of Agriculture Regulated Soils permit must accompany the soil sample shipment. A copy of the permit will be mailed to the client along with a numbered label to be affixed to the outside of each package containing soils. BAL is currently permitted to receive these samples. The client should have the necessary permits and compliance agreements to legally ship these samples.

Tissue Import: The client must provide a copy of BAL's USFW Permit and COC form with Waybill. Provide your BAL PM with a shipment tracking number as soon as possible (48 hrs. prior to shipping) along with the COC, a list of species names and their country of origin. BAL cannot accept samples from threatened or endangered migratory birds, bald eagles, or golden eagles.

Accreditations:

Brooks Applied Labs holds accreditations for numerous analyses to the NELAP and ISO 17025 standards. For current certificates and up to date lists of accredited parameters, visit our web site at <http://brooksapplied.com/resources/certificates-permits/>

Prepared By: Geoffrey Leadbeater



Laboratory Services Agreement (LSA)

Brooks Applied Labs agrees to deliver services as quoted in Quotation No. AEC-VN2201

This LSA is valid for samples received at BAL by: 12/31/2022

Please complete, sign, and return by email to the attention of: Geoffrey Leadbeater

Email: geoff@brooksapplied.com

Payment terms are Net 30 days from the invoice date. Each work order or sample delivery group is invoiced within 30 days of delivery of the final report or completion of the contracted services. All services will be billed out at the quoted unit price rate(s). Past due balances will be charged a finance fee of 1.5% per month.

Company: _____

Billing Contact Name: _____

Address: _____

Phone: _____

Email: _____

Purchase Order No.: _____

Paying with Credit Card? Yes No

If payment will be made by credit card, BAL personnel will contact you by phone to obtain this information before issuing the report.

Client Project ID: _____

I accept the Terms and Conditions of this quotation for analytical services from Brooks Applied Labs and by signing this laboratory services agreement (LSA), I verify that I am authorized to bind my company to the quoted payment terms.

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____



General Terms & Conditions

All of the general terms and conditions below apply unless specifically stated otherwise in the Project Scope section of the quote.

Minimum Quantity: If fewer than 5 samples are submitted for each matrix/analyte, the client will be billed for the associated quality control (QC) samples, not to exceed the 5-sample minimum, unless otherwise specified elsewhere in the referenced quotation. This applies to each sample delivery group (SDG), where SDG is defined as a group of samples that are to have their results provided in the same report. Each sample submittal is considered an SDG unless the client communicates otherwise to BAL (in writing). There is a \$250 minimum which will be applied for any SDG where the total price of all services performed does not reach or exceed this minimum.

Field QC: Depending on the specific program requirements associated with the analysis of samples collected, the collection and analysis of certain types of field QC samples, such as field blanks and field duplicates, may be required. If the proper field QC samples are not collected and analyzed, samples may not be reportable for regulatory purposes. It is the client's responsibility to determine what field QC samples are required to be collected with their samples and at what frequency these field QC samples must be analyzed. For more information, please contact a Brooks Applied Labs Project Manager.

Volume Discounts: Volume discounts may be applied for large projects. However, if the estimated quantities of samples are not submitted to BAL, these discounts may be reduced or eliminated.

Deliverables: Level II or Standard deliverables include: Brief case narrative or cover letter, sample results summary, QA sample summary, work order receipt report, and chain-of-custody form(s).
 Level III deliverables include: Level II deliverables plus calibration and calibration verification summary. **5% surcharge**
 Level IV or Full deliverables include: Level III deliverables plus detailed narrative, all raw/instrument data, and preparation and analysis bench sheets. **20% surcharge (\$250 min.)**

CLP-Like deliverables: BAL does not provide reports with CLP deliverables; however, our Level IV or Full deliverables package is considered "CLP-like" and contains all of the same information that is found in a CLP report.

Other deliverables: If additional deliverables are required (i.e., litigation packages, standards logs, etc.), please contact BAL for pricing.

If a client-specific EDD is required, please provide EDD specifications for pricing. **EDDs are only provided upon request.**

Turn-around Time (TAT): An e-mailed report (as a PDF) is delivered by 11:59 pm Pacific Time on the due date. The TAT for any samples received after 1:00 pm Pacific Time may be started the following business-day. Standard TAT varies depending on the quoted service, but typically ranges from 5 - 20 business days; reference the quotation for additional details. TAT multipliers for services expedited beyond the standard turnaround time are as follows:

TAT (Business Days)	Surcharge	TAT (Business Days)	Surcharge
15 - 19	10%	3 - 4	100% (call first)
10 - 14	30%	2	200% (call first)
5 - 9	50%	1	300% (call first)

If the quoted TAT is not met, then the applied expedited TAT surcharge may be prorated.

Fees or penalties that are assessed by the customer for missing the TAT shall not be valid if the customer's account balance is not current.

In order to provide the best analytical services possible, BAL reserves the right to supersede TAT obligations as dictated by matrix interferences that can be encountered during sample analysis. Upon identification of any matrix interferences, the client will be immediately notified regarding the impact on the delivery time of the final report.

Hold Samples: Any samples received, but not analyzed as per the client's request, shall be billable at \$20/sample/month to cover costs of containers, sample log-in, storage and disposal.

Storage/Archival: All reports and data are archived for a minimum of 7 years. Original samples are stored for a minimum of 30 days from reporting date, or until the holding-time has expired, whichever comes first. If you require longer archival of samples, data, or reports, please inquire for pricing.

MDL/Reporting Limits: BAL always strives to produce the lowest detection limit and will report results down to the method detection limit (MDL), unless otherwise instructed by the client. Samples requiring dilution will have adjusted sample-specific MDLs. We reserve the right to charge for the analysis unless non-matrix related QA/QC samples fail to meet method criteria.

Quote Expiration: A laboratory services agreement (LSA), purchase order (PO), or contract must be received by the "Quote Expiration" date; otherwise, BAL reserves the right to requote. If you need guaranteed pricing for a longer time period, please contact BAL.



General Terms & Conditions (continued)

Quality Assurance:

Prices include standard batch QA only, with no guarantee of site-specific or sample-specific QA, unless explicitly requested on the COC form. It is the client's responsibility to request sample-specific matrix spike/matrix spike duplicate (MS/MSD) on one of their samples by indicating this requirement on the COC form accompanying the samples. Any sample-specific QA required by the client will be billed at the same per-sample rate. Due to the potential for matrix interferences, BAL cannot guarantee acceptable recoveries on MS/MSD QC samples. If MS/MSD recoveries fail, but non-matrix specific batch QA is acceptable, then the presence of matrix interferences is assumed and the analytical work shall be billable.

Blank Correction:

In most cases, BAL blank corrects all data for EPA Methods 1630, 1631, 1632, and 1640, unless otherwise specified by the client. Sample results are corrected for the mean of at least 3 method blanks, with tight quality control limits set on the standard deviation of the blanks.

Trace Metals Analysis and Instrumentation:

ICP-QQQ-MS is the default analytical technology used for total metals analyses by ICP-MS at BAL; however, alternative instruments with different interference reduction technologies (CRC, DRC, KED mode, etc.) may be used if deemed appropriate, unless otherwise specified by the client.

Shipping:

It is the client's responsibility to pay for shipping of the samples to the laboratory. If the client's shipping coolers/containers are used and the client wants these returned, this request must be indicated on the COC form. Coolers/shipping containers are returned via Ground service. Charges for standard sampling kits (if applicable) are included in the quoted analytical prices (unless otherwise noted) and include costs for ground shipment of bottle orders from BAL to the client. If expedited shipping costs are incurred due to insufficient notice from the client, shipping costs will be billable. BAL typically requires a minimum of 3-days notice for preparation of bottle orders.

Saturday Receiving:

Sample receiving on Saturdays is only available when prior arrangements are made, and it is only available from 8:30 am - 1:00 pm Pacific Time.

High-level or Hazardous Samples:

Samples submitted to BAL that are hazardous, contain biohazards (e.g., untreated sewage, "influent" samples), or contain high levels of trace metals, require advance notice to ensure appropriate handling. If prior notice is not given, BAL reserves the right to decline to provide analytical services and to return the sample(s) to the client at the client's expense.

Payment:

Net 30 days (based on credit approval), Credit Card (Visa or Mastercard), or Pre-pay (when credit is not approved). Prices quoted are NOT valid for longer payment terms. BAL will NOT accept "pay when paid" terms. If longer than net 30-day terms are required, please specify and a revised quote may be provided. BAL reserves the right to withhold reports or sample processing on delinquent accounts (unpaid balances beyond the agreed payment terms). In accordance with FTC guidelines, a finance charge will be assessed at the rate of 1.50% per month (APR 18%) on balances not paid within the due date of the invoice. A credit card fee of up to 4% may be applied when payment is made by credit card.

Contracting:

Samples received without a current LSA, PO, or contract in place may be placed on hold. Only after the proper contracting paperwork is in place, will the TAT commence. Submittal of samples to BAL following receipt of this quotation shall constitute acceptance of all terms of this quote, except when an alternated agreement (contract or order) has been signed by both BAL and the client covering the scope of work as described within this quote. If an alternate agreement is desired, please ensure reference to this quote and clearly stipulate any exceptions to terms contained herein.

Invoicing:

Each work order or sample delivery group (SDG) is invoiced within 30 days of delivery of the final report or completion of the contracted services (usually within 1 day).

Taxes:

You shall pay to BAL the amount of any applicable duties or sales, use, excise, value added, or similar taxes imposed upon BAL on account of the sale, transportation, or provisioning of services or products, as applicable.

Force Majeure:

Any dates for delivery of services or products are estimates only, and BAL in no way guarantees that the services or products will be delivered in accordance with such estimates. Without limiting the generality of the foregoing, BAL may delay delivery without liability as a result of any delay caused by events outside BAL's reasonable control.

Disclaimer of Warranties:

BAL expressly disclaims all warranties of any kind, whether express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. In no event shall BAL be liable for any direct, indirect, special, incidental, consequential, punitive, exemplary, or other damages and/or loss of profits based on breach of contract, tort (including negligence), strict liability, product liability, or otherwise. To the fullest extent allowed by law, BAL disclaims any and all representations, warranties, and liabilities arising hereunder or relating to services or products delivered or to be delivered by BAL. BAL's total liability for any kind of loss, damage, or liability shall be limited to the price paid to BAL for the applicable service or product.



Brooks Applied Labs
13751 Lake City Way NE, Suite 108
Seattle, WA 98125
(206) 632-6206

General Terms & Conditions (continued)

Default/Remedies and Termination:

In the event that you fail to make payment when due or otherwise breach any terms or conditions herein, or become insolvent, the client shall be liable for any loss suffered by BAL by reason of such action, including but not limited to the costs of collection, attorneys' fees, loss of BAL's profits, and unreimbursed costs. In such event, BAL, at its sole discretion may terminate the delivery of any services or products; may demand cash in advance prior to filling any orders or completing BAL's obligations; and may place you on credit hold. The foregoing remedies are cumulative and are in addition to any other remedies available to BAL at law or in equity.

Governing Law:

These terms and conditions shall be governed by and construed in accordance with the laws of the State of Washington without giving effect to principles regarding conflict of laws. Any action or proceeding hereunder shall be brought in a state or federal court of competent subject matter jurisdiction located within King County in the State of Washington.

Entire Agreement:

These terms and conditions constitute the parties' entire agreement relating to the subject matter hereof and thereof and supersede all prior or contemporaneous oral or written communications, proposals, and representations with respect to such subject matter. No modification to these terms and conditions shall be binding unless in writing and signed by each party.

No Waiver:

No waiver of any provision herein or delay by either party in enforcement of any right hereunder shall be construed as a continuing waiver or create an expectation of non-enforcement of that or any other provision or right.

Services Quotation - C30645



Company	AECOM Canada Ltd	Project Manager
Attention	Laura Bekar	Marie Muisse
Project	Nova Scotia Tissue	(902) 420-0203 ext 253
Date Issued	Feb 08, 2023	(902) 220-8399
Effective	Feb 06, 2023 to Dec 29, 2023	Marie.MUISE@bureauveritas.com
Primary Lab	Bureau Veritas Bedford	

PACKAGE / TEST	METHOD REFERENCE	MATRIX	QTY.	UNIT FEE	TOTAL
Pb and As in tissue			70	\$70.00	\$4,900.00
<i>Metals in Tissue</i>	EPA 6020B R2 m	Tissue			
Mercury in biota	EPA 245.6 R2.3 m	Tissue	70	\$50.00	\$3,500.00
Metals in Tissue	EPA 6020B R2 m	Tissue	1	\$105.00	\$105.00
Methyl Mercury in Tissue(sub fr Bedford) ⁽¹⁾	N/A	Tissue	70	\$362.50	\$25,375.00
Sample Homogenization	EPA 6020B R2 m	Tissue	70	\$20.00	\$1,400.00
Weight of Tissue	Balance	Tissue	70	\$12.50	\$875.00
Dissection (Tissue)	N/A	Tissue	1	\$43.85	\$43.85
TOTAL(CAD):					\$36,198.85

COMMENTS:

- Prices quoted do not include applicable taxes.
- All TAT quoted is in business days (TAT is calculated from the time of receipt at the testing laboratory).

⁽¹⁾Test Location: Flett Research Ltd.

- Pricing for any analyses sent to a facility outside the BV network is set by the subcontract lab and is therefore subject to change.

Please freeze tissue samples within 48 hours of sampling. Methyl mercury aliquot should be collected in a glass jar. Metals and mercury aliquots should be submitted in a plastic (ziplock style) bag clearly labeled with the sample ID. Send frozen aliquots to the lab for analysis.

Standard TAT from receipt at the lab for tissue sample analysis is 4-5 weeks.

Dissection fee is noted in case it is required. If the lab needs to dissect the muscle tissue from the rest of the fish sample than dissection fees would apply.

All tissue samples are weighed after homogenization to ensure we have enough sample for the requested tests.

- Unless otherwise agreed to in writing, quotations and services are subject to Bureau Veritas' standard Terms and Conditions, which are available at www.bvna.com.

Parameter Details - C30645



PROFILE/GROUP	TEST	PARAMETER	RDL	UNIT
Dissection (Tissue)	Dissection (Tissue)	Sample Preparation	0	N/A
Mercury in biota	Mercury in biota	Mercury (Hg)	0.010	mg/kg
Metals in Tissue	Metals in Tissue	Aluminum (Al)	2.5	mg/kg
		Antimony (Sb)	0.50	mg/kg
		Arsenic (As)	0.50	mg/kg
		Barium (Ba)	1.5	mg/kg
		Beryllium (Be)	0.50	mg/kg
		Boron (B)	1.5	mg/kg
		Cadmium (Cd)	0.050	mg/kg
		Chromium (Cr)	0.50	mg/kg
		Cobalt (Co)	0.20	mg/kg
		Copper (Cu)	0.50	mg/kg
		Iron (Fe)	15	mg/kg
		Lead (Pb)	0.18	mg/kg
		Lithium (Li)	0.50	mg/kg
		Manganese (Mn)	0.50	mg/kg
		Molybdenum (Mo)	0.50	mg/kg
		Nickel (Ni)	0.50	mg/kg
		Selenium (Se)	0.50	mg/kg
		Silver (Ag)	0.12	mg/kg
		Strontium (Sr)	1.5	mg/kg
		Thallium (Tl)	0.020	mg/kg
Tin (Sn)	0.50	mg/kg		
Uranium (U)	0.020	mg/kg		
Vanadium (V)	0.50	mg/kg		
Zinc (Zn)	1.5	mg/kg		
Methyl Mercury in Tissue(sub fr Bedford)	Methyl Mercury in Tissue(sub fr Bedford)	Subcontract Parameter	0	N/A
Sample Homogenization	Sample Homogenization	Sample Preparation	0	N/A
Weight of Tissue	Weight of Tissue	Weight	0.10	g
Pb and As in tissue	Metals in Tissue	Arsenic (As)	0.50	mg/kg
		Lead (Pb)	0.18	mg/kg

Analysis Details - C30645



PACKAGE / TEST	MATRIX	METHOD REFERENCE	REQ. VOLUME (mL or g)
Pb and As in tissue			
<i>Metals in Tissue</i>	Tissue	EPA 6020B R2 m	12
Mercury in biota	Tissue	EPA 245.6 R2.3 m	50
Metals in Tissue	Tissue	EPA 6020B R2 m	12
Methyl Mercury in Tissue(sub fr Bedford)	Tissue	N/A	5
Sample Homogenization	Tissue	EPA 6020B R2 m	0
Weight of Tissue	Tissue	Balance	0
Dissection (Tissue)	Tissue	N/A	0

Additional Fees - C30645



**BUREAU
VERITAS**

	UNIT	UNIT FEE
ADMINISTRATION FEES & HOURLY RATES (NON-EMERGENCY)		
Certificate of Analysis Reissue	Per Report	\$50.00
Copy of Chromatogram (when requested after reporting)	Per Chromatogram	\$25.00
Credit Memo Administration Fee - Applies when issuing credits/debits where required information was not provided on COC	Per File	\$25.00
Hourly Rate - Administration	Per Hour	\$50.00
Hourly Rate - Customer Service After Hours Support	Per Hour	\$120.00
Hourly Rate - Instrument Analyst	Per Hour	\$120.00
Hourly Rate - Sample Receiving Staff and Sample Preparation	Per Hour	\$85.00
Hourly Rate - Scientific Services / Expert Testimony	Per Hour	\$300.00
Hourly Rate - Senior Department Manager / Data Validation	Per Hour	\$195.00
Minimum Billing	Per Job Submission	\$275.00
PICK UP & DELIVERY SERVICES		
Inbound Shipment of Samples Dropped at BV Labs Service Centres	Excludes SUMMA canisters	Complimentary
Inbound Shipment of Samples Using External Courier Service	FedEx, UPS, etc.	Responsibility of the Client
Outbound Shipment of Sampling Materials - Regular ground service	Excludes SUMMA canisters and Air sampling supplies	Complimentary
Outbound Shipment of Sampling Materials - Rush service or Remote	FedEx, UPS, etc.	Responsibility of the Client
SAMPLING SUPPLIES, SAMPLE HANDLING AND STORAGE FEES		
Container Supply and Non-Hazardous Disposal Fee	Per Sample	\$8.50
Coolers not returned (after 90 days)	Per Unit	\$50.00
Disposal of unused sampling containers	Per Container	\$1.25
Environmental Disposal Fee, Hazardous Samples (PCB Hazardous or TCLP Leachate Toxic)	Per Sample	at Cost
Expedited Turnaround Time to Meet Holding Time	When samples arrive with <50% of available holding time remaining or 48 hours whichever is greater	BV Labs Standard Surcharges Apply
Extract and Hold	Charge waived if sample is analyzed	50% of test cost
Hold Fee (samples received with no analysis requested)	Per Sample	\$10.00
Laboratory Filtration	Per Sample	\$15.00
Long Term Storage Fee > 30 Days (at -15°C)	Per Sample / Per Month	\$15.00
Long Term Storage Fee > 30 Days (at 4°C)	Per Sample / Per Month	\$10.00
Reanalysis at Customer Request	If reanalysis confirms original result	At Test Cost
Rush Container Order Fee	For orders with less than 48hr notice	\$50.00
Sample Compositing Fee	Per Composite	\$25.00

Appendix C Standard Operating Procedures

To be developed for the proposed field program.

C.1 Benthic Invertebrate Tissue Sampling

C.2 Fish Tissue Sampling

C.3 Sediment Sampling

C.4 Trace Metals Clean Hands-Dirty Hands Sampling

Appendix E. NSECC Obligations Letter

Our File Number: 33000-30-BED-2022-5060525

October 5, 2022

DEPARTMENT OF NATURAL RESOURCES - NS (HEAD OFFICE)
1701 HOLLIS STREET, 3RD FLOOR, PO BOX 698
HALIFAX, NS B3J 2T9

Dear Peter Geddes

RE: Contaminated Sites Obligations

PID	Civic #	Street Name	Street Type	Community	County
41019332	3630	MOOSELAND	RD.	MOOSELAND	HALIFAX COUNTY

Based on receipt of FRM-100, Notification of Free Product or Contamination on September 27, 2022 for the above noted property(ies), a contaminated site has been identified. Pursuant to the *Environment Act* and the *Contaminated Sites Regulations*, you are responsible to ensure that the contamination is properly addressed.

You are required to obtain the services of a Site Professional, as defined within the *Contaminated Sites Regulations* to ensure contamination at the above noted property(ies) is addressed. Your timely contact with a Site Professional may be key to reducing the overall time and cost of remediation and may result in the avoidance of unnecessary work.

Section 11(a)(iii) requires you to remediate the contaminated site in accordance with the regulations. To achieve compliance, the regulations require you to:

1. Complete the required Environmental Site Assessment(s) in accordance with Ministerial Protocol(s) and submit to the Department by March 27, 2023.
2. Complete a Remedial Action Plan report in accordance with Ministerial Protocol(s) and submit to the Department by September 27, 2024.
3. Complete a Confirmation of Remediation Report in accordance with Ministerial Protocol(s) and submit to the Department by September 27, 2024.
4. Complete a Record of Site Condition or a Declaration of Property Condition, as applicable, in accordance with Ministerial Protocol(s) and submit to the Department by September 27, 2024.

Yours truly,
Nova Scotia Department of Environment and Climate Change

AECOM Canada Ltd.
1701 Hollis Street
SH400 (PO Box 576 CRO)
Halifax, NS B3J 3M8
Canada

T: 902.428.2021
F: 902.334.4140
www.aecom.com