



BUILD NOVA SCOTIA

Human Health and Ecological Risk Assessment (HHERA) Problem Formulation - Final

Former Frenchvale Mine Site, Frenchvale, Nova Scotia

PID No. 15845167



November 2025 – 24-8606



November 21, 2025

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*Human Health and Ecological Risk Assessment (HHERA) Problem Formulation - Final
Parcel Identification Designation Numbers (PID No.): 15845167*

Dillon Consulting Limited (Dillon) is pleased to provide the final report for the Human Health and Ecological Risk Assessment (HHERA) Problem Formulation Report for the Former Mine Site located in Frenchvale, Nova Scotia, and identified by Parcel Identification Designation Number (PID No.) 15845167.

Should you have any questions, please do not hesitate to contact us.

Sincerely,

DILLON CONSULTING LIMITED

A handwritten signature in blue ink, appearing to read "N. Wambolt", is written over the company name.

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Acronyms, Abbreviations, Definitions

Acronym	Definition
ACCDC	Atlantic Canada Conservation Data Centre
AEP	Alberta Environment and Parks
ANZECC	Australian and New Zealand Environment and Conservation Council
APEC	Area of Potential Environmental Concern
ARBCA	Atlantic Risk-Based Corrective Action
ARD	Acid Rock Drainage
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
As	Area (of site)
ASTM	American Society for Testing and Materials
ATV	All Terrain Vehicle
AUF	Area Use Factor
BC MOECC	British Columbia Ministry of Environment and Climate Change Strategy
BC CSR	British Columbia Contaminated Sites Regulation
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CCME	Canadian Council of Ministers of the Environment
CCREM	Canadian Council of Resources and Environment Ministers
CEQG	Canadian Environmental Quality Guidelines
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSM	Conceptual Site Model
CSR	Contaminated Sites Regulations
CWS	Canada Wide Standard
CWQG	Canadian Water Quality Guidelines
DOC	Dissolved Organic Carbon
ECCC	Environment and Climate Change Canada
EcoSSL	Ecological Soil Screening Levels
EQS	Environmental Quality Standards
ERA	Ecological Risk Assessment
ERM	Effects Range Median
ESA	Environmental Site Assessment
FCSAP	Federal Contaminated Sites Action Plan
FEQG	Federal Environmental Quality Guideline
ha	Hectares

Acronym	Definition
HC	Health Canada
HHERA	Human Health and Ecological Risk Assessment
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
HRs	Home Range (of species)
ICMM	International Council on Mining and Metals
IQ	Intelligence Quotient
ISQG	Interim Sediment Quality Guideline
LANL	Los Alamos National Library
LOE	Lines of Evidence
m	Meters
MCP	Massachusetts Contingency Plan
MDEP	Maine Department of Environmental Protection
MECP	Ministry of Environment, Conservation and Parks
MOECC	Ministry of the Environment and Climate Change (British Columbia)
NA	Not Applicable
NGA	No Guideline Applicable
NOAA	National Oceanic and Atmospheric Administration
NORM	Naturally Occurring Radioactive Materials
NS	Nova Scotia
NS CSR	Nova Scotia Contaminated Sites Regulations
NS DNR	Nova Scotia Department of Natural Resources
NS ESA	Nova Scotia Endangered Species Act
NSECC	Nova Scotia Environment and Climate Change
NS PSS	Nova Scotia Pathway Specific Standards
Ns	Number of Individuals
PAH	Polycyclic Aromatic Hydrocarbons
PARCC	Precision, Accuracy, Representativeness, Comparability and Completeness
PCB	Polychlorinated Biphenyls
PEL	Probable Effect Level
PHC	Petroleum Hydrocarbons
PID	Parcel Identification Designation Number
PIRI	Partnership for the Implementation of Risk-Based Corrective Action
PPE	Personal Protective Equipment
PQRA	Preliminary Quantitative Risk Assessment
PSS	Pathway Specific Standards
QA	Quality Assurance
QC	Quality Control

Acronym	Definition
RBCA	Risk-Based Corrective Action
RBSL	Risk-Based Screening Level
RDL	Reportable Detection Limit
ROC	Receptor of Concern
RPD	Relative Percent Difference
RSL	Regional Screening Level
SABCS	Science Advisory Board of Contaminated Sites in British Columbia
SAR	Species At Risk
SARA	Species At Risk Act
SedQG _E	Sediment Quality Guideline for Ecological health
SEL	Severe Effects Level
SoCC	Species of Conservation Concern
SoQG _E	Soil Quality Guideline for Ecological health
SoQG _{HH}	Soil Quality Guideline for Human Health
SSI	Supplemental Site Investigation
SSTL	Site-Specific Target Level
SWQG _E	Surface Water Quality Guideline for Ecological health
TEL	Threshold Effect Level
THQ	Target Hazard Quotient
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TRV	Toxicological Reference Value
UCLM	Upper Confidence Limit of the Mean
US DOA	United States Department of Agriculture
US EPA	United States Environmental Protection Agency
WOE	Weight of Evidence

Executive Summary

Dillon Consulting Limited (Dillon) was retained by Build Nova Scotia, on behalf of the Nova Scotia Department of Natural Resources (NS DNR), to conduct a Human Health and Ecological Risk Assessment (HHERA) Problem Formulation for the former Frenchvale mine site in Frenchvale, Cape Breton County, Nova Scotia, herein referred to as the “site” or “subject property”.

The former Frenchvale mine is located in Frenchvale, Cape Breton County, Nova Scotia along Quarry Road, that extends west from Gouthro Road (Figure 1, Appendix A). The former mine site included a mill processing area and weigh scale. A former limestone quarry was also associated with the mine, but is located off-site to the northwest and west, and is outside of the scope of this study. The former mine site (Parcel Identification Designation Numbers [PID No.] 15845167) is owned by NS DNR. The total property area of the site is approximately 6.6 hectares (ha). The area of the site impacted by historical site activities comprises five (5) Areas of Potential Environmental Concern (APECs). The study boundary (or “study area”) for the HHERA encompasses approximately 6.6 ha of the total area of the former mill site. The HHERA study boundary is shown in Figure 2, Appendix A. Photos of the site are provided in Appendix B.

Previous investigations at the site included a Phase I Environmental Site Assessment (ESA), (Dillon, 2025a), a Phase II ESA (Dillon, 2025b) and a Supplemental ESA (Dillon, 2025c) conducted by Dillon. The previous investigations identified five areas of potential concern (APECs) which are anticipated to be impacted by historical site activities. The APECs for the site are summarized below and presented in Figure 2, Appendix A:

- APEC 1: Overburden/Fill Stockpiled material;
- APEC 2: Surface debris/waste scattered on the site;
- APEC 3: Buried and/or partially buried debris;
- APEC 4: Waste Rock Pile; and
- APEC 5: Off-site and upgradient former quarry operations.

The HHERA problem formulation identified potential receptors for human and ecological health which were site visitors, terrestrial vegetation and soil organisms; herbivorous and insectivorous small mammals; herbivorous and insectivorous birds; freshwater aquatic life and amphibians. Potential SAR were also assessed for the site; however, it was determined that SAR are unlikely to be impacted by site contaminants. Analytical chemistry data for soil, sediment and surface water were screened against applicable regulatory benchmarks (guidelines) to identify contaminants of concern (COCs) for identified exposure pathways. Lead in soil was identified as the only COC for human health. Copper and zinc for terrestrial vegetation and soil organisms and lead in soil for mammals and birds were identified as COCs for ecological health. No COCs were identified for amphibians or freshwater aquatic life.

The outcomes and recommendations from the HHRA problem formulation are provided below.

- Lead was identified at concentrations above the $SoQG_{HH}$ at two soil sample locations (BH44 and BH45). These locations represent potential hotspots of contamination that require additional evaluation. As such, the following is recommended:
 - The vehicle debris (as seen in Photos 21 and 22, Appendix B) present at APEC 2 should be removed where feasible, based on site conditions and access, as it is potentially a source of lead contamination in soil (e.g., lead in car paint, batteries, tetraethyl lead in old gasoline).
 - Soil removal (e.g., surface soil) could be completed at the time of removal of vehicle debris, if obvious signs of impacts are observed.
 - Following the removal of vehicle debris (and potential removal of surface soil) at the site, additional soil sampling is recommended in the vicinity of the vehicle debris to horizontally and vertically delineate soil lead impacts, including deeper horizon samples at BH44 and BH45. If vehicles cannot be removed (e.g., due to access considerations), soil sampling is recommended around the vehicles.
 - Depending on the results of these soil samples, a HHRA and/or soil risk management or remedial measures may be recommended.
- Additional debris on site including abandoned fishing gear (Photo 8, Appendix B), abandoned tires, geotextile rolls (Photo 12 and 27, Appendix B), metal drums (Photo 28, Appendix B) and rusted equipment (Photo 9 and 11, Appendix B) located in and around APEC 2 should be removed where feasible based on site conditions and access. While not identified as a potential chemical risk, the debris could pose a physical risk to people that access the site. If visible soil staining is noticed upon removal of the metal drums or rusted equipment, soil samples should be collected from stained areas to confirm whether or not there are contaminant concerns.

The outcomes and recommendations from the ERA problem formulation are provided below.

- Copper and zinc were identified as COCs in site soil for terrestrial vegetation and soil organisms.
- Lead was identified as a COC in site soil for mammals and birds.
- No COCs were identified in site surface water or sediments for freshwater aquatic life, including amphibians.
- There is uncertainty regarding the extent of lead impacts in soil from the vehicle debris on site. Thus, the following is recommended:
 - The additional soil sampling recommended for lead for HHRA soil delineation purposes would also delineate the extent of lead impacts in soil for ecological receptors.
 - Depending on the new lead soil chemistry data, further evaluation of lead with respect to small mammals and birds (such as an ERA) may be required.
- To further assess potential impacts to vegetation and soil organisms, the following is recommended:
 - Visual examination of the site vegetation communities in the areas where soil COCs exceeded the $SoQG_E$ for vegetation and soil organisms (i.e., BH1, BH, BH7, BH14, BH15, BH18, BH27, BH28, BH33, BH37, BH36, BH45 and BH47) for signs of stress / impairment, to see if the expected species and communities are present (or not), and whether these vegetation communities are

similar (or not) to vegetation communities in areas where soil guideline exceedances were not observed. Existing photos provide inadequate coverage to properly assess potential vegetation impacts at these sampling locations.

- o This could also include an examination of previous site photos and field notes for site and off-site vegetation.

1.0

Introduction

Dillon Consulting Limited (Dillon) was retained by Build Nova Scotia, on behalf of the Nova Scotia Department of Natural Resources (NS DNR), to conduct a Human Health and Ecological Risk Assessment (HHERA) Problem Formulation for the former Frenchvale mine site in Frenchvale, Cape Breton County, Nova Scotia, herein referred to as the “site” or “subject property”.

The former Frenchvale mine is located in Frenchvale, Cape Breton County, Nova Scotia along Quarry Road, that extends west from Gouthro Road (Figure 1, Appendix A). The former mine site included a mill processing area and weigh scale. A former limestone quarry was also associated with the mine, but is located off-site to the northwest and west, and is outside of the scope of this study. The former mine site (Parcel Identification Designation Numbers [PID No.] 15845167) is owned by NS DNR. The total property area of the site is approximately 6.6 hectares (ha). The area of the site impacted by historical site activities comprises five (5) Areas of Potential Environmental Concern (APECs). The study boundary (or “study area”) for the HHERA encompasses approximately 6.6 ha of the total area of the former mill site. The HHERA study boundary is shown in Figure 2, Appendix A. Photos of the site are provided in Appendix B.

The findings presented in this report are based on information and analytical data obtained from the Phase I Environmental Site Assessment (ESA; Dillon, 2025a), Phase II ESA (Dillon, 2025b) and Supplemental ESA (Dillon, 2025c) in addition to other reports and site records, information obtained during site visits, and discussions with the province and Build Nova Scotia.

1.1

Structure of the Report

The current section of this report (Section 1.0) details the objectives and scope of the HHERA Problem Formulation. Section 2.0 provides information related to the site background and characterization, including physical descriptions of the site, summaries of previous investigations, and site data available for the assessment. The Human Health Risk Assessment (HHRA) framework and problem formulation outcomes are detailed in Section 3.0, and the Ecological Risk Assessment (ERA) framework and problem formulation outcomes are detailed in Section 4.0. Section 5.0 presents the overall conclusions and recommendations from the HHERA problem formulation. Limitations and closure conditions are described in Section 6.0 and references are provided in Section 7.0. Site figures can be found in Appendix A, while site photos are provided in Appendix B. Additional information to support the HHERA (including laboratory certificates of analysis and analytical data tables) is provided in Appendices C to E.

Objectives and Scope

The overall study boundary for the HHERA problem formulation is provided in Figure 2, Appendix A. The study boundary included the following APECs identified in previous reports (Dillon, 2022b) and shown on Figure 2, Appendix A:

- APEC 1: Overburden/Fill Stockpiled material;
- APEC 2: Surface debris/waste scattered on the site;
- APEC 3: Buried and/or partially buried debris;
- APEC 4: Waste Rock Pile; and
- APEC 5: Off-site and upgradient former quarry operations.

These above 5 APECs were identified as areas of the site anticipated to be impacted by historical site activities in the Phase I ESA (Dillon, 2025a), Phase II ESA (Dillon 2025b) and Supplemental ESA (Dillon, 2025c) conducted by Dillon. Photos and descriptions of the terrestrial habitat in each of the above APECs is provided in Section 3.3.2 of Appendix D.

The objective of this project is to determine whether there are contaminants of concern associated with site activities that could pose potential adverse health effects to humans and ecological receptors within the study boundary.

The scope of this project included conducting the problem formulation step of an HHERA to evaluate analytical data for site soil, sediment, and surface water, collected within and adjacent to, the APECs. This included on-site soil data collected to date and surface water and sediment data collected on-site, and within Gouthro Lake adjacent to the site. The scope also included preparing a report presenting the results of the outcomes of the HHERA problem formulation, including identifying data gaps and next steps.

The HHERA problem formulation for the site was conducted in accordance with the Nova Scotia Contaminated Sites Regulations (NS CSRs) and associated Ministerial Protocols, where applicable. Provincial guidelines were applied where possible (i.e., the Nova Scotia Pathway Specific Standards [NS PSS] and the Atlantic Risk-Based Corrective Action [ARBCA] guidelines). In addition, Federal Contaminated Sites Action Plan (FCSAP), Health Canada (HC), Environment and Climate Change Canada (ECCC) guidance materials and applicable provincial and federal protocols and guidelines were also considered, where relevant (see Section 3.2.4 and 4.2.8 for details of the guidelines applied in the human and ecological risk assessments, respectively).

The site is zoned for commercial land use, and neighbouring properties are zoned for residential and commercial land use. No known potable wells are currently located on the site, nor are they reasonable anticipated to be constructed in the future. The surrounding properties are serviced by individual potable wells; however, the nearest potable well is located approximately 150 metres (m) northeast and upgradient to the study boundary. As such, it would not be expected to be impacted by groundwater from the site.

Two grain size samples were collected from different areas of the site during the Phase II ESA. The results indicated the site is classified as coarse-grained. As such, the Nova Scotia Tier II Pathway Specific Standards (PSS) for coarse-grained soils have been considered.

For the purpose of the HHRA problem formulation, the site was considered to be commercial and non-potable, with coarse-grained soil conditions.

The HHRA evaluates current and reasonably foreseeable future exposures associated with the site (based on current media concentrations), assuming the anticipated future land use, existing engineering controls and site conditions remain consistent with current land use, as is anticipated.

2.0

Background and Site Characterization

The Frenchvale Former Mine (i.e., the site) is located in Frenchvale, Nova Scotia. The former mine site (PID No. 15845167) is owned by NS DNR. The site can be accessed by an unpaved access road (Quarry Road) that extends west from Gouthro Road (Figure 1, Appendix A). A former mill processing area and weigh scale were historically present on-site, with a former limestone quarry located off-site to the northwest and west. Historically, the former off-site quarry supplied the Sydney Steel Plant with carbonate materials, including limestone and dolomite, and operated from 1964 to 1970 and then reopened in 1971 for an unknown period. Crushing, screening, and milling operations associated with the former quarry took place at the site. Overburden and steel plant screening materials were reportedly dumped and spread over areas of the site. Tailings were not reported to have been present at the site. Structures and infrastructure (i.e., weigh scale) were constructed to support site operations. While the majority of the former site infrastructure has been removed, some infrastructure remnants are present on-site (e.g., former weigh scale foundation). Site photos can be found in Appendix B.

The total property area of the site is approximately 6.6 ha (Figure 2, Appendix A) which includes the terrestrial land area, wetland areas, as well as the portion of Gouthro Lake included in the property boundary. A large portion of the central area of the site is dominated by overburden/stockpiled material from mining operations (APEC 1) and is characterized by a lack of vegetation and piles of fill material. Other disturbed areas include waste rock (APEC 4) adjacent to the quarry road access into the site and the weigh scale foundation (APEC 3). In addition, several areas containing debris (APEC 2) were identified (Figure 2, Appendix A) and include: discarded fishing gear, vehicle debris, rusted equipment,

metal pipes, discarded geotextile roles and tires (see Photos 7 to 9, 11, 12, 20 to 22, 27, and 28, Appendix B). An old culvert is also present on-site adjacent to the eastern watercourse (Figure 2, Appendix A).

Two watercourses and two wetland areas were identified by Dillon personnel during previous field investigations and both discharge into Gouthro Lake (Figure 2, Appendix A). The watercourses were not confirmed to contain fish; however, aquatic invertebrates were observed along the shoreline of Gouthro Lake. Fishing was observed by Dillon personnel on the eastern side of Gouthro Lake just off of Gouthro Road, and Gouthro Lake was considered to provide habitat for fish. A beaver dam was also observed by Dillon personnel (Photo 1, Appendix B) around the on-site pond (eastern watercourse) and appeared in good condition.

Gouthro Lake is considered a habitat of potential ecological concern as it is adjacent to the southern study boundary and a small portion of Gouthro Lake is within the study boundary itself. In addition, a continuous wetland area borders Gouthro Lake throughout the site and the shoreline is characterized by extensive aquatic vegetation growth (Photo 2, Appendix B) with difficult shoreline access.

The study boundary is well vegetated with trees and shrubs with the exception of the gravel roadway and the stockpile of fill (APEC 1) which are less well vegetated. The concrete foundation of the weigh scale was partially submerged during previous field investigations and was also sparsely vegetated (although vegetation appears to be slowly reclaiming the area). Information on habitat characterization as it pertains to ecological risk is provided in Section 4.2.1.

2.1 Physical Setting

2.1.1 Water Supply/Groundwater Usage

During the Supplemental ESA field program (Dillon, 20225c), groundwater was encountered at depths ranging from 0.15 m bgs (BH15) to 0.75 mbgs (BH9) while hand augering and collecting soil samples. While groundwater elevation measurements were not conducted during previous field investigations, groundwater flow is inferred to be southeast towards Gouthro Lake. There are currently no potable wells present on-site and the nearest well is located approximately 150 m northeast and upgradient to the site on an adjacent residential property.

2.1.2 Regional Geology and Topography

To describe the regional physiography and expected hydrogeologic conditions beneath the subject property, the following documents were reviewed:

- Stea, R.R., Conley, H., and Brown, Y. (compilers) 1992: Surficial Geology of the Province of Nova Scotia; Nova Scotia Department of Natural Resources, Map 92-3, Scale 1:500,000.

- Keppie, J.D. (compiler) 2000: Geological Map of the Province of Nova Scotia; Nova Scotia Department of Natural Resources, Minerals and Energy Branch, Map ME 2000-1, Scale 1:500,000.

The surficial geology of the subject area is mapped as stony till plain and drumlins. Till is a stony, sandy matrix and consists of material derived from local bedrock sources, ranging in thickness from 2 meters (m) to 20 m. Drumlin facies are siltier due to erosion and incorporation of older till units by glaciers, ranging in thickness from 4 m to 30 m. Soil observed during previous investigations (Dillon, 2025b) generally consisted of silty sand, or sand and crushed gravel. Two representative soil samples collected from the site indicated a coarse-grained soil classification (see Table D-1, Appendix D).

The regional bedrock geology of the site is primarily mapped as the Kempt Head, Sydney River, Gays River, MacBeth Brook and Macumber Formations as part of the Lower Windsor Group formation of the Carboniferous period, consisting of anhydrite, salt, gypsum, shale, marine dolomite, and limestone (Stea et al., 1992; Keppie, 2000). Bedrock was not encountered during previous field investigations (Dillon, 2025b; Dillon, 2025c).

The topography of the site is flat to rolling with many surface boulders; drumlins-elongate or oval hills veneered by stony till with underlying multiple till layers (Stea et al., 1992; Keppie, 2000). Regional topography suggests the regional shallow groundwater flow is likely southeast towards Gouthro Lake.

The local shallow groundwater flow direction may vary from the regional context and be influenced by backfilled areas with coarse-grain materials and/or debris, which may provide a more permeable conduit for groundwater flow when compared to the lower permeability of the native soils.

2.1.3 Stratigraphy

Due to the nature of the site, there is significant variability in soil stratigraphy depending on the area. Additionally, the grade of the site is even more variable depending on the area within the study boundary. During the Phase II ESA (Dillon, 2025b) it was noted that soil stratigraphy in the area generally consisted of a thin layer of sand or silt underlain with organics and gravel with varying amounts of sand and gravel. Bedrock was not encountered during previous environmental assessments.

2.1.4 Climate

Current climate conditions at the site can be characterized by examining the historical data. Climate data were obtained from ClimateAtlas.ca using the historical period 1976-2005. All data are for the Sydney region which includes the Frenchvale site (ClimateAtlas.ca, 2025):

- Average annual temperature: 6.2 °C;
- Coldest month: February, -9.4 °C;
- Hottest month: August, 22.7 °C;
- Annual average precipitation: 1433 mm;
- Number of frost days (days with coldest temperature below 0°C): 150.3 days;

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- Number of summer days (days above 25°C): 18.9 days; and
- Dry days (number of days without rain or snow): 164.1 days.

The site is situated within the maritime boreal climate zone and as shown above, is characterized by variable weather, warm summers, cold winters, and moderate precipitation.

2.2 Land Use Considerations

The site is zoned for commercial land use, and neighbouring properties are zoned for residential and commercial land use. The site is currently vacant with no buildings present. A concrete foundation from the weigh scale used during mining operations remains on-site (APEC 3; Figure 2, Appendix A); however, during the time of the most recent field investigation it was partially submerged in pooled surface water (Photo 10, Appendix B). A culvert is also present on-site (Figure 2, Appendix A) adjacent to the watercourse on the eastern side of the property.

No potable wells are currently located on-site; however, the surrounding developed properties are serviced by individual potable wells with the nearest residential building located approximately 150 m northeast and upgradient.

For the HHERA problem formulation, commercial land use with coarse soils, and non-potable water was assumed.

2.3 Previous Assessments

2.3.1 Phase I ESA (Dillon, 2025a)

Dillon was commissioned by Build Nova Scotia to complete a Phase I ESA of the former Frenchvale mine site (PID: 15845167). The Phase I ESA included a records review and reporting of the findings.

Findings of the Phase I ESA identified five on-site APECs. Preliminary Contaminants of Potential Concern (COPCs) were also identified for each APEC in soil, sediment and/or surface water which included: metals, pH, naturally occurring radioactive material (NORM), acid rock drainage (ARD), petroleum hydrocarbons (PHCs; including total petroleum hydrocarbons (TPH)), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and general chemistry parameters (surface water only). A summary of the APECs and preliminary COPCs from the Phase I report are presented in Table 2-1.

Table 2-1: Summary of APECs and Site Conditions. Adapted from Phase II ESA (Dillon, 2025a).

APEC No.	APEC	Preliminary COPCs	Media of Concern	Comments
1	Overburden/fill stockpiled material	Metals, pH, NORM, ARD	Soil, sediment, surface water	Stockpiled material, iron.
2	Surface debris/waste scattered across the site	Metals, PHCs, TPH, BTEX, PAHs, PCBs, pH	Soil, sediment, surface water	Debris containing burned heavy equipment tires, rusted steel, discarded fishing gear, and degraded/partially buried geotextile rolls.
3	Buried and/or partially buried debris	Metals, general chemistry, PHCs, PAHs, PCBs	Soil, sediment, surface water	Former weigh scale area.
4	Waste rock pile	Metals, pH, PHCs, PAHs, NORM, ARD	Soil, sediment, surface water	From Limestone kiln.
5	Off-site and upgradient former quarry operations	Metals, pH, PHCs, PAHs, NORM, ARD	Soil, sediment, surface water	Buried debris and inferred neighboring activities.

Based on the identified APECs and preliminary COPCs, the Phase I ESA recommended the following:

- Conduct a Phase II ESA to sample environmental media (soil, sediment and surface water) in each APEC and analyze for the preliminary COPCs identified in Table 2-1.
- Removal of debris from the site for appropriate disposal at a licensed facility.

2.3.2

Phase II ESA (Dillon, 2025b)

Dillon was commissioned by Build Nova Scotia to complete a Phase II ESA of the former Frenchvale mine site. The Phase II ESA included soil, sediment and surface water sampling. Based on the findings of the Phase I ESA, sample analysis was conducted for metals, BTEX and modified TPHs, PAHs, PCBs, pH, conductivity and general chemistry (for water only). Potential NORM was assessed for by collection of one sample for gross alpha beta and isotope analysis. Acid rock drainage (ARD) was pre-screened by assessing concentrations of sulphur, chloride, electrical conductivity, sodium adsorption and pH at select surface soil and sediment sample locations in areas where overburden piles and waste rock had been identified. Grain size analysis was also conducted on two soil samples.

Reported concentrations of contaminants in environmental media were compared to NS Tier I EQS for commercial land use potable water use and coarse-grained soil. The results of the Phase II ESA were as follows:

- Soil
 - Metals exceedances (i.e., beryllium, cadmium, copper, selenium, uranium and zinc) above the NS Tier I EQS and Environment Canada Background Soil Database (Dillon, 2011) concentrations were identified in soil.
 - Elevated sulphur concentrations were identified in soil above the Sulphide Bearing Material Disposal Regulation (Nova Scotia Environment Act, 1995).
 - Lateral delineation of metals in soil was achieved to the north, but not the east, south or west.
 - Vertical delineation of metals in soil was not achieved.
 - No BTEX, TPH, PCB or PAH exceedances were identified in soil.
- Sediment
 - Metals exceedances (i.e., lead, manganese and zinc) above the NS Tier I EQS were identified in sediment.
 - Elevated sulphur concentrations were identified in sediment above the Sulphide Bearing Material Disposal Regulation.
 - Delineation of metals in sediment was achieved to the east and west but not to the north or south.
- Surface Water
 - Metals exceedances (i.e., aluminium, copper, iron and manganese) above the NS Tier I EQS were identified in surface water.
 - Impacts in surface water were not delineated.
- NORM
 - One soil sample submitted for gross alpha-beta and isotope analysis indicated the potential for NORM at the site is low.
- ARD
 - The soil and sediment samples analyzed for sodium adsorption ratio indicated a low potential for ARD; however, additional ARD sampling was recommended at BH10 and SED8 due to elevated sulphur concentrations.

Based on the results of the Phase II ESA, the following recommendations were made:

- Additional soil sampling to establish vertical and lateral delineation of metals impacts in soil.
- Additional near shoreline surface water and sediment sampling in Gouthro Lake.
- Additional soil sampling along the southwest study boundary to assess potential local background metals concentrations in soil.
- Obtain soil and sediment samples for ARD analysis at BH10 and SED8.
- No further action was recommended with regards to NORM.
- Conduct an HHERA to further evaluate potential risk to human and ecological health at the site.

2.3.3

Supplemental ESA (Dillon, 2025c)

Based on the findings of the Phase II ESA (Dillon, 2025b), Dillon was contracted by Build Nova Scotia to complete a Supplemental ESA at the former Frenchvale mine site, and to support an HHERA if deemed necessary. The purpose of the Supplemental ESA was to obtain additional soil samples to support delineation identified impacts within the study boundary, and to collect additional surface water and sediment samples, including at the adjoining Gouthro Lake shoreline. Additional soil sampling was also conducted for BTEX/PHC analysis in the area of abandoned vehicles to identify potential impacts. Soil sampling for acid rock drainage was conducted based on the Phase II ESA findings and recommendations. Thirteen soil samples were taken along the southwestern study boundary and the analytical data for these samples were reviewed to determine if these data could be used to represent local background conditions.

The results of the Supplemental ESA were as follows:

- Soil
 - Soil exceedances above the NS Tier I EQS were reported for: aluminium, arsenic, beryllium, cadmium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, selenium, uranium, vanadium and zinc.
 - Sulphur in soil was also reported above the Sulphide Bearing Material Disposal Regulation guideline.
 - No BTEX or PHC exceedances above the NS Tier I EQS were reported.
- Sediment
 - Sediment exceedances above the NS Tier I EQS were reported for: copper, manganese and zinc.
 - Sulphur in sediment was also reported above the Sulphide Bearing Material Disposal Regulation guideline in sediment samples within Gouthro Lake.
- Surface Water
 - Surface water exceedances above the NS Tier I EQS were reported for: aluminium and iron.
- ARD Analysis
 - Soil and sediment ARD analysis indicated the material on-site is not net acid generating.

Based on the results of the supplemental ESA, four areas of on-site metals impacts (based on Tier 1 screening) were identified across the site having a total area of approximately 2.1 ha (as shown in Figure 3 of the Dillon, 2025c report). These areas delineate metals impacts in soil to the north and east and partially to the south. Potential metal impacts extend to the west off-site. Further assessment of metals in environmental media was recommended. No further action was recommended to address acid generation from the waste rock. The soil samples initially taken to potentially represent background conditions were determined to not likely be applicable as background soil samples due to their proximity to observable historical impacts. It is likely that the deposition of contaminated soils (i.e., wind blown dusts) may have deposited to the south and west where the background soil samples were collected (see Section 2.4.1); as such, these 'background' samples were incorporated into the site data set for the HHERA.

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2.4 Data Availability and QA/QC

2.4.1 Background Data

Soil, sediment and surface water samples were initially collected as local background samples during the supplemental ESA (Dillon, 2025c). The intended soil samples were collected within the study boundary and in some cases were relatively close to the upgradient mine site and/or the APECs. No clear trend was observed between the surficial and deeper soil samples collected. It is possible that deposition of contaminated soils across the site may have occurred, including potential windblown dusts impacting areas within close proximity to historical mining activities from the site and the upgradient former limestone quarry located off-site. As such, these soil samples were conservatively included in the on-site soil data set, rather than being carried forward as background samples. Excluding these samples as background did not affect the outcome of the final COPC selection.

No local off-site background soil analytical data were available, as such, measured metal concentrations in site soil were compared to the Nova Scotia Maximum Concentration Background Levels for the Highlands Soil Zone, as presented in Environment Canada's Background Soil Database (Dillon, 2011).

There are two main watercourses running through the site. Review of the locations of the sediment/surface water samples collected to potentially represent local background within the site boundaries indicated that they could be potentially influenced from either the on-site APECs or the upgradient mine site (i.e., more suitable background samples would be required off-site and upstream of the mine and quarry from both watercourses) (Dillon, 2025c). As such, each of the analyzed sediment and surface water samples were conservatively included in the on-site data. Excluding these samples as background did not affect the outcome of the final COPC selection.

2.4.2 Site Data

The site data selected for the HHRA were compiled from the Phase II ESA field program (Dillon, 2025b) and the supplemental ESA (Dillon, 2025c). Site soil, sediment, and surface water analytical data considered in the HHRA can be found in Appendix D and E and laboratory certificates of analysis of all the data considered in the HHRA are provided in Appendix C. The number of samples and type of analysis conducted in each media type is presented in Table 2-2.

Table 2-2: Summary of Sample Analysis for Each Media Considered in the Problem Formulation

Analysis	Soil	Sediment	Surface Water
Grain Size	N = 5	N = 2	NA
Moisture Content	N = 13 (1)	N = 2 (1)	NA
pH	N = 29 (2)	N = 10 (1)	N = 17 (2)

Analysis	Soil	Sediment	Surface Water
Electrical Conductivity	N = 12 (1)	N = 3 (1)	N = 17 (2)
Sodium Adsorption Ratio	N = 4 (1)	N = 3 (1)	N = 0
Total Organic Carbon	N = 0	N = 9 (1)	N = 17 (2)
General Chemistry ¹	-	-	N = 17 (2)
Metals	N = 63 (6)	N = 19 (2)	N = 17 (2)
BTEX	N = 12 (1)	N = 1	None
PHCs	N = 12 (1)	N = 1	None
PAHs	N = 8 (1)	N = 1	None
PCBs	N = 6 (1)	None	None

Notes

N = # refers to the total number of samples, including field duplicates. Number in parentheses refers to the number of field duplicates included in the total count.

NA denotes the analysis was not applicable to the media type.

- General chemistry analysis is presented by the specific analysis for soil and sediment. For surface water, all general chemistry parameters were analyzed in each sample.

2.4.3 Data Quality Assurance and Control

A program to ensure data quality assurance and control (QA/QC) was implemented throughout the Phase II ESA (Dillon, 2025b) and the supplemental ESA (Dillon, 2025c). The QA/QC program consisted of the following elements:

- Collection of samples using protocols consistent with Dillon Standard Environmental Field Procedures and/or industry standards;
- Use of dedicated sampling equipment and/or adherence to established equipment cleaning protocols, where applicable;
- Use of laboratory supplied containers;
- Collection of blind field duplicates; and
- Implementation of laboratory QA/QC procedures including analysis of reference standards, laboratory blanks and replicates.

Validation criteria were established that required the analytical data to have an acceptable and documented level of precision, accuracy, representativeness, comparability, and completeness (the

PARCC criteria). The precision of the data for the samples collected was evaluated by calculating the Relative Percent Difference (RPD) between the original samples and its duplicate when the samples had concentrations greater than five (5) times the laboratory Reportable Detection Limit (RDL).

Additional details on the sampling procedures and RPD calculations have been previously supplied under a separate cover (Dillon, 2025b; Dillon, 2025c). Overall, major analytical issues were not identified that would negatively affect the use of the soil, surface water, or sediment data. Thus, all such data were considered to be of adequate quality for use in the HHRA problem formulation presented herein.

3.0

Human Health Risk Assessment

3.1

Human Health Risk Assessment Framework, Purpose, and Scope

Risk assessment is a systematic quantitative or qualitative process for interpreting the potential adverse effects associated with an activity, situation, or an exposure. The framework and methods used for the HHRA problem formulation for the former Frenchvale mine site are described in this section and its associated subsections.

The fundamental purpose of any HHRA is to estimate or determine whether people working, living at, or visiting a given location are being exposed, or are likely to be exposed, to concentrations of chemicals that have the potential to result in adverse human health effects (i.e., toxicity). In order for a potential risk to exist, three things must be present: a contaminant of potential concern (or hazard), a receptor, and an exposure pathway that links the chemical constituent to the receptor, as presented in the graphic to the right. If one of these elements is missing, potential risk does not exist. If all three elements are present, then the degree of risk may be estimated and compared to target risk levels to identify whether or not unacceptable levels of risk are present and remedial action or risk management is required.

The HHRA problem formulation for the Frenchvale mine site was conducted in accordance with the following Canadian regulatory HHRA guidance documents, where applicable:

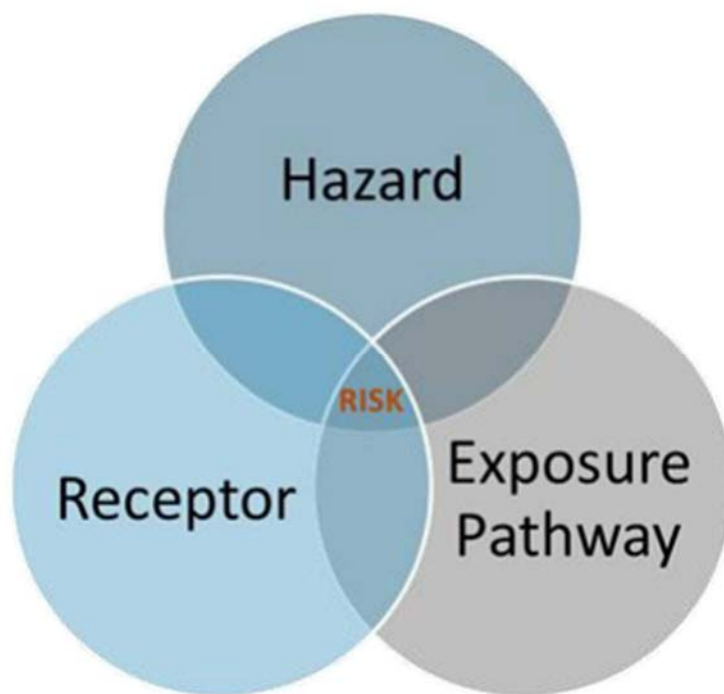


Figure 3-1: Components of Risk

- Federal Contaminated Site Risk Assessment in Canada. *Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA)*. Version 4.0. March 2024. Health Canada Contaminated Sites Division, Safe Environments Directorate (Health Canada, 2024);
- Federal Contaminated Site Risk Assessment in Canada. *Overview of Health Canada Guidance Documents Related to Human Health Risk Assessment of Federal Contaminated Sites*. March 2021. Health Canada Contaminated Sites Division, Safe Environments Directorate (Health Canada, 2021);
- *Canada Wide Standard for Petroleum Hydrocarbons in Soil: Scientific Rationale*. Supporting Technical Document. PN 1399. ISBN 978-1-896997-77-3 PDF (Canadian Council of Ministers of the Environment [CCME], 2008); and
- *CCME Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines* (CCME, 2006).

The HHRA also utilized relevant guidelines and approaches provided in the Nova Scotia Contaminated Sites ministerial protocols (Atlantic PIRI, 2022; NSECC, 2022). The Nova Scotia Department of Environment and Climate Change (NSECC) has adopted environmental quality benchmarks derived by the CCME, and other regulatory authorities in Canadian or international jurisdictions. Where appropriate or necessary, the HHRA also considered human health risk assessment guidance and procedures developed and endorsed by other regulatory agencies such as the US EPA (Environmental Protection Agency). In this HHRA, the US EPA Regional Screening Levels (RSL) (US EPA, 2024) were used as a guideline source for COPC screening, consistent with Health Canada (2024) PQRA guidance, in the absence of federal or provincial benchmarks.

HHRA framework is shown in Figure 3-2 and the main steps are briefly described below. As previously discussed, only the problem formulation step of the HHRA was conducted herein. The specific methods used to conduct the problem formulation step of the HHRA and the outcomes of this step are presented in Section 3.2.

Problem Formulation: The data gathered and evaluated in this step provides information regarding the history and layout of the subject site, possible exposure scenarios and pathways, identification of receptors of potential concern, identification of contaminants of concern, other specific issues of concern to be addressed, and the development of a conceptual site model.

Exposure Assessment: The exposure assessment of an HHRA involves estimation of exposure of hypothetical human receptors to each of the COPCs.

Toxicity (Hazard) Assessment: This step determines an exposure limit or toxicological reference value (i.e., concentration of a chemical not expected to be associated with adverse health effects, or a concentration associated with an acceptable risk level) for each of the COPCs.

Risk Characterization: Integrates the exposure and toxicity (hazard) assessments to estimate the likelihood of potential human health risk for the receptors, COPCs, exposure pathways and exposure scenarios that were evaluated. Potential risk is characterized through a comparison of the estimated or predicted COPC exposures to the selected human receptors from all exposure pathways and routes (from the exposure assessment) with the identified TRVs from the toxicity (hazard) assessment.

Risk Management Recommendations: determination of the need for corrective action, and development of site-specific risk management objectives and/or criteria (such as site-specific target levels, or SSTLs), if required.

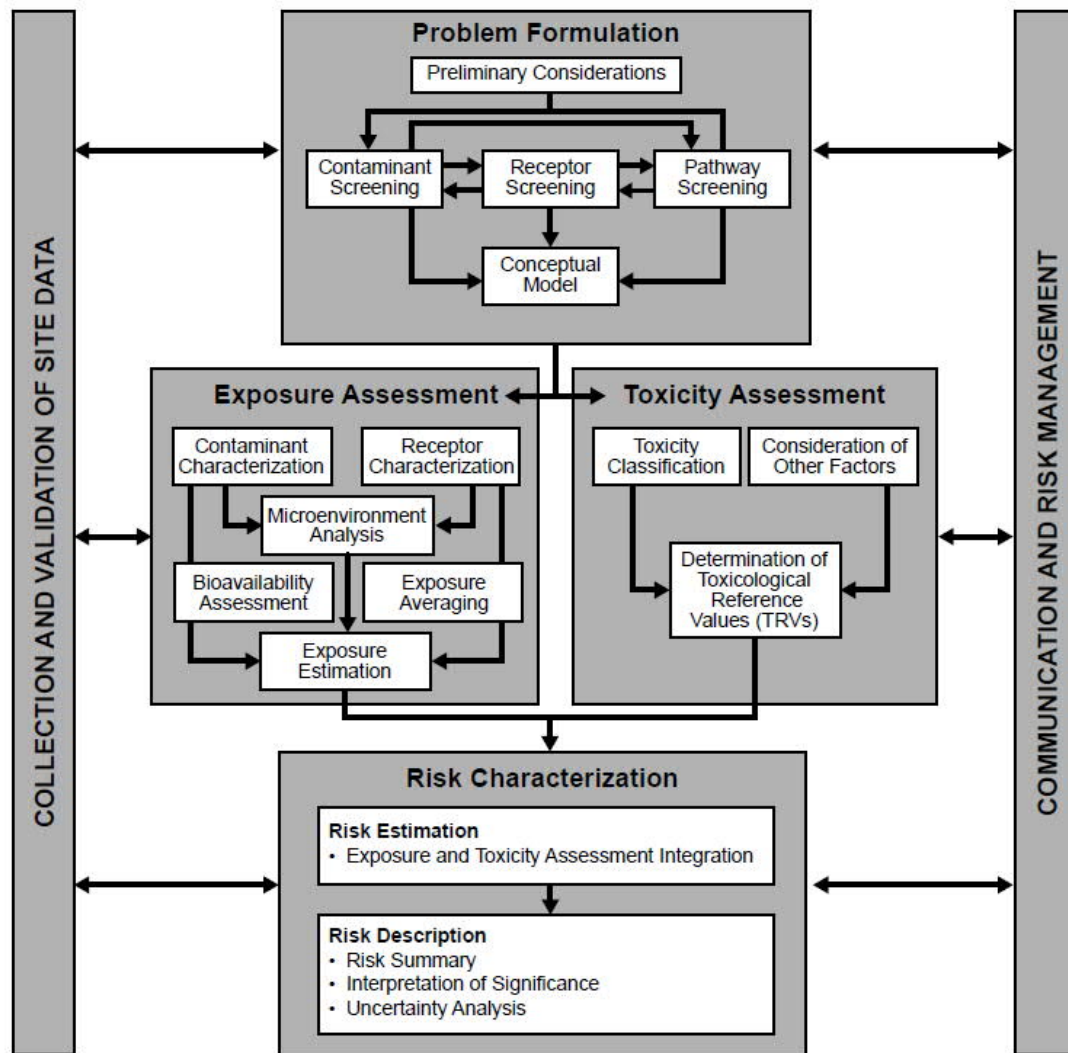


Figure 3-2: Human Health Risk Assessment Framework (from Health Canada, 2010)

3.2 Problem Formulation

The problem formulation step of an HHRA is an information gathering step that helps to plan and focus the risk assessment. The data gathered and evaluated in this step provides information regarding the history and layout of the subject site, possible exposure scenarios and pathways, identification of receptors of potential concern, identification of contaminants of concern, and other specific issues of concern to be addressed.

Key tasks requiring evaluation within the problem formulation step include the following:

- Site characterization;
- Selection of receptors;
- Selection of exposure pathways and scenarios;
- Identification of COPCs; and
- Development of a conceptual site model (CSM).

3.2.1 Site Characterization

The site characterization step provides a description of the site including information regarding the history and layout of the site and site characteristics that are pertinent to understanding and assessing potential exposures on the site.

Site characterization for the study boundary was previously provided in Section 2.0. Site photos are provided in Appendix B and within Section 3.3.2 of Appendix D.

3.2.2 Selection and Characterization of Receptors

A human receptor is a hypothetical person (e.g., infant, toddler, child, adolescent, or adult) who resides, visits, or works in the area being investigated and is, or could potentially be, exposed to the chemicals identified as being of potential concern. General physical/physiological and behavioural characteristics specific to the receptor type (e.g., body weight, breathing rate, amount of soil, and food consumed) are used to determine the amount of chemical exposure received by each receptor. Due to differences in these characteristics between children and adults and between males and females, the exposures received by a female child, a male child, a female adult, or a male adult will be different. Consequently, the potential risks posed by the chemicals being evaluated will also differ depending on the receptor chosen for evaluation. While HHRA guidance in some jurisdictions continues to differentiate receptors based on gender, Health Canada HHRA guidance has moved away from distinguishing between genders for the selection of human receptors.

Since people have varying physical/physiological features, lifestyles, and habits, it is not possible to evaluate all types of individuals. However, an HHRA must be sufficiently comprehensive to ensure that those receptors with the greatest potential for exposure to COPCs and/or those that have the greatest sensitivity, or potential for developing adverse effects from such exposures, are included in the

evaluation. If no potential health risks are determined for relevant receptors that are considered to be either the most sensitive, or receive the greatest exposures from the site, then it can be assumed that those receptors who are either less sensitive, or who receive lower exposures, would also not be at risk.

In an HHRA, it is commonplace to select toddler receptors for the evaluation of chemicals that are not considered to be carcinogens (i.e., threshold response chemicals) or that have TRVs available that are based on a chemical's non-carcinogenic effects. This is because toddlers typically receive greater chemical exposures, via all pathways and routes, on a relative body weight basis, when compared to other human receptor classes.

For chemicals that are considered to be carcinogens, or that have TRVs available that are based on a chemical's carcinogenic effects, it is necessary that HHRAs evaluate such substances over an appropriate period of time, as the development of cancer is a long-term process that may take many years to manifest (i.e., latency). For this reason, a special type of hypothetical receptor called a "lifetime" or "composite" receptor is evaluated when potential carcinogenic risks require consideration in a HHRA.

Based on the current and reasonably anticipated future land use identified for the site, the following potential human receptors (i.e., people who may be exposed to COPCs from the site) were selected:

- Site Visitor (toddler, child, adolescent and adult age classes) – the most likely human receptor for the site are site visitors (all ages except infants) using the land for recreational purposes (walking, hiking, etc.). A walking trail was observed during the 2025 field investigation in the southwestern portion of the site that a site visitor may make use of while on the site. Infants are excluded from assessment as it is extremely unlikely infants would be present with their caregivers on the site. Furthermore, HHRAs do not typically assess infant receptors in relation to contaminated sites, unless the sites are residential or high use recreational.

There are currently no buildings on-site and construction work is not expected to occur on-site in the future. However, should intrusive/remediation work be conducted on the site, workers could potentially come in contact with COPCs in soils at all depths. The evaluation of potential exposures and risks to workers who may participate in site remediation work that involves soil excavation, grading, stockpiling, and other soil handling activities, at some point in the future, is beyond the scope of this HHRA. Such workers are generally not evaluated in a HHRA, but rather, would be covered under applicable NS Health and Safety Regulations. In addition, it is recommended and expected that appropriate PPE (personal protective equipment) be worn by workers when on the site, and that applicable NS occupational health and safety regulations and policies be complied with at all times. Although site worker receptors were not evaluated in the HHRA, site soil data (all depths) were reviewed to aid in the preparation of site-specific health and safety plans for Dillon personnel conducting field work on the site.

Key parameters and assumptions for the receptors evaluated in the HHRA are described in Table 3-1, below:

Table 3-1: Summary of Parameters and Assumptions for Human Receptors

Parameter	Value	Reference
Age (years)	Toddler: 6 months to <5 years Child: 5 years to <12 years Teen: 12 years to <20 years Adult: ≥20 years	Health Canada, 2024
Body Weight (kg)	Toddler: 16.5 Child: 32.9 Teen: 59.7 Adult: 70.7	Health Canada, 2024
Inhalation Rate (m ³ /day)	Toddler: 8.3 Child: 14.5 Teen: 15.6 Adult: 16.6	Health Canada, 2024
Soil Ingestion Rate (mg/day)	Toddler: 80 Child: 20 Teen: 20 Adult: 20	Health Canada, 2024
Hand Surface Area (m ²)	Toddler: 0.043 Child: 0.059 Teen: 0.08 Adult: 0.089	Health Canada, 2024
Skin Surface Area (upper and lower arms and legs) (m ²)	Toddler: 0.258 Child: 0.455 Teen: 0.720 Adult: 0.822	Health Canada, 2024
Hand Soil Adherence Factor (kg/cm ² -event)	Toddler: 1×10^{-7} Child: 1×10^{-7} Teen: 1×10^{-7} Adult: 1×10^{-7}	Health Canada, 2024
Skin Soil Adherence Factor (kg/cm ² – event)	Toddler: 1×10^{-8} Child: 1×10^{-8} Teen: 1×10^{-8} Adult: 1×10^{-8}	Health Canada, 2024
Outdoor Dust Level from Soil (g/m ³) ¹	0.00025	Health Canada, 2024

Parameter	Value	Reference
Time Spent On Site	<i>Outdoor site visitor: 2 hours/day, 1 day/week, for 6 months/year (assumed May to October).</i> Note: For oral and dermal soil contact exposure pathways, exposures are considered event driven, and as such, the hours/day term does not apply in the exposure and risk modelling. Inhalation exposures are considered time driven where the hours/day is included.	Assumed

Notes:

- The outdoor dust level assumes vehicular traffic on unpaved roads as ATV use is known to be used on-site.

3.2.3 Selection of Exposure Pathways and Scenarios

People can come into contact with chemicals in a variety of ways, depending on their daily activities and their land use patterns. The means by which a person comes into contact with a chemical in an environmental medium are referred to as exposure pathways. The means by which a chemical enters the body from the environmental medium are referred to as exposure routes. There are three major exposure routes through which chemicals can enter the body: inhalation, ingestion, and dermal absorption through the skin. For each of these major exposure routes, there are a number of potential exposure pathways. For example:

- Inhalation of gases, vapours, and dusts/particulate material through the lungs;
- Ingestion of soils, dusts, drinking water, garden produce, local food items (e.g., fish, shellfish, game meats, wild berries/plants), grocery store-bought food items, and accidental/incidental ingestion of surface water, groundwater, and/or sediments; and
- Dermal absorption (uptake through the skin) from direct skin contact with gases/vapours, soils/dusts/sediments, water, and other materials.

The potential for adverse health effects to occur as a result of exposure to chemicals, in any medium, is directly related to the exposure pathways. If there is no possible pathway of exposure to a chemical, regardless of its toxic potency or concentration within a given medium, there is no potential for the development of adverse health effects from that chemical.

Exposure scenarios are based on the outcomes of exposure pathway, receptor, and COPC identification/selection at a site, and describe how human exposure to site contaminants may take place. Exposure scenarios were selected based on the information previously presented in relation to site characterization, COPC identification, receptor selection, exposure pathway selection, and land use.

Based on the information previously presented in relation to site characterization, COPC identification and exposure pathway selection, and assuming that a commercial land use will be applicable in the future, the selected exposure scenario was as follows:

- Outdoor Site Visitor Scenario: This scenario assumes that receptors (all age classes except infants) would periodically visit the site. It was assumed that outdoor site visitors would be present on the site for 2 hours per day, 1 day per week for 6 months of the year.

The most likely and relevant human exposure pathways/routes for site-related exposures were considered to be as follows:

- Inhalation of outdoor soils/dusts;
- Ingestion of outdoor soils/dust; and
- Dermal contact with outdoor soils/dusts.

A number of other potential exposure pathways for human receptors were considered, but were ultimately excluded, as briefly summarized in Table 3-2, below. HHRAs commonly exclude pathways that are not relevant to the site under investigation or that lack sufficient data to enable their evaluation with a reasonable degree of confidence and/or accuracy.

Table 3-2: Summary of Selected and Excluded Exposure Pathways for the Frenchvale Mine Site

Pathway	Selected or Excluded?	Rationale
Inhalation of outdoor soils/dusts	Selected	COPCs have been identified in on-site soils. People may be exposed to COPC in surface soils while on-site.
Dermal Contact with outdoor soils/dusts	Selected	
Ingestion of outdoor soils/dusts	Selected	
Ingestion and dermal contact with groundwater	Excluded	There are currently no potable groundwater wells on-site and no plans to install a potable well in the future. The closest potable well to the site is approximately 150 m northeast and upgradient of the study boundary. It is unlikely that people would be exposed to groundwater from the site. Construction activities including trenching or excavation are not anticipated to occur at the site in the future. This would exclude the possibility of dermal contact with any potential shallow groundwater at the site.

Pathway	Selected or Excluded?	Rationale
Ingestion and dermal contact of surface water/sediments	Excluded	While there is surface water present on the site (Gouthro Lake), and within some small site watercourses, this water would not be used for drinking. This lake is quite marshy along the shoreline within the study boundary. It is unlikely that people swim in this lake, particularly in the areas adjacent to the site. If someone accidentally fell into the lake, exposures to COPCs in surface water and sediments would be transient, of very short duration and insignificant.
Inhalation of vapours in indoor air	Excluded	There are no habitable or occupied buildings on the site. The construction of buildings on-site is not anticipated to occur in the future; therefore, this pathway was excluded from further assessment.
Indoor dust ingestion, dermal contact, and ingestion	Excluded	
Ingestion of country foods	Excluded	Evidence that hunting or foraging occurs at the site has not been observed within the study boundary. Given residences are nearby, it is not anticipated that hunting would occur on the site. Fishing was observed during the 2025 field investigation along Gouthro Road near the outlet of Gouthro Lake; however, this is well outside the assessment area. While pelagic fish could travel throughout the lake, it is unlikely they would receive significant site-related exposures given their large home range compared to the potentially impacted areas of the Lake, and given the wetland like conditions along Gouthro Lake. Lake access from the site is generally poor, and the wetland like conditions along Gouthro Lake would prohibit ease of access for local fishing. If hunting or foraging activities are anticipated to occur at the site in the future, this pathway should be investigated further; however, for the current problem formulation, this pathway is excluded from further assessment.
Ingestion of agricultural foods (crops, livestock)	Excluded	The site has never been and is highly unlikely to ever be used for agricultural purposes. Soil and terrain conditions would make any attempt to use the site for agricultural purposes extremely challenging; therefore, this pathway was excluded from further assessment.

Pathway	Selected or Excluded?	Rationale
Outdoor air inhalation	Excluded	Even though trace amounts of site contaminants could potentially volatilize from soils and groundwater to outdoor air, these vapours would be readily dispersed. Exposures via this pathway are expected to be negligible and, as such, this pathway was excluded from assessment.

3.2.4

Identification of COPCs

It is common practice in HHRAs to limit the number of chemicals evaluated to those that represent the greatest potential concern to people that may be present in the area under consideration. This is done because it is often impractical in terms of time and cost to conduct a risk assessment for every chemical that has been found at measurable concentrations in a particular area. In addition, the concentrations of many chemicals associated with a particular site may be similar to chemical concentrations found naturally in the area rather than the result of predicted, current or former anthropogenic activities at the site. It is also preferable to comprehensively evaluate a smaller number of chemicals which represent the greatest potential concern, than it is to conduct a less detailed risk assessment on a larger number of chemicals that are of lesser potential concern.

This step of the HHRA identifies chemicals that have the potential to pose a risk to human health. As per Health Canada (2024) guidance, COPCs are defined as follows:

- Chemicals for which the maximum on-site concentration exceeds appropriate human health-based environmental quality criteria (e.g., human health-based guidelines or criteria); AND
- Chemicals for which the maximum on-site concentration exceeds local or regional background concentrations; OR
- Chemicals for which no human health-based criteria or background data exist.

The identification of COPCs involved a sequential step-wise process, as follows:

1. Comparison of site soil chemistry data maxima to regulatory human health-based benchmarks (guidelines) and background data;
2. Chemicals with a maximum concentration that exceeded the applicable human health-based benchmark and were above background concentrations, were identified as initial COPCs. Chemicals for which no health-based benchmark was available were also identified as initial COPCs;
3. These initial COPCs were further evaluated by considering the frequency of detection, and the frequency and degree of exceedance of site soil chemistry data over human health-based soil quality benchmarks; and
4. Further considerations (where/if deemed necessary and relevant), such as: essential nutrient status of certain inorganic elements, ubiquity of certain elements in soils, statistical relationships, local geology, spatial distribution patterns of soil chemical concentrations, as well as environmental fate

and behaviour properties (including the potential for a substance to bioaccumulate and biomagnify), and the likely speciation (chemical forms) in site media.

The COPC identification process excluded data for general chemistry and physical properties of environmental media (e.g., chloride, electrical conductivity, sodium absorption ratio, etc.). While such parameters can inform on soil and water quality (where applicable), and may influence or modify the bioavailability, mobility and toxicity of certain COPCs, they are not typically considered directly in the COPC identification step of a HHRA. Also, many of these parameters lack toxicity or human health-based benchmarks that media concentrations can be compared against. As such, these types of parameters were not considered further in the HHRA; however, general chemistry data is provided in Appendix D.

If site media concentrations are less than the applicable guidelines, then the likelihood of potential human health effects related to that chemical can be considered negligible. However, if site media concentrations exceed these guidelines, it does not necessarily mean that unacceptable risk exists; it is simply an indicator that further assessment is required. Guidelines are intentionally derived by regulatory agencies to be conservative and protective.

The goal of COPC selection is to identify those chemicals measured in site media that may pose a potential risk to human health. Based on the site characterization information, the anticipated future land use of the site, and consideration of the physical-chemical and environmental fate and behaviour properties of the chemicals present in site media, the human exposure media of concern is surface soil.

The site data and benchmarks (guidelines) used in the COPC screening process are described and discussed in the following sections. Laboratory certificates of analysis are provided in Appendix C. All analytical data used in the COPC screening, along with applicable benchmarks and background data are provided in Appendix D. The COPC screening results are discussed in the following sections.

3.2.4.1

COPCs in Site Soil

Determining Usability of Soil Data

For HHRA, surface soils can be represented by soil depths ranging from 0.05 m bgs to 1.5 m bgs; however, the soil depth that is considered to contribute the greatest to incidental soil exposures via direct contact is typically the top 5 cm to 10 cm (provided the soils are not tilled, excavated, subjected to gardening) (Health Canada, 2024).

Soil depth of <0.15 m bgs is considered most applicable to human health. All but three (3) of the forty-five (45) sampling locations had analytical soil data for metals in the top 15 cm of soil (Table D-2, Appendix D). Several sampling locations had analytical data for more than one soil depth. All the samples were collected within a depth of 1.5 m, with the majority being collected within the top 0.5 m. For the screening of COPCs in soil, all soil depth were conservatively considered. This assumes that a person accessing the site could be exposed to subsurface soils as well as surface soils and conservatively assumes that all soil is biologically accessible for humans. Therefore, no soil data was excluded when identifying COPCs in soil.

Comparison of Site Soil Data to Regulatory Human Health-Based Benchmarks

Part of the COPC identification process involved comparing site soil data to available benchmarks that are protective of human health. Maximum measured soil chemical concentrations were compared to applicable regulatory benchmarks that were derived specifically for the protection of human health as per Health Canada (2024) guidance (see Appendix D).

The specific human health-based soil quality benchmarks that were considered in the COPC identification process are presented below. As the study area is located on Nova Scotia crown land, NS CSR guidelines apply and the NS PSS for commercial soils were preferentially used.

It is important to recognize that all human health-based benchmarks are derived by their respective regulatory agencies to be intentionally conservative and protective. Thus, exceedance of these benchmarks does not imply there is a risk of adverse health effects; rather, it suggests that further evaluation of those chemicals is warranted.

Given the available soil chemistry information for the site and considering the operable exposure pathways that were selected for the HHRA, soil quality benchmarks that were developed to be protective of direct soil contact exposure pathways (ingestion, dermal contact, and soil/dust inhalation), were considered to be the most relevant and applicable for use. Where applicable, the applied soil quality benchmarks were for a non-potable groundwater use condition and coarse soil condition (as the majority of soil samples for which grain size analysis was conducted was coarse-grained). The non-potable groundwater condition benchmarks were selected as no potable wells are present on-site and the closest potable well is approximately 150 m to the northeast and is upgradient of the site.

The study area has a current commercial land use designation, which was assumed not to change in the future. As such, commercial land use soil quality guidelines were used in the screening.

Nova Scotia assumes an acceptable target cancer risk level of 1 in 100,000 ($1E^{-5}$), similar to most federal departments and several other provinces. Thus, all soil quality benchmarks (guidelines) used for carcinogens were set to correspond to the $1E^{-5}$ target cancer risk level. The specific guideline sources used in the COPC screening are briefly described below.

Nova Scotia Pathway Specific Standards (NS PSS)

The Nova Scotia Tier II PSS for Soil (2022) - commercial land use; protective of direct soil contact/ingestion; were selected for the COPC screening, where available. The PSS are benchmarks (guidelines) developed by source agencies and departments outside of Nova Scotia such as the CCME soil quality guidelines (SoQGs) developed for the protection of human health (SoQG_{HH}); Alberta Environment and Parks (AEP) guidelines for human health; Ontario Ministry of the Environment, Conservation and Parks [MECP] soil component values; Atlantic Risk-Based Corrective Action (RBCA) tier II pathway specific screening levels for soil; US EPA Regional Screening Levels [RSLs]). The primary guidelines adopted by NSECC, and thus applied herein, are provided below. The original guideline sources were reviewed to ensure the NS PSS guideline referenced the most current guideline from the original source. The specific source of the guidelines used in the COPC screening are identified in the human health screening tables (Tables D-1 and D-8, Appendix D).

Canadian Council of Ministers of the Environment (CCME)

CCME SoQG_{HH} for a commercial land use coarse-grained soils, were applied. The direct soil contact guidelines were selected. Where the CCME soil guidelines defer to the older CCME (1991) soil remediation criteria (which are not identified as being either human or ecological health-based), the benchmarks from the next preferred jurisdiction were selected rather than using the outdated CCME (1991) value(s), where possible. If no other guideline was available from another jurisdiction, the CCME (1991) value was used. The most up to date CCME guidelines were selected from on the online CCME summary tables and associated fact sheets (<http://st-ts.ccme.ca/en/index.html>; searched August, 2025).

Atlantic Risk-Based Corrective Action (RBCA, 2022)

The Atlantic RBCA (2022) tier II pathway specific screening levels for soil were applied. Guidelines were used for the screening of BTEX for commercial sites, coarse-grained soil and direct soil contact were used. Details on the basis and derivation of the tier II pathway specific screening levels are provided online at: https://atlanticrbca.com/wp-content/uploads/2022/07/ARBCA_V4_Tier_I_RBSL_and_Tier_II_PSSL_Tables_July_21_2021.pdf (searched August, 2025).

CCME Canada Wide Standards for PHCs in Soils (CCME, 2008)

The Canada Wide Standards (CWS) for PHCs for commercial land use and coarse-grained soils applicable for human health were selected for comparison purposes for PHC F1 to F4 (CCME, 2008). Tier 1 levels protective of direct contact (ingestion and dermal contact) were selected. Details on the basis and derivation of the CWS human health SoQGs are provided in CCME (2008).

Alberta Environment and Parks (AEP, 2024)

The direct soil contact, human health-based soil guidelines for commercial land use, and coarse-grained soils, were applied. These AEP guidelines are developed in a very similar manner to, and are protective of, the same human receptor types as the CCME SoQG_{HH}. Details on soil guideline basis and derivation are provided in AEP (2024).

Ontario Ministry of the Environment, Conservation, and Parks (MECP, 2011)

The MECP human health-based soil component values for soil contact (i.e., soil component values for S1 Risk) were applied. The specific soil component values that were used are from Table 3 in MECP (2011), for conditions of non-potable water, commercial land use, and coarse-textured soils. The derivation of these values is described in MECP (2011).

US Environmental Protection Agency Regional Screening Levels (RSL) (2024)

The US EPA RSLs for residential soil (summary table; November, 2024) were applied. RSLs are divided by 5 for non-carcinogens to be consistent with CCME SoQGs, which typically assume a soil allocation factor or target HQ of 0.2 in their derivation (RSLs assume a HQ of 1.0). RSLs for carcinogens were multiplied by 10 to adjust the risk factor from $1E^{-6}$ to $1E^{-5}$. Details on the basis and derivation of these benchmarks is provided at <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>.

COPC screening was conducted using all site soil data. The comparison of the maximum measured concentrations of chemicals in the site soil at all depths to the selected SoQG_{HH} are presented in Table 3-3 and Tables D-1 and D-4, Appendix D. Figure 2, Appendix A shows the soil sampling locations. Figure 3, Appendix A shows the exceedances of human health-based soil quality guidelines (SoQG_{HH}) within the study boundary.

Chemicals that were not detected in any of the analyzed soil samples and were not associated with current and historical activities at the site were excluded from further assessment. Additionally, no regulatory guideline was available for calcium; however, calcium is an essential nutrient that is easily metabolized and has low toxicity, as such calcium was excluded from further assessment. A check was conducted to confirm that chemicals that were not detected in any of the soil samples had detection limits that were lower than the applicable benchmarks. Parameters which exceeded the applicable soil quality guideline, or which had no soil quality guideline and were reported above the RDL are summarized below in Table 3-3.

Table 3-3: Human Health Screening for COPCs in Soil, Direct Contact Pathway

Chemical	Maximum Reported Concentration (mg/kg)	Human Health Soil Quality Guideline (mg/kg)	Background Concentration (mg/kg) ^d	Exceeds Guideline and/or Background? (Y/N)
<i>Metals</i>				
Aluminium	36,100	15,400 ^a	28,000	Y
Arsenic	65.2	31 ^c	16.8	Y
Cobalt	29.9	22 ^b	26	Y
Iron	330,000	11,000 ^a	52,000	Y
Lead	596	82 ^{c,d}	84	Y
Manganese	3,250	360 ^a	4,340	N
Nickel	718	310 ^c	48	Y

Chemical	Maximum Reported Concentration (mg/kg)	Human Health Soil Quality Guideline (mg/kg)	Background Concentration (mg/kg) ^d	Exceeds Guideline and/or Background? (Y/N)
Uranium	36	33 ^c	1.2	Y

Notes:

Number of samples = 63

Y = Yes; N = No.

BOLD values indicate exceedances over the guideline and background.

- US EPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to 1x 10⁻⁵ risk level.
- MECP (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact S1 Risk; Institutional land use.
- CCME Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact pathway; coarse soils; 10-5 risk level (1 in 100,000) where applicable.
- CCME provides a SoQG_{HH} based on a lead soil concentration which would produce an IQ decrement of 0.5 and an IQ decrement of 1.0. The more conservative guideline (based on an IQ decrement of 0.5) was applied for initial COPC screening.

Initial COPCs in Soil

As presented in Table 3-3, substances with a maximum concentration which exceeded the applicable guideline and the regional background include: aluminium, arsenic, cobalt, iron, lead, nickel and uranium.

Maximum concentrations of manganese exceeded the SoQG_{HH}; however, the maximum concentration of manganese was below the maximum regional background concentrations. As such, exceedances of manganese are likely background related and not from historical site activity, and is excluded from further consideration.

Initial COPCs:

- Aluminium;
- Arsenic;
- Cobalt;
- Iron;
- Lead;
- Nickel; and
- Uranium.

Further Examination of Initial COPCs in Soil

Aluminium exceeded the SoQG_{HH} and regional background concentration in 6 of 63 samples (9.5%) in 5 of 45 sampling locations (11%). The maximum concentration (36,100 mg/kg at BH44) exceeded the SoQG_{HH} of 15,400 mg/kg by 2.3-fold. Exceedances over the regional background ranged from 1.3-fold over background for the max concentration and 1.05-fold over for the lowest of the 6 samples with

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exceedances. Aluminium is a ubiquitous element present in soils and clays and its presence in soil is expected. Aluminium is not associated with historical mining activities, and the presence of aluminium in soils is anticipated to be associated with background conditions. For these reasons, aluminium is excluded from further consideration.

Arsenic exceeded the $SoQG_{HH}$ and regional background concentration in 1 of 63 samples (1.6%) in 1 of 45 sampling locations (2.2%). The maximum concentration (65.2 mg/kg) exceeded the $SoQG_{HH}$ of 31 mg/kg by 2.1-fold. The only sample location where arsenic exceeded was sample BH45. The frequency of exceedance for arsenic is generally low¹ indicating elevated arsenic concentrations in soil are generally not widespread. Due to the low frequency of exceedance, arsenic was excluded from further consideration.

Cobalt exceeded the $SoQG_{HH}$ and regional background concentration in 1 of 63 samples (1.6%) in 1 of 45 sampling locations (2.2%). The maximum concentration (29.9 mg/kg) exceeded the $SoQG_{HH}$ of 22 mg/kg by 1.4-fold. The only sample location where cobalt exceeded was sample BH45, indicating that elevated cobalt concentrations are not widespread throughout the site. Due to the low frequency of exceedance, cobalt was excluded from further consideration.

Iron exceeded the $SoQG_{HH}$ and regional background concentration in 1 of 63 samples (1.6%) in 1 of 45 sampling locations (2.2%). The maximum concentration (330,000 mg/kg) exceeded the $SoQG_{HH}$ of 11,000 mg/kg by 30-fold. The only sample location where iron exceeded was sample BH45, indicating that elevated iron concentrations are not widespread throughout the site. Due to the low frequency of exceedance, iron was excluded from further consideration.

Lead exceeded the $SoQG_{HH}$ and regional background concentration in 3 of 63 samples (4.8%) in 3 of 45 sampling locations (6.6%). The maximum concentration (596 mg/kg) exceeded the $SoQG_{HH}$ of 82 mg/kg by 7.3-fold. Lead exceeded the guideline in three sampling locations (BH14 at 0.9 mbgs; BH44 and BH45 at 0-0.15m bgs).

The highest lead concentrations were observed at BH44 (362 mg/kg; 4.4-fold exceedance) and BH45 (596 mg/kg; 7.3-fold exceedance). There was a slight exceedance of the $SoQG_{HH}$ at BH14 (84.6 mg/kg; 1.03-fold exceedance) in the sample collected at a depth of 0.90 mbgs; however, a shallower soil sample taken at 0-0.15 mbgs from this same location had a reported lead concentration of 50 mg/kg which is below the $SoQG_{HH}$. A site visitor is more likely to be exposed to surface soils (i.e., soils <0.15mbgs) indicating that exposure to the slightly elevated lead concentration of at the BH14 sampling location is unlikely. As such, lead would not be of concern in the vicinity of BH14.

¹ A significance level of 5% was applied for both frequency of detection and frequency of exceedance. While there is no consistent regulatory guidance on a significance level or cut-off value to use when considering the frequency of detection, and/or exceedance over benchmarks in a COPC identification process, a value of 5% has some regulatory precedent within the U.S. Superfund program and as per the U.S. Navy HHRA Guidance document (US Navy, 2008). The US EPA Superfund Program has used a 5% cut-off value for detection frequency to eliminate chemicals from further consideration since the early 1990s, and the U.S. Navy (2008) HHRA guidance also supports the use of a 5% cut-off value when considering detection and benchmark exceedance frequency.

Samples BH44 and BH45 likely represent hotspots of soil contamination as iron also exceeded the $SoQG_{HH}$ at BH44, and arsenic, cobalt, iron and nickel also exceeded their respective $SoQG_{HH}$ at BH45. BH45 and BH44 were sampled from soils adjacent to old/abandoned vehicles in soil beneath the gas tanks (see Photos 20 to 23, Appendix B). The origin of the vehicle debris is unknown; however, the high concentrations of lead observed in these two samples likely originates from these vehicles (e.g., leaded gasoline, lead in car paint) and not from site wide historical mining activity. While the elevated lead in the vicinity of BH44 and BH45 are unlikely to be related to historical mining activity, the lead in soils in these areas could potential be of concern. In addition, the extent of lead contamination around these vehicles has not been delineated. As such, lead was retained as a COPC to further assess the lead impacts in soil at APEC 2 near the observed vehicle debris (see Section 3.3).

Nickel exceeded the $SoQG_{HH}$ and regional background concentration in 1 of 63 samples (1.6%) in 1 of 45 sampling locations (2.2%). The maximum concentration (718 mg/kg) exceeded the $SoQG_{HH}$ of 310 mg/kg by 2.3-fold. The only sample location where nickel exceeded was sample BH45, indicating that elevated nickel concentrations are not widespread throughout the site. Due to the low frequency of exceedance, nickel was excluded from further consideration.

Uranium exceeded the $SoQG_{HH}$ and regional background concentration in 2 of 63 samples (3.2%) in 1 of 45 sampling locations (2.2%). The maximum concentration (36 mg/kg) exceeded the $SoQG_{HH}$ of 33 mg/kg by 1.1-fold. Uranium exceeded in one sampling location (BH41) at 1.5 mbgs in both the parent and duplicate sample. At this depth it is unlikely that a site visitor would be exposed to elevated concentrations of uranium. Furthermore, uranium is not associated with historical limestone mining operations. For these reasons, uranium was excluded from further consideration.

Final COPCs in Soil

Based on the available soil data, and the COPC identification steps and considerations described above, the following COPCs were carried forward as COCs for soil in the HHRA.

COCs for Soil Direct Contact - (Site Visitor)

- Lead.

3.2.4.2

Final COCs in the HHRA

Based on the COC identification steps and considerations described in the preceding sections, the following COCs were carried forward for quantitative human health risk assessment:

Table 3-4: Summary of Final COCs Identified in the Problem Formulation

Receptor	Soil Direct Contact	Sediment Direct Contact	Surface Water Direct Contact
Site Visitor (toddler, child, teen and adult)	Lead *	No operable pathway	No operable Pathway

Notes:

* While lead in soil is not anticipated to be related to historical site activities, further action is recommended to address lead in soils from the vehicle debris observed at and near APEC 2.

3.2.5**Conceptual Site Model for Human Health**

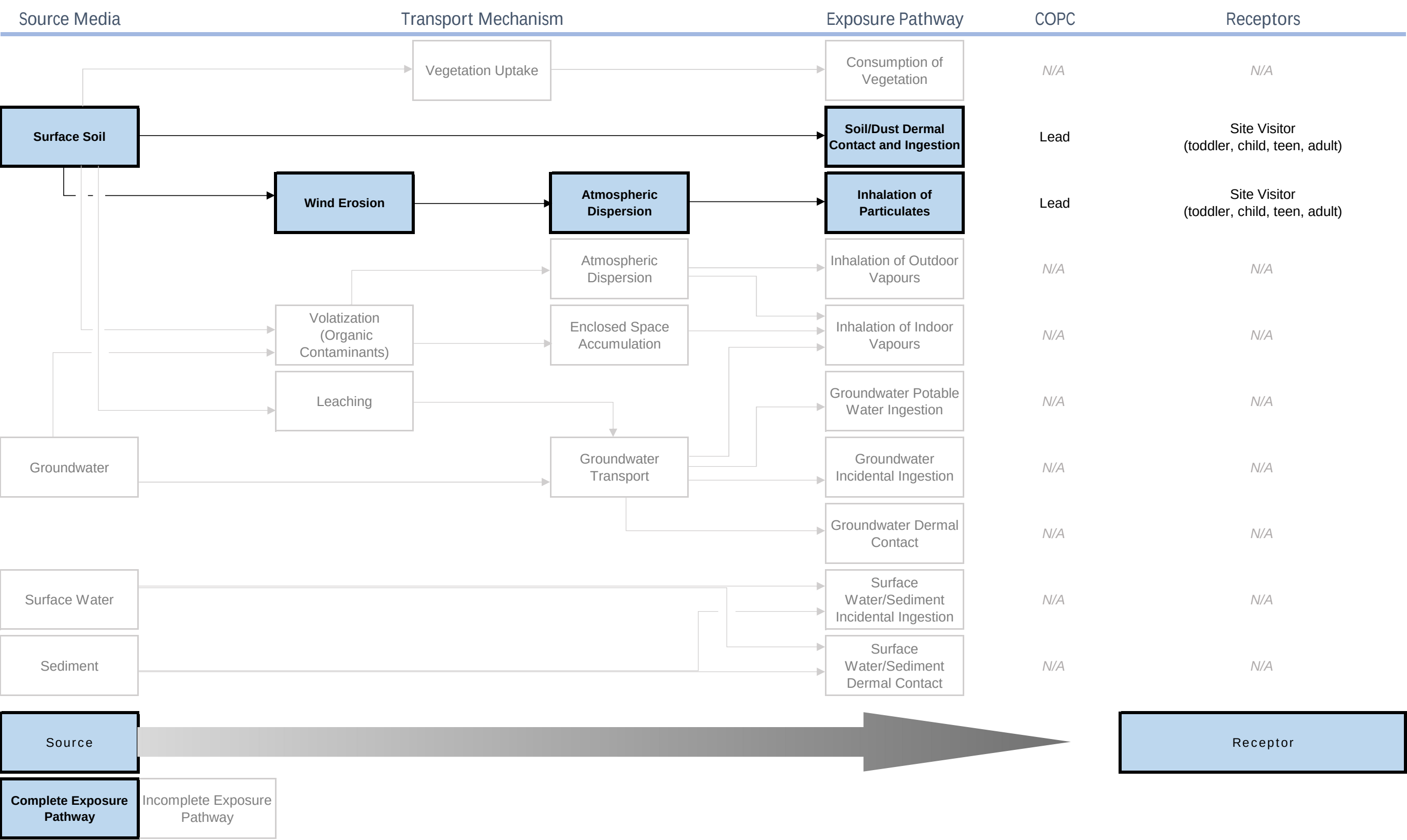
A CSM provides a description of relevant exposure pathways for the COCs that have the potential to contribute to human exposures and potential health risks for the selected receptors. The HHRA CSM is presented in Figure 3-3. The CSM provides a simplified representation of relevant exposure pathways and routes that link the identified COCs in site environmental media to the selected human receptors.

3.3**HHRA Problem Formulation Outcomes and Recommendations**

The outcomes and recommendations from the HHRA problem formulation are reiterated below.

- Lead was identified at concentrations above the $SoQG_{HH}$ at two soil sample locations (BH44 and BH45). These locations represent potential hotspots of contamination that require additional evaluation. As such, the following is recommended:
 - The vehicle debris (as seen in Photos 21 and 22, Appendix B) present at APEC 2 should be removed where feasible, based on site conditions and access, as it is potentially a source of lead contamination in soil (e.g., lead in car paint, batteries, tetraethyl lead in old gasoline).
 - Soil removal (e.g., surface soil) could be completed at the time of removal of vehicle debris, if obvious signs of impacts are observed.
 - Following the removal of vehicle debris at the site (and potential removal of surface soil) at the site, additional soil sampling is recommended in the vicinity of the vehicle debris to horizontally and vertically delineate soil lead impacts, including deeper horizon samples at BH44 and BH45. If vehicles cannot be removed (e.g., due to access considerations), soil sampling is recommended around the vehicles.
 - Depending on the results of these soil samples, a HHRA and/or soil risk management or remedial measures may be recommended.
- Additional debris on site including abandoned fishing gear (Photo 8, Appendix B), abandoned tires, geotextile rolls (Photo 12 and 27, Appendix B), metal drums (Photo 28, Appendix B) and rusted equipment (Photo 9 and 11, Appendix B) located in and around APEC 2 should be removed where feasible based on site conditions and access. While not identified as a potential chemical risk, the debris could pose a physical risk to people that access the site. If visible soil staining is noticed upon removal of the metal drums or rusted equipment, soil samples should be collected from stained areas to confirm whether or not there are contaminant concerns.

Figure 3-3: Conceptual Site Model for Soils for Human Receptors for the Former Frenchvale Mine Site, Frenchvale, Nova Scotia



4.0

Ecological Risk Assessment

4.1

Ecological Risk Assessment Framework

An ERA evaluates potential effects on non-human (ecological) organisms, populations, or communities in response to human-induced stressors. The framework and methods used for the problem formulation step and other steps of an ERA are described in this section and its associated subsections.

4.1.1

ERA Goals, Approach, and Scope

In many ERA frameworks, it is common to establish management and assessment goals for the ERA of a given site. The FCSAP ERA guidance (FCSAP, 2012a²) defines a site management goal as the “overall planning objective for a site”, which provides a statement about the “desired condition of an ecosystem, or its components, within the context of current or future site use.” While the scope of this report only extends to the problem formulation of an ERA, site management and assessment goals were identified as they help inform the problem formulation step. The ERA site management goal was to determine whether environmental media at the Frenchvale Former Mine site warrant risk management for the protection of ecological receptors that may occur on or utilize the site. The assessment goal for an ERA relates to the management goal. The ERA assessment goal was to determine if there are potential ecological risks associated with current conditions at the site, and if so, determine what (if any) management or remedial action is needed to reduce environmental risks and liabilities.

The scope of this ERA problem formulation is limited to the terrestrial and aquatic media at the site. The scope of the ERA problem formulation is also limited by the chemistry data that are currently available for the on-site media. Potential exposures and risks to ecological receptors that may occur on adjacent properties other than the site, are not considered or evaluated in this ERA problem formulation. Similarly, the adjacent freshwater water bodies that could potentially be influenced by the current and historical activities at the site, were not considered with the exception of Gouthro Lake (a small portion of which is present within the study boundary). Contamination within site adjacent areas of Gouthro Lake were evaluated for freshwater aquatic life receptors. The evaluation of off-site water bodies other than Gouthro Lake and / or the evaluation of any other land based properties adjacent to the site, was outside the scope of this ERA problem formulation.

² ECCC has put forth a draft version of an updated FCSAP ERA guidance (FCSAP, 2023); however, as this newer version is still in a draft state, the published FCSAP 2012 ERA guidance has been referenced for the problem formulation herein.

The ERA problem formulation for the site was conducted in accordance with the NS CSRs and associated Ministerial Protocols, where relevant. In addition, the current ERA problem formulation considered widely accepted ERA frameworks, methodologies and guidance published and endorsed by Environment and Climate Change Canada (ECCC) (e.g., CCME, 2020; the FCSAP ERA Guidance Document [2012a] and associated modules, and the US EPA [i.e., US EPA, 1998]). Where necessary, consideration was also given to ERA guidance from other agencies and jurisdictions in Canada and internationally.

ERAs can involve various levels of detail, complexity, and level of effort. The initial ERA framework developed by ECCC (CCME, 1996) reflected this in its tiered approach, where each successive tier is sequentially more detailed than the previous one, with assessment characteristics ranging from a simple, qualitative and literature-based approach for the first tier (often termed Screening Level Assessment) to complex, predictive and field-based approaches for the second and third tiers (often termed Preliminary Quantitative and Detailed Quantitative Assessments, respectively). While moving from one tier to the next increases the complexity and effort of the ERA, this is typically only required if the results of the previous tier indicate that a more complex and detailed assessment is warranted. The more recent ERA guidance endorsed by ECCC for use on federally contaminated sites (i.e., CCME, 2020; FCSAP, 2012a) recognizes that the level of detail and effort in an ERA may involve a combination of qualitative screening level and quantitative approaches, depending on the chemicals and receptors that are selected for assessment, as well as spatial and temporal factors or boundaries that are associated with the ERA.

In general, if the use of conservative assumptions related to both chemical exposure and toxicity to ecological receptors (as would be commonplace in an initial tier of an ERA) indicates a low potential for ecological risks, there is typically a high degree of confidence in this finding, such that areas and/or receptors with a low risk potential may be excluded from further investigation. However, in situations where the initial tier of an ERA indicates an elevated potential for ecological risk or identifies key data gaps that preclude the completion of an ERA, further data collection is typically required and/or more detailed ERA approaches are typically applied (i.e., those that are less conservative but more realistic or site-specific).

The specific steps used to conduct an ERA are based on CCME (2020) and FCSAP (2012a) guidance as illustrated on Figure 4-1, below. As previously discussed, only the problem formulation step of the ERA was conducted herein. The specific methods used to conduct the problem formulation step of the ERA and the outcomes of this step are presented in Section 4.2.

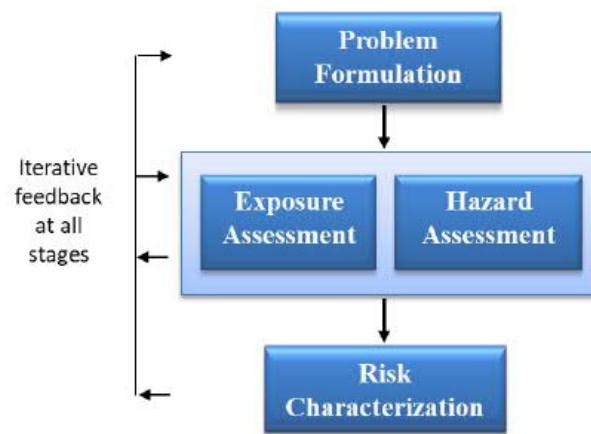


Figure 4-1: Ecological Risk Assessment Steps (from CCME, 2020; FCSAP, 2012a)

Each step of an ERA is briefly described in the following sections.

Problem Formulation: The problem formulation step of an ERA is analogous to that described above for the HHRA and acts as an information-gathering and interpretation stage, which serves to plan and focus the approach of the ERA on the most critical aspects of the site being evaluated.

There are several elements or tasks that typically comprise the problem formulation step in an ERA, including:

- Site characterization and review of existing site information;
- Review regulatory context;
- Establish the objectives, goals, and level of effort of the ERA;
- Selection of study boundary and reference areas;
- Identify receptors of concern (ROC);
- Identify assessment and measurement endpoints;
- Develop lines of evidence (LOE);
- Identify exposure pathways;
- Identify COCs; and
- Develop a CSM for the ERA.

The outcomes of these tasks form the basis of the approach taken in the ERA. The outcomes of the various problem formulation tasks can also help identify key uncertainties and data gaps that may limit aspects of the ERA, and/or lead to sampling and analytical plan development and determine whether or not there is a need to further evaluate certain areas of a site, receptor types, exposure pathways and site-related chemicals. The outcomes of the problem formulation step are provided in Section 4.2.

Exposure Assessment: The exposure assessment step of an ERA involves estimating the amount of each COPC that is potentially received by each selected ecological receptor or receptor group. For quantitative assessments, exposures are generally estimated using key receptor physiological and ecological characteristics and parameters (e.g., body weight, diet proportions, food intake rates, energy utilization, home ranges, amount of time spent in study area, etc.). For more qualitative (or screening level) assessments, receptor exposures are often assumed to be equal to measured media concentrations (e.g., soil concentrations are assumed to represent exposure concentrations for soil invertebrates).

Effects Assessment: Also called hazard or toxicity assessment in some jurisdictions, this step identifies toxicity reference values (TRVs) or other types of toxicity benchmarks for each receptor or receptor group evaluated, for each COPC.

Risk Characterization and Uncertainty Assessment: Risk characterization typically involves the evaluation and interpretation of each line of evidence (LOE) considered in the preceding steps of the ERA. This is often done using a weight of evidence (WOE) approach to make conclusions on the probability and/or potential magnitude of ecological risk. Consideration of the various uncertainties, limitations and conservative assumptions within the ERA is also an important consideration in ecological risk characterization. The outcomes of risk characterization may lead to additional media or biota sampling, other additional site characterization activities, further or supplementary ERA, and/or risk management recommendations or corrective remedial action. This step also involves an uncertainty assessment which provides details of major uncertainties in ERA.

4.2 Problem Formulation

As discussed in Section 4.1, the problem formulation step is an important information gathering and interpretation stage, which serves to plan and focus the ERA on the most critical aspects of the site being evaluated. The problem formulation herein incorporates data from the Phase II ESA (Dillon, 2025b) and the Supplemental ESA (Dillon, 2025c) which includes analytical chemistry data for soil, sediment and surface water. Outcomes of the problem formulation are provided in the following sections.

4.2.1 Site Habitat Characterization

Site characterization information has been previously presented in Section 2.0 of this report. Additional site information specifically relevant for the ERA problem formulation are provided below. Photos of the site and the surrounding ecological habitat can be found in Appendix B.

The study boundary encompasses approximately 6.6 ha which contains a mixture of forested land (predominantly along the study boundary), wetlands, two watercourses and an overburden stockpile area with sparse vegetation area. Of the five APECs identified on-site, several offer poor quality habitat for ecological receptors. The central area of the site is dominated by APEC 1, a large stockpile of overburden/fill (Photos 4, 5, and 16, Appendix B). While some grasses are growing in the stockpile, it is sparse, and APEC 1 (approximately 1 ha in size) is mostly rocky coarse fill where most ecological receptors would not be expected to find suitable habitat. APEC 4 contains a waste rock pile (Photo 6, Appendix B) which may not offer suitable habitat for some ecological receptors (i.e., burrowing animals, soil organisms and vegetation); however, this area is relatively small (approximately 0.2 ha). APEC 2, 3 and 5 are located closer to, or within the forested area on the eastern and northeastern study boundary and are well vegetated with grasses, shrubs, bushes and trees (Photos 8 to 12, Appendix B). The western study boundary is also dominated by a forested area (Photo 25 and 26, Appendix B). These areas would likely offer more suitable habitat for land-based ecological receptors (greater abundance of food and habitat).

As noted previously in Section 2.0, two watercourses are present which discharge into Gouthro Lake (Figure 2, Appendix A). The watercourses are generally shallow and unlikely to support adequate fish habitat. The areas along the watercourses were well vegetated and in some parts aquatic vegetation (e.g., lily-pads) were abundant. In addition, several frogs were observed by Dillon personnel during field investigations in around the watercourses/wetland areas indicating the site provides adequate habitat for amphibians. Although shallow, the watercourses were assumed to be present year-round (i.e., the watercourses are not ephemeral), even during drier parts of the summer. The outflow area of the watercourses (Photo 15, Appendix B) contained shallow but faster flowing river and abundant vegetation and would also provide habitat for frogs and smaller fish and aquatic invertebrates. The drainage of the site and outflow of the watercourses is into Gouthro Lake.

Beaver dams were observed within the study boundary, one along the on-site pond/wetland on the eastern watercourse (Photo 1, Appendix B), and one along the shoreline of Gouthro Lake (Photo 18, Appendix B). Evidence of deer (scat and tracks) were also observed in the forested area within the study boundary. While no other mammals were directly observed it is likely that the forested areas of the site provide potential habitat for mammals and birds.

The shoreline of Gouthro Lake is dominated by a continuous wetland area that extends east and west off site. Aquatic invertebrates (crayfish) and fish were observed along the shoreline (Photo 24, Appendix B) within the study boundary and Gouthro Lake as a whole provides suitable habitat for fish.

4.2.2 Regulatory Context

With respect to the regulatory context for the ERA problem formulation, the site is located on land owned by the NS DNR, and as such the NS PSS were preferentially applied. The PSS are benchmarks developed by source agencies and departments outside of Nova Scotia such as the CCME, AEP and MECP. The original guideline sources were reviewed to ensure the NS PSS guideline referenced was the most recent applicable guideline from the original source. Where no NS PSS was identified, other provincial or federal regulatory benchmarks were used, where available. In the absence of Canadian guidelines, the US EPA EcoSSL (Ecological Soil Screening Levels) were considered.

For a number of regulatory jurisdictions, ecological soil quality benchmarks have been derived for specific receptor types such as terrestrial vegetation, soil invertebrates, mammals and birds. In these cases, the lowest benchmark provided was selected for COPC identification purposes.

While the study boundary contains areas with dense forests and wetlands, the areas most impacted within the study boundary site provide limited habitat for ecological receptors as it mostly consists of deforested land and gravel areas (Dillon, 2022b). Based on this, the commercial zoning of the site, and the reasonably anticipated future site use, the most appropriate land use for selecting applicable guidelines for the ERA was determined to be commercial. As such, the COPC screening was conducted using commercial guidelines for ecological health.

Soil within the study boundary was generally coarse-grained as such, guidelines for coarse-grained soils were preferentially sourced from all jurisdictions, where applicable.

4.2.3 Selection of Site Boundaries

The spatial boundary for the current land-based ERA problem formulation is the study area boundary (i.e., approximately 6.6 ha; see Figure 2, Appendix A). Off-site impacts to site-adjacent areas of Gouthro Lake that could potentially affect aquatic life were also considered in the problem formulation.

Available study boundary and background data used in the problem formulation have been previously discussed in Section 2.4.

4.2.4 Species at Risk (SAR) Assessment

To identify a preliminary list of SAR and species of conservation concern (SoCC) that may use the site, relevant federal and provincial guidance was reviewed along with applicable regulations and legislation. The following definitions of SAR and SoCC applied to the assessment:

- Species at Risk (SAR): A species that is determined to be endangered, threatened, or vulnerable/special concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Nova Scotia Endangered Species Act (NSES), or the federal Species at Risk Act (SARA); and

- Species of Conservation Concern (SoCC): those species that are not SAR but are identified as regionally vulnerable or imperilled by the Atlantic Canada Conservation Data Centre (ACCDC) (i.e., those species with ACCDC S-ranks of S1: critically imperilled in the province; S2: imperilled in the province; and S3: vulnerable in the province).

Data was gathered from ACCDC, previous reports, and the species at risk registry, with special attention to applicable recovery strategies, action plans, and management plans. The ACCDC report included 106 historical records of rare and endangered flora and fauna within a 5 km radius of the site centre. Of these records there were 9 species considered to be SAR, as defined above, for this assessment. Table 4-1 summarizes the identified SAR and discusses their potential presence on-site.

Table 4-1: Discussion of the Exposure Potential of COPCs for Species at Risk within the Study Boundary

Species	Suitable Habitat Description	Available Suitable habitat within the Site	Species on Site?
Atlantic Salmon – Eastern Cape Breton population (<i>Salmo salar</i> pop. 4)	Salmon spawn in stream rearing habitats before swimming out to sea. Atlantic salmon spend 1-3 years in stream habitats and 1-4 years at sea (NatureServe, 2025a).	Insufficient aquatic habitat present within the study boundary.	ACCDC records within 5 km
Canada Warbler (<i>Cardellina canadensis</i>)	Abundant in moist, mixed coniferous-deciduous forest with a well-developed understory. Nests are built on or near the ground, hidden in mossy hummocks, or beneath root masses, downed wood, base of large wet forest fern species and clumps of grass (COSEWIC, 2023a).	Potential suitable habitat in forested areas.	ACCDC records within 5 km
Common Nighthawk (<i>Chordeiles minor</i>)	Require open ground or clearings for nesting. Breeds in a wide range of open habitats. Forage in open areas with flying insects during twilight, although they sometimes forage during the day. Roosting sites consist of tree limbs, ground, fence posts, rooftops (COSEWIC, 2023b).	Open areas are present on-site but consist of gravel roads and stockpiled fill which are unlikely to provide sufficient nesting habitat.	ACCDC records within 5 km
Olive-sided Flycatcher (<i>Contopus cooperi</i>)	Nests in open, forested areas, often with many conspicuous perches (i.e., tall trees or snags alongside open areas) (Cornell, 2025). Diet is comprised almost entirely of flying insects (NatureServe Explorer, 2025).	Potential suitable habitat in forested areas.	ACCDC records within 5 km

Species	Suitable Habitat Description	Available Suitable habitat within the Site	Species on Site?
Bobolink (<i>Dolichonyx oryzivorus</i>)	Nests in tall-grass prairies, hayfields and pastures. Nests are built on the ground and their diet consists of a mixture of seeds and insects (COSEWIC, 2023c).	Insufficient grass habitat present on-site.	ACCDC records within 5 km
Evening Grosbeak (<i>Coccothraustes vespertinus</i>)	Breeding habitat generally includes open, mature mixed wood forests where fir species and/or white spruce are dominant and Spruce Budworm is abundant. Outside of the breeding season the species is dependent on seed crops from various trees such as firs and spruces. Nests are located in the canopy and the preference is to use conifers (COSEWIC, 2016).	Potential suitable habitat in forested areas.	ACCDC records within 5 km
Eastern Wood-Pewee (<i>Contopus virens</i>)	The Eastern Wood-pewee is most commonly found in the mid-canopy of clearings and edges within deciduous and mixed forests in Canada, preferring intermediate to mature stands. During migration and winter, the bird uses a variety of habitats, including forest edges, clearings, and tropical forests (COSEWIC, 2012).	Potential suitable habitat in forested areas.	ACCDC records within 5 km
Canada Lynx (<i>Lynx canadensis</i>)	Generally occurs in boreal regions with mixed coniferous/deciduous forest and thick undergrowth. Lynx will sometimes also be found in open rocky areas or tundra in search of prey (NatureServe Explorer, 2025b).	Potential habitat in the forested areas. Lynx may make use of the site for hunting prey.	ACCDC records within 5 km
Yellow-banded Bumble Bee (<i>Bombus terricola</i>)	Nests underground often within or in close proximity to wooded areas and wetlands (NatureServe Explorer, 2025c).	Potential suitable habitat in forested areas. Wetland habitats are in close proximity for this species.	ACCDC records within 5 km

Notes

Bold and shaded denotes SAR with potential suitable habitat on the site that may incidentally be present on the site.

Though present on and/or within 5 km from the subject properties, the ACCDC report showed no historical observations of SAR or SoCC within the former mine footprint. The nearest SAR and SoCC records are approximately 1 km away from the approximate center of the former mine site. Overall, the assessment indicated the potential presence of several SAR on the site, as follows:

- Canada Warbler (*Cardellina canadensis*);
- Olive-sided Flycatcher (*Contopus cooperi*);
- Evening Grosbeak (*Coccothraustes vespertinus*);
- Eastern Wood-Pewee (*Contopus virens*);
- Canada Lynx (*Lynx canadensis*); and
- Yellow-banded Bumble Bee (*Bombus terricola*).

These SAR were further examined by considering their potential for exposures to site-related COPCs which is influenced by several factors, including the size of the study boundary, availability of food resources within the study boundary, the surrounding habitats and food resources, the home range of the species, and species diet. Table 4-2 summarizes the potential for site exposures for the SAR considered to have potential habitat on-site. Based on these considerations, it was concluded that potential site-related exposures to these SAR would be negligible, and as such, there were excluded from further assessment. Further SAR surveys are not recommended.

Table 4-2: Discussion of the Exposure Potential of COPCs for SAR within the Study Boundary

Species	Life History Comments	Available Suitable Habitat within the Site	Potential for Exposure of Site COPCs
Canada Warbler (<i>Cardellina canadensis</i>)	Canada Warblers are migratory birds. Their nests are on or near the ground, among roots of fallen trees, in cavities in banks, or on ledges, sides of rocks, hummocks, stumps, or fallen logs, or on the ground under shrubbery (NatureServe, 2025e). Canada Warblers eat many types of insects and spiders. They quickly hop between branches picking insects from understory vegetation in a flurry of activity. They also grab feed on flying insects (Cornell, 2019).	Potential suitable habitat in forested areas.	Limited potential for exposure given their diet of insects from understory vegetation and foraging above ground, preferred foraging habitats, and home range size (>5 km). As such, the Canada Warbler was not carried forward for further assessment.

Species	Life History Comments	Available Suitable Habitat within the Site	Potential for Exposure of Site COPCs
	Breeding habitat includes moist thickets of woodland undergrowth (especially aspen-poplar), bogs, tall shrubbery along streams or near swamps, and deciduous second growth (NatureServe, 2025e). As such, breeding would not likely occur in the more contaminated areas of the study boundary.		
Olive-sided Flycatcher (<i>Contopus cooperi</i>)	Diet consists almost entirely of flying insects and often forage for insects near or above the canopy level of surrounding forests (Cornell, 2025). The olive-sided flycatcher is highly territorial with large home ranges between 10 and 20 ha (Cornell, 2025). Breeding occurs primarily in forests (Cornell, 2025). As such, breeding would not likely occur in the more contaminated areas of the study boundary.	Potential suitable habitat in forested areas.	Limited potential for exposure given their diet consists predominantly of flying insects. Potential for ingestion of contaminated soils and / or food items would be expected to be minimal.
Evening Grosbeak (<i>Coccothraustes vespertinus</i>)	Coniferous (primarily spruce and fir) and mixed coniferous-deciduous woodland, second growth, and occasionally parks; in migration and winter in a variety of forest and woodland habitats, and around human habitation (NatureServe, 2025d).	Potential suitable habitat in forested areas.	Limited potential for exposure given a diet of non-soil dwelling invertebrates as well as a wide variety of fruits and seeds, preferred breeding and foraging habitats, and large home range size relative to the size of the site. As such, the Evening Grosbeak was not carried forward for further assessment.

Species	Life History Comments	Available Suitable Habitat within the Site	Potential for Exposure of Site COPCs
	In summer, Evening Grosbeaks eat mostly invertebrates such as spruce budworm larvae, caterpillars, and aphids. They also eat a wide variety of seeds and small fruits, such as ash fruits, cherries, crabapples, snowberries, hawthorn fruits, Russian olive fruits, and juniper berries. Evening Grosbeaks typically feed at the tops of trees and shrubs, but they may come to the ground for fallen fruits and seeds or capture aerial insects in flight (Cornell, 2019). Evening Grosbeaks nest high in trees or large shrubs (Cornell, 2019).		
Eastern Wood-Pewee (<i>Contopus virens</i>)	Nests are typically located high in the tree canopy constructed of woven grass, wool, bark strips, twigs, roots, mosses, pine needles or leaves (Cornell, 2025). Territorial size during breeding season ranges from 2-8 ha for a single breeding pair (Cornell, 2025). Feeds on flying insects within a forest canopy. When nesting, may occasionally feed its young with insects from foliage on the ground (Cornell, 2025)	Potential suitable habitat in forested areas.	Limited potential for exposure given the diet consists predominantly of flying insects. Potential for ingestion of contaminated soils would be expected to be minimal. As such, the Eastern wood-peewee was not carried forward for further assessment.

Species	Life History Comments	Available Suitable Habitat within the Site	Potential for Exposure of Site COPCs
Canada Lynx (<i>Lynx canadensis</i>)	Home range sizes of the Canada Lynx varies with age but can be up to 30 km² (3000 ha) for a single adult. Populations are characterized by generally low population densities (NatureServe Explorer, 2025b). Lynx make their dens in hollow trees, stumps or in thick brush, typically in mature or old growth stands with a high density of logs (NatureServe Explorer, 2025b). Lynx forage in habitats suitable for snowshoe hare, their primary prey (i.e., habitat with hardwood browse and softwood cover) (NS Lynx Recovery Team, 2006).	Potential suitable habitat in the forested areas.	While some small areas of potential suitable habitat may occur on the site for the lynx and its prey, given the large home range and foraging area of the lynx, site-related exposures to this species would likely be negligible.
Yellow-banded Bumble Bee (<i>Bombus terricola</i>)	Yellow-banded bumble bees are a short-tongued species and feed from the following flowering plants: <i>Crocus</i>, <i>Eupatorium</i>, <i>Linaria</i>, <i>Melilotus</i>, <i>Monarda</i>, <i>Ribes</i>, <i>Rosa</i>, <i>Rubus</i>, <i>Spiraea</i>, <i>Taraxacum</i>, <i>Vaccinium</i> and <i>Vicia</i>. This species frequently takes nectar from long-corolla flowers (NatureServe Explorer, 2025c). Distribution of this species is relatively large and bees may disperse to a range of 2.6-10 km (NatureServe Explorer, 2025c).	Potential suitable habitat in forested areas. Wetland habitats are in close proximity for this species.	A limited number of flowering species are on-site presenting a limited food sources within the study boundary. ACCDC identified the nearest occurrence of this species 4.7 km from the site, given that the range of the species is 2.6-10 km, these bumble bees would likely only be on-site for short durations. For these reasons, the potential site-related exposure would be limited and the yellow-banded bumble bee was not carried forward for further assessment.

4.2.5 Identification of Receptors of Concern

A receptor of concern (ROC) is any non-human individual, species, population, community, habitat or ecosystem that is potentially exposed to COCs (FCSAP, 2012a). Consideration of potential ROCs for an ERA is site-specific and must reflect an understanding of the specific ecological attributes of the site being investigated. For example, sites that offer limited or no habitat or food resources for ecological receptors likely do not merit an ERA study. Identification of ROCs is not limited to those that only occur on the site of interest, but also considers receptors that may utilize the site for foraging, breeding, nesting, resting and other aspects of their life history.

For the purposes of an ERA, it is neither practical nor necessary to assess each and every species that may potentially occupy or utilize a site. Instead, it is common practice to identify a selected subset of species as the ROCs for the assessment. There are many considerations when identifying ROCs for an ERA, which include the following:

- General study area characteristics (e.g., surface coverings, habitat types of present, observed species) as determined from environmental site investigations;
- Representation from the various trophic levels, habitats, and feeding guilds that are appropriate for the study area;
- Behavioural and physiological characteristics that would increase or decrease the potential for chemical exposure (e.g., diet and habitat preferences, feeding behaviour, home/foraging /breeding ranges, mobility, or body weights);
- Habitat quality, suitability, and preferences for receptors that may occur on or utilize a site (e.g., does the site meet habitat requirements or preferences for receptors of interest?);
- Likely percentage of time spent within potentially impacted areas of a site and fraction of diet obtained from within these areas;
- Whether species of interest are resident biota or migratory (and other seasonal factors, such as species that may hibernate);
- The availability of biological data describing receptor characteristics, life history and behaviour for the study area;
- The physical-chemical, environmental fate/behaviour, and toxicological properties of COCs (such as persistence and potential to bioaccumulate and/or biomagnify in terrestrial and/or aquatic food webs; known sensitivity of certain wildlife species to certain chemicals);
- Availability of reliable ecotoxicological data for the receptor or receptor group;
- Availability of appropriate measurement endpoints for the ROC;
- Availability of regional and local habitat surveys or species inventories;
- Potential or documented presence of species that are at risk (e.g., listed as rare or endangered), or have some similar status within provincial jurisdictions);
- Socioeconomic considerations (e.g., commercial importance of a species, level of value to humans; recognized as a pest or vermin);
- Availability of information from local experts and residents of the area or surrounding properties;

- Potential presence of domestic animals (e.g., livestock, cats, dogs); domestic animals may have different protection goals or biological endpoints of interest than wildlife, and the presence of domestic animals may serve as key ecological stressors for wildlife species that may occur on a given site;
- A site visit to visually confirm habitat types, exposure pathways, and the potential for certain wildlife species to occur on or utilize the site; and
- Professional judgement.

The key outcome of the ROC identification step is the consideration of relevant receptor types that could potentially be included in the ERA, along with rationale or justification for why certain receptor types are included or excluded from the ERA. This is often presented as a tabular or matrix format. Ideally, the ROCs selected for an ERA will be those that occur within the study boundary (or would be expected to utilize the site on a regular basis), have a high exposure potential to COPCs in site media, and/or have a known sensitivity to one or more COPCs. When the selected ROCs meet these general conditions, the likelihood for the occurrence of adverse effects in less exposed or less sensitive receptors would be lower than for the assessed receptors.

The level of biological organization at which a ROC is evaluated in an ERA is an important concept that links closely with ecological protection goals for the ROCs. For lower trophic levels, such as vegetation and soil and sediment invertebrates and pelagic aquatic life (e.g., fish, invertebrates), the level of biological organization that is evaluated in an ERA is generally community level (FCSAP, 2012a; Suter et al., 2000). The community level is also considered the relevant level of biological organization when a receptor group has limited ecotoxicity data available (e.g., amphibians and reptiles). For higher trophic level receptors (such as birds and mammals), the ROCs are usually evaluated at the population level³ of biological organization. The individual organism level of biological organization is typically evaluated in an ERA only if the ROCs are rare, threatened, or endangered species (FCSAP, 2012a; Suter et al., 2000).

Thus, for most ROCs that are assessed at contaminated sites, the relevant level of biological organization is either community or population. The ecological protection goals for ROCs are the same in that the goal of an ERA is to protect most ROCs at the population or community level (unless there is evidence that the ROCs being evaluated are rare, threatened, or endangered, or listed as “species at risk” under the *Species at Risk Act* [SARA]). As such, in most contaminated site ERAs, the focus is not on protecting individual organisms or even groups of individuals (such as breeding pairs) that may occur on or utilize a site. Rather, the ecological protection goal is focused on maintenance of local populations of the ROC (or its surrogate), or maintenance of community ecological structure and function.

³ In the ERA context, the definition of a “population” can vary, and as such, very few ERA guidance documents define this term. In general, a population is a group of individuals of the same species that live together and breed amongst each other. Setting numerical limits on the number of individuals that comprise a population is inherently difficult and would vary greatly depending on the receptor species and its life history characteristics.

The selection of ROC considers receptor diet, receptor characteristics, site characteristics (e.g., available habitat), in addition to the size of the site. While the total area of the property is approximately 6.6 ha, the land based study boundary is approximately 6.4 ha, and only a small portion of the total land-based area contains soils that are elevated above the applicable benchmarks. In addition, some of the land within the central areas of the study boundary have limited habitat for some ecological receptors. The study boundary is shown on Figure 2, Appendix A. The evaluation of off-site soil contamination was not within the scope of this assessment. However, an evaluation of off-site contamination in site-adjacent areas of Gouthro Lake and potential risks to freshwater aquatic life were considered.

To identify ROCs for the site, a number of information sources were reviewed and considered including:

- Previous environmental reports (e.g., Dillon 2025a, 2025b, and 2025c);
- FCSAP (2012b) Ecological Risk Assessment Guidance Module C: Standardization of Wildlife Receptor Characteristics. This document suggests a number of candidate receptors for Canadian federally owned sites;
- Specific guidance related to spatial and habitat quality considerations for ERA (i.e., American Society for Testing and Materials [ASTM], 2014; 2016); and
- Information gathered during fieldwork on the site and obtained through on-line searches regarding wildlife species that would be expected to be within the study boundary.

The ecological receptors and receptor groups that were considered for selection as receptors in the problem formulation step for the ERA, along with rationale for their inclusion/exclusion are provided in Table 4-3. Among the rationale for inclusion or exclusion of ecological receptors is the presence or absence of operable exposure pathways by which receptors could come into contact with COPCs in soil. While the selection of exposure pathways is typically its own item within the problem formulation step of ERA, it is only conducted for ROCs that have been deemed to merit inclusion in the ERA. Furthermore, receptor and exposure pathway selection are linked processes that influence each other, and it is commonplace for exposure pathway considerations to be a factor in deciding whether or not certain ecological receptors should be selected for evaluation in an ERA.

Surrogate receptor species are also provided in Table 4-3, where relevant. As noted in FCSAP (2012a), surrogate receptor species are used to represent particular feeding guilds or ecological niches and are selected based on many of the same considerations used to identify ecological ROCs (as noted above).

Table 4-3: Ecological Receptors Selected for or Excluded from Evaluation in the ERA

Receptor Groups	Include/ Exclude	Surrogate Species for Receptor Group (if included)	Rationale for Inclusion/Exclusion
Terrestrial Vegetation	Include	Not applicable; assessed at the community level	Terrestrial vegetation has been observed on the site during fieldwork conducted in 2024 and 2025 (see Appendix B). While there is less vegetation in the central portion of the study boundary (APEC1) where the overburden fill has been stockpiled and along the access road, vegetation is plentiful to the west and east of the study boundary and along the boundary of Lake Gouthro to the south. COPCs in soil may enter vegetation via root uptake and potentially via the pathway of volatilization from soil and subsequent foliar uptake of vapour phase COPCs. Terrestrial vegetation on the site may be consumed by herbivorous wildlife. Terrestrial vegetation is not mobile, and most species have limited strategies to avoid root contact with contaminated soil. Thus, these organisms have a high exposure potential to COPCs in soil and were selected as ROC.
Soil Invertebrates	Include	Not applicable; assessed at the community level	Soil invertebrates would be expected to inhabit the site based on physical characteristics. Soil invertebrates (such as earthworms and arthropods) have a key role in soil development and nutrient cycling and are a major food item for many wildlife species. Soil invertebrates are in constant direct contact with soil, are largely immobile, and some species directly consume soil. Thus, these organisms have a high exposure potential to COPCs in soil.
Herbivorous Small Mammals	Include	Meadow vole (<i>Microtus pennsylvanicus</i>)	Small herbivorous mammals such as the snowshoe hare and woodchucks are some of the herbivorous mammals that are found in Nova Scotia and could possibly be found on the site (Government of Nova Scotia, 2021). Herbivorous small mammals have a high potential to be exposed to COPCs in soil due to burrowing behaviour, ground-foraging of vegetation and seeds, and generally small home ranges. The site is larger than the home and foraging range sizes of small mammal herbivores (e.g., meadow vole - 0.0069 ha to 0.348 ha; snowshoe hare - 1.6 ha; FCSAP, 2012b). Small herbivorous mammals could be exposed to COPCs via the consumption of vegetation and incidental soil ingestion. As such, this receptor group was selected as a ROC. In addition, evidence of beaver dams were present during the previous

Receptor Groups	Include/ Exclude	Surrogate Species for Receptor Group (if included)	Rationale for Inclusion/Exclusion
			field investigations (Dillon, 2025) indicating that small mammals are present in some portions of the site. The meadow vole and the snowshoe hare were selected as surrogate species for this receptor group as they occur in Nova Scotia and would likely have relatively high exposures due to their small home ranges.
Insectivorous or Invertevorous Small Mammals	Include	Masked shrew (<i>Sorex cinereus</i>)	Insectivorous/invertevorous small mammals such as the masked shrew, star-nosed mole and deer mouse are some of the insectivorous/invertevorous mammals that are found in Nova Scotia and could possibly be in the area (Government of Nova Scotia, 2021; NatureServe Explorer, 2025f). Insectivorous/invertevorous small mammals have a high potential to be exposed to COPCs in soil due to their burrowing behaviour, consumption of soil dwelling organisms (soil invertebrates) and generally small home ranges. The site is large relative to the home and foraging range sizes of small mammal insectivores/invertevores. While some of the habitat that makes up the APECs and immediate surrounding areas would not be considered suitable (e.g., extremely wet areas along Gouthro Lake, stockpiles of fill (APEC 1), concrete pad(APEC 3)), there are areas that would be suitable habitat for insectivorous small mammals and the site could provide food resources these receptors. This receptor group was included as a ROC and the masked shrew was selected as a surrogate for this receptor group.
Herbivorous Birds	Include	Ruffed Grouse (<i>Bonasa umbellus</i>)	Herbivorous birds such as the ruffed grouse and spruce grouse have been reported to occur in Nova Scotia (Nova Scotia Bird Society, 2023). While herbivorous birds tend to have moderately large home/foraging ranges, some areas of the site could contain habitat and food resources for herbivorous birds. Thus, it is possible that herbivorous birds occur/forage on the site where they would be exposed to COPCs via the consumption of vegetation and incidental soil ingestion.

Receptor Groups	Include/ Exclude	Surrogate Species for Receptor Group (if included)	Rationale for Inclusion/Exclusion
			The ruffed grouse was selected as a surrogate for this receptor group given that it occurs in Nova Scotia (NatureServe Explorer, 2025g).
Insectivorous/ Invertevorous Birds	Include	Dark-eyed Junco (<i>Junco hyemalis</i>)	Insectivorous/invertevorous birds have a high potential to be exposed to COPCs in contaminated soils due to their typical ground foraging behaviour in relation to the consumption of soil dwelling organisms (soil invertebrates) and generally small home/foraging ranges. The site is large relative to the home and foraging range sizes of most small bird insectivores/invertevores; however, there is limited habitat and food resources within the study boundary. Although there is limited habitat and food resources for these receptors, it is likely they could forage in some parts of the site; therefore, insectivorous/invertevorous birds were selected for assessment. The dark-eyed junco was selected as a surrogate for this receptor group to assess COPC exposures to insectivorous bird species. The junco has been reported to be a year round resident of Nova Scotia and is physically smaller in size (Cornell, 2025). The junco is a commonly assessed avian receptor in ERAs due to its year round residency, foraging behaviours which tend to increase potential exposure to COPCs in soil and food items, its small body weight, and relatively small home/foraging range.
Carnivorous Small Mammals	Exclude		Carnivorous small mammals, such as the red fox and the ermine (or short tailed weasel), could potentially occur on site and be exposed to COPCs via the ingestion of prey items that occur or forage on the site, and via incidental soil ingestion from the site. Prey items on the site would consist primarily of herbivorous small mammals and birds. However, the study boundary area (approximately 6.6 ha, with contaminated areas being a small portion of this total area) is small relative to the home ranges of carnivorous species (e.g., the ermine home range in NS is reported to be approximately 12 ha to 16 ha, almost double the site area of the site, Natural Resources and Renewables, 2023). As such, the exposure potential to COPCs for these receptors is likely

Receptor Groups	Include/Exclude	Surrogate Species for Receptor Group (if included)	Rationale for Inclusion/Exclusion
			limited. As such, carnivorous small mammals were not included for assessment.
Freshwater Pelagic and Benthic Aquatic Life	Include	Not applicable; assessed at the community level	Two watercourses leading to Gouthro Lake are present along the eastern and western boundaries of the property which could serve as suitable habitat to aquatic or benthic invertebrates. The portions of the two water courses leading to Gouthro Lake that occur within the study boundary is not anticipated to provide fish habitat. No fish were observed in the two water courses during the time the field crew was on the site. Fishing was observed at the outlet of Gouthro Lake (offsite) indicating the lake as a whole is a habitat for fish. In addition, aquatic invertebrates were observed during the 2025 field investigation in Gouthro Lake. Gouthro Lake is adjacent to the site and site drainage is generally towards Gouthro Lake; therefore, it is assumed pelagic and benthic freshwater life could be present in Gouthro Lake and could be potentially exposed to contaminants that originated from the site. Similarly, aquatic and benthic invertebrates in the two watercourse on-site could be exposed via on-site contamination. Therefore, freshwater aquatic life was carried forward as a receptor.
Amphibians	Include	Not applicable; assessed at the community level	Amphibians are commonly regarded as being among the more highly exposed and sensitive receptors to contaminants in environmental media, due to various aspects of their life history, dietary preferences, and physiology. Parts of the site are more marsh-like and could potentially offer habitat to amphibian species (i.e., wetland environments along the shoreline of Gouthro Lake and along the watercourses). Amphibians can also be exposed via potentially impacted sediments or surface waters in Lake Gouthro. Amphibians were therefore carried forward as a receptor.

Receptor Groups	Include/ Exclude	Surrogate Species for Receptor Group (if included)	Rationale for Inclusion/Exclusion
Species at Risk (or other rare, threatened or endangered species)	Exclude		A SAR assessment was conducted for this study (Section 4.2.4) and based on the SAR outcomes, and in consideration of exposure potential to COCs, it was determined that the potential for a SAR receptor to be on-site and exposed to COCs would be limited.
Reptiles	Exclude		Terrestrial reptile species could potentially be on the site. Reptiles are commonly regarded as being among the more highly exposed and sensitive receptors to contaminants in environmental media, due to various aspects of their life history, dietary preferences, and physiology. However, the availability of reliable or relevant toxicity data for these receptors is essentially non-existent at this time for most substances. This paucity of suitable toxicity data precludes the assessment of reptiles in most ERA studies. Given this, the small area of site contamination and that no reptilian SAR were reported within 5 km of the site, reptiles were not included for assessment.
Soil Microorganisms	Exclude		While soil microorganisms play key roles in nutrient cycling within soils (as they are primary consumers of organic matter and convert soil nutrients into forms that are available for uptake by plants and higher trophic level organisms), their inclusion as ROCs in an ERA is problematic, even though there are some soil quality benchmarks that utilize nutrient cycling parameters as the biological endpoints. There is high spatial and temporal variability in soils with respect to microbial community composition and tolerance to most contaminants. Reliable toxicity data are extremely limited and exposure-response relationships are unclear for most contaminants, especially those that can be utilized by certain microbial species as energy sources, or terminal electron receptors in respiration. There are limited tools and approaches that reliably determine microbial exposure and responses to chemical stressors. The ecological relevance of microbial responses to contaminants is questionable, given the often high rates of functional redundancy in soil microbial communities. Basic

Receptor Groups	Include/ Exclude	Surrogate Species for Receptor Group (if included)	Rationale for Inclusion/Exclusion
			understanding of microbial community structure and function in soils is limited. Given these considerations, soil microorganisms were excluded as ROCs.
Herbivorous Large Mammals	Exclude		Herbivorous large mammals such as deer and moose could occur within the site (deer scat were observed during previous field investigations) but would not be anticipated to occur within the APECs to a large degree due to there being less habitat and food resources in these areas than adjacent areas. Given the large home range of large herbivorous mammals (e.g., white-tailed deer have a home range of 30 ha and moose have a home range of 460 ha; FCSAP, 2012b), and their large body weights (relative to other herbivores), the exposure potential to COPCs for these receptors is likely limited, especially given that the site has minimal vegetation in some areas. While exposure routes for this receptor group were not selected for evaluation (i.e., direct soil contact/soil ingestion and vegetation ingestion), the evaluation of these pathways for small mammal herbivores adequately captures potential worst case COPC exposures for large mammals. Small mammals have much smaller body weights and home/foraging range sizes than large mammals and would therefore incur much higher exposures and potential risks to site COPCs.
Carnivorous Large Mammals	Exclude		While large carnivorous mammals occur in Nova Scotia, they generally have large home ranges. For example, the coyote home range is reported to be approximately 2,000 ha in Nova Scotia) and the bobcat home range is reported to be 100 ha to 10,000 ha) (NatureServe Explorer, 2025g). While these species could be exposed to site chemicals via ingestion of prey from the site, given the limited food resources within the most contaminated areas of the study boundary, the large home ranges and body weights of carnivorous large mammals, their exposure potential to COPCs in media and biota at the site are likely limited. As such, carnivorous large mammals were excluded as ROCs.

Receptor Groups	Include/ Exclude	Surrogate Species for Receptor Group (if included)	Rationale for Inclusion/Exclusion
Carnivorous Birds	Exclude		Carnivorous birds may be exposed to COPCs via the ingestion of prey items that occur or forage on the site, and incidental soil ingestion. The prey items on the site would consist primarily of herbivorous and/or insectivorous/ invertevorous small mammals (and birds). The potential for exposure of carnivorous birds to site related COCs would be expected to be limited due to their large home ranges, and the limited available habitat/food resources within the contaminated areas of the study boundary for these birds, compared to other nearby areas. As such, carnivorous birds were excluded as ROCs.
Marine Pelagic and Benthic Aquatic Life	Exclude		Marine surface water and aquatic receptors are not located on or near the site; thus, this receptor group was excluded as ROCs.
Waterfowl and Piscivorous Wildlife (bird and mammal piscivores)	Exclude		No waterfowl or piscivores were observed on the site during the Supplemental ESA (Dillon, 2025) or previous site visits. While piscivorous wildlife could occur within the study boundary, their exposures to COPCs from site media and food items in these areas is likely limited. This is partly due to their relatively large home and foraging range sizes, the small potentially contaminated area within the site, the number of waterbodies in the area and varied diets for some species (e.g., fish, benthic invertebrates, aquatic vegetation).

4.2.5.1

Size of Site and Potential Habitat

The spatial scale of impacts at a given contaminated site can be useful in determining if potentially significant exposure conditions exist for ecological receptors, and for determining if risk estimates are ecologically significant (US EPA, 1997; 1998; 1994; ASTM, 2014; MCP, 1996). Ideally, spatial scale issues are discussed at the onset of the ERA process. This can allow small sized sites that may not require ERA, to be excluded early in the ERA process, such that resources are not needlessly allocated to the assessment of these sites. ASTM (2014) states that the space or size of a contaminated site is directly related to the potential for ecological receptors to be exposed. Consideration of spatial scale can help focus an ERA on the issues or receptors of greatest ecological relevance, and/or provide a basis for determining that an ERA for a given site is not necessary for some or all receptors of interest. Similarly, the FCSAP (2012a) guidance identifies home range size, habitat suitability, and off-site habitat characteristics as factors that can affect the degree of exposures to site receptors.

ASTM (2014) suggests that for terrestrial environments (or sites), ecological habitat areas of less than two acres (equivalent to approximately 0.81 ha) are commonly considered too small to require an ERA, so long as there are no site-specific issues of special concern. While it is noted that sites of < 2 acres may contain foraging or breeding areas for individual small mammals, birds, and herpetofauna (amphibians and reptiles), this spatial scale does not usually support local populations of such wildlife species, and these sites would not require an ERA in most cases. Vegetation and soil invertebrates are typically excluded from this criterion, as there can be populations or communities of these receptors on sites < 2 acres in size, as long as the habitat and soil conditions are suitable. ASTM (2014) also notes that site coverings and surface features (such as foundations, pavement, gravel, concrete, fences, walls) are important to account for, as they limit the size of the habitat and foraging areas for various receptors.

The land-based study boundary of the site is approximately 6.6 ha which is above the ASTM (2014) spatial criterion of 0.81 ha, indicating the site may be large enough support local populations of mammalian and avian receptors. This, however, does not consider the available habitat and food resources on the site, which are rather limited in many areas (i.e., within the central portion of the study boundary). There is less vegetation in the central areas of the site (access road and stockpiled fill) although trees and shrubs are more plentiful outside of this area and outside of the study boundary. In addition, watercourses and wetlands identified within the study boundary (Section 2.1) would not provide suitable habitat or foraging areas some terrestrial receptors.

4.2.5.2

Consideration of Habitat Quality and Habitat Preferences

ASTM (2016) provides guidance on using habitat quality and preference information as a means of determining if an ERA of a site is warranted. This guidance defines “habitat” as the combination of physical (landscape) and biological features preferred by a particular species. ASTM (2016) states that consideration of landscape features to characterize habitat quality can enhance the ecological relevance of an ERA and avoid conducting ERAs on sites or in areas where wildlife species would be absent (or limited) because of a lack of suitable habitat. ASTM (2016) further notes that even if the habitat is determined to be suitable for certain ecological receptors, other factors such as limited food resources, predation, or human disturbances may override the apparent habitat quality for a given receptor, such that its exposure to contaminants in site media and biota would be minimal. Because the foraging behaviour/time and occurrence of receptors on a site is directly related to habitat suitability, the exposure potential to contaminants in site media is also directly related to the suitability of the site’s habitat for a given receptor. ERAs should only be conducted for sites where ecological receptors occur or would likely occur. If receptors are not present or are unlikely to be present because of poor habitat quality or suitability, then an ERA of those receptors is not warranted.

Other habitat-related considerations suggested by ASTM (2016) include the following:

- Consider the size of the site relative to receptor home/foraging/breeding range requirements; and
- Consider the site habitat quality relative to habitat quality on adjacent or surrounding sites. If a site’s habitat quality is approximately equal to that of the site surroundings, the proportion of time that an

animal will spend on the site will likely be proportional to the surrounding sites and bounded by the size of the animal's home range. If the habitat on the site is of lower or higher quality than the surrounding sites, then an animal is likely to spend proportionally less or more of its time on the site.

To further explore these concepts in relation to the site, information was sourced on habitat preferences, and home, foraging, and breeding range size for the selected ROCs. Review of habitat preferences for these ROCs shows that the site has some conditions and ecological features that are consistent with their preferred habitat types (e.g., forested areas and open grassy fields); however, some areas within the central portion of the study boundary associated with the most contamination (i.e., within the APECs) provide limited suitable habitat for ROC due to the presence of waste rock (APEC 4), overburden stockpile (APEC 1) and limited vegetation. Therefore, while some areas within the study boundary do not have suitable habitat or food resources, other areas offer some suitable habitat conditions for various common mammal and avian receptors. As such, it is possible that local populations of these receptors could utilize the site for foraging, nesting, breeding, and other activities. This conclusion is generally supported by conducting N_s calculations for these receptors (where N_s is the number of individuals of a given receptor species that are likely to inhabit any habitat subdivision on a site), as presented in ASTM (2016). The N_s calculation is similar to the common Area Use Factor (AUF) calculation that is sometimes used in ERAs. One form of this calculation is as follows (some alternate means of determining N_s are also provided in ASTM, 2016).

Equation 1

$$N_s = \frac{A_s}{HR_s}$$

Where:

- N_s = the number of individuals likely to inhabit the habitat subdivision on a site and incur potential exposures to COPCs from site media.
- A_s = the area of the habitat subdivision (or portions of the site with potential habitat or foraging areas). In this case, the habitat subdivision of interest includes land-based areas of the site which were conservatively assumed to be the area of the based study boundary of approximately 6.6 ha.
- HR_s = the approximate home/foraging range size of the receptor (ha); based on literature regarding lowest reported home range sizes.

To examine whether the site could support populations of the mammalian ROC being examined, N_s values were calculated for the ROC in addition to other typical avian and mammalian species evaluated in ERA. N_s calculations for the receptors selected as ROC are presented below (Table 4-4). For all receptor species, the smallest identified HRs value was taken from the FCSAP ERA guidance documentation (i.e., FCSAP, 2012b) or other resources if no FCSAP value was available. The AS value used was approximately 6.6 ha which is the entire area within the study boundary.

Table 4-4: Estimated N_s Values for Selected Ecological Receptors at the Frenchvale Former Mine Site

Receptor	A _s	HR _s	N _s
Meadow vole	6.6	0.348 ha	19
Masked shrew		0.6 ha	11
Dark-eyed junco ¹		0.833	8
Ruffed grouse		1 ha	7
Ermine ²		12	<1
Snowshoe hare		1.6 ha	4
White-tailed deer		30 ha	<1
Black bear		300 ha	<1

Notes:

Home ranges from FCSAP, 2012b unless otherwise noted. The smallest home ranges provided were used for the N_s calculation with the exception of the meadow vole. The lowest home range for the meadow vole of 0.0069 ha would apply only if the habitat quality and food resources are exceptional, which they would not be on the site due to limited habitat and food resources in some areas. As such, the home range of 0.348 ha (FCSAP, 2012b) was used.

¹ Home range is female home range during nestling period (Reichard and Ketterson, 2012).

² Home range from the wildlife of Nova Scotia website which noted adult home ranges are 12 ha to 16 ha, with males having higher home ranges than females (NS DNR, 2021). The lower of these two home ranges was used for the N_s calculation. N_s values rounded down to nearest whole number.

Receptors include terrestrial receptors selected as ROC in this ERA in addition to other typical avian and mammalian species evaluated in ERAs.

While there is no set N_s value that represents the presence of a population for each receptor, the N_s values in Table 4-4 suggest that a few individuals to potentially local populations of small mammals with smaller home ranges (i.e., meadow vole, masked shrew) may occur on-site. The N_s scores were calculated based on the total area of the site within the study boundary which is approximately 6.6 ha. If the areas of limited habitat and food resources/unsuitable habitat for ROC within the study boundary are considered, the N_s scores for each receptor would be lower; thus, these estimations are considered to be conservative.

While the N_s calculation is not without uncertainty and does not account for literature reports of actual measured population density and territoriality considerations, it provides a reasonable and often conservative indication of the numbers of individual organisms that may be expected to use a habitat subdivision on a given site. For the Frenchvale Former Mine site, these N_s values would be considered conservative given the limited habitat/food resources within some areas of the study boundary. As such, it would be unrealistic to assume that ROC presence and foraging occurs extensively within the study boundary, but not on the various adjacent areas that have equally suitable (or better) habitat conditions and food availability. For example, the central areas of the study boundary have less terrestrial vegetation than the adjacent areas which are mostly forested and have more lush vegetation.

There is nothing to distinguish the site from other areas as offering unique or preferred habitat or food resources for any known ecological receptor population or community. In fact, areas outside of the study boundary would offer better habitat and food resources than the habitat within the study boundary (particularly the central portion of the study boundary).

The calculated N_s scores support that the use of the site by small mammalian receptors, and to a lesser extent avian receptors, could potentially include individuals but not populations of these receptors (with the exception of the meadow vole and masked shrew where a small local population could potentially be supported). The N_s scores were calculated based on the total site area and did not exclude areas within the study boundary where there is no available habitat and/or limited food resources. Given much of the central portion of the study boundary has less vegetation and food resources from the stockpiled fill, it is unlikely that populations of carnivorous small mammals, larger mammals or birds could be supported within the study boundary (particularly in the most contaminated areas). However, the site may support populations of smaller mammals with smaller home ranges. In addition, individual birds and mammals with slightly larger home ranges (such as the snowshoe hare) could use the habitat present on-site.

The home range used to estimate this N_s score for the junco ($N_s = 8$) was a home range of a female for breeding and nesting (Reichard and Ketterson, 2012). Non-breeding winter home range has been reported to be approximately 4 ha to 5 ha (10 to 12 acres; Sullivan, 1999; US DOA, 1991). When these home ranges are considered, the N_s scores are 2 and 1 respectively, which would not support a population. Additional support for the site not being able to support a population of junco, comes from a study in Minnesota, where the overall mean densities of the junco in national forest lands, ranged from 0.08 to 0.11 pairs per 40 ha (Pfannmuller et al. [Minnesota Breeding Bird Atlas], 2023). Given the size of the study boundary is 6.6 ha, it is unlikely that there would be more than one or two nesting pairs of junco present.

Similarly, population densities of the ruffed grouse in North America are low and have been reported to average approximately 10 to 15 bird per square km (100 ha) (Collicutt, 2023). Given the size of the study boundary is approximately 6.6 ha, only about 1 or 2 birds would be present. Based on these overall considerations, it is unlikely that populations of dark-eyed junco or ruffed grouse or other similar species would be supported within the study boundary. While populations of herbivorous and insectivorous/invertevorous birds are not anticipated to be supported by the site, they were carried forward for further consideration in the ERA problem formulation.

4.2.5.3

Summary of ROC Selection

Based on the ROC selection procedure and related considerations described in the preceding sections, the receptors/receptor groups in Table 4-5 were identified as ROCs that were selected for further evaluation in the ERA problem formulation.

Table 4-5: Receptors of Concern (ROC) Selected for Evaluation

ROC	Surrogate	Comment
Terrestrial vegetation	NA	Assessed at the community level
Soil invertebrates	NA	Assessed at the community level
Herbivorous small mammals	Meadow vole	Assessed at the population level
Insectivorous/invertevorous small mammals	Masked shrew	Assessed at the population level
Herbivorous birds	Ruffed grouse	Assessed at the population level
Insectivorous/invertevorous birds	Dark-eyed junco	Assessed at the population level
Amphibians	NA	Assessed at the community level
Freshwater aquatic life	NA	Assessed at the community level

Notes:

NA = not applicable; ROC = Receptor of Concern

4.2.6**Selection of Assessment and Measurement Endpoints and Lines of Evidence**

An assessment endpoint is defined as an explicit expression of what is to be protected, defined by an ecological entity (i.e., receptor or receptor group) and by a characteristic (Suter, 1989; US EPA, 1998; FCSAP, 2012a). The characteristic is a specific attribute or property for the receptor that is important to protect, and which is potentially at risk (e.g., abundance, survival). As noted previously, the ecological entity (or receptor) can be defined at different levels of biological organization. An assessment endpoint must include a receptor (or receptor group) and a specific property or attribute of that receptor (FCSAP, 2012a). Assessment endpoints are quite similar to protection goals with the only notable difference being that the former describes the environmental attribute of interest, whereas the latter articulates the desired state of that attribute (FCSAP, 2012a). It is common practice in ERA that assessment endpoints do not express a direction or desired state (such as: increased, decreased, healthy, or sustainable).

Assessment endpoints may or may not be directly measurable (US EPA, 1998). For example, the abundance of songbirds may be assessed directly if avian surveys have been conducted but would have to be assessed indirectly if survey outcomes are not available. If assessment endpoints are not directly measurable (which is not uncommon due to practical reasons), then other measures, called “measurement endpoints”, may be used to evaluate the risk related to the assessment endpoints.

A measurement endpoint is considered to be any measure of exposure or effects for a ROC or any measure of change in the attribute of an assessment endpoint (FCSAP, 2012a). Measurement endpoints form the LOE that are used to estimate risks in an ERA. Measurement endpoints and LOEs are developed at the same time. Similar definitions of measurement endpoints have been provided by others. For example, Suter II (2007) defined measurement endpoints as responses to a chemical stressor that can be measured and quantified. CCME (1996) defines measurement endpoints as “the effects on an ecological component that can be measured and described in some quantitative fashion.”

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A key consideration in the selection of measurement endpoints is how well a given measurement endpoint represents an assessment endpoint, and its ecological relevance. The greater the strength of association between the measurement and assessment endpoint, the greater the weight that is given to that measurement endpoint in the overall ERA, so long as the measurement endpoint is considered ecologically relevant.

FCSAP (2012a) defines LOE as any pairing of exposure and effects measures (or measurement endpoints) that provide evidence for the evaluation of a specific assessment endpoint. It is not uncommon for a LOE to involve the use of more than one measurement endpoint.

Essentially, measurement endpoints are tools, and LOEs are the way that these tools are used and applied in the ERA. LOEs are directly related to both measurement endpoints and assessment endpoints.

Four main categories of LOE are described in FCSAP (2012a), as follows:

- Site-specific toxicological evidence – Considers measurement endpoints related to studies of test organism exposures to contaminated site media under controlled conditions;
- Indirect toxicology evidence – Considers toxicological information obtained from other sites, or the literature, assuming that the concentration-response relationships between sites are similar;
- Site-specific biological evidence – Considers direct assessment of the site biological conditions; and
- Indirect biological evidence – Considers indirect assessment of biology, through extrapolation of knowledge obtained at other sites and from the literature.

Specific assessment and measurement endpoints and LOE were identified for the ROC that were selected for evaluation in the ERA and are presented in Table 4-6.

Table 4-6: Assessment and Measurement Endpoints and Lines of Evidence for the Selected ROCs

Receptor of Concern (ROC)	Assessment Endpoint	Measurement Endpoints	Lines of Evidence (LOE)
Terrestrial vegetation	Survival, growth, and reproduction of vegetation communities	Concentrations of chemicals in site soil and reference areas. Vegetation health-based soil quality benchmarks. Qualitative site survey of vegetation types and apparent health and similarity to surrounding sites.	Outcomes of the comparison of site soil chemical concentrations to vegetation health-based soil quality benchmarks and reference areas. Comparison of vegetation on-site to vegetation present in the surrounding area. Outcomes of visual vegetation observations.

Receptor of Concern (ROC)	Assessment Endpoint	Measurement Endpoints	Lines of Evidence (LOE)
Soil invertebrates	Survival and reproduction of soil invertebrate communities	Concentrations of chemicals in site soil and reference areas. Soil invertebrate health-based soil quality benchmarks.	Outcomes of the comparison of site soil chemical concentrations to soil invertebrate health-based soil quality benchmarks and reference areas.
Herbivorous small mammals (surrogates: meadow vole) Insectivorous or invertevorous small mammals (surrogate: masked shrew)	Survival, growth, reproduction, and abundance of populations	Concentrations of chemicals in site soils. Mammalian health-based soil quality benchmarks. Modeled exposure and risk estimates for COCs in food items and soil. Applicable mammalian TRVs. Spatial size and habitat quality/preference considerations for the site. N _s (the number of individuals of a given receptor species that are likely to inhabit any habitat subdivision on a site) values estimated for the site.	Outcomes of the comparison of site soil chemical concentrations to mammalian health-based soil quality benchmarks. Comparisons between estimated COC exposures and TRVs (i.e., ecological hazard quotients). Comparison of site spatial size to ASTM spatial criteria for ERA; comparison of receptor habitat preferences to site habitat conditions and habitat quality. Interpretation of N _s values with respect to likelihood for populations or individuals to utilize or occur on the site.
Herbivorous birds (surrogate: ruffed grouse) Insectivorous or invertevorous birds (surrogate: dark-eyed junco)	Survival, growth, reproduction, and abundance of populations	Concentrations of chemicals in site soils and reference areas. Avian health-based soil quality benchmarks. Modeled exposure and risk estimates for COCs in food items and soil. Applicable avian TRVs. Spatial size and habitat quality/preference considerations for the site.	Outcomes of the comparison of site soil chemical concentrations to avian health-based soil quality benchmarks. Comparisons between estimated COC exposures and TRVs (i.e., ecological hazard quotients). Comparison of site spatial size to ASTM spatial criteria for ERA; comparison of receptor habitat preferences to site habitat conditions and habitat quality.

Receptor of Concern (ROC)	Assessment Endpoint	Measurement Endpoints	Lines of Evidence (LOE)
		N _s (the number of individuals of a given receptor species that are likely to inhabit any habitat subdivision on a site) values estimated for the site.	Interpretation of N _s values with respect to likelihood for populations or individuals to utilize or occur on the site.
Freshwater Aquatic Life	Survival, growth, reproduction, and abundance of populations.	Concentrations of chemicals in site sediment and surface water. Freshwater aquatic life health-based surface water and sediment quality benchmarks.	Outcomes of the comparison of site sediment and surface water to freshwater aquatic life health-based sediment and surface water quality benchmarks.
Amphibians	Survival, growth, reproduction, and abundance of populations.	Concentrations of chemicals in site surface water and sediments and wetland areas. Amphibian toxicity data. Spatial size and habitat quality/preference considerations for the subject property.	Comparison of freshwater aquatic life guidelines and amphibian toxicity data to site concentrations. Comparison spatial size and habitat quality to surrounding areas, comparison of receptor habitat preferences to subject property habitat conditions and habitat quality.

Notes

In the ERA context, the definition of a “population” can vary, and as such, very few ERA guidance documents define this term. FCSAP (2012a) states the following “From a pure biology perspective, an ecological population is defined as a group of organisms of a single species that interbreed and share a common habitat.” From a risk assessment perspective, however, this definition is too broad. Setting numerical limits on the number of individuals that comprise a population is inherently difficult and would vary greatly depending on the receptor species and its life history characteristics.

The abundance of a species could be affected directly (i.e., as a result of direct toxicity of COCs on survival, growth or reproduction), or indirectly (e.g., as a result of decreased habitat suitability or reduced prey/food abundance) as a result of toxicity to food or prey items and other site activities that may affect habitat and presence of food resources. This ERA problem formulation focuses on potential health effects as a result of direct chemical exposures.

4.2.7 Selection of Exposure Pathways and Routes

Ecological receptors can come into contact with chemicals in a variety of ways, depending on their daily activities, foraging and dietary behaviour and life history characteristics. The means by which an ecological receptor comes into contact with a chemical in an environmental medium are referred to as exposure pathways. The means by which a chemical enters the receptor from the environmental medium are referred to as exposure routes. If there are no possible exposure pathways that link ROCs to COPCs that are present in site media, there can be no potential for adverse effects from those chemicals. Therefore, it is important for any ERA to identify the major exposure pathways and routes for each of the selected/identified receptor groups. Exposure pathways selected for the receptor groups in the ERA are provided below.

4.2.7.1 Terrestrial Vegetation and Soil Invertebrates

- Exposure of terrestrial plants to chemicals in soil is controlled by the root distribution in the soil profile, physicochemical characteristics of the soil (which determines the forms of the chemicals and their phytoavailability) and by interactions of the chemicals of interest with other chemicals present in soil (Suter II, 2007);
- Exposure of soil invertebrates to chemicals in soil is determined by depth of burrowing, the rate, and quantity of soil material ingested, activity patterns, soil physical-chemical characteristics, and interactions of the chemicals of interest with other chemicals in soil (Suter II, 2007); and
- The main exposure pathways and routes evaluated for terrestrial vegetation and soil invertebrates included were direct soil contact pathways, which include direct contact with the dermal coverings or integument of invertebrates, direct soil ingestion by invertebrates, and root uptake by plants.

4.2.7.2 Birds and Mammals

- For avian and mammalian receptors, it is common ERA practice to evaluate only those pathways that relate to the oral route of exposure (such as consumption of food/prey items, drinking water ingestion, incidental soil, and sediment ingestion). Not only is the oral route the most commonly assessed exposure route in ERAs by far, but it is also almost always the dominant route that drives site-specific exposures and risks to ecological receptors at most sites;
- Dermal and inhalation exposure pathways rarely require evaluation in ERAs (FCSAP, 2012a, Science Advisory Board of Contaminated Sites in British Columbia [SABCS], 2008; US EPA, 2003a). This is considered to be the case in the current ERA as well, given that the ROCs have fur that would limit dermal contact of the COPC with skin, and given that the potential for significant soil/dust resuspension in local ambient air is low at the site for much of the year due to snow cover or frozen ground in the winter;
- For the current ERA problem formulation, it was assumed that herbivorous small mammalian ROCs are exposed to COCs in site soil via direct soil contact (soil ingestion) as well as the ingestion of vegetation;

- For many small mammals, and many birds, it is common not to consume water from surface water bodies, but rather, to obtain the majority of their water requirements from puddles or droplets on vegetation surfaces, as well as from the consumption of food. Many small mammals and many bird species obtain their water requirements from consumed food items, wherein their physiological water needs are met via the metabolism of ingested food. For the small mammals and birds expected to be on the site, surface water ingestion would not be expected to be a pathway of concern;
- The main exposure pathways and routes evaluated for herbivorous small mammals and birds were soil ingestion and ingestion of vegetation; and
- The main exposure pathways and routes evaluated for insectivorous/invertevorous small mammals and birds were soil ingestion and ingestion of soil invertebrates.

4.2.7.3 Freshwater Aquatic Life

The main routes and pathways by which these receptors may be potentially exposed to COPCs would include: direct contact of gills and other respiratory surfaces with water and sediments, sediment and water ingestion (including sediment pore water for benthos), and ingestion of aquatic prey species and other food items (i.e., detritus, plants, phytoplankton, zooplankton, macroinvertebrate fauna, and fish can all be food items for aquatic organisms depending on the number of trophic levels and aquatic food web structure). Sediment ingestion and pore water ingestion is more prevalent for bottom-dwelling or bottom-feeding species (Schoof, 2003). Aquatic plants are typically exposed to chemicals through root uptake of substances present in sediments and sediment pore water, and surface water uptake. For benthic species, the relative importance of whole (or bulk) sediment versus pore water exposures depends on the individual species, and their feeding and burrowing behavior. For example, pore water exposure may be insignificant to invertebrates that ingest sediment particles but may be an important exposure pathway for benthic organisms that burrow, and/or obtain their food by filter feeding.

4.2.7.4 Amphibians

Amphibians have a complex life history and can live in either aquatic or terrestrial habitats depending on life stage. As such, the evaluation of exposure pathways for amphibians is complicated. Generally, during embryo and larval life stages, amphibian exposures are primarily aquatic, while during juvenile and adult stages, exposures are primarily terrestrial. The main exposure pathways associated with life stages in the terrestrial areas of the site would include soil ingestion and direct contact and ingestion of terrestrial foods, while exposures in aquatic areas would include direct contact with sediment and surface water, incidental ingestion of soil/sediments and ingestion of aquatic foods.

4.2.7.5

Exposure Pathway Summary

With respect to the assessment and measurement endpoints and LOEs noted in Table 4-6 and the exposure pathways and routes selected for the ROC, there were some inherent conservative assumptions within the ERA that must be acknowledged. It is assumed that the ROC forage entirely in areas of the site that contain impacted soils and that their diet consists entirely of food from within the study boundary. While these are typical assumptions for an ERA of a contaminated site, they are considered conservative, particularly given the limited habitat and food resources on some areas of the site compared to the surrounding area.

For the receptor groups selected for evaluation in the current ERA problem formulation, the following information on exposure pathways applies. Exposure pathways and routes for each receptor group are summarized in Table 4-7.

Table 4-7: Summary of Exposure Pathways and Routes Selected for the Receptor Groups

Receptor Group	Exposure Pathway Selected for Evaluation
Terrestrial vegetation	• Direct contact with soils • Root uptake
Soil organisms	• Direct soil ingestion • Direct contact with dermal coverings or integument
Herbivorous small mammals	• Incidental soil ingestion • Vegetation ingestion
Insectivorous or invertevorous small mammals	• Incidental soil ingestion • Ingestion of soil invertebrates
Herbivorous birds	• Incidental soil ingestion • Vegetation ingestion
Insectivorous or invertevorous birds	• Incidental soil ingestion • Ingestion of soil invertebrates
Freshwater Aquatic Life	• Direct contact with sediment • Direct contact with surface water
Amphibians	• Soil and sediment ingestion • Direct contact with soil, sediments, and surface water • Ingestion of aquatic and terrestrial foods

4.2.8

Identification of COCs

The goal of COC selection is to identify those chemicals measured in site media that may pose a potential risk to ecological health. Details regarding the COC identification process for the ERA (including the data and statistics, benchmarks that were used, COC screening tables and screening outcomes) are provided in the following sections and Appendix E.

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Similar to the COPC identification process for the HHRA, the identification of COCs for the ERA also involved a sequential process, as follows.

1. Comparison of the maximum measured concentrations of contaminants in site soil to applicable regulatory ecological health-based benchmarks and available local background data;
2. Chemicals with a maximum concentration that exceeded the applicable ecological health-based benchmark and were above background concentrations, were identified as initial COPCs;
3. These initial COPCs were further evaluated by determining the frequency, magnitude, and spatial extent of relevant media exceedances from the site above the applicable receptor-specific ecological health-based benchmarks, where available. For mobile receptors (e.g., mammals and birds), the initial COPCs were further screened against a 90th percentile soil concentrations as per FCSAP (2012a);
4. Further considerations (where/if deemed necessary and relevant), such as:
 - Essential nutrient status of certain inorganic elements;
 - Ubiquity of elements in soil, water or sediments;
 - Statistical relationships;
 - Local geology;
 - Spatial distribution of soil chemical concentrations;
 - Fate and behaviour properties (including potential to bioaccumulation and biomagnification);
 - Speciation of chemicals in site media; and
5. Final COCs are selected considering all other above, where relevant.

COC identification in site media was guided by the following considerations:

- Substances that were non-detectable (below RDLs) in all site media samples were excluded from further consideration unless the RDL was above the applicable benchmark value;
- All site data were considered, including field duplicate samples;
- Soil concentrations of analytes were assumed to be accessible for ecological receptor exposure regardless of location and considered soils up to 1.5 m deep (i.e., all site soil data);
- Coarse-grained soil benchmarks were used based on the particle size analysis (Table E-1, Appendix E);
- With respect to sediment benchmarks, only probable effect level (PEL) and similarly derived benchmarks were applied (i.e., examples of sediment benchmarks similar to a PEL are effects range median (ERM) and severe effect levels (SEL)). It has become well established in the scientific and regulatory literature over the years that exceedances over PELs and similar benchmarks are often a better or more reliable indicator of potential sediment toxicity (or an increased likelihood for benthic community impairment) than low effect level sediment benchmark exceedances (such as ISQGs or interim sediment quality guidelines). The past experience of Dillon personnel in numerous ERAs of contaminated sediments has shown that exceedance of low effect level benchmarks often does not correlate well with other endpoints that are commonly evaluated in aquatic risk assessments (e.g., sediment bioassay results and benthic community parameters). In practice, exceedance of the PEL (and similar values) is the more realistic indicator of a potential for population or community level

adverse effects for benthic organisms and is also typically the most suitable basis for determining when/if further action or assessment is necessary. The use of the PEL is well supported in the literature (e.g., NOAA, 1999; Long et al., 1998; MDEP, 2006a,b). There is also considerable precedent for reliance on PEL exceedances as a means of determining the need for further assessment or action when evaluating contaminated sediments. For example, there are numerous papers in the scientific literature that calculate PEL quotients (not ISQG, or other low effect level quotients) when evaluating sediment contamination and ranking aquatic contaminated sites for further action or no action. This approach is also common to a number of sediment assessment frameworks used within Canada (e.g., FCSAP Aquatic Sites Classification System);

- The COC identification process excluded data for general chemistry and physical properties of environmental media (e.g., pH, chloride, electrical conductivity, sodium absorption ratio, etc.). While such parameters can inform on soil, sediment and water quality (where applicable), and may influence or modify the bioavailability, mobility and toxicity of certain COPCs, they are not typically considered directly in the COPC identification step of an ERA. Also, many of these parameters lack toxicity or ecological health-based benchmarks that media concentrations can be compared against. As such, these types of parameters were not considered further in the ERA problem formulation; however, general chemistry data is provided in Appendix E.
- Chemicals having a maximum concentration which exceeded the applicable ecological benchmark value and available regional background data were retained for further assessment as initial COPCs. It is a general assumption in all risk assessment studies that there is a low to negligible likelihood for potential adverse effects when maximum media chemical concentrations are below such benchmarks. Media chemistry data that meets these conditions are typically considered to require no further evaluation or action; and
- Chemicals without environmental health-based benchmarks were carried forward for further discussion if they were reported at concentrations above the RDL.

The COC identification processes used are consistent with site and risk assessment procedures and help to distinguish natural occurring concentrations from those that have been influenced by anthropogenic activities.

With respect to the regulatory context for the ERA, the site is located on land owned by the NS DNR, and as such the NS CSR guidelines apply and were preferentially used in the COPC screening. As part of the NS Contaminated Sites protocol, Tier I EQS and Tier II PSS for soil, sediment and surface water have been selected for use in NS. Links to these EQS and PSS are provided on the NS CSR website (<https://novascotia.ca/nse/contaminatedsites/protocols.asp>). While the ecological health-based PSS for commercial soils were not found on the NS CSR website, these values have been provided by Atlantic RBCA and have been adopted by the province. Except for petroleum hydrocarbons and select chlorinated volatile organic compounds (CVOs), the Atlantic RBCA EQS/PSS values are adopted values that have been derived by CCME and other regulatory authorities in Canadian or international jurisdictions. For contaminants other than PHCs, the general hierarchy used to select EQS/PSS is outlined

in the Environmental Quality Standards Rationale and Guidance Document (2021). The PSS were developed by source agencies and departments outside of Nova Scotia such as the CCME, AEP and MECP. The original guideline sources were reviewed to ensure the NS PSS guideline referenced the most recent applicable guideline from the original source. Where no NS PSS was identified, other provincial or federal regulatory benchmarks were used, where available. In the absence of Canadian guidelines, the US EPA EcoSSL (ecological soil screening levels) were applied. As previously noted, since the site is zoned as commercial, commercial land use guidelines were selected for screening purposes for the ERA. For terrestrial vegetation and soil invertebrates, freshwater aquatic life and amphibians, the focus of an ERA is on community level effects, and for birds and mammals, the focus is on population level effects. As such, an exceedance of a maximum concentration over a guideline is not indicative of potential risks. Assuming that exposures occur only to the maximum soil, surface water or sediment concentration is highly conservative and unrealistic. For mobile receptors, FCSAP (2012a) guidance states that if maximum concentrations are exceeded, then consideration should be given to summary statistics (e.g., compare the 95th upper confidence limit on the mean [UCLM] or the 90th percentile of the concentrations to the guideline) for screening when data sizes are reasonable (e.g., 10 or more samples in the area used by a receptor), as these metrics are more realistic for determining true COPCs. Therefore, in addition to the maximum media concentrations, the 90th percentile concentrations have also been considered in some cases. In addition, the frequency, magnitude, and spatial extent of exceedance of site soil, surface water or sediment data over applicable ecological health-based benchmarks was also considered before final selection of a chemical as a COC.

An initial list of COPCs was identified by comparing maximum concentrations in soils within the study boundary soil, sediment and surface water to ecological health-based guidelines and regional background data (where available). These initial COPCs were then considered further to select the final COCs for the ERA. Section 4.2.8.1 to 4.2.8.3 provides results of the COPC screening. A summary of analytical data used in the COPC screening is provided in Appendix E. Laboratory certificates for these data are provided in Appendix C. Results of the soil screening were used to identify COCs for terrestrial vegetation, soil invertebrates and small mammals (herbivorous and insectivorous). Results of the sediment and surface water screening were used to identify COCs for freshwater aquatic life and amphibians.

Published regulatory benchmarks are generic values, with no consideration given to site-specific populations/communities or media conditions that influence bioavailability. Also, they are developed by regulatory agencies to be intentionally conservative and protective. Exceedance of these values does not necessarily imply there is a risk of adverse effects; rather, it suggests that further evaluation is warranted (such as further ecological risk assessment or data collection). This is especially true for metals, many of which have essential nutritional and physiological roles in terrestrial biota. When interpreting screening level exceedances, it is also important to consider the body of literature regarding acclimation and adaptation of terrestrial organisms to metals and other substances in soil and/or food items. For example, it is well established that populations chronically exposed to metals often show an

enhanced tolerance relative to populations with no, or lower exposure (Kapustka et al., 2004). This increased tolerance can be due to either acclimation (shifting of tolerance within the genetically defined limit of the organism) or adaptation (modification of the limits of an organism through changes in heritable genetic material) (International Council on Mining and Metals [ICMM], 2007). Increased metal/metalloid tolerance has been documented for many species of terrestrial and aquatic plants, animals, and microbes. For the most part, acclimation and/or adaptation have been demonstrated primarily at the population level, but studies of pollution-induced community tolerance have also documented these phenomena at the community level at various metals-contaminated sites. Acclimation and adaptation to metals is described further in Kapustka et al., (2004), ICMM (2007), Chapman (2008), and Newman and Clements (2008).

4.2.8.1

COPCs in Site Soil

FCSAP (2012a) states that all data in the top 1.5 m of soil should be considered relevant for screening COPCs for an ERA. As such, all soil samples collected within the top 1.5 m were screened against direct contact soil guidelines. Sample locations are presented on Figure 2, Appendix A. Site photographs are presented in Appendix B. All soil data used in the current assessment are presented in Appendix E.

For a number of regulatory jurisdictions, ecological soil quality benchmarks have been derived for specific receptor types such as terrestrial vegetation, soil invertebrates, mammals and birds. In these cases, the lowest benchmark provided was selected for initial COPC identification purposes.

The specific regulatory ecological health-based soil quality benchmarks that were used to identify the initial COPCs in site soil are briefly described below. Based on soil grain size data (Table E-1, Appendix E), the site was considered to have coarse -grained soils and as such, soil data were compared to coarse-grained soil guidelines, where applicable.

4.2.8.2

Comparison of Site Soil Data to Regulatory Ecological Health-Based Benchmarks

Canadian Council of Ministers of the Environment (CCME)

The CCME Canadian soil quality guidelines developed for the protection of ecological health (SoQG_E), commercial land use (coarse soils), were preferentially applied. The lowest of the ecological soil contact or soil and food ingestion guidelines were used. Where the CCME soil guidelines defer to the older CCME (1991) soil remediation criteria (which are not identified as being either human or ecological health-based), the benchmarks from the next preferred jurisdiction were selected rather than using the outdated CCME (1991) value(s), where possible. If no other guideline was available from another jurisdiction, the CCME (1991) value was used. The most up to date CCME guidelines are available from on the online CCME summary tables and associated fact sheets (<http://st-ts.ccme.ca/en/index.html>; searched August 2025).

CCME Canada Wide Standards for PHCs in Soils (CCME, 2008)

The Canada Wide Standards (CWS) for PHCs for commercial land use and lower of fine and coarse-grained soils applicable for ecological health (ecological soil contact) were selected for comparison purposes for PHC F1 to F4 (CCME, 2008). Details on the basis and derivation of the CWS ecological health SoQGs are provided in CCME (2008).

Alberta Environment and Parks (AEP, 2024)

The lower of the direct soil contact, livestock soil and food ingestion, and wildlife soil and food ingestion ecological health-based soil guidelines for commercial land use and coarse-grained soils were applied. These AEP guidelines are developed in a very similar manner to, and are protective of, the same ecological receptor types as the CCME SoQGs. Details on soil guideline basis and derivation are provided in AEP (2024).

Ontario Ministry of the Environment, Conservation, and Parks (MECP, 2011)

The lowest of the relevant MECP ecological health-based soil component values (i.e., soil component values for plants and soil organisms, soil component values for mammals and birds) were applied. The specific soil component values that were used are from Table 3 in MECP (2011), for conditions of non-potable water, institutional land use, and coarse-textured soils. The derivation of these values is described in MECP (2011).

Atlantic Risk-Based Corrective Action (RBCA, 2022)

The Atlantic RBCA (2022) ecological tier II pathway specific screening levels for soil were applied. Guidelines were used for the screening of BTEX for commercial sites, coarse-grained soil and direct soil contact were used. Details on the basis and derivation of the tier II pathway specific screening levels are provided online at: https://atlanticrbca.com/wp-content/uploads/2022/07/ARBCA_V4_Tier_I_RBSL_and_Tier_II_PSSL_Tables_July_21_2021.pdf (searched August, 2025).

United States Environmental Protection Agency Ecological Soil Screening Levels (US EPA)

Where no Canadian value was available, the lowest relevant United States Environmental Protection Agency Ecological Regional Screening Level (US EPA EcoSSL) was used in the screening. The lower of plant, soil invertebrate, avian, and mammalian EcoSSLs were applied. The EcoSSL background and derivation documents can be found at <https://www.epa.gov/chemical-research/interim-ecological-soil-screening-level-documentsat>.

Oregon Department of Environmental Quality Risk-Based Concentrations (2020)

The Oregon Department of Environmental Quality Risk-Based Concentrations for Plants, Invertebrates, and Wildlife Exposed to Soil were applied where no other guideline was available. These values were obtained from the Los Alamos National Library (LANL) ECORISK Database (LA-UR-17-26376, Los Alamos

National Laboratory, Los Alamos, New Mexico; LANL 2017, 602538). The lower of the herbivore, omnivore, or mixed diet exposure scenarios was applied. Background and derivation documents can be found at <https://www.oregon.gov/deq/FilterDocs/EcoRiskTablesAppendices.pdf>.

Site soil screening results are provided in Table 4-8 and Table 4-9 and discussed in the following sections. Analytical chemistry data used for the COPC screening for site soil are provided in Tables E-1 to E-5, Appendix E and Figures 4ai, 4aii and 4b (Appendix A) show the locations of ecological soil quality guideline (SoQG_E) exceedances for metals in soil. Results of the soil screening were used to identify COCs for terrestrial vegetation, soil invertebrates, and mammalian and avian ROC.

Chemicals that were not detected in any of the analyzed soil samples and were not associated with current and historical activities at the site were excluded from further assessment. In addition, chemicals where the maximum reported concentration was reported below the guideline were also excluded from further assessment. PAHs, PCBs and BTEX were all not-detected in any of the submitted soil samples and as such, were not assessed further.

No ecological health-based guideline was available for calcium or sulphur; however, calcium and sulphur are essential nutrients and are not generally known to be toxic and are readily metabolized by plant and animal life. For these reasons, calcium and sulphur were excluded from further consideration.

Parameters which exceeded the applicable soil quality guideline, or which had no soil quality guideline and were reported above the RDL are summarized below in Table 4-8.

Table 4-8: Ecological Screening for COPCs in Soil for the Frenchvale Mine Site

Chemical	Maximum Reported Concentration (mg/kg)	Ecological Health Soil Quality Guideline (mg/kg)	Background Concentration (mg/kg) ^d	Exceeds Guideline and/or Background? (Y/N)
<i>Metals</i>				
Aluminium	36,100	NGA	28,000	NA
Arsenic	65.2	26 ^b	16.8	Y
Cadmium	21.6	1.9 ^c	0.4	Y
Chromium (Total, III+VI)	89.8	87 ^b	81	Y
Copper	453	91 ^b	49	Y
Iron	330,000	NGA	52,000	NA
Lead	596	32 ^c	84	Y
Manganese	3,250	220 ^d	4,340	N
Nickel	718	89 ^b	48	Y
Selenium	3.4	2.9 ^b	0.8	Y
Uranium	36	33 ^c	1.2	Y

Chemical	Maximum Reported Concentration (mg/kg)	Ecological Health Soil Quality Guideline (mg/kg)	Background Concentration (mg/kg) ^d	Exceeds Guideline and/or Background? (Y/N)
Vanadium	64.6	18 ^c	86	N
Zinc	2,140	340 ^c	270	Y

Notes:

Number of samples = 63

Y = Yes; N = No; NGA = No Guideline Available; NA = not applicable

BOLD values indicate exceedances over the guideline and background.

- AEP (2024) Tier 1 Soil and Groundwater Remediation Guidelines. Appendix A, Table A-4 surface soils, commercial land use, coarse-grained soil. Lowest of eco direct soil contact and protection of freshwater aquatic life guidelines.
- CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion guidelines.
- MECP. 2011. Soil Components for Table 3 - Full Depth, Non-potable Water Scenario. Commercial land use, coarse-grained soil. Lowest of the soil component values plants & soil organisms and mammals & birds.
- US EPA. 2007. Manganese Eco-SSLs. Lowest of plants, soil invertebrates, avian and mammalian eco-SSLs.

Initial COPCs in Soil

As presented in Table 4-8, substances with a maximum concentration which exceeded the applicable guideline and the regional background include: arsenic, cadmium, chromium (Total, III+VI), copper, lead, nickel, selenium, uranium and zinc. In addition, aluminium and iron had no SoQG_E available; however, the maximum reported concentrations of these chemicals exceeded the maximum regional background concentration.

Manganese and vanadium both were reported at concentrations exceeding the SoQG_E; however, the maximum reported concentration for each substance was below the maximum regional background concentrations. Therefore, manganese and vanadium were excluded from further consideration in the ERA.

Initial COPCs:

- Aluminium;
- Arsenic;
- Cadmium;
- Chromium (Total, III+VI);
- Copper;
- Iron;
- Lead;
- Nickel;
- Selenium;
- Uranium; and
- Zinc.

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Human Health and Ecological Risk Assessment (HHERA) Problem Formulation -
Final - Former Frenchvale Mine Site, Frenchvale, Nova Scotia

PID No. 15845167

November 2025 – 24-8606



Further Examination of Initial COPCs in Soil and Secondary Screening

Aluminium had no SoQG_E available for comparison of site soil data; however, the regional background concentration was exceeded in 6 of 63 samples (9.5%) and in 5 of 45 sample locations (11%). Although no guideline was available, aluminium is a ubiquitous element present in soils as aluminum silicate, micas and clay minerals (US EPA, 2003b), as such the detection of aluminium in site soils would be expected. Aluminium toxicity is associated with soluble aluminium and the uptake from soil to plants (US EPA, 2003a). Aluminium in soils is also generally toxic when the soil pH is less than 5.5 (US EPA, 2003b). The highest concentrations of aluminium were observed at soil sample locations: BH24, BH25, BH33, BH41 and BH44. While soil pH was not analyzed for these samples, pH across the site for which data are available ranges from 3.9 to 8.02 and is generally greater than 5.5. It is possible that aluminium is present at concentrations and at soil pH conditions which could potentially be toxic to plants; however, a review of the vegetation at BH24, BH25, BH33, BH41 and BH44 indicates that plants do not appear adversely impacted (i.e., no stunted growth) indicating aluminium does not appear to be adversely affecting vegetation at the site. For these reasons, aluminium was excluded from further consideration.

Iron had no SoQG_E available for comparison of site soil data; however, the regional background concentration was exceeded in 1 of 63 samples (1.6%) and in 1 of 45 sample locations (BH45, 2.2%). This represents a low frequency of exceedance over the background. Iron is also an essential nutrient for plants (US EPA, 2003c) and is considered the key metal in energy transformations needed for synthesis and other life process in cell (US EPA, 2003c). In addition, the bioavailability of iron in is dependent on soil pH, redox potential and soil-water conditions (US EPA, 2003c). Generally, iron is not considered toxic when soil pH is between 5 and 8 (at these pH values, the iron demand of plants is typically greater than the iron available) (US EPA, 2003c). Soil pH at the site was generally in this range. In addition, symptoms of iron toxicity (stunted top growth and root growth) were not observed in vegetation at the site. For these reasons, iron was excluded from further consideration.

Previously mentioned, the ecological health-based benchmarks selected in the initial soil screening were the lowest available benchmark for any receptor. The chemicals identified as initial COPCs were then carried forward for a receptor-specific secondary screening (i.e., separate screening conducted for soil invertebrates and vegetation, and mammals and avian ROC) (Table 4-9). The soil quality guidelines specific to vegetation and soil invertebrates for direct soil contact exposure pathways were compared to the maximum site soil chemical concentrations as these receptors are immobile. The soil quality guidelines specific to mammalian and avian receptors for soil and food ingestion exposure pathways, were compared to the 90th percentile site soil chemical concentrations. This is in keeping with FCSAP (2012a) guidance, which indicates that a 90th percentile soil concentration can be used for screening mobile receptors if the sample size is >10 and a site is adequately characterized. This site had >10 samples and the site has been adequately characterized; as such, the 90th percentile soil concentrations were used in the secondary screening. Soil concentrations were also compared to the background soil concentration range (Table 4-9).

Table 4-9 compares maximum site soil chemical concentrations (for the initial COPCs) to vegetation and soil invertebrate-specific ecological health-based soil guidelines and compares 90th percentile soil chemical concentrations across the entire site for the initial COPCs (N = 63 for all metals) to mammal and avian-specific ecological health-based soil guidelines. The maximum and 90th percentile concentrations were also compared to background soil concentrations where available. As presented in Table 4-9 (and Figure 4ai and 4aii, Appendix A), arsenic, chromium, copper, nickel, selenium and zinc exceeded the receptor specific SoQG_E for terrestrial vegetation and soil organisms; and cadmium, lead and uranium (Figure 4b, Appendix A) exceeded the receptor specific SoQG_E for mammals and birds.

For the initial COPCs identified in Table 4-9, a significance level of 5% was used for both frequency of detection and frequency of exceedance. While there is no consistent regulatory guidance on a significance level or cut-off value to use when considering the frequency of detection, and/or exceedance over benchmarks in a COPC identification process, a value of 5% has some regulatory precedent within the U.S. Superfund program and as per the U.S. Navy HHRA Guidance document (US Navy, 2008). The US EPA Superfund Program has used a 5% cut-off value for detection frequency to eliminate chemicals from further consideration since the early 1990s, and the U.S. Navy (2008) HHRA guidance also supports the use of a 5% cut-off value when considering detection and benchmark exceedance frequency. Thus, the initial COPCs carried forward for the receptor specific benchmark comparison that displayed a frequency of detection, and/or a frequency of exceedance over the applicable soil benchmark of less than 5%, were excluded from further consideration in the ERA. If the frequency of detection was equal to or greater than 5% for the carried forward substances, they were then evaluated on the basis of their frequency of exceedance over the applicable soil quality benchmark. In addition, the degree of benchmark exceedance was also considered. If the frequency of exceedance over the soil benchmark was equal to or greater than 5%, then the substance was carried forward into the next step of the COPC identification process. Also, a 5% significance level is consistent with the default alpha value used in most statistical calculations with environmental data sets. This approach in COPC identification procedures have been applied for at least twenty years in the numerous ERAs and HHRAs conducted by Dillon, and the approach has been accepted by the applicable federal and provincial regulatory authorities.

Table 4-9: Comparison of Frenchvale Former Mine Site Soil Chemistry Data for Initial COPCs to Receptor-Specific Ecological Health-Based Soil Quality Benchmarks and Local Background

Chemical	Number of Samples	Number of Detectable Samples	Max Concentration (mg/kg)	90th Percentile (mg/kg) ^a	Maximum Background Concentration (mg/kg) ^d	Ecological Health-Based Soil Quality Benchmarks by Receptor Group (mg/kg)		Number of Samples Exceeding Ecological Soil Quality Benchmarks and Background		Frequency of Exceedance Over Ecological Soil Quality Benchmarks and Background (%)	
						Terrestrial Vegetation/ Soil Organisms ^b	Birds/Mammals ^c	Terrestrial Vegetation/ Soil Organisms ^b	Birds/Mammals ^c	Terrestrial Vegetation/ Soil Organisms ^b	Birds/Mammals ^c
Arsenic	63	63	65.2	4.01	16.8	26	330	1	0	1.6%	0%
Cadmium	63	63	21.6	0.961	0.4	22	1.9	0	1	0%	1.6%
Chromium (Total, III + VI)	63	63	89.8	26.6	81	87	160	1	0	1.6%	0%
Copper	63	63	453	199.5	49	91	3,100	16	0	25%	0%
Lead	63	63	596	55.1	84	600	32	0	3	0%	4.8%
Nickel	63	63	718	25.1	48	89	528 ^e	1	0	1.6%	0%
Selenium	63	37	3.5	1.18	0.8	2.9	5.5	2	0	3.2%	0%
Uranium	63	63	36	9.20	1.2	2,000	33	0	2	0%	3.2%
Zinc	63	63	2140	341	270	450	960 ^f	7	0	11%	0%

Notes:

BOLD indicates the maximum concentration exceeded the vegetation/soil organism guideline; or the 90th percentile exceeds the bird/mammal guideline and background range.

Number of samples includes all parent and duplicate samples from all 45 sampling locations.

^a For 90th percentile calculations, non-detectable concentrations were assumed to equal the detection limit and the higher of a sample and its corresponding field duplicate were used in the calculation. Similarly, the highest sample result for a given location (i.e., if a sampling location had samples taken at different depths) was used to calculate the 90th percentile. Values rounded to 2 significant figures.

^b CCME SoQGE soil contact guidelines; commercial land use; coarse-grained soil.

^c MECP (2011) Table 3 Soil Components - Full Depth, Non-Potable Water - Institutional land use; Coarse soils; Lower of Mammals & Birds Soil Components.

^d Maximum reported concentration from Dillon (2011). Background soil concentrations for the highlands area in Nova Scotia.

^e The CCME (2018) developed updated nickel guidelines which included a commercial soil contact guideline of 89 m/kg and an agricultural soil and food ingestion guideline of 528 mg/kg. The CCME (2018) agricultural soil and food ingestion guideline was selected for the evaluation of birds and mammals.

^f The CCME (2018) developed updated zinc guidelines which included a commercial soil contact guideline of 450 m/kg and an agricultural soil and food ingestion guideline of 960 mg/kg. The CCME (2018) agricultural soil and food ingestion guideline was selected for the evaluation of birds and mammals.



Terrestrial Vegetation and Soil Organisms

Arsenic exceeded the SoQG_E and regional background concentration in 1 of 63 samples (1.6%) and 1 of 45 sampling locations (2.2%). The maximum concentration (65.2 mg/kg) exceeded the SoQG_E of 26 mg/kg by 2.5-fold. As described above, due to the low frequency of exceedance, arsenic was excluded from further consideration.

Chromium (Total, III+VI) exceeded the SoQG_E and regional background concentration in 1 of 63 samples (1.6%) and 1 of 45 sampling locations (2.2%). The maximum concentration (89.8 mg/kg) exceeded the SoQG_E of 87 mg/kg by 1-fold. As described above, due to the low frequency of exceedance, chromium was excluded from further consideration.

Copper exceeded the SoQG_E and regional background concentration in 16 of 63 samples (25%) and 13 of 45 sampling locations (29%). The maximum concentration (453 mg/kg) exceeded the SoQG_E of 91 mg/kg by 5-fold. Due to the frequency and degree of exceedance, copper was included for further assessment.

Nickel exceeded the SoQG_E and regional background concentration in 1 of 63 samples (1.6%) and 1 of 45 sampling locations (2.2%). The maximum concentration (718 mg/kg) exceeded the SoQG_E of 89 mg/kg by 8.06-fold. As described above, due to the low frequency of exceedance, nickel was excluded from further consideration.

Selenium exceeded the SoQG_E and regional background concentration in 2 of 63 samples (3.2%) and 2 of 45 sampling locations (4.4%). The maximum concentration (3.4 mg/kg) exceeded the SoQG_E of 2.9 mg/kg by 1.2-fold. As described above, due to the low frequency of exceedance, selenium was excluded from further consideration.

Zinc exceeded the SoQG_E and regional background concentration in 7 of 63 samples (11%) and 5 of 45 sampling locations (11%). The maximum concentration (2,140 mg/kg) exceeded the SoQG_E of 340 mg/kg by 6.29-fold. Due to the frequency and degree of exceedance, zinc was included for further assessment.

Mammals and Birds

Cadmium exceeded the SoQG_E and regional background concentration in 1 of 63 samples (1.6%) and 1 of 45 sampling locations (2.2%). The maximum concentration (21.6 mg/kg) exceeded the SoQG_E of 1.9 mg/kg by 11.4-fold. As described above, due to the low frequency of exceedance, cadmium was excluded from further consideration.

Lead exceeded the SoQG_E and regional background concentration in 3 of 63 samples (4.8%) and 3 of 45 sampling locations (6.6%). The maximum concentration (596 mg/kg) exceeded the SoQG_E of 32 mg/kg by 18.6-fold. Due to the frequency and degree of exceedance, lead was included for further assessment. Figure 4b, Appendix A, indicates the area of lead soil guideline exceedance is small and therefore it is unlikely that exposures from these contaminated areas would be large enough to result in population

level health effects in ROC. However, there is uncertainty as to the extent of lead impacts in soil. Recommendations are provided in Section 4.3 to address this uncertainty.

Uranium exceeded the $SoQG_E$ and regional background concentration in 2 of 63 samples (3.2%) and 1 of 45 sampling locations (2.2%). The maximum concentration (36 mg/kg) exceeded the $SoQG_E$ of 33 mg/kg by 1.1-fold. As described above, due to the low frequency of exceedance, uranium was excluded from further consideration.

Final COCs in Site Soil

Based on the COPC identification steps and considerations described above, a number of COCs in soil were carried forward for assessment as listed below:

COCs for Terrestrial Vegetation and Soil Invertebrates:

- Copper; and
- Zinc.

COCs for Small Mammals and Birds:

- Lead.

4.2.8.3

COPCs in Site Sediment

Sediment represents an exposure medium for amphibians and benthic freshwater aquatic life. Sediment samples across the site were collected at a depth of 0 to 0.15 m in 2024 and 2025. The sediment data includes samples collected from the on-site watercourses, wetlands and along the lakeshore of Gouthro Lake.

Comparison of Site Sediment Data to Regulatory Ecological Health-Based Benchmarks

Nova Scotia Pathway Specific Standards (PSS)

The Nova Scotia Pathway Specific Standards (NS PSS) for freshwater sediment were selected for COPC screening, where available. The PSS for sediment are benchmarks developed by source agencies and departments outside of Nova Scotia such as CCME Probable Effect Levels (PELs), BC MOECC, Atlantic RBCA, and international jurisdictions (US EPA and ANZECC/ARMCANZ). These represent the primary guidelines adopted by NSECC and applied herein, and are provided below. The original guideline sources were reviewed to ensure the NS PSS guideline referenced the most current guideline from the original source. The specific source of the guidelines used in the COPC screening are identified in the ecological health screening tables (Tables E-5 to E-7, Appendix E).

Canadian Council of Ministers of the Environment (CCME)

The applicable guidelines for freshwater sediments are the CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (<http://cegg-rcqe.ccme.ca/en/index.html>). CCME has two types of sediment guidelines: Interim Sediment Quality Guidelines (ISQGs) and PELs. The ISQGs are essentially

threshold effect levels (TELs), which represent the concentration of a contaminant below which adverse effects are not anticipated (CCME, 1995). A PEL is defined by CCME (1995) as the concentration of a contaminant above which adverse biological effects are usually or always observed. As noted in Section 4.2.8, the PEL guidelines were preferentially applied for the COPC screening.

British Columbia Ministry of Environment and Climate Change Strategy Approved and Working Sediment Quality Guidelines (BC MOECC)

The BC MOECC (2025a, 2025b) Working and Approved Sediment Quality Guidelines (freshwater). These guidelines represent safe levels of substances that protect different water uses including freshwater aquatic life. The BC MOECC (2025) notes that exceeding the guideline does not imply that unacceptable risks exist, but rather that the potential for adverse effects may be increased and additional investigation may be required.

Australian and New Zealand Guidelines for Freshwater Water Quality (ANZECC/ARMCANZ; Simpson et al., 2013)

The Australian and New Zealand Guidelines for Freshwater Water Quality (ANZECC/ARMCANZ) provide comprehensive guidance on assessing and managing the quality of freshwater environments in Australia and New Zealand. These guidelines offer a framework for water quality monitoring and management, covering aspects such as water quality objectives, environmental indicators, and assessment methodologies to protect and sustainably manage aquatic ecosystems and water resources in the region. They are an essential reference for policymakers, researchers, and environmental practitioners involved in water quality management in Australia and New Zealand. The derivation of these values can be found at: <https://publications.csiro.au/rpr/pub?pid=legacy:965>.

Atlantic Risk-Based Corrective Action (RBCA)

The Atlantic RBCA (2022) ecological tier II pathway specific screening levels for freshwater sediment were applied. Guidelines were used for the screening of BTEX and PHCs. Details on the basis and derivation of the tier II pathway specific screening levels are provided online at: https://atlanticrbca.com/wp-content/uploads/2023/06/Ecological_Tier_II_Pathway-Specific_Standards_PSS_for_Sediment_-_Freshwater_and_Marine_June2023.pdf (searched August, 2025).

Sediment analytical results was screened to identify COPCs for both freshwater aquatic life and for amphibians. Due to the interconnected nature of the wetlands, watercourses and lake sediment areas, all sediment data was screened as a group for these ROCs. No background wetland sediment data were available for comparison purposes.

Site sediment screening results are provided in Table 4-10 and discussed in the following sections. Details of the ecological screening for site sediment are provided in Table E-5 to E-7, Appendix E. Figure 5 (Appendix A) shows the locations of ecological sediment quality guideline (SedQG_E) exceedances for metals in sediment. Results of the sediment screening were used to identify COCs for freshwater aquatic life and amphibians.

Chemicals that were not detected in any of the analyzed soil samples and were not associated with current and historical activities at the site were excluded from further assessment. In addition, chemicals where the maximum reported concentration was reported below the guideline were also excluded from further assessment. PAHs, PHCs, BTEX and tin were all not-detected in any of the submitted sediment samples, and as such, were not assessed further.

No ecological health-based guideline was available for calcium; however, calcium is an essential nutrient and is generally not generally known to be toxic and is easily metabolized by plant and animal life. As such, calcium was excluded from further consideration.

Parameters which exceeded the applicable soil quality guideline, or which had no soil quality guideline and were reported above the RDL are summarized below in Table 4-10.

Table 4-10: Ecological Screening of Sediment for the Former Frenchvale Mine Site

Chemical	Maximum Reported Concentration (mg/kg)	Ecological Health Sediment Quality Guideline (mg/kg)	Exceeds Ecological Health Sediment Quality Guideline? (Y/N)
Aluminium	30,000	NGA	NA
Barium	96.4	NGA	NA
Beryllium	1.61	NGA	NA
Boron	13.4	NGA	NA
Cobalt	20	NGA	NA
Copper	432	197 ^a	Y
Lead	116	91.3 ^a	Y
Manganese	3,270	1,100 ^b	Y
Molybdenum	2.88	NGA	NA
Strontium	76.9	NGA	NA
Thallium	0.286	NGA	NA
Uranium	16.4	NGA	NA
Vanadium	65.9	NGA	NA
Zinc	489	315 ^a	Y

Notes:

Number of samples = 19

Y = Yes; N = No; NGA = No Guideline Available; NA = not applicable

BOLD values indicate exceedances over the guideline and background.

- CCME. Fact sheets. Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Freshwater sediment quality guidelines. PEL based guideline used where applicable.
- BC MOECC. 2025. British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Table 2 Working Sediment Quality Guidelines.

Initial COPCs in Sediment

As presented in Table 4-10, substances with a maximum concentration which exceeded the applicable guideline include: copper, lead, manganese and zinc. In addition, aluminium, barium, beryllium, boron, cobalt, molybdenum, strontium, thallium, uranium and vanadium had no SedQG_E available; however, the maximum reported concentrations of these chemicals exceeded the RDL.

Initial COPCs:

- Aluminium;
- Barium;
- Beryllium;
- Boron;
- Cobalt;
- Copper;
- Lead;
- Manganese;
- Molybdenum;
- Strontium;
- Thallium;
- Uranium;
- Vanadium; and
- Zinc.

Further Examination of Initial COPCs in Sediment

No sediment quality guidelines were available for aluminium, barium, beryllium, boron, cobalt, molybdenum, strontium, thallium, uranium and vanadium. These metals are well established as being common elements that occur naturally in all freshwater sediments. The presence of these metals in freshwater sediments are not commonly related to former or current activities at a given site, particularly not a former limestone mill processing area and weigh scale. It is believed that their occurrence in site sediments is natural. Furthermore, there are virtually no freshwater sediment toxicity data available for these metals, which greatly limits the ability to interpret the implications of measured site sediment concentrations. Given the above considerations, these metals were excluded from further assessment in the ERA.

Copper exceeded the SedQG_E in 1 of 19 samples (5.3%) and 1 of 17 sampling locations (5.9%). An exceedance of the guideline was only reported at SED16, and the concentration exceeded the guideline by 2.2-fold. Sample SED16 was taken not in one of the 2 main watercourses but taken in a drainage area west of the western watercourse adjacent to some trees in some pooled water (Photo 25, Appendix B). The pooled water at SED 16 was shallow during the June 2025 field investigation and well vegetated. While this location may offer suitable habitat for amphibians; however, preferable habitat is likely

present at the nearby wetland and watercourse. Given the habitat considerations and low frequency of exceedance, copper was excluded from further consideration.

Lead exceeded the SedQG_E in 1 of 19 samples (5.3%) and 1 of 17 sampling locations (5.9%). An exceedance of the guideline was only reported at SED8, and the concentration exceeded the guideline by 1.3-fold. Sample SED8 occurs within the wetland area adjacent to Gouthro Lake. While TOC (total organic carbon) was not measured at SED8, it was high in SED11 (25,000 mg/kg) and SED12 (83,900 mg/kg) which were also collected in the wetland area and in the general vicinity of SED8. Given the high TOC, lead would be expected to be tightly bound to the sediment and not readily available for uptake of aquatic species. In addition, soil samples collected in the vicinity of SED8, were below the maximum background soil lead concentration of 84 mg/kg (i.e., lead soil concentrations in BH9, BH10, BH32, BH33, BH34 and BH41 ranged from 7.28 mg/kg to 50.3 mg/kg). Given these considerations and due to the low frequency of exceedance, lead was excluded for further assessment.

Manganese exceeded the SedQG_E in 3 of 19 samples (16%) and 3 of 17 sampling locations (18%). Exceedances over the guideline were reported at SED8, SED9 and SED11, and the maximum reported concentration exceeded the guideline by 3.0-fold. As noted previously manganese is naturally occurring in the region (Dillon, 2011) and the presence of manganese in site sediment is likely background related and not site related. For this reason, manganese was excluded from further consideration.

Zinc exceeded the SedQG_E in 2 of 19 samples (11%) and 2 of 17 sampling locations (12%). Exceedances over the applicable guideline of 317 mg/kg, were reported at SED8 (406 mg/kg; 1.3-fold exceedance) and SED16 (489 mg/kg; 1.5-fold exceedance). As discussed above for copper, SED16 is unlikely to provide suitable habitat for freshwater aquatic life and may not offer preferable habitat for amphibians. As such, potential exposure to zinc via sediments to freshwater aquatic life and amphibians in the vicinity of SED16 is likely to be low. As per the discussion above for lead, zinc would also be most likely bound to sediments in the vicinity of SED8 due to the high organic carbon content of the wetland area. Zinc concentrations in soil samples collected in the vicinity of SED8 were below the maximum regional background concentration of 270 mg/kg (i.e., BH9, BH10, BH32, BH33, BH34 and BH41 ranged from 51.4 mg/kg to 223 mg/kg). Given these considerations and the low frequency of exceedance, zinc was excluded from further consideration.

Final COCs in Sediment

Based on the COPC identification steps and considerations described above, no COCs in sediment were carried forward for assessment:

COCs for Freshwater Aquatic Life:

- None.

In their comparison of sediment quality guidelines for various jurisdictions for several metals, FCSAP (2019) noted that the amphibian sediment toxicity data was not a reliable method to make inference about potential risks to amphibians as amphibian sediment toxicity data are limited. For the purposes of this ERA, given the low / non-detectable sediment concentrations of PAHs, BTEX and PHCs, and lack of sediment quality guideline exceedances (and when exceedances occurred, they were not considered site-related) no COCs were carried forward for amphibians.

COCs for Amphibians:

- None.

4.2.8.4

COPCs in Site Surface Water

Surface water samples from the watercourses, Gouthro Lake and wetland areas within the study boundary were compared to freshwater aquatic life guidelines. The specific source of the guideline used in the COPC screening are identified in the ecological health screening tables (Tables E8 and E9, Appendix E), while the original guideline sources are provided below.

Comparison of Site Sediment Data to Regulatory Ecological Health-Based Benchmarks

Nova Scotia Pathway Specific Standards (PSS)

The Nova Scotia Pathway Specific Standards (NS PSS) for freshwater surface water were selected for COPC screening, where available. The PSS for surface water are benchmarks developed by source agencies and departments outside of Nova Scotia such as CCME water quality guidelines, ECCC FEQGs, BC CSR and international jurisdictions. These represent the primary guidelines adopted by NSECC and applied herein, and are provided below. The original guideline sources were reviewed to ensure the NS PSS guideline referenced the most current guideline from the original source. The specific source of the guidelines used in the COPC screening are identified in the ecological health screening tables (Tables E-8 and E-9, Appendix E).

Canadian Council of Ministers of the Environment (CCME)

The Canadian Water Quality Guidelines (CWQG) for the Protection of Freshwater Aquatic Life are intended to protect all forms of aquatic life and all aspects of aquatic life cycles, including the most sensitive life stage of the most sensitive species over the long term. Details regarding surface water guideline bases and derivation are provided in their respective fact sheets available from CCME (<https://ccme.ca/en/summary-table>).

Federal Environmental Quality Guidelines (FEQG)

Federal Environmental Quality Guidelines (FEQGs) have been developed by ECCC under the federal Chemicals Management Plan to support federal environmental quality monitoring, risk assessment, and risk management activities on substances for which CCME guidelines do not yet exist or are not reasonably expected to be updated in the near future (Government of Canada, 2023). Details on surface water guideline bases and derivation are provided on the Government of Canada's website

(<https://www.canada.ca/en/health-canada/services/chemical-substances/fact-sheets/federal-environmental-quality-guidelines.html>).

British Columbia Contaminated Sites Regulation (BC CSR)

The British Columbia Contaminated Sites Regulations (BC CSR) Schedule 3.2 - Generic Numerical Water Standards for Aquatic Life (December, 2023) were applied in the screening where other guidelines were not available. Guidelines are available at

https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/375_96_08.

Michigan Department of Environment, Great Lakes and Energy

Aquatic life, final chronic values (reported as MDEQ in NS PSS (2021)). Searched August 2025.

<https://www.michigan.gov/egle/about/organization/water-resources/assessment-michigan-waters/rule-57-water-quality-values>.

Surface water concentrations from the site were compared to the generic freshwater aquatic life surface water guidelines to identify COCs for freshwater aquatic life and amphibians (Tables E-8, Appendix E). The watercourses and wetlands on-site all drain into Gouthro Lake, and due to this potential habitat for fish and amphibians, it was assumed that these ROCs could be exposed to any of the surface water bodies observed. For this reason, all surface water data was used to identify COCs for these ROCs. The CCME provides equations to adjust freshwater aquatic life guidelines for some metals using various site-specific water quality parameters (e.g., pH, hardness, DOC). Where metals exceeded the generic surface water guidelines in Tables E-8, Appendix E, adjusted guidelines were calculated. Where exceedances were noted, and the guideline could be modified with site-specific water quality parameters, the guidelines were adjusted to incorporate the site-specific data, as was the case for aluminium, copper and manganese (Table E-9, Appendix E). Table 4-11 provides the exceedances of surface water exceedances of freshwater aquatic life guidelines that have been adjusted where available. Figure 6, Appendix A shows the locations of surface water quality guideline (SWQG_E) exceedances.

Chemicals that were not detected in any of the analyzed surface water samples and were not associated with current and historical activities at the site were excluded from further assessment. Substances which were not detected in any surface water samples include: bismuth, boron, mercury, tellurium, thorium, tungsten, lithium, silver, thallium tin and zirconium. In addition, chemicals where the maximum reported concentration was reported below the guideline were also excluded from further assessment.

No freshwater aquatic life surface water quality guideline was available for calcium, magnesium, phosphorous, potassium, sodium, sulphur, silica or silicon. These parameters are not generally considered in the selection of COPCs for an ERA as they are common of major ions or essential nutrients in water. While such parameters can inform on surface water quality, and may influence or modify the bioavailability, mobility and toxicity of certain COPCs, they are not typically considered directly in the COPC identification step of an ERA. Calcium, magnesium, sodium and potassium are essential nutrients for all animal life (NRC, 2005; US EPA Region 4, 2018). In a recent US EPA Region 4 supplemental ERA

guidance document (US EPA Region 4, 2018), it is noted that calcium, magnesium, sodium and potassium can be eliminated from ERAs given their essentiality. Silica and silicon are ubiquitous elements found in the earth's crust and are considered natural components of soil/sediment which may be present in surface water. In addition, these chemicals are not considered to be associated with former site activities. For these reasons, calcium, magnesium, phosphorous, potassium, sodium, sulphur, silica and silicon were excluded from further consideration.

Parameters which exceeded the applicable surface water quality guideline, or which had no surface water quality guideline and were reported above the RDL are summarized below in Table 4-10.

Table 4-11: Ecological Screening of Surface Water for the Frenchvale Mine Site

Chemical	Maximum Reported Concentration (mg/L)	Ecological Health Surface Water Quality Guideline (mg/L)	Exceeds Ecological Health Surface Water Quality Guideline? (Y/N)
Aluminium	0.361	0.1 ^{a,b}	Y
Iron	7.22	0.3 ^a	Y
Manganese	1.15	0.73 ^{a,c}	Y
Cesium	0.000064	NGA	NA
Rubidium	0.00232	NGA	NA
Titanium	0.00912	NGA	NA

Notes:

Number of samples = 17

Y = Yes; N = No; NGA = No Guideline Available; NA = not applicable

BOLD values indicate exceedances over the guideline and background.

- CCME. Fact sheets. Canadian Water Quality Guidelines for the Protection of Aquatic Life. Freshwater quality guidelines.
- Guideline has been adjusted based on pH of the surface water: Guideline = 5 µg/L if pH <6.5; 100 µg/L if pH >6.5 (CCREM, 1987). For comparison of adjusted guidelines for other site aluminium samples, please refer to Table E-9, Appendix E.
- The CWQG for manganese (i.e., long-term guideline) is found using the CWQG calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese. For comparison of adjusted guidelines for other site manganese samples, please refer to Table E-9, Appendix E

Initial COPCs in Surface Water

As presented in Table 4-11, substances with a maximum concentration which exceeded the applicable guideline include: aluminium, iron and manganese. In addition, cesium, rubidium and titanium had no SWQG_E available; however, the maximum reported concentrations of these chemicals exceeded the RDL.

Initial COPCs:

- Aluminium;
- Iron;
- Manganese;
- Cesium;
- Rubidium; and
- Titanium.

Further Examination of Initial COPCs in Surface Water

Aluminium exceeded the adjusted SWQG_E in 2 of 17 samples (12%) and 2 of 15 sampling locations (13.3%). Iron exceeded the SWQG_E in 2 of 17 samples (12%) and 2 of 15 sampling locations (13.3%). Manganese exceeded the adjusted SWQG_E in 3 of 17 samples (18%) and 3 of 15 sampling locations (20%). While these chemicals exceed the SWQG_E, they are naturally occurring in the regional geology (Dillon, 2011) and would be expected to be present in surface water. Gouthro Lake is a suitable fish habitat and concentrations of aluminium and manganese were below the adjusted SWQG_E in samples SW11, SW12 and SW13 (which were sampled within the lake). While iron exceeded the SWQG_E in SW11 and SW13, iron is considered an essential nutrient for aquatic life, and its presence in surface water is expected in trace amounts. Iron may be released into the environment as a result of mining activities through acid rock drainage; however, this was previously assessed (Dillon, 2025b; Dillon, 2025c) and the site is not considered acid generating. For these reasons aluminium, iron and manganese in surface waters are likely naturally occurring; therefore, these chemicals were excluded from further consideration.

No guidelines were available for cesium, rubidium or titanium; however, these chemicals cannot be clearly attributed to former or current site activities. Although concentrations of these metals were greater than the RDL, these elements are expected to be naturally occurring in freshwater bodies in trace amounts. As these chemicals are not related to site activities, they are excluded from further assessment.

Final COCs in Surface Water

Based on the COPC identification steps and considerations described above, no COCs in surface water were carried forward for assessment as listed below:

COCs for Freshwater Aquatic Life:

- None.

While media were not specifically screened for amphibians due to a lack of amphibian health-based guideline, freshwater aquatic life surface water guidelines exceedances were considered to represent potential COCs for amphibians. While freshwater aquatic life guidelines are not specifically derived for amphibians, some of the more recent guidelines have included amphibian toxicity data. In addition, in

the FCSAP (2019) amphibian ERA guidance document, it is stated that freshwater aquatic life guidelines in surface water appear to provide adequate protection for amphibians based on the metals they evaluated and the available amphibian toxicity data (i.e., lead, mercury, cadmium and zinc).

COCs for Amphibians:

- None.

4.2.9 Final COCs in the ERA

Based on the COC identification steps and considerations described in the preceding sections, the following COCs were carried forward for quantitative ecological health risk assessment:

Table 4-12: Summary of Final COCs Identified in the Problem Formulation

Receptor	Soil Direct Contact	Sediment Direct Contact	Surface Water Direct Contact
Terrestrial Vegetation and Soil Organisms	Copper and Zinc	NA	NA
Mammals and Birds	Lead	NA	NA
Freshwater Aquatic Life	NA	None	None
Amphibians	NA	None	None

Notes:

NA denotes not applicable.

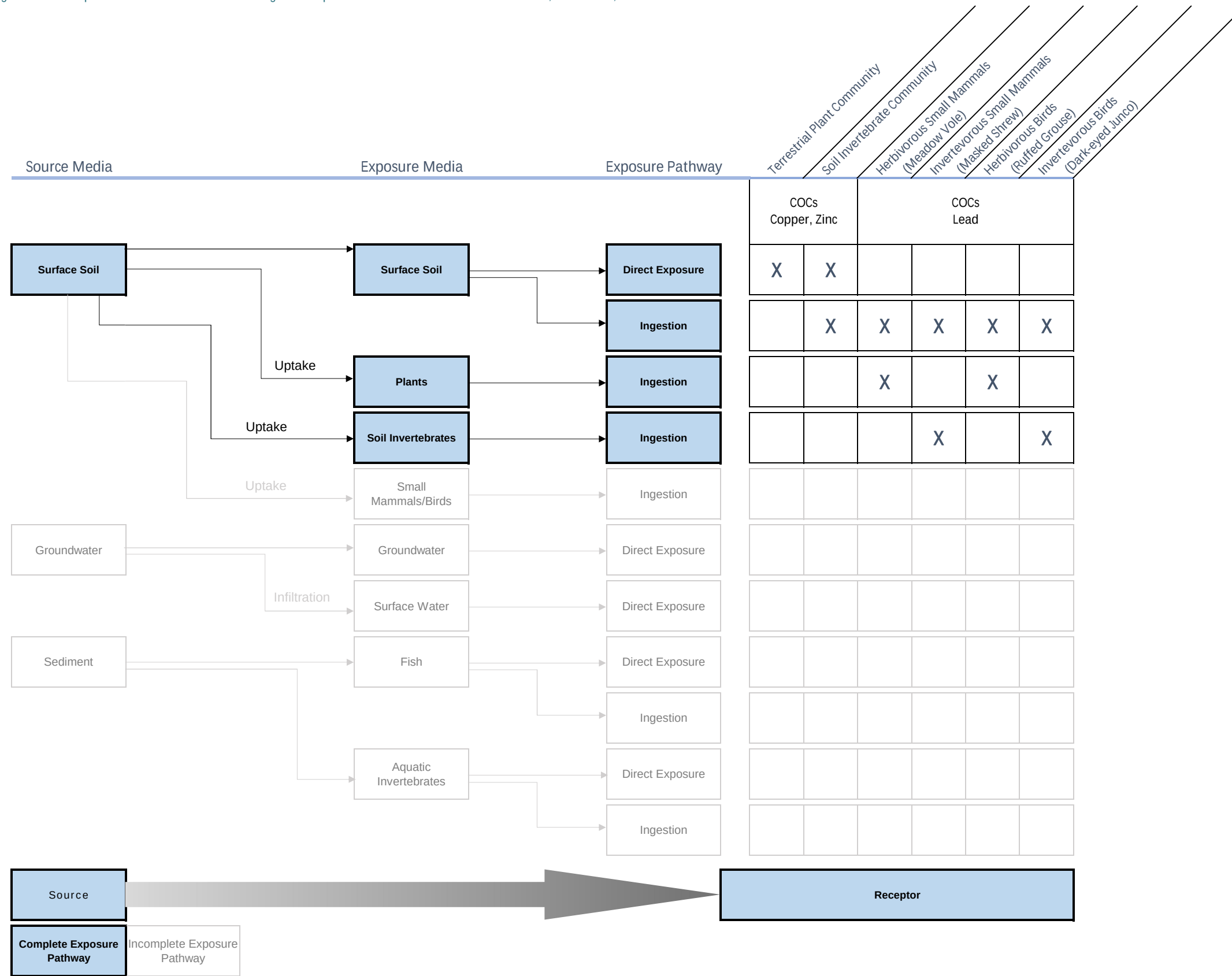
4.2.10 Conceptual Site Model for Ecological Receptors

A CSM provides a description of relevant exposure pathways for the COCs that have the potential to contribute to ecological exposures and potential health risks for the selected receptors. The ERA CSM is presented in Figure 4-2. The CSM provides a simplified representation of relevant exposure pathways and routes that link the identified COCs in site environmental media to the selected ecological receptors.

Based on the COPC screening, COCs were carried forward for terrestrial vegetation and soil invertebrates, and small mammals and birds.

No COCs were identified in sediment or surface waters at the site; therefore, freshwater aquatic life and amphibians were excluded from further consideration and are not presented in the CSM below.

Figure 4-2: Conceptual Site Model for Soils for Ecological Receptors for the Former Frenchvale Mine Site, Frenchvale, Nova Scotia



Notes

X - indicates a complete exposure pathway that may require further evaluation

4.3

ERA Problem Formulation Outcomes and Recommendations

The outcomes and recommendations from the ERA are reiterated below.

- Copper and zinc were identified as COCs in site soil for terrestrial vegetation and soil organisms.
- Lead was identified as a COC in site soil for mammals and birds.
- No COCs were identified in site surface water or sediments for freshwater aquatic life, including amphibians.
- There is uncertainty regarding the extent of lead impacts in soil from the vehicle debris on site. Thus, the following is recommended:
 - The additional soil sampling recommended for lead for HHRA soil delineation purposes would also delineate the extent of lead impacts in soil for ecological receptors.
 - Depending on the new lead soil chemistry data, further evaluation of lead with respect to small mammals and birds (such as an ERA) may be required.
- To further assess potential impacts to vegetation and soil organisms, the following is recommended:
 - Visual examination of the site vegetation communities in the areas where soil COCs exceeded the $SoQG_E$ for vegetation and soil organisms (i.e., BH1, BH, BH7, BH14, BH15, BH18, BH27, BH28, BH33, BH37, BH36, BH45 and BH47) for signs of stress / impairment, to see if the expected species and communities are present (or not), and whether these vegetation communities are similar (or not) to vegetation communities in areas where soil guideline exceedances were not observed. Existing photos provide inadequate coverage to properly assess potential vegetation impacts at these sampling locations.
 - This could also include an examination of previous site photos and field notes for site and off-site vegetation.

5.0

Summary of Problem Formulation Outcomes and Recommendations

The outcomes and recommendations from the HHRA problem formulation are reiterated below.

- Lead was identified at concentrations above the $SoQG_{HH}$ at two soil sample locations (BH44 and BH45). These locations represent potential hotspots of contamination that require additional evaluation. As such, the following is recommended:
 - The vehicle debris (as seen in Photos 21 and 22, Appendix B) present at APEC 2 should be removed where feasible, based on site conditions and access, as it is potentially a source of lead contamination in soil (e.g., lead in car paint, batteries, tetraethyl lead in old gasoline).
 - Soil removal (e.g., surface soil) could be completed at the time of removal of the vehicle debris, if obvious signs of impacts are observed.
 - Following the removal of vehicle debris (and potential removal of surface soil) at the site, additional soil sampling is recommended in the vicinity of the vehicle debris to horizontally and

- vertically delineate soil lead impacts, including deeper horizon samples at BH44 and BH45. If vehicles cannot be removed (e.g., due to access considerations), soil sampling is recommended around the vehicles.
- Depending on the results of these soil samples, a HHRA and/or soil risk management or remedial measures may be recommended.
 - Additional debris on site including abandoned fishing gear (Photo 8, Appendix B), abandoned tires, geotextile rolls (Photo 12 and 27, Appendix B), metal drums (Photo 28, Appendix B) and rusted equipment (Photo 9 and 11, Appendix B) located in and around APEC 2 should be removed where feasible based on site conditions and access. While not identified as a potential chemical risk, the debris could pose a physical risk to people that access the site. If visible soil staining is noticed upon removal of the metal drums or rusted equipment, soil samples should be collected from stained areas to confirm whether or not there are contaminant concerns.

The outcomes and recommendations from the ERA problem formulation are reiterated below.

- Copper and zinc were identified as COCs in site soil for terrestrial vegetation and soil organisms.
- Lead was identified as a COC in site soil for mammals and birds.
- No COCs were identified in site surface water or sediments for freshwater aquatic life, including amphibians.
- There is uncertainty regarding the extent of lead impacts in soil from the vehicle debris on site. Thus, the following is recommended:
 - The additional soil sampling recommended for lead for HHRA soil delineation purposes would also delineate the extent of lead impacts in soil for ecological receptors.
 - Depending on the new lead soil chemistry data, further evaluation of lead with respect to small mammals and birds (such as an ERA) may be required.
- To further assess potential impacts to vegetation and soil organisms, the following is recommended:
 - Visual examination of the site vegetation communities in the areas where soil COCs exceeded the SoQGE for vegetation and soil organisms (i.e., BH1, BH, BH7, BH14, BH15, BH18, BH27, BH28, BH33, BH37, BH36, BH45 and BH47) for signs of stress / impairment, to see if the expected species and communities are present (or not), and whether these vegetation communities are similar (or not) to vegetation communities in areas where soil guideline exceedances were not observed. Existing photos provide inadequate coverage to properly assess potential vegetation impacts at these sampling locations.
 - This could also include an examination of previous site photos and field notes for site and off-site vegetation.

6.0

Limitations and Closure

This report was prepared exclusively for the purposes, project and site location outlined in the report. The report is based on information provided to, or obtained by Dillon as indicated in the report, and applies solely to site conditions existing at the time of the site investigation. Although a reasonable investigation was conducted by Dillon, Dillon's investigation was by no means exhaustive and cannot be construed as a certification of the absence of any contaminants from the site. Rather, Dillon's report represents a reasonable review of available information within an agreed work scope, schedule, and budget. It is, therefore, possible that currently unrecognized contamination or potentially hazardous materials may exist at the site, and that the levels of contamination or hazardous materials may vary across the site. Further review and updating of the report may be required as local and site conditions, and the regulatory and planning frameworks, change over time.

This report was prepared by Dillon for the sole benefit of Build Nova Scotia. The material in the report reflects Dillon's best judgment in light of the information available to Dillon at the time of preparation. Any use which a third party (e.g., a party other than Build Nova Scotia) makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Respectfully submitted,

DILLON CONSULTING LIMITED



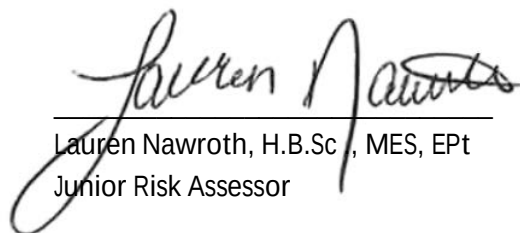
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Human Health and Ecological Risk Assessment (HHERA) Problem Formulation -
Final - Former Frenchvale Mine Site, Frenchvale, Nova Scotia

PID No. 15845167

November 2025 – 24-8606



7.0

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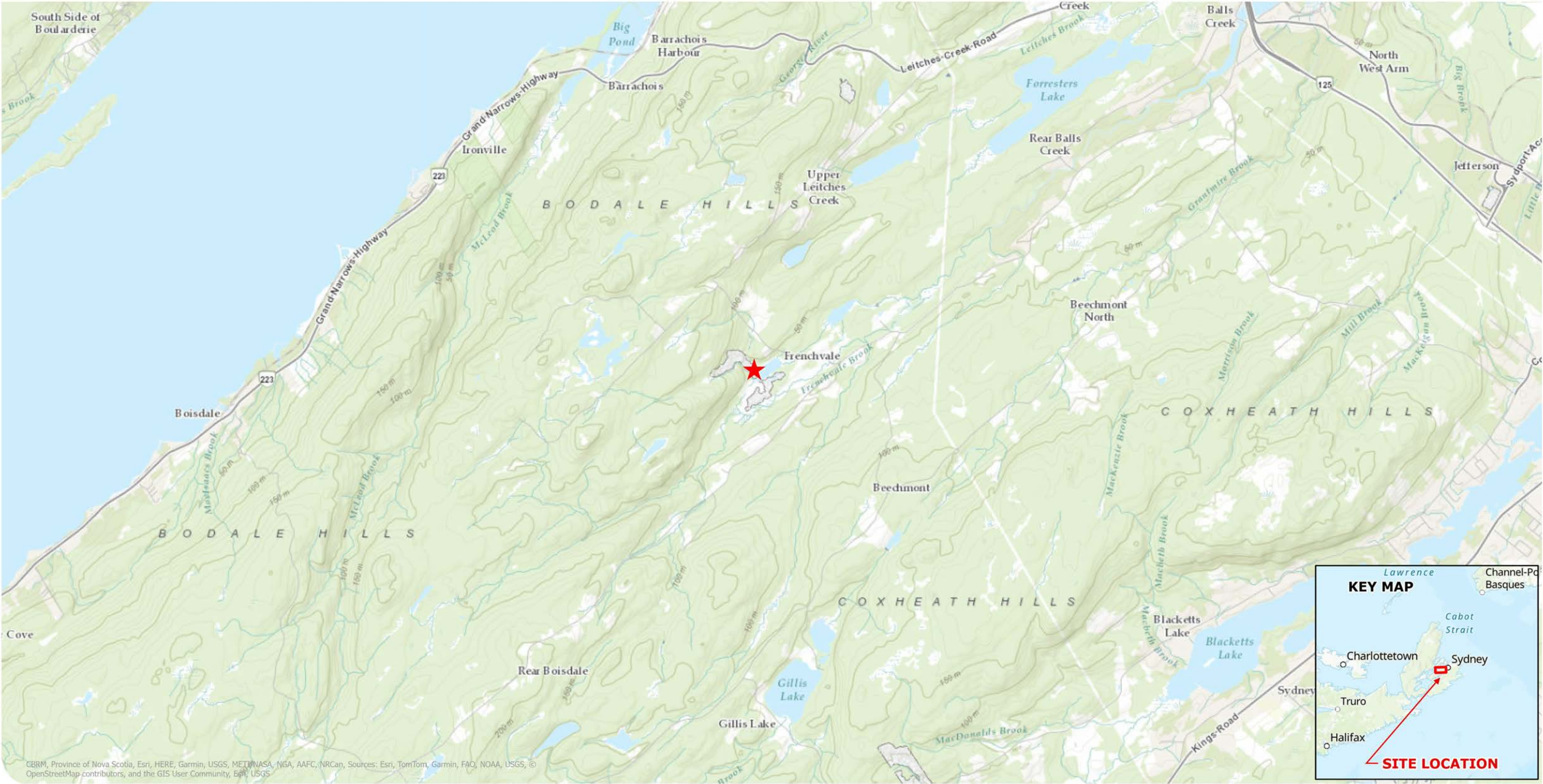
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Appendix A

Figures



BUILD NOVA SCOTIA

Former Frenchvale Mine Site,
HHRA Problem Formulation

★ Site Location

SITE LOCATION MAP

FIGURE 1



MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI & Dillon consulting Ltd.

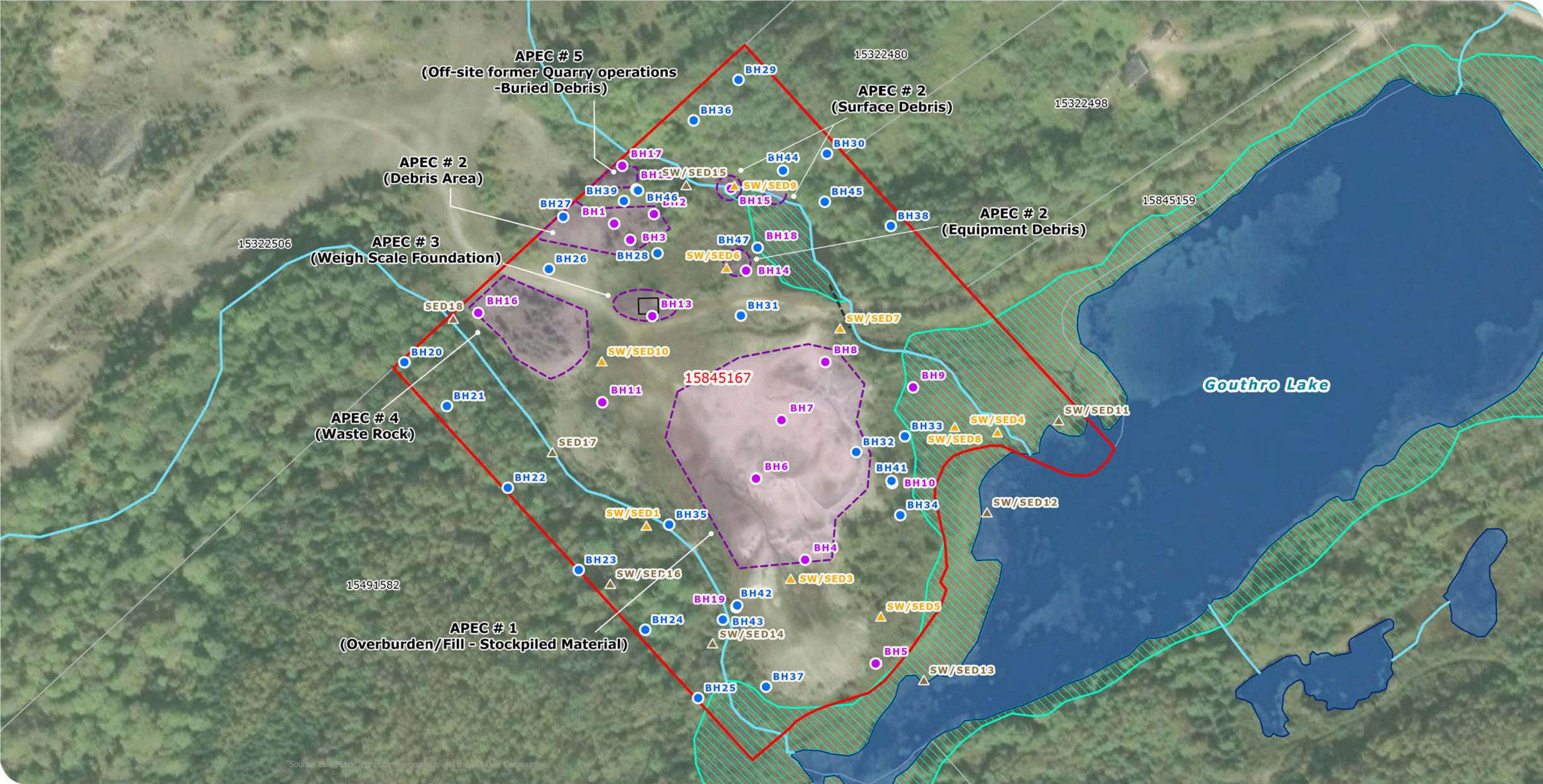
MAP CREATED BY: CHM
MAP CHECKED BY: JKD
MAP PROJECTION: WGS 1984 Web Mercator Auxiliary Sphere

SCALE 1:80,000

0 0.5 1 2 Kilometers

PROJECT: 24-8606 STATUS: FINAL DATE: 2025-09-30





BUILD NOVA SCOTIA
Former Frenchvale Mine Site,
HHRA Problem Formulation

**SAMPLE LOCATIONS AND
APECS**
FIGURE 2

- Soil Sample (Phase II ESA)
- Soil Sample (Supplemental ESA)
- Surface Water and Sediment Sample (Phase II ESA)

- Surface Water and Sediment Sample (Supplemental ESA)
- Subject Property Boundary
- Adjacent Parcels

- Culvert
- Watercourse (GeoNova)
- Wetland (GeoNova)
- Waterbody (GeoNova)

- APEC (Area of Potential Environmental Concern)
- Weigh Scale Foundation



MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI, GeoNova, Build NS & Dillon Consulting Ltd.

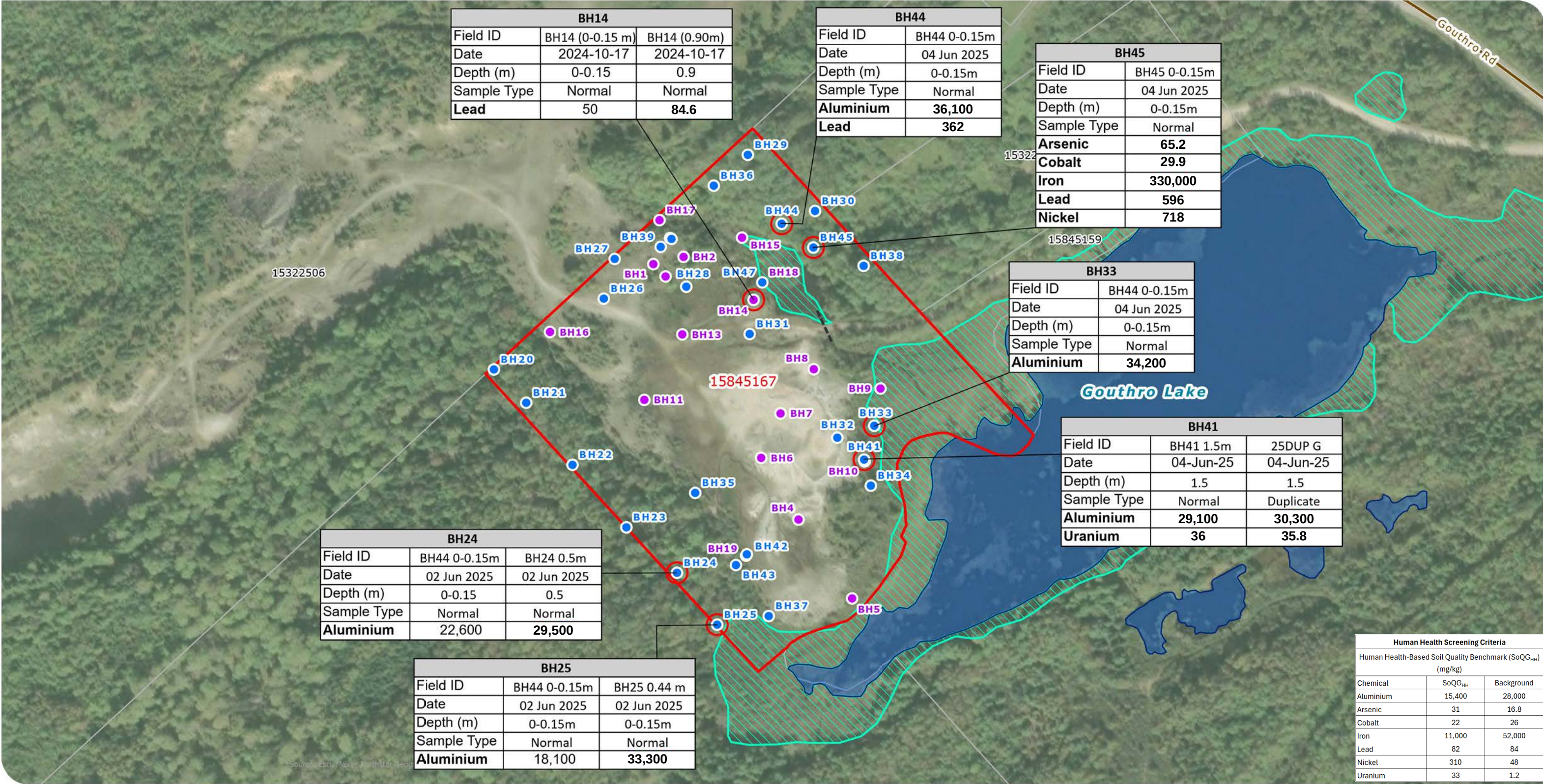
MAP CREATED BY: CHM
MAP CHECKED BY: JKD
MAP PROJECTION: NAD 1983 CSRS UTM Zone 20N

Note:
Areas of partially buried debris were observed across the site. Based on interview information, there is potential for on-site buried debris (exact location, if present, is unknown). Assessment of APEC #3 was across the site as applicable.

SCALE 1:1,900

0 15 30 60 Metres

PROJECT: 24-8606 STATUS: FINAL DATE: 2025-09-30



BUILD NOVA SCOTIA

Former Frenchvale Mine Site,
HHRA Problem Formulation

**EXCEEDANCES OF METALS IN SOIL
OF HUMAN HEALTH-BASED
GUIDELINES AND REGIONAL
BACKGROUND**

FIGURE 3

- Soil Sample (Phase II ESA)
- Soil Sample (Supplemental ESA)
- Metals Exceedance of SoQGHH and Regional Background
- Subject Property Boundary
- Adjacent Parcels
- Culvert
- Wetland (GeoNova)
- Waterbody (GeoNova)

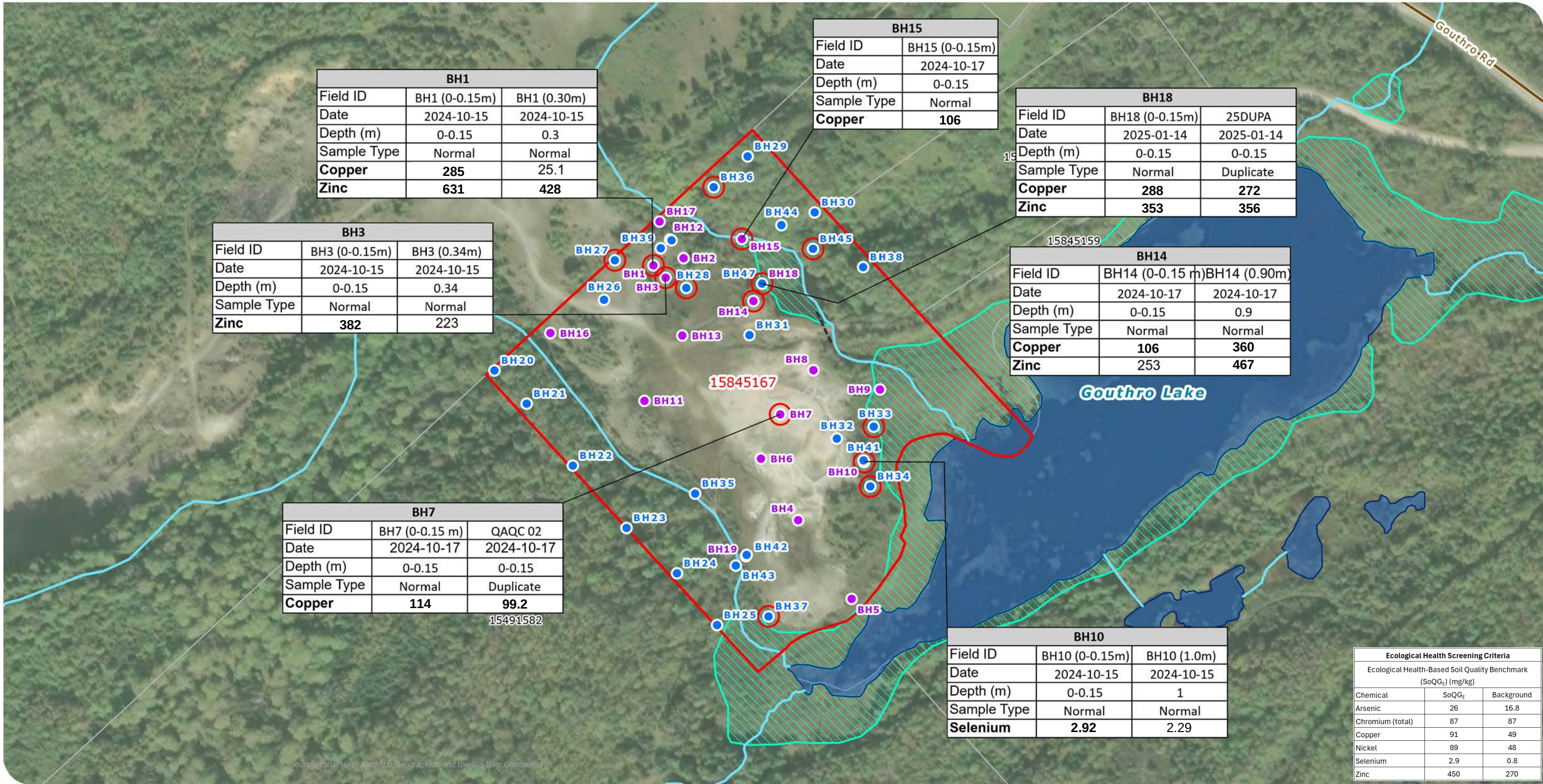


MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI, GeoNova, Build NS & Dillon Consulting Ltd.
MAP CREATED BY: CHM
MAP CHECKED BY: JKD
MAP PROJECTION: NAD 1983 CSRS UTM Zone 20N

SCALE 1:2,500

0 20 40 80 Metres

PROJECT: 24-8606 STATUS: FINAL DATE: 2025-09-30



BUILD NOVA SCOTIA

Former Frenchvale Mine Site,
HHRA Problem Formulation

EXCEEDANCES OF METALS IN SOIL OF
ECOLOGICAL HEALTH-BASED
GUIDELINES FOR TERRESTRIAL
VEGETATION AND SOIL ORGANISMS
AND REGIONAL BACKGROUND
FIGURE 4 A (I)

- Metals Exceedance of SoQGE and Regional Background
- Soil Sample (Phase II ESA)

- Soil Sample (Supplemental ESA)
- Subject Property Boundary
- Adjacent Parcels

- Culvert
- Roads (GeoNova)
- Watercourse (GeoNova)

- Wetland (GeoNova)
- Waterbody (GeoNova)

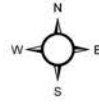


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DATA PROVIDED BY ESRI, GeoNova, Build NS & Dillon Consulting Ltd.

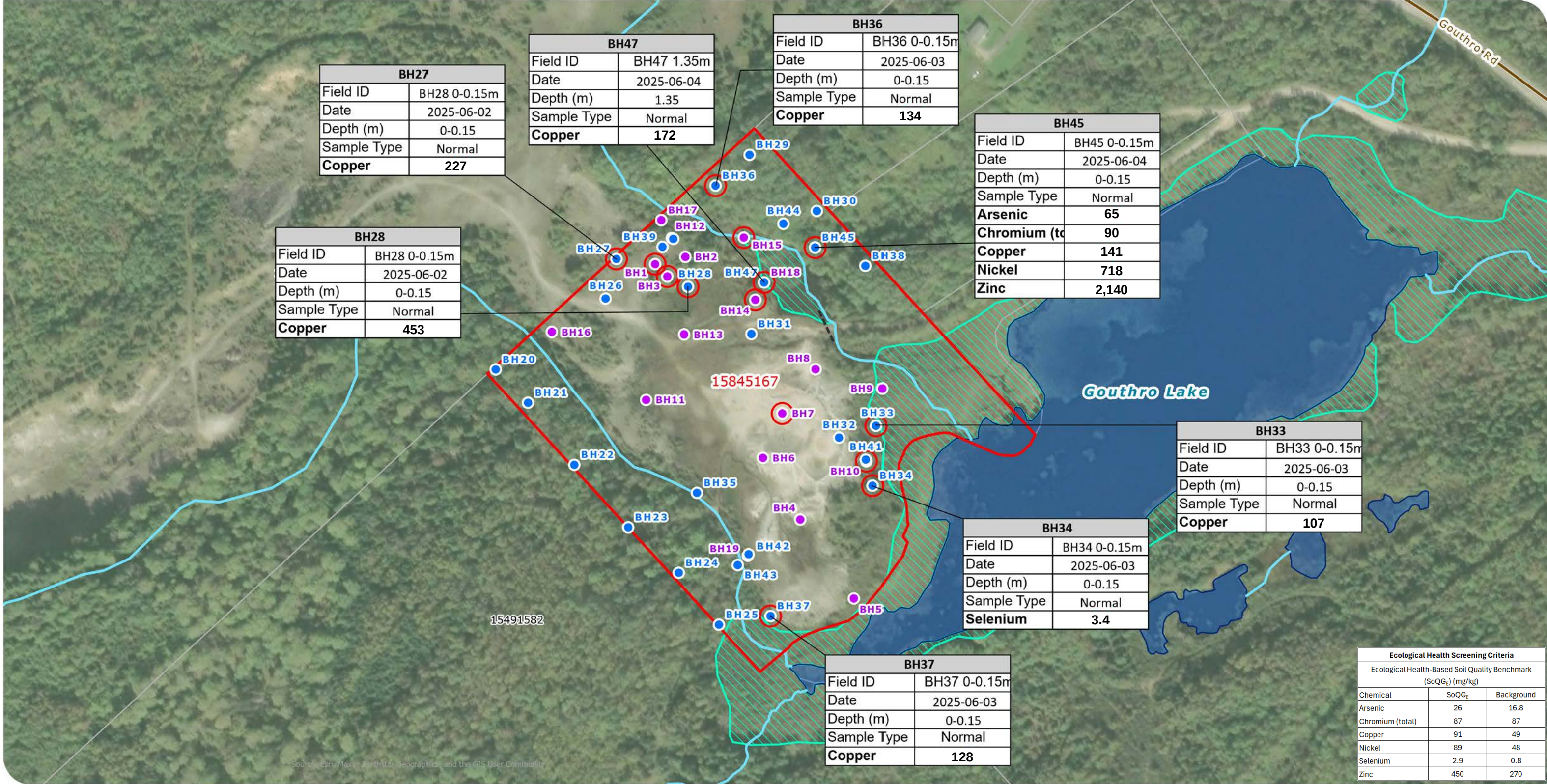
MAP CREATED BY: CHM
MAP CHECKED BY: JKD
MAP PROJECTION: NAD 1983 CSRS UTM Zone 20N

SCALE 1:2,500

0 20 40 80 Metres



PROJECT: 24-8606 STATUS: FINAL DATE: 2025-09-30



BUILD NOVA SCOTIA

Former Frenchvale Mine Site,
HHRA Problem Formulation

EXCEEDANCES OF METALS IN SOIL OF
ECOLOGICAL HEALTH-BASED
GUIDELINES FOR TERRESTRIAL
VEGETATION AND SOIL ORGANISMS
AND REGIONAL BACKGROUND
FIGURE 4 A (II)

- Metals Exceedance of SoQGE and Regional Background
- Soil Sample (Phase II ESA)

- Soil Sample (Supplemental ESA)
- Subject Property Boundary
- Adjacent Parcels

- Culvert
- Roads (GeoNova)
- Watercourse (GeoNova)

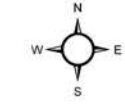
- Wetland (GeoNova)
- Waterbody (GeoNova)



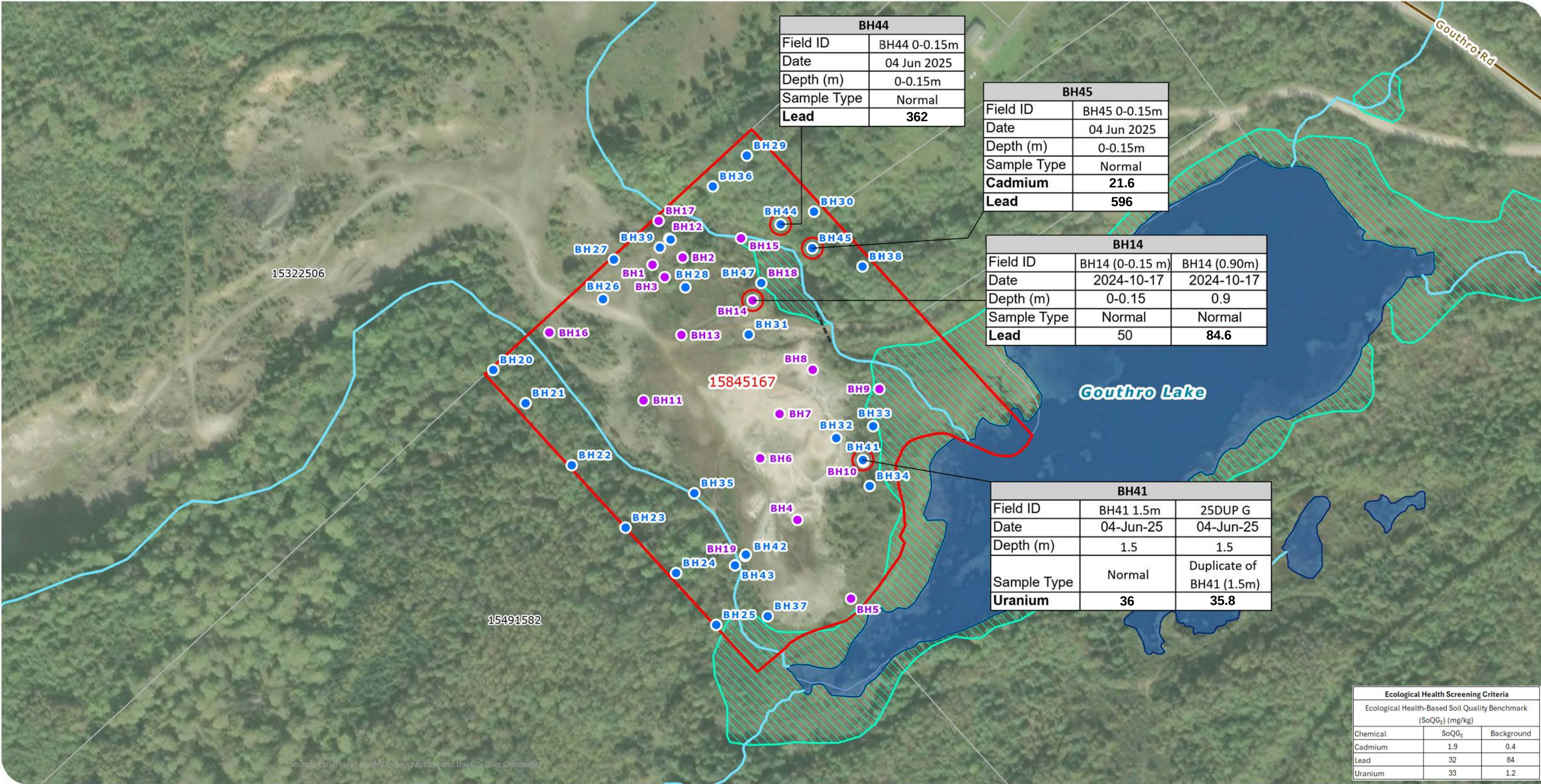
MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI, GeoNova, Build NS & Dillon Consulting Ltd.

MAP CREATED BY: CHM
MAP CHECKED BY: JKD
MAP PROJECTION: NAD 1983 CSRS UTM Zone 20N

SCALE 1:2,500
0 20 40 80 Metres



PROJECT: 24-8606 STATUS: FINAL DATE: 2025-09-30



BUILD NOVA SCOTIA

Former Frenchvale Mine Site,
HHRA Problem Formulation

**EXCEEDANCES OF METALS IN SOIL
OF ECOLOGICAL HEALTH-BASED
GUIDELINES FOR MAMMALS AND
BIRDS AND REGIONAL BACKGROUND**
FIGURE 4 B

- Metals Exceedance of SoQGE and Regional Background
- Soil Sample (Phase II ESA)

- Soil Sample (Supplemental ESA)
- Subject Property Boundary
- Adjacent Parcels

- Culvert
- Watercourse (GeoNova)
- Roads (GeoNova)

- Wetland (GeoNova)
- Waterbody (GeoNova)



MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI, GeoNova, Build NS & Dillon Consulting Ltd.

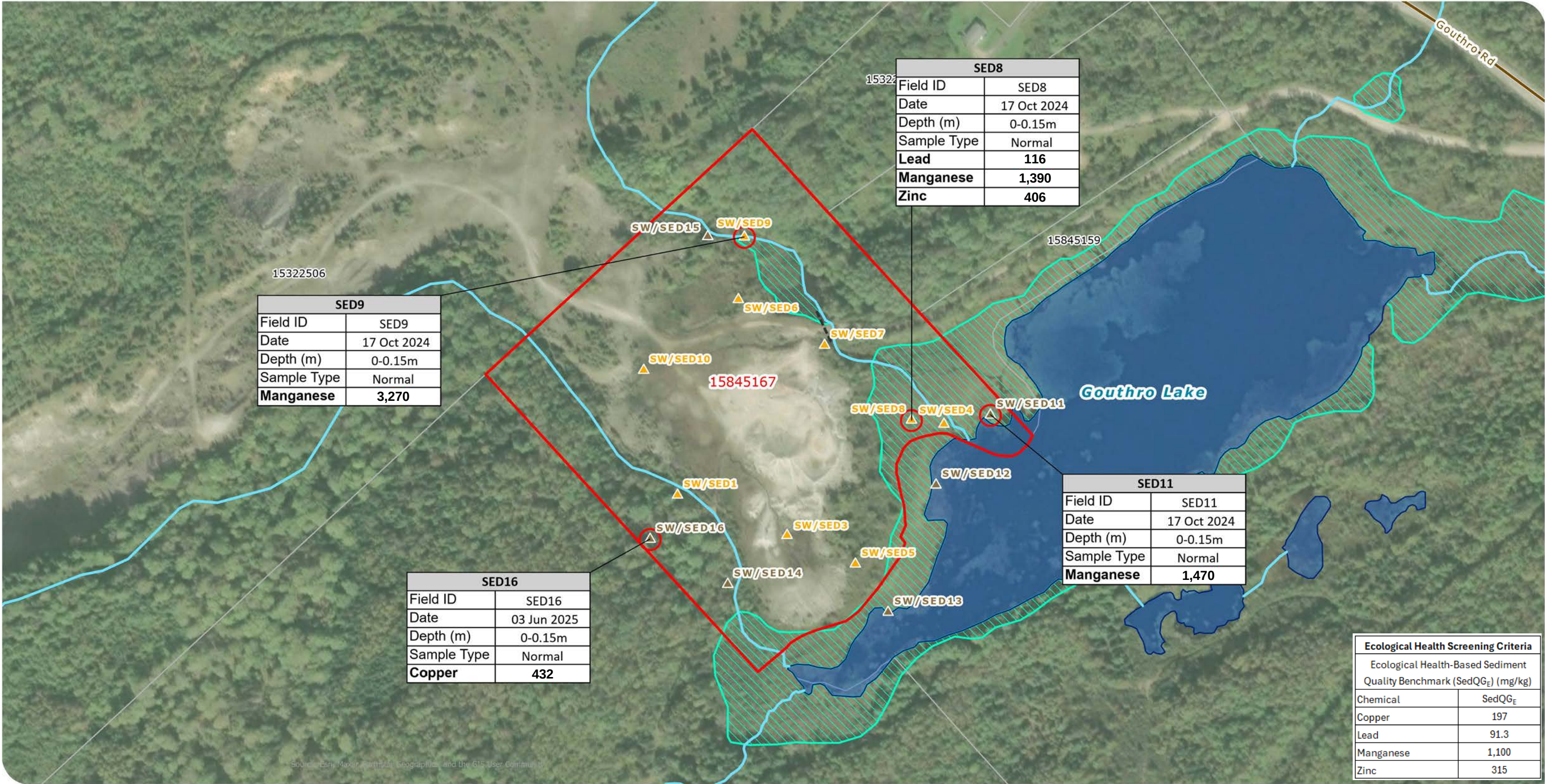
MAP CREATED BY: CHM
MAP CHECKED BY: JKD
MAP PROJECTION: NAD 1983 CSRS UTM Zone 20N

SCALE 1:2,500

0 20 40 80 Metres

PROJECT: 24-8606 STATUS: FINAL DATE: 2025-09-30

Ecological Health Screening Criteria		
Ecological Health-Based Soil Quality Benchmark (SoQGE) (mg/kg)		
Chemical	SoQGE	Background
Cadmium	1.9	0.4
Lead	32	84
Uranium	33	1.2



BUILD NOVA SCOTIA

Former Frenchvale Mine Site,
HHRA Problem Formulation

**EXCEEDANCES OF METALS IN
SEDIMENT OF ECOLOGICAL HEALTH-
BASED GUIDELINES**

FIGURE 5

- Metals Exceedance of SedQGE
- Subject Property Boundary
- Adjacent Parcels



- Culvert
- Watercourse (GeoNova)
- Wetland (GeoNova)
- Waterbody (GeoNova)

MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI, GeoNova, Build NS & Dillon Consulting Ltd.

MAP CREATED BY: CHM
MAP CHECKED BY: JKD
MAP PROJECTION: NAD 1983 CSRS UTM Zone 20N

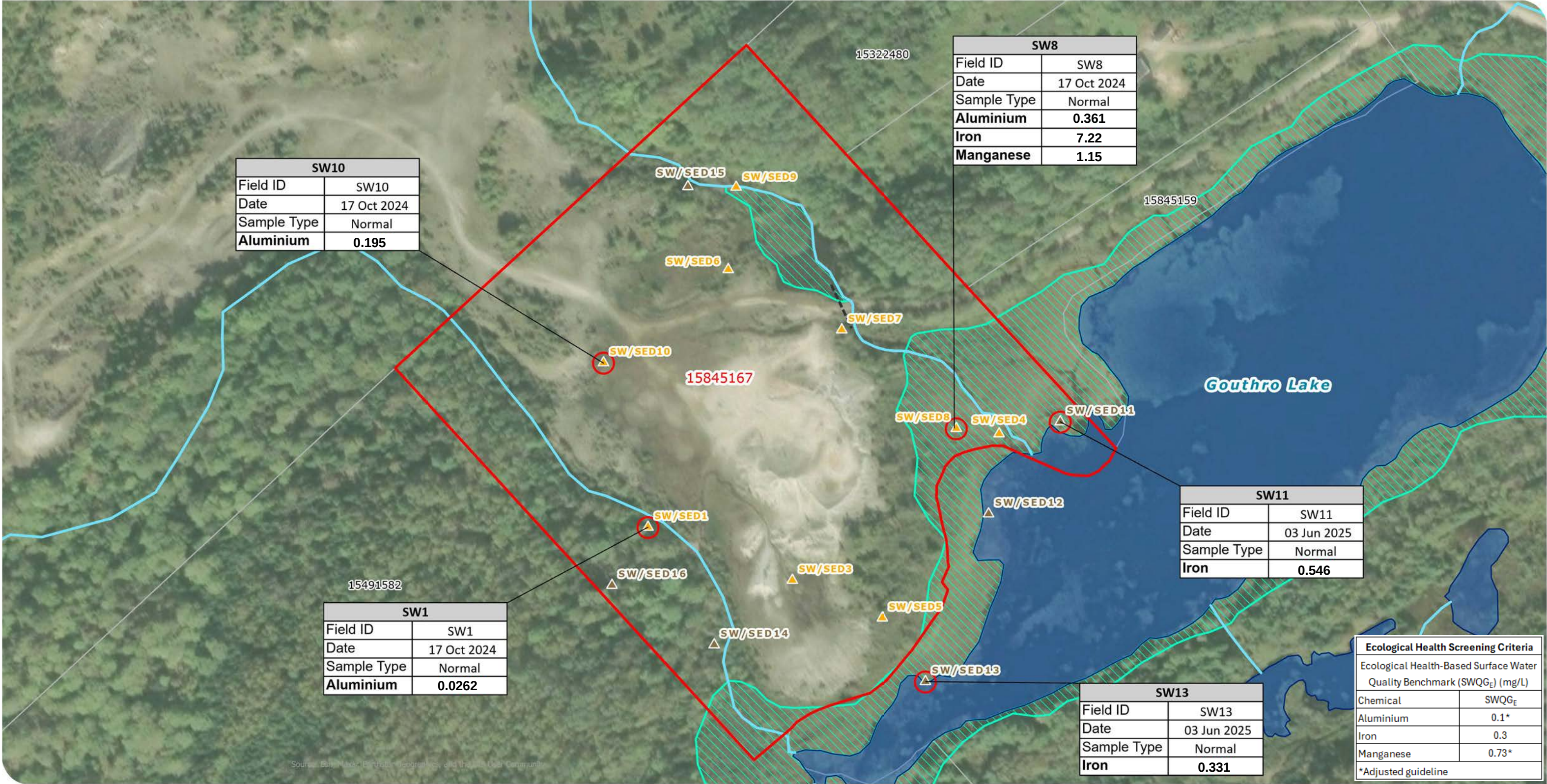
- Roads (GeoNova)
- Surface Water and Sediment Sample (Supplemental ESA)
- Surface Water and Sediment Sample (Phase II ESA)

Surface Water and Sediment Sample (Supplemental ESA)

SCALE 1:2,500
0 20 40 80 Metres



PROJECT: 24-8606 STATUS: FINAL DATE: 2025-09-30



BUILD NOVA SCOTIA

Former Frenchvale Mine Site,
HHRA Problem Formulation

**EXCEEDANCES OF METALS IN
SURFACE WATER OF ECOLOGICAL
HEALTH-BASED GUIDELINES**

FIGURE 6

- Metals Exceedance of SWQGE
- Surface Water and Sediment Sample (Phase II ESA)

- Surface Water and Sediment Sample (Supplemental ESA)
- Subject Property Boundary
- Adjacent Parcels

- Culvert
- Watercourse (GeoNova)
- Wetland (GeoNova)
- Waterbody (GeoNova)



MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI, GeoNova, Build NS & Dillon Consulting Ltd.

MAP CREATED BY: CHM
MAP CHECKED BY: JKD
MAP PROJECTION: NAD 1983 CSRS UTM Zone 20N

SCALE 1:1,900

0 15 30 60 Metres

PROJECT: 24-8606

STATUS: FINAL

DATE: 2025-09-30



Appendix B

Site Photographs



Photo 1: View of an on-site pond with apparent beaver activity, facing northwest. (July 25, 2024)



Photo 2: View of an on-site wetland area and the adjacent Gouthro Lake, facing northeast.
(July 25, 2024)



Photo 3: View of possible iron precipitate observed in an on-site watercourse that discharges to Gouthro Lake. (July 25, 2024)



Photo 4: View of stockpile washout to the shore of Gouthro Lake, facing north. (July 25, 2024)



Photo 5: View of on-site stockpiles and ponded water, facing east. (July 25, 2024)



Photo 6: View of an on-site waste rock pile with iron staining observed. (July 25, 2024)



Photo 7. View of a pipe observed on-site, use unknown. (July 25, 2024)



Photo 8: View of discarded fishing gear observed on-site near northeast property boundary.
(July 25, 2024)



Photo 9: View of rusted vehicle/equipment debris. (July 25, 2024)



Photo 10: View of weigh scale remains. (July 25, 2024)



Photo 11: View of rusted metal debris observed within an on-site watercourse; located upgradient of an on-site pond. (July 25, 2024)



Photo 12: View of burned heavy equipment, tires, metal, geotextiles, and concrete debris. (July 25, 2024)



Photo 13: View of sample locations SW3/SED3 near on-site stockpiles.
(October 17, 2024)



Photo 14: View of sample location BH8 within on-site stockpiles.
(October 15, 2024)



Photo 15: View of sample locations SW4/SED near outflow to Gouthro Lake.
(October 15, 2024)



Photo 16: View of site looking southeast from coarse rock pile overlooking on site stockpiles and Gouthro Lake. (October 17, 2024)



Photo 17: View of sample locations SW10/SED10 at the base of the coarse waste rock at the Northwest area of the subject site. (January 14, 2025)



Photo 18: View of subject site boundary and Gouthro Lake. Arrow in photo indicates beaver dam/den. (January 14, 2025)



Photo 19: View of background sample location BH25 along southwest property boundary.
(June 2, 2025).



Photo 20: View of derelict car near northeast boundary and near sample location BH44.
(June 2, 2025)



Photo 21: View of sample location BH44.
(June 4, 2025)



Photo 22: View of derelict car near northeast boundary and near sample location BH45.
(June 2, 2025)



Photo 23: View of sample location BH45.
(June 4, 2025)



Photo 24: View of sample locations SW11/SED11 at Gouthro Lake; noticeable fish observed during sampling. (June 3, 2025)



Photo 25: View of sample locations SW16/SED16 at southwest property boundary of the site.
(June 3, 2025)



Photo 26: View of sample location SED18 at northwest property boundary of the site.
(June 4, 2025)



Photo 27: View of discarded geotextile rolls.
(July 25, 2024)



Photo 28: View of metal drum.
(July 25, 2024)

Appendix C

Laboratory Certificates of Analysis

CERTIFICATE OF ANALYSIS

Work Order : **HA2402608**
Amendment : **4**
Client : **Dillon Consulting Limited**
Contact : Nadine Wambolt
Address : 137 Chain Lake Drive
Halifax Nova Scotia Canada B3S 1B3
Telephone : 902.562.9880 ext. 5206
Project : 24-8606
PO : ----
C-O-C number : ----
Sampler : Manpreet Kaur
Site : ----
Quote number : HA24-DICL100-2 - Frenchvale Mine
No. of samples received : 29
No. of samples analysed : 29

Laboratory : ALS Environmental - Halifax
Account Manager : Andrew Martin
Address : 13-100 Wright Ave
Dartmouth NS Canada B3B 1L2
Telephone : +1 902 707 4888
Date Samples Received : 18-Oct-2024 16:00
Date Analysis Commenced : 21-Oct-2024
Issue Date : 10-Feb-2025 09:59

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).



Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Andrea Armstrong	Department Manager - Air Quality and Volatiles	VOC, Waterloo, Ontario
Andrew Martin	Project Manager	External Subcontracting, Charleston, South Carolina
Greg Pokocky	Manager - Inorganics	Inorganics, Waterloo, Ontario
Hedy Lai	Team Leader - Inorganics	Inorganics, Saskatoon, Saskatchewan
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Metals, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Dartmouth, Nova Scotia
Kelly Fischer	Technical Specialist	Inorganics, Waterloo, Ontario
Mathy Mahadeva	Project Manager	External Subcontracting, Charleston, South Carolina
Nik Perkio	Senior Analyst	Metals, Waterloo, Ontario
Nik Perkio	Senior Analyst	Inorganics, Waterloo, Ontario
Niral Patel		Centralized Prep, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Metals, Waterloo, Ontario



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	Description
-	no units
%	percent
Bq/kg	becquerels per kilogram
CU	colour units (1 cu = 1 mg/l pt)
meq/L	milliequivalents per litre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
mS/cm	millisiemens per centimetre
none	none
NTU	nephelometric turbidity units
pH units	pH units
µg/g	micrograms per gram
µS/cm	microsiemens per centimetre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Amendment (21-NOV-2024): This report has been amended and re-released to allow the reporting of additional analytical data. Supplemental Gross Alpha Beta report with updated units.

Amendment (11/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data.

Amendment (23/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data.

RRQC: Silver recovery outside of ALS DQOs due to issue with standard. Reported data was not affect by this issue

Amendment (08/01/2025): This report has been amended and re-released to allow the reporting of additional analytical data.



Sample Comments

Sample	Client Id	Comment
HA2402608-006	SED 7	LOF: Lube oil fraction
HA2402608-023	BH 12 0-0.15 m	LOF: Lube oil fraction
HA2402608-024	BH 13 0-0.15 m	LOF: Lube oil fraction
HA2402608-025	BH 14 0-0.15 m	LOF: Lube oil fraction
HA2402608-026	BH 15 0-0.15 m	LOF: Lube oil fraction

Qualifiers

Qualifier	Description
DLHM	Detection Limit Adjusted: Sample has high moisture content.
DLUI	Detection Limit Raised: Unknown interference generated an apparent false positive test result.



Analytical Results

Sub-Matrix: Sediment

(Matrix: Soil/Solid)

					Client sample ID	SED 1	SED 3	SED 4	SED 5	SED 6
					Client sampling date / time	17-Oct-2024 13:20	17-Oct-2024 14:15	17-Oct-2024 14:45	17-Oct-2024 14:00	17-Oct-2024 15:45
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-001	HA2402608-002	HA2402608-003	HA2402608-004	HA2402608-005	
					Result	Result	Result	Result	Result	
Physical Tests										
Conductivity (1:2 leachate)	----	E100-L/WT	0.00500	mS/cm	----	0.0941	----	----	----	----
Moisture	----	E144/WT	0.25	%	----	11.4	----	----	----	----
pH (1:2 soil:CaCl2-aq)	----	E108A/WT	0.10	pH units	6.90	7.51	6.43	7.01	7.17	
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg	14900	4260	11800	11700	6980	
Antimony	7440-36-0	E440/WT	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	1.96	2.32	2.14	2.09	0.93	
Barium	7440-39-3	E440/WT	0.50	mg/kg	22.8	7.78	22.4	26.4	9.26	
Beryllium	7440-41-7	E440/WT	0.10	mg/kg	0.64	0.21	0.66	0.62	0.34	
Boron	7440-42-8	E440/WT	5.0	mg/kg	<5.0	<5.0	9.3	10.6	6.1	
Cadmium	7440-43-9	E440/WT	0.020	mg/kg	0.121	0.107	0.198	0.424	0.097	
Calcium, soluble ion content	7440-70-2	E484/WT	0.50	mg/L	----	1.50	----	----	----	
Chromium	7440-47-3	E440/WT	0.50	mg/kg	9.55	4.35	10.8	11.4	8.29	
Cobalt	7440-48-4	E440/WT	0.10	mg/kg	6.53	3.64	6.81	7.60	4.38	
Copper	7440-50-8	E440/WT	0.50	mg/kg	24.2	14.2	43.4	32.2	25.3	
Iron	7439-89-6	E440/WT	50	mg/kg	25800	8780	17600	14200	12700	
Lead	7439-92-1	E440/WT	0.50	mg/kg	7.50	11.2	14.3	40.5	5.71	
Magnesium, soluble ion content	7439-95-4	E484/WT	0.50	mg/L	----	1.14	----	----	----	
Manganese	7439-96-5	E440/WT	1.0	mg/kg	343	486	934	1010	771	
Mercury	7439-97-6	E510/WT	0.0050	mg/kg	<0.0050	<0.0050	0.0272	0.0122	0.0062	
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg	0.87	0.22	0.40	0.44	0.48	



Analytical Results

Sub-Matrix: Sediment

(Matrix: Soil/Solid)

					Client sample ID	SED 1	SED 3	SED 4	SED 5	SED 6
					Client sampling date / time	17-Oct-2024 13:20	17-Oct-2024 14:15	17-Oct-2024 14:45	17-Oct-2024 14:00	17-Oct-2024 15:45
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-001	HA2402608-002	HA2402608-003	HA2402608-004	HA2402608-005	
					Result	Result	Result	Result	Result	Result
Metals										
Nickel	7440-02-0	E440/WT	0.50	mg/kg	8.96	4.08	8.82	10.7	6.41	
Selenium	7782-49-2	E440/WT	0.20	mg/kg	<0.20	<0.20	0.34	<0.20	<0.20	
Silver	7440-22-4	E440/WT	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	
Sodium, soluble ion content	17341-25-2	E484/WT	0.50	mg/L	----	0.65	----	----	----	
Strontium	7440-24-6	E440/WT	0.50	mg/kg	17.5	76.9	67.4	65.6	64.8	
Sulfur	7704-34-9	E440/WT	1000	mg/kg	<1000	<1000	<1000	<1000	<1000	
Thallium	7440-28-0	E440/WT	0.050	mg/kg	<0.050	<0.050	0.064	0.108	<0.050	
Tin	7440-31-5	E440/WT	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	
Uranium	7440-61-1	E440/WT	0.050	mg/kg	1.95	0.868	1.97	2.33	0.729	
Vanadium	7440-62-2	E440/WT	0.20	mg/kg	35.8	12.5	28.2	26.2	17.1	
Zinc	7440-66-6	E440/WT	2.0	mg/kg	40.9	45.5	86.0	154	40.8	
Sodium adsorption ratio [SAR]	----	E484/WT	0.10	-	----	<0.10	----	----	----	
Leachable Anions & Nutrients										
Chloride, soluble ion content	16887-00-6	E236.CI/WT	5.0	µg/g	----	9.5	----	----	----	
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A-L/WT	0.0050	mg/kg	----	<0.0050	----	----	----	
Acenaphthylene	208-96-8	E641A-L/WT	0.0050	mg/kg	----	<0.0050	----	----	----	
Acridine	260-94-6	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	
Anthracene	120-12-7	E641A-L/WT	0.0040	mg/kg	----	<0.0040	----	----	----	
Benz(a)anthracene	56-55-3	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	
Benzo(a)pyrene	50-32-8	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	



Analytical Results

Sub-Matrix: Sediment

(Matrix: Soil/Solid)

					Client sample ID	SED 1	SED 3	SED 4	SED 5	SED 6
					Client sampling date / time	17-Oct-2024 13:20	17-Oct-2024 14:15	17-Oct-2024 14:45	17-Oct-2024 14:00	17-Oct-2024 15:45
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-001	HA2402608-002	HA2402608-003	HA2402608-004	HA2402608-005	
					Result	Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j)fluoranthene	n/a	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A-L/WT	0.015	mg/kg	----	<0.015	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Chrysene	218-01-9	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A-L/WT	0.0050	mg/kg	----	<0.0050	----	----	----	----
Fluoranthene	206-44-0	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Fluorene	86-73-7	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Methylnaphthalene, 1+2-	----	E641A-L/WT	0.015	mg/kg	----	<0.015	----	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Naphthalene	91-20-3	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Perylene	198-55-0	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Phenanthrene	85-01-8	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Pyrene	129-00-0	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
Quinoline	91-22-5	E641A-L/WT	0.010	mg/kg	----	<0.010	----	----	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A-L/WT	0.020	mg/kg	----	<0.020	----	----	----	----
IACR (CCME)	----	E641A-L/WT	0.150	-	----	<0.150	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Acridine-d9	34749-75-2	E641A-L/WT	0.1	%	----	87.1	----	----	----	----



Analytical Results

Sub-Matrix: Sediment (Matrix: Soil/Solid)					Client sample ID	SED 1	SED 3	SED 4	SED 5	SED 6
Client sampling date / time						17-Oct-2024 13:20	17-Oct-2024 14:15	17-Oct-2024 14:45	17-Oct-2024 14:00	17-Oct-2024 15:45
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-001	HA2402608-002	HA2402608-003	HA2402608-004	HA2402608-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A-L/WT	0.1	%		----	84.6	----	----	----
Naphthalene-d8	1146-65-2	E641A-L/WT	0.1	%		----	92.0	----	----	----
Phenanthrene-d10	1517-22-2	E641A-L/WT	0.1	%		----	91.2	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Analytical Results

Sub-Matrix: Sediment (Matrix: Soil/Solid)					Client sample ID	SED 7	SED 8	SED 9	SED 10	QAQC 04
Client sampling date / time						17-Oct-2024 15:00	17-Oct-2024 14:30	17-Oct-2024 16:00	17-Oct-2024 12:50	17-Oct-2024 14:45
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-006	HA2402608-007	HA2402608-008	HA2402608-009	HA2402608-010
						Result	Result	Result	Result	Result
Physical Tests										
Conductivity (1:2 leachate)	----	E100-L/WT	0.00500	mS/cm		----	----	----	0.298	0.103
Moisture	----	E144/WT	0.25	%		13.6	----	----	----	----
pH (1:2 soil:CaCl2-aq)	----	E108A/WT	0.10	pH units		7.09	6.38	6.64	6.97	7.61
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg		5750	27000	17500	13400	5500
Antimony	7440-36-0	E440/WT	0.10	mg/kg		<0.10	0.16	<0.10	<0.10	<0.10
Arsenic	7440-38-2	E440/WT	0.10	mg/kg		1.10	4.92	2.94	2.32	0.64
Barium	7440-39-3	E440/WT	0.50	mg/kg		13.4	55.2	64.5	23.0	7.34
Beryllium	7440-41-7	E440/WT	0.10	mg/kg		0.28	1.31	1.10	0.64	0.21
Boron	7440-42-8	E440/WT	5.0	mg/kg		5.4	13.4	<5.0	7.5	<5.0
Cadmium	7440-43-9	E440/WT	0.020	mg/kg		0.146	1.06	0.426	0.304	0.071



Analytical Results

Sub-Matrix: Sediment

(Matrix: Soil/Solid)

					Client sample ID	SED 7	SED 8	SED 9	SED 10	QAQC 04
					Client sampling date / time	17-Oct-2024 15:00	17-Oct-2024 14:30	17-Oct-2024 16:00	17-Oct-2024 12:50	17-Oct-2024 14:45
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-006	HA2402608-007	HA2402608-008	HA2402608-009	HA2402608-010	
					Result	Result	Result	Result	Result	
Metals										
Calcium, soluble ion content	7440-70-2	E484/WT	0.50	mg/L	----	----	----	12.1	1.71	
Chromium	7440-47-3	E440/WT	0.50	mg/kg	8.43	26.8	13.6	11.6	5.02	
Cobalt	7440-48-4	E440/WT	0.10	mg/kg	3.52	18.5	10.2	8.60	2.26	
Copper	7440-50-8	E440/WT	0.50	mg/kg	13.0	84.7	24.5	50.2	5.10	
Iron	7439-89-6	E440/WT	50	mg/kg	13900	27200	26100	20200	7920	
Lead	7439-92-1	E440/WT	0.50	mg/kg	11.5	116	6.62	18.8	27.9	
Magnesium, soluble ion content	7439-95-4	E484/WT	0.50	mg/L	----	----	----	4.66	1.24	
Manganese	7439-96-5	E440/WT	1.0	mg/kg	822	1390	3270	836	422	
Mercury	7439-97-6	E510/WT	0.0050	mg/kg	0.0058	0.0418	0.0132	0.0181	<0.0050	
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg	2.88	1.55	0.80	0.83	0.19	
Nickel	7440-02-0	E440/WT	0.50	mg/kg	5.21	28.6	14.8	11.1	3.28	
Selenium	7782-49-2	E440/WT	0.20	mg/kg	<0.20	0.32	0.22	0.33	<0.20	
Silver	7440-22-4	E440/WT	0.10	mg/kg	<0.10	0.11	<0.10	0.17	<0.10	
Sodium, soluble ion content	17341-25-2	E484/WT	0.50	mg/L	----	----	----	7.95	0.85	
Strontium	7440-24-6	E440/WT	0.50	mg/kg	76.8	42.4	18.3	67.7	71.3	
Sulfur	7704-34-9	E440/WT	1000	mg/kg	<1000	5500	<1000	<1000	<1000	
Thallium	7440-28-0	E440/WT	0.050	mg/kg	<0.050	0.286	0.134	0.095	<0.050	
Tin	7440-31-5	E440/WT	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	
Uranium	7440-61-1	E440/WT	0.050	mg/kg	1.05	5.63	3.30	3.67	1.19	
Vanadium	7440-62-2	E440/WT	0.20	mg/kg	13.8	57.4	45.1	29.6	12.7	
Zinc	7440-66-6	E440/WT	2.0	mg/kg	49.3	406	71.8	90.1	28.6	



Analytical Results

Sub-Matrix: Sediment

(Matrix: Soil/Solid)

					Client sample ID	SED 7	SED 8	SED 9	SED 10	QAQC 04
					Client sampling date / time	17-Oct-2024 15:00	17-Oct-2024 14:30	17-Oct-2024 16:00	17-Oct-2024 12:50	17-Oct-2024 14:45
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-006	HA2402608-007	HA2402608-008	HA2402608-009	HA2402608-010
						Result	Result	Result	Result	Result
Metals										
Sodium adsorption ratio [SAR]	----	E484/WT	0.10	-		----	----	----	0.49	0.12
Leachable Anions & Nutrients										
Chloride, soluble ion content	16887-00-6	E236.Cl/WT	5.0	µg/g		----	----	----	33.8	8.5
Hydrocarbon Distribution of RBCA mTPH (Tier I) Fractions										
C6-C10 fraction of mTPH	n/a	EC581D/WT	1	%		<1	----	----	----	----
>C10-C16 fraction of mTPH	n/a	EC581D/WT	1	%		<1	----	----	----	----
>C16-C21 fraction of mTPH	n/a	EC581D/WT	1	%		<1	----	----	----	----
>C21-C32 fraction of mTPH	n/a	EC581D/WT	1	%		100	----	----	----	----
Hydrocarbons										
Benzene	71-43-2	E611A/WT	0.0050	mg/kg		<0.0050	----	----	----	----
Toluene	108-88-3	E611A/WT	0.050	mg/kg		<0.050	----	----	----	----
Ethylbenzene	100-41-4	E611A/WT	0.015	mg/kg		<0.015	----	----	----	----
Xylenes, total	1330-20-7	E611A/WT	0.050	mg/kg		<0.050	----	----	----	----
Xylene, o-	95-47-6	E611A/WT	0.030	mg/kg		<0.030	----	----	----	----
Xylene, m+p-	179601-23-1	E611A/WT	0.030	mg/kg		<0.030	----	----	----	----
VPH C6-C10	n/a	E581.VPH/WT	5.0	mg/kg		<5.0	----	----	----	----
VPH C6-C10 (less BTEX)	n/a	EC580C/WT	5.0	mg/kg		<5.0	----	----	----	----
EPH >C10-C16	n/a	E601F/WT	5.0	mg/kg		<5.0	----	----	----	----
EPH >C16-C21	n/a	E601F/WT	5.0	mg/kg		<5.0	----	----	----	----
EPH >C21-C32	n/a	E601F/WT	5.0	mg/kg		8.7	----	----	----	----
EPH >C34-C50	n/a	E601F/WT	20	mg/kg		<20	----	----	----	----



Analytical Results

Sub-Matrix: Sediment

(Matrix: Soil/Solid)

					Client sample ID	SED 7	SED 8	SED 9	SED 10	QAQC 04
					Client sampling date / time	17-Oct-2024 15:00	17-Oct-2024 14:30	17-Oct-2024 16:00	17-Oct-2024 12:50	17-Oct-2024 14:45
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-006	HA2402608-007	HA2402608-008	HA2402608-009	HA2402608-010
						Result	Result	Result	Result	Result
Hydrocarbons										
hydrocarbon resemblance	n/a	E601F/WT	-	none		LOF	----	----	----	----
mTPH (Tier I)	n/a	EC581D/WT	10	mg/kg		<10	----	----	----	----
return to baseline at C32	n/a	E601F/WT	-	-		Yes	----	----	----	----
TEH >C10-C32	n/a	E601F/WT	10	mg/kg		<10	----	----	----	----
Hydrocarbons Surrogates										
dotriacontane, n- (EPH)	n/a	E601F/WT	1.0	%		97.4	----	----	----	----
isobutylbenzene (EPH)	538-93-2	E601F/WT	1.0	%		97.8	----	----	----	----
isobutylbenzene (VPH)	538-93-2	E581.VPH/WT	1.0	%		80.1	----	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/WT	0.10	%		81.3	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/WT	0.10	%		90.4	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

					Client sample ID	SW 1	SW 3	SW 4	SW 5	SW 6
					Client sampling date / time	17-Oct-2024 13:20	17-Oct-2024 14:15	17-Oct-2024 14:45	17-Oct-2024 14:00	17-Oct-2024 15:45
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-011	HA2402608-012	HA2402608-013	HA2402608-014	HA2402608-015
						Result	Result	Result	Result	Result
Physical Tests										
Alkalinity, bicarbonate (as HCO ₃)	71-52-3	E290/WT	1.0	mg/L		203	155	133	153	145
Alkalinity, carbonate (as CO ₃)	3812-32-6	E290/WT	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, hydroxide (as OH)	14280-30-9	E290/WT	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, total (as CaCO ₃)	----	E290/WT	1.0	mg/L		167	127	109	126	119



Analytical Results

Sub-Matrix: Water

(Matrix: Water)

					Client sample ID	SW 1	SW 3	SW 4	SW 5	SW 6
					Client sampling date / time	17-Oct-2024 13:20	17-Oct-2024 14:15	17-Oct-2024 14:45	17-Oct-2024 14:00	17-Oct-2024 15:45
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-011	HA2402608-012	HA2402608-013	HA2402608-014	HA2402608-015	
					Result	Result	Result	Result	Result	
Physical Tests										
Colour, apparent	----	E330/WT	2.0	CU	3.6	6.6	3.4	8.1	4.1	
Conductivity	----	E100/WT	1.0	µS/cm	419	374	324	379	336	
Hardness (as CaCO ₃), from total Ca/Mg	----	EC100A/WT	0.50	mg/L	205	163	125	170	148	
Langelier index (@ 20°C)	----	EC105A/WT	0.010	-	0.867	0.260	0.197	0.223	0.240	
Langelier index (@ 4°C)	----	EC105A/WT	0.010	-	0.621	0.011	-0.051	-0.028	-0.009	
pH	----	E108/HA	0.10	pH units	8.34	7.94	8.05	7.88	7.98	
pH, saturation (@ 20°C)	----	EC105A/WT	0.010	pH units	7.47	7.68	7.85	7.66	7.74	
pH, saturation (@ 4°C)	----	EC105A/WT	0.010	pH units	7.72	7.93	8.10	7.91	7.99	
Solids, total dissolved [TDS]	----	E162/HA	10	mg/L	240	224	180	229	192	
Turbidity	----	E121/WT	0.10	NTU	<0.10	0.28	0.32	0.20	0.30	
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L	0.0239	0.0089	0.0182	0.0061	0.0112	
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L	22.6	30.1	26.2	29.1	25.4	
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L	<0.020	0.025	0.045	0.026	0.039	
Nitrate (as N)	14797-55-8	E235.NO ₃ /WT	0.020	mg/L	0.586	<0.020	0.116	<0.020	0.092	
Nitrate + Nitrite (as N)	----	EC235.N+N/W T	0.0032	mg/L	0.586	<0.0224	0.116	<0.0224	0.104	
Nitrite (as N)	14797-65-0	E235.NO ₂ /WT	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	0.012	
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	
Sulfate (as SO ₄)	14808-79-8	E235.SO ₄ /WT	0.30	mg/L	17.2	18.1	13.8	18.8	14.0	
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	----	E355-L/WT	0.50	mg/L	1.98	2.37	1.74	2.75	1.46	



Analytical Results

Sub-Matrix: Water

(Matrix: Water)

					Client sample ID	SW 1	SW 3	SW 4	SW 5	SW 6
					Client sampling date / time	17-Oct-2024 13:20	17-Oct-2024 14:15	17-Oct-2024 14:45	17-Oct-2024 14:00	17-Oct-2024 15:45
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-011	HA2402608-012	HA2402608-013	HA2402608-014	HA2402608-015	
					Result	Result	Result	Result	Result	Result
Ion Balance										
Anion sum	----	EC101A/WT	0.10	meq/L	4.37	3.76	3.22	3.73	3.40	
Cation sum (total)	----	EC101A/WT	0.10	meq/L	4.54	3.80	3.26	3.91	3.54	
Ion balance (cations/anions)	----	EC101A/WT	0.01	%	104	101	101	105	104	
Total Metals										
Aluminum, total	7429-90-5	E420/WT	0.0030	mg/L	0.0262	0.0102	0.0109	0.0165	0.0122	
Antimony, total	7440-36-0	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Arsenic, total	7440-38-2	E420/WT	0.00010	mg/L	0.00011	0.00014	0.00013	0.00013	0.00013	
Barium, total	7440-39-3	E420/WT	0.00010	mg/L	0.0151	0.00811	0.00959	0.0108	0.00747	
Beryllium, total	7440-41-7	E420/WT	0.000020	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	
Bismuth, total	7440-69-9	E420/WT	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Boron, total	7440-42-8	E420/WT	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	
Cadmium, total	7440-43-9	E420/WT	0.0000050	mg/L	0.0000071	<0.0000050	<0.0000050	<0.0000050	0.0000056	
Calcium, total	7440-70-2	E420/WT	0.100	mg/L	52.0	41.4	31.3	44.0	37.5	
Cesium, total	7440-46-2	E420/WT	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	
Chromium, total	7440-47-3	E420/WT	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Cobalt, total	7440-48-4	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	
Copper, total	7440-50-8	E420/WT	0.00050	mg/L	0.00099	0.00084	<0.00050	0.00091	<0.00050	
Iron, total	7439-89-6	E420/WT	0.010	mg/L	0.025	0.056	0.132	0.036	0.296	
Lead, total	7439-92-1	E420/WT	0.000050	mg/L	<0.000050	<0.000050	<0.000050	0.000063	<0.000050	
Lithium, total	7439-93-2	E420/WT	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Magnesium, total	7439-95-4	E420/WT	0.0050	mg/L	18.2	14.6	11.4	14.6	13.1	



Analytical Results

Sub-Matrix: Water

(Matrix: Water)

					Client sample ID	SW 1	SW 3	SW 4	SW 5	SW 6
					Client sampling date / time	17-Oct-2024 13:20	17-Oct-2024 14:15	17-Oct-2024 14:45	17-Oct-2024 14:00	17-Oct-2024 15:45
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-011	HA2402608-012	HA2402608-013	HA2402608-014	HA2402608-015	
					Result	Result	Result	Result	Result	Result
Total Metals										
Manganese, total	7439-96-5	E420/WT	0.00010	mg/L	0.00706	0.0199	0.0466	0.00439	0.164	
Mercury, total	7439-97-6	E508/WT	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Molybdenum, total	7439-98-7	E420/WT	0.000050	mg/L	0.000306	0.000514	0.000442	0.000580	0.000653	
Nickel, total	7440-02-0	E420/WT	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Phosphorus, total	7723-14-0	E420/WT	0.050	mg/L	0.151	<0.050	<0.050	<0.050	<0.050	
Potassium, total	7440-09-7	E420/WT	0.050	mg/L	0.958	1.12	0.796	1.22	1.18	
Rubidium, total	7440-17-7	E420/WT	0.00020	mg/L	0.00223	0.00217	0.00140	0.00218	0.00229	
Selenium, total	7782-49-2	E420/WT	0.000050	mg/L	<0.000050	<0.000050	0.000066	<0.000050	0.000054	
Silicon (as SiO ₂), total	7631-86-9	EC420.SiO ₂ /WT	0.25	mg/L	7.25	6.57	5.99	6.22	6.54	
Silicon, total	7440-21-3	E420/WT	0.10	mg/L	3.39	3.07	2.80	2.91	3.06	
Silver, total	7440-22-4	E420/WT	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium, total	7440-23-5	E420/WT	0.050	mg/L	9.63	11.4	16.9	11.0	12.4	
Strontium, total	7440-24-6	E420/WT	0.00020	mg/L	0.0876	0.0572	0.0442	0.0580	0.0464	
Sulfur, total	7704-34-9	E420/WT	0.50	mg/L	6.03	6.40	4.94	6.99	5.14	
Tellurium, total	13494-80-9	E420/WT	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
Thallium, total	7440-28-0	E420/WT	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Thorium, total	7440-29-1	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Tin, total	7440-31-5	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Titanium, total	7440-32-6	E420/WT	0.00030	mg/L	<0.00050 ^{DLUI}	<0.00030	<0.00030	<0.00080 ^{DLUI}	<0.00040 ^{DLUI}	
Tungsten, total	7440-33-7	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Uranium, total	7440-61-1	E420/WT	0.000010	mg/L	0.00147	0.00254	0.00229	0.00291	0.00349	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	SW 1	SW 3	SW 4	SW 5	SW 6
					Client sampling date / time	17-Oct-2024 13:20	17-Oct-2024 14:15	17-Oct-2024 14:45	17-Oct-2024 14:00	17-Oct-2024 15:45
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-011	HA2402608-012	HA2402608-013	HA2402608-014	HA2402608-015
						Result	Result	Result	Result	Result
Total Metals										
Vanadium, total	7440-62-2	E420/WT	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc, total	7440-66-6	E420/WT	0.0030	mg/L		0.0038	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium, total	7440-67-7	E420/WT	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	SW 7	SW 8	SW 9	SW 10	QAQC 03
					Client sampling date / time	17-Oct-2024 15:00	17-Oct-2024 14:30	17-Oct-2024 16:00	17-Oct-2024 12:50	17-Oct-2024 14:45
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-016	HA2402608-017	HA2402608-018	HA2402608-019	HA2402608-020
						Result	Result	Result	Result	Result
Physical Tests										
Alkalinity, bicarbonate (as HCO ₃)	71-52-3	E290/WT	1.0	mg/L		130	192	135	109	147
Alkalinity, carbonate (as CO ₃)	3812-32-6	E290/WT	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, hydroxide (as OH)	14280-30-9	E290/WT	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, total (as CaCO ₃)	----	E290/WT	1.0	mg/L		106	157	111	89.3	120
Colour, apparent	----	E330/WT	2.0	CU		4.6	73.8	<2.0	8.0	5.7
Conductivity	----	E100/WT	1.0	µS/cm		317	373	333	256	338
Hardness (as CaCO ₃), from total Ca/Mg	----	EC100A/WT	0.50	mg/L		125	177	125	108	145
Langelier index (@ 20°C)	----	EC105A/WT	0.010	-		-0.392	-0.034	0.061	-0.473	0.389
Langelier index (@ 4°C)	----	EC105A/WT	0.010	-		-0.643	-0.285	-0.188	-0.724	0.142
pH	----	E108/HA	0.10	pH units		7.46	7.50	7.90	7.50	8.14
pH, saturation (@ 20°C)	----	EC105A/WT	0.010	pH units		7.85	7.53	7.84	7.97	7.75



Analytical Results

Sub-Matrix: Water

(Matrix: Water)

					Client sample ID	SW 7	SW 8	SW 9	SW 10	QAQC 03
					Client sampling date / time	17-Oct-2024 15:00	17-Oct-2024 14:30	17-Oct-2024 16:00	17-Oct-2024 12:50	17-Oct-2024 14:45
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-016	HA2402608-017	HA2402608-018	HA2402608-019	HA2402608-020	
					Result	Result	Result	Result	Result	
Physical Tests										
pH, saturation (@ 4°C)	----	EC105A/WT	0.010	pH units	8.10	7.78	8.09	8.22	8.00	
Solids, total dissolved [TDS]	----	E162/HA	10	mg/L	166	209	188	148	195	
Turbidity	----	E121/WT	0.10	NTU	0.25	11.8	0.13	0.26	0.19	
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L	0.0113	0.0233	0.0212	0.0124	0.0079	
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L	26.0	19.8	29.9	18.0	25.4	
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L	0.041	0.053	0.053	0.026	0.037	
Nitrate (as N)	14797-55-8	E235.NO3/WT	0.020	mg/L	0.126	<0.020	0.181	0.207	0.092	
Nitrate + Nitrite (as N)	----	EC235.N+N/W T	0.0032	mg/L	0.126	<0.0224	0.181	0.207	0.103	
Nitrite (as N)	14797-65-0	E235.NO2/WT	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	0.011	
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L	13.9	7.10	13.6	12.3	13.9	
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	----	E355-L/WT	0.50	mg/L	1.50	9.11	1.28	2.86	1.98	
Ion Balance										
Anion sum	----	EC101A/WT	0.10	meq/L	3.15	3.85	3.36	2.56	3.41	
Cation sum (total)	----	EC101A/WT	0.10	meq/L	3.25	4.42	3.50	2.67	3.47	
Ion balance (cations/anions)	----	EC101A/WT	0.01	%	103	115	104	104	102	
Total Metals										
Aluminum, total	7429-90-5	E420/WT	0.0030	mg/L	0.0143	0.361	0.0117	0.0195	0.0085	
Antimony, total	7440-36-0	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	SW 7	SW 8	SW 9	SW 10	QAQC 03
					Client sampling date / time	17-Oct-2024 15:00	17-Oct-2024 14:30	17-Oct-2024 16:00	17-Oct-2024 12:50	17-Oct-2024 14:45
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-016	HA2402608-017	HA2402608-018	HA2402608-019	HA2402608-020
						Result	Result	Result	Result	Result
Total Metals										
Arsenic, total	7440-38-2	E420/WT	0.00010	mg/L		0.00013	0.00043	0.00026	<0.00010	0.00011
Barium, total	7440-39-3	E420/WT	0.00010	mg/L		0.00949	0.0194	0.0150	0.00657	0.00719
Beryllium, total	7440-41-7	E420/WT	0.000020	mg/L		<0.000020	0.000025	<0.000020	<0.000020	<0.000020
Bismuth, total	7440-69-9	E420/WT	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron, total	7440-42-8	E420/WT	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium, total	7440-43-9	E420/WT	0.0000050	mg/L		<0.0000050	0.0000203	<0.0000050	0.0000161	<0.0000050
Calcium, total	7440-70-2	E420/WT	0.100	mg/L		31.5	45.9	31.8	27.8	36.5
Cesium, total	7440-46-2	E420/WT	0.000010	mg/L		<0.000010	0.000064	<0.000010	<0.000010	0.000010
Chromium, total	7440-47-3	E420/WT	0.00050	mg/L		<0.00050	0.00064	<0.00050	<0.00050	<0.00050
Cobalt, total	7440-48-4	E420/WT	0.00010	mg/L		<0.00010	0.00057	<0.00010	<0.00010	0.00013
Copper, total	7440-50-8	E420/WT	0.00050	mg/L		<0.00050	0.00229	<0.00050	0.00057	<0.00050
Iron, total	7439-89-6	E420/WT	0.010	mg/L		0.115	7.22	0.014	0.013	0.262
Lead, total	7439-92-1	E420/WT	0.000050	mg/L		<0.000050	0.000975	<0.000050	0.000090	<0.000050
Lithium, total	7439-93-2	E420/WT	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium, total	7439-95-4	E420/WT	0.0050	mg/L		11.3	15.1	11.0	9.38	13.0
Manganese, total	7439-96-5	E420/WT	0.00010	mg/L		0.0420	1.15	0.00539	0.00276	0.151
Mercury, total	7439-97-6	E508/WT	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum, total	7439-98-7	E420/WT	0.000050	mg/L		0.000444	0.000314	0.000424	0.000502	0.000667
Nickel, total	7440-02-0	E420/WT	0.00050	mg/L		<0.00050	0.00054	<0.00050	<0.00050	<0.00050
Phosphorus, total	7723-14-0	E420/WT	0.050	mg/L		<0.050	0.050	<0.050	<0.050	<0.050
Potassium, total	7440-09-7	E420/WT	0.050	mg/L		0.800	0.974	0.779	0.758	1.16



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	SW 7	SW 8	SW 9	SW 10	QAQC 03
					Client sampling date / time	17-Oct-2024 15:00	17-Oct-2024 14:30	17-Oct-2024 16:00	17-Oct-2024 12:50	17-Oct-2024 14:45
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-016	HA2402608-017	HA2402608-018	HA2402608-019	HA2402608-020
						Result	Result	Result	Result	Result
Total Metals										
Rubidium, total	7440-17-7	E420/WT	0.00020	mg/L		0.00153	0.00219	0.00137	0.00155	0.00232
Selenium, total	7782-49-2	E420/WT	0.000050	mg/L		0.000080	0.000082	0.000082	0.000060	0.000054
Silicon (as SiO ₂), total	7631-86-9	EC420.SiO ₂ /WT	0.25	mg/L		6.07	9.50	6.29	6.03	6.54
Silicon, total	7440-21-3	E420/WT	0.10	mg/L		2.84	4.44	2.94	2.82	3.06
Silver, total	7440-22-4	E420/WT	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium, total	7440-23-5	E420/WT	0.050	mg/L		16.6	12.0	22.7	11.2	12.3
Strontium, total	7440-24-6	E420/WT	0.00020	mg/L		0.0448	0.0601	0.0476	0.0403	0.0464
Sulfur, total	7704-34-9	E420/WT	0.50	mg/L		5.00	2.62	5.11	4.39	5.00
Tellurium, total	13494-80-9	E420/WT	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium, total	7440-28-0	E420/WT	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium, total	7440-29-1	E420/WT	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin, total	7440-31-5	E420/WT	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium, total	7440-32-6	E420/WT	0.00030	mg/L		<0.00050 ^{DLUI}	0.00912	<0.00040 ^{DLUI}	<0.00040 ^{DLUI}	<0.00030
Tungsten, total	7440-33-7	E420/WT	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium, total	7440-61-1	E420/WT	0.000010	mg/L		0.00239	0.00108	0.00217	0.00174	0.00356
Vanadium, total	7440-62-2	E420/WT	0.00050	mg/L		<0.00050	0.00140	0.00051	<0.00050	<0.00050
Zinc, total	7440-66-6	E420/WT	0.0030	mg/L		<0.0030	0.0058	<0.0030	0.0038	<0.0030
Zirconium, total	7440-67-7	E420/WT	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020

Please refer to the General Comments section for an explanation of any result qualifiers detected.



Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BH 7 0-0.15 m	BH 9 0-0.15 m	BH 12 0-0.15 m	BH 13 0-0.15 m	BH 14 0-0.15 m
Client sampling date / time					17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 10:35	17-Oct-2024 10:15	17-Oct-2024 11:10	
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-021	HA2402608-022	HA2402608-023	HA2402608-024	HA2402608-025	
					Result	Result	Result	Result	Result	
Physical Tests										
Conductivity (1:2 leachate)	----	E100-L/WT	0.00500	mS/cm	0.0945	0.229	----	----	----	
Moisture	----	E144/WT	0.25	%	----	----	35.4	28.1	15.7	
pH (1:2 soil:CaCl2-aq)	----	E108A/WT	0.10	pH units	7.86	7.17	----	----	----	
Particle Size										
Sand (>0.075mm)	----	E178/SK	1.0	%	----	----	----	64.8	----	
Fines (<0.075mm)	----	E178/SK	1.0	%	----	----	----	35.2	----	
Texture class	----	E178/SK	-	-	----	----	----	Coarse	----	
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg	8580	8180	17700	9680	13600	
Antimony	7440-36-0	E440/WT	0.10	mg/kg	<0.10	<0.10	0.17	<0.10	<0.10	
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	1.88	1.20	2.86	2.10	2.12	
Barium	7440-39-3	E440/WT	0.50	mg/kg	17.4	9.14	28.8	15.6	25.7	
Beryllium	7440-41-7	E440/WT	0.10	mg/kg	0.44	0.41	1.08	0.47	0.76	
Boron	7440-42-8	E440/WT	5.0	mg/kg	9.5	6.5	8.1	7.5	9.7	
Cadmium	7440-43-9	E440/WT	0.020	mg/kg	0.429	0.109	0.402	0.239	1.05	
Calcium, soluble ion content	7440-70-2	E484/WT	0.50	mg/L	1.32	----	----	----	----	
Chromium	7440-47-3	E440/WT	0.50	mg/kg	7.45	12.0	15.1	9.35	11.6	
Cobalt	7440-48-4	E440/WT	0.10	mg/kg	7.74	4.46	13.0	6.58	11.4	
Copper	7440-50-8	E440/WT	0.50	mg/kg	114	8.24	53.8	56.2	194	
Iron	7439-89-6	E440/WT	50	mg/kg	13300	7820	24300	13200	16000	
Lead	7439-92-1	E440/WT	0.50	mg/kg	23.5	7.08	26.2	20.2	50.0	



Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BH 7 0-0.15 m	BH 9 0-0.15 m	BH 12 0-0.15 m	BH 13 0-0.15 m	BH 14 0-0.15 m
Client sampling date / time					17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 10:35	17-Oct-2024 10:15	17-Oct-2024 11:10	
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-021	HA2402608-022	HA2402608-023	HA2402608-024	HA2402608-025	
					Result	Result	Result	Result	Result	
Metals										
Magnesium, soluble ion content	7439-95-4	E484/WT	0.50	mg/L	<0.50	----	----	----	----	
Manganese	7439-96-5	E440/WT	1.0	mg/kg	934	664	1390	869	1210	
Mercury	7439-97-6	E510/WT	0.0050	mg/kg	0.0189	<0.0050	0.0295	0.0135	0.0291	
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg	0.38	1.14	0.76	0.50	0.49	
Nickel	7440-02-0	E440/WT	0.50	mg/kg	8.83	8.26	18.0	8.17	15.1	
Selenium	7782-49-2	E440/WT	0.20	mg/kg	<0.20	<0.20	0.36	<0.20	<0.20	
Silver	7440-22-4	E440/WT	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	
Sodium, soluble ion content	17341-25-2	E484/WT	0.50	mg/L	<0.50	----	----	----	----	
Strontium	7440-24-6	E440/WT	0.50	mg/kg	108	64.1	35.9	78.0	102	
Sulfur	7704-34-9	E440/WT	1000	mg/kg	<1000	<1000	<1000	<1000	<1000	
Thallium	7440-28-0	E440/WT	0.050	mg/kg	0.095	0.096	0.140	0.078	0.141	
Tin	7440-31-5	E440/WT	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	
Uranium	7440-61-1	E440/WT	0.050	mg/kg	1.52	4.93	5.31	1.43	1.08	
Vanadium	7440-62-2	E440/WT	0.20	mg/kg	22.0	16.3	40.6	22.2	27.0	
Zinc	7440-66-6	E440/WT	2.0	mg/kg	141	51.4	87.4	94.5	253	
Sodium adsorption ratio [SAR]	----	E484/WT	0.10	-	<0.10	----	----	----	----	
Leachable Anions & Nutrients										
Chloride, soluble ion content	16887-00-6	E236.CI/WT	5.0	µg/g	<5.0	----	----	----	----	
Hydrocarbon Distribution of RBCA mTPH (Tier I) Fractions										
C6-C10 fraction of mTPH	n/a	EC581D/WT	1	%	----	----	<1	<1	<1	
>C10-C16 fraction of mTPH	n/a	EC581D/WT	1	%	----	----	<1	<1	<1	



Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BH 7 0-0.15 m	BH 9 0-0.15 m	BH 12 0-0.15 m	BH 13 0-0.15 m	BH 14 0-0.15 m
Client sampling date / time					17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 10:35	17-Oct-2024 10:15	17-Oct-2024 11:10	
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-021	HA2402608-022	HA2402608-023	HA2402608-024	HA2402608-025	
					Result	Result	Result	Result	Result	
Hydrocarbon Distribution of RBCA mTPH (Tier I) Fractions										
>C16-C21 fraction of mTPH	n/a	EC581D/WT	1	%	----	----	21	10	<1	
>C21-C32 fraction of mTPH	n/a	EC581D/WT	1	%	----	----	79	90	100	
Hydrocarbons										
Benzene	71-43-2	E611A/WT	0.0050	mg/kg	----	----	<0.0050	<0.0050	<0.0050	
Toluene	108-88-3	E611A/WT	0.050	mg/kg	----	----	<0.050	<0.050	<0.050	
Ethylbenzene	100-41-4	E611A/WT	0.015	mg/kg	----	----	<0.015	<0.015	<0.015	
Xylenes, total	1330-20-7	E611A/WT	0.050	mg/kg	----	----	<0.050	<0.050	<0.050	
Xylene, o-	95-47-6	E611A/WT	0.030	mg/kg	----	----	<0.030	<0.030	<0.030	
Xylene, m+p-	179601-23-1	E611A/WT	0.030	mg/kg	----	----	<0.030	<0.030	<0.030	
VPH C6-C10	n/a	E581.VPH/WT	5.0	mg/kg	----	----	<5.0	<5.0	<5.0	
VPH C6-C10 (less BTEX)	n/a	EC580C/WT	5.0	mg/kg	----	----	<5.0	<5.0	<5.0	
EPH >C10-C16	n/a	E601F/WT	5.0	mg/kg	----	----	<5.0	<5.0	<5.0	
EPH >C16-C21	n/a	E601F/WT	5.0	mg/kg	----	----	12.5	11.5	<5.0	
EPH >C21-C32	n/a	E601F/WT	5.0	mg/kg	----	----	46.0	108	29.2	
EPH >C34-C50	n/a	E601F/WT	20	mg/kg	----	----	86	138	50	
hydrocarbon resemblance	n/a	E601F/WT	-	none	----	----	LOF	LOF	LOF	
mTPH (Tier I)	n/a	EC581D/WT	10	mg/kg	----	----	58	120	29	
return to baseline at C32	n/a	E601F/WT	-	-	----	----	No	No	No	
TEH >C10-C32	n/a	E601F/WT	10	mg/kg	----	----	58	120	29	
Hydrocarbons Surrogates										
dotriacontane, n- (EPH)	n/a	E601F/WT	1.0	%	----	----	92.7	93.4	74.6	



Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

					Client sample ID	BH 7 0-0.15 m	BH 9 0-0.15 m	BH 12 0-0.15 m	BH 13 0-0.15 m	BH 14 0-0.15 m
					Client sampling date / time	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 10:35	17-Oct-2024 10:15	17-Oct-2024 11:10
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-021	HA2402608-022	HA2402608-023	HA2402608-024	HA2402608-025
						Result	Result	Result	Result	Result
Hydrocarbons Surrogates										
isobutylbenzene (EPH)	538-93-2	E601F/WT	1.0	%		----	----	112	94.0	116
isobutylbenzene (VPH)	538-93-2	E581.VPH/WT	1.0	%		----	----	85.9	85.1	89.3
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/WT	0.10	%		----	----	74.2	72.8	82.4
Difluorobenzene, 1,4-	540-36-3	E611A/WT	0.10	%		----	----	88.2	92.5	91.7
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A-L/WT	0.0050	mg/kg		----	----	----	<0.0050	----
Acenaphthylene	208-96-8	E641A-L/WT	0.0050	mg/kg		----	----	----	<0.0050	----
Acridine	260-94-6	E641A-L/WT	0.010	mg/kg		----	----	----	<0.010	----
Anthracene	120-12-7	E641A-L/WT	0.0040	mg/kg		----	----	----	<0.0040	----
Benz(a)anthracene	56-55-3	E641A-L/WT	0.010	mg/kg		----	----	----	<0.010	----
Benzo(a)pyrene	50-32-8	E641A-L/WT	0.010	mg/kg		----	----	----	<0.010	----
Benzo(b+j)fluoranthene	n/a	E641A-L/WT	0.010	mg/kg		----	----	----	<0.010	----
Benzo(b+j+k)fluoranthene	n/a	E641A-L/WT	0.015	mg/kg		----	----	----	<0.015	----
Benzo(g,h,i)perylene	191-24-2	E641A-L/WT	0.010	mg/kg		----	----	----	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A-L/WT	0.010	mg/kg		----	----	----	<0.010	----
Chrysene	218-01-9	E641A-L/WT	0.010	mg/kg		----	----	----	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A-L/WT	0.0050	mg/kg		----	----	----	<0.0050	----
Fluoranthene	206-44-0	E641A-L/WT	0.010	mg/kg		----	----	----	<0.010	----
Fluorene	86-73-7	E641A-L/WT	0.010	mg/kg		----	----	----	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L/WT	0.010	mg/kg		----	----	----	<0.010	----



Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

					Client sample ID	BH 7 0-0.15 m	BH 9 0-0.15 m	BH 12 0-0.15 m	BH 13 0-0.15 m	BH 14 0-0.15 m
					Client sampling date / time	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 10:35	17-Oct-2024 10:15	17-Oct-2024 11:10
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-021	HA2402608-022	HA2402608-023	HA2402608-024	HA2402608-025	
					Result	Result	Result	Result	Result	
Polycyclic Aromatic Hydrocarbons										
Methylnaphthalene, 1-	90-12-0	E641A-L/WT	0.010	mg/kg	----	----	----	<0.010	----	
Methylnaphthalene, 1+2-	----	E641A-L/WT	0.015	mg/kg	----	----	----	<0.015	----	
Methylnaphthalene, 2-	91-57-6	E641A-L/WT	0.010	mg/kg	----	----	----	<0.010	----	
Naphthalene	91-20-3	E641A-L/WT	0.010	mg/kg	----	----	----	<0.010	----	
Perylene	198-55-0	E641A-L/WT	0.010	mg/kg	----	----	----	<0.010	----	
Phenanthrene	85-01-8	E641A-L/WT	0.010	mg/kg	----	----	----	<0.010	----	
Pyrene	129-00-0	E641A-L/WT	0.010	mg/kg	----	----	----	<0.010	----	
Quinoline	91-22-5	E641A-L/WT	0.010	mg/kg	----	----	----	<0.010	----	
B(a)P total potency equivalents [B(a)P TPE]	----	E641A-L/WT	0.020	mg/kg	----	----	----	<0.020	----	
IACR (CCME)	----	E641A-L/WT	0.150	-	----	----	----	<0.150	----	
Polycyclic Aromatic Hydrocarbons Surrogates										
Acridine-d9	34749-75-2	E641A-L/WT	0.1	%	----	----	----	87.4	----	
Chrysene-d12	1719-03-5	E641A-L/WT	0.1	%	----	----	----	84.7	----	
Naphthalene-d8	1146-65-2	E641A-L/WT	0.1	%	----	----	----	92.5	----	
Phenanthrene-d10	1517-22-2	E641A-L/WT	0.1	%	----	----	----	91.3	----	
Polychlorinated Biphenyls										
Aroclor 1016	12674-11-2	E687/WT	0.010	mg/kg	----	----	----	----	<0.010	
Aroclor 1221	11104-28-2	E687/WT	0.010	mg/kg	----	----	----	----	<0.010	
Aroclor 1232	11141-16-5	E687/WT	0.010	mg/kg	----	----	----	----	<0.010	
Aroclor 1242	53469-21-9	E687/WT	0.010	mg/kg	----	----	----	----	<0.010	
Aroclor 1248	12672-29-6	E687/WT	0.010	mg/kg	----	----	----	----	<0.010	



Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

					Client sample ID	BH 7 0-0.15 m	BH 9 0-0.15 m	BH 12 0-0.15 m	BH 13 0-0.15 m	BH 14 0-0.15 m
					Client sampling date / time	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 10:35	17-Oct-2024 10:15	17-Oct-2024 11:10
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-021	HA2402608-022	HA2402608-023	HA2402608-024	HA2402608-025
						Result	Result	Result	Result	Result
Polychlorinated Biphenyls										
Aroclor 1254	11097-69-1	E687/WT	0.010	mg/kg		----	----	----	----	<0.010
Aroclor 1260	11096-82-5	E687/WT	0.010	mg/kg		----	----	----	----	<0.010
Aroclor 1262	37324-23-5	E687/WT	0.010	mg/kg		----	----	----	----	<0.010
Aroclor 1268	11100-14-4	E687/WT	0.010	mg/kg		----	----	----	----	<0.010
Polychlorinated biphenyls [PCBs], total	n/a	E687/WT	0.030	mg/kg		----	----	----	----	<0.030
Polychlorinated Biphenyls Surrogates										
Decachlorobiphenyl	2051-24-3	E687/WT	0.1	%		----	----	----	----	132
Tetrachloro-m-xylene	877-09-8	E687/WT	0.1	%		----	----	----	----	118

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

					Client sample ID	BH 15 0-0.15 m	BH 16 0-0.15 m	QAQC 02	BH 14 0.90 m	----
					Client sampling date / time	17-Oct-2024 11:30	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-026	HA2402608-027	HA2402608-028	HA2402608-029	----
						Result	Result	Result	Result	----
Physical Tests										
Conductivity (1:2 leachate)	----	E100-L/WT	0.00500	mS/cm		----	0.121	0.0944	----	----
Moisture	----	E144/WT	0.25	%		57.5	----	----	----	----
pH (1:2 soil:CaCl2-aq)	----	E108A/WT	0.10	pH units		----	7.22	7.89	----	----
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg		8200	15200	7150	16000	----
Antimony	7440-36-0	E440/WT	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	----
Arsenic	7440-38-2	E440/WT	0.10	mg/kg		1.66	2.03	1.65	2.56	----



Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BH 15 0-0.15 m	BH 16 0-0.15 m	QAQC 02	BH 14 0.90 m	----
					Client sampling date / time	17-Oct-2024 11:30	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-026	HA2402608-027	HA2402608-028	HA2402608-029	----	
					Result	Result	Result	Result	----	
Metals										
Barium	7440-39-3	E440/WT	0.50	mg/kg	18.1	17.3	15.6	29.5	----	
Beryllium	7440-41-7	E440/WT	0.10	mg/kg	0.40	0.95	0.34	0.70	----	
Boron	7440-42-8	E440/WT	5.0	mg/kg	10.7	6.8	8.1	10.3	----	
Cadmium	7440-43-9	E440/WT	0.020	mg/kg	0.414	0.155	0.358	1.16	----	
Calcium, soluble ion content	7440-70-2	E484/WT	0.50	mg/L	----	4.96	3.39	----	----	
Chromium	7440-47-3	E440/WT	0.50	mg/kg	7.08	9.71	6.54	14.2	----	
Cobalt	7440-48-4	E440/WT	0.10	mg/kg	7.24	8.68	6.60	16.4	----	
Copper	7440-50-8	E440/WT	0.50	mg/kg	106	24.5	99.2	360	----	
Iron	7439-89-6	E440/WT	50	mg/kg	10800	19600	9510	22700	----	
Lead	7439-92-1	E440/WT	0.50	mg/kg	20.8	9.48	22.6	84.6	----	
Magnesium, soluble ion content	7439-95-4	E484/WT	0.50	mg/L	----	2.67	0.73	----	----	
Manganese	7439-96-5	E440/WT	1.0	mg/kg	1020	686	870	1620	----	
Mercury	7439-97-6	E510/WT	0.0050	mg/kg	0.0165	0.0095	0.0167	0.0428	----	
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg	0.34	0.39	0.29	0.40	----	
Nickel	7440-02-0	E440/WT	0.50	mg/kg	8.15	10.4	7.40	22.0	----	
Selenium	7782-49-2	E440/WT	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	----	
Silver	7440-22-4	E440/WT	0.10	mg/kg	<0.10	<0.10	<0.10	0.14	----	
Sodium, soluble ion content	17341-25-2	E484/WT	0.50	mg/L	----	1.15	0.57	----	----	
Strontium	7440-24-6	E440/WT	0.50	mg/kg	109	52.2	97.2	94.2	----	
Sulfur	7704-34-9	E440/WT	1000	mg/kg	<1000	<1000	<1000	1600	----	
Thallium	7440-28-0	E440/WT	0.050	mg/kg	0.088	0.099	0.077	0.188	----	



Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

					Client sample ID	BH 15 0-0.15 m	BH 16 0-0.15 m	QAQC 02	BH 14 0.90 m	----
					Client sampling date / time	17-Oct-2024 11:30	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-026	HA2402608-027	HA2402608-028	HA2402608-029	----	----
					Result	Result	Result	Result	----	----
Metals										
Tin	7440-31-5	E440/WT	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	----	----
Uranium	7440-61-1	E440/WT	0.050	mg/kg	1.57	1.76	1.18	1.17	----	----
Vanadium	7440-62-2	E440/WT	0.20	mg/kg	19.4	35.6	18.1	33.4	----	----
Zinc	7440-66-6	E440/WT	2.0	mg/kg	139	57.5	127	467	----	----
Sodium adsorption ratio [SAR]	----	E484/WT	0.10	-	----	0.10	<0.10	----	----	----
Leachable Anions & Nutrients										
Chloride, soluble ion content	16887-00-6	E236.Cl/WT	5.0	µg/g	----	<5.0	<5.0	----	----	----
Hydrocarbon Distribution of RBCA mTPH (Tier I) Fractions										
C6-C10 fraction of mTPH	n/a	EC581D/WT	1	%	<1	----	----	----	----	----
>C10-C16 fraction of mTPH	n/a	EC581D/WT	1	%	<1	----	----	----	----	----
>C16-C21 fraction of mTPH	n/a	EC581D/WT	1	%	8	----	----	----	----	----
>C21-C32 fraction of mTPH	n/a	EC581D/WT	1	%	92	----	----	----	----	----
Hydrocarbons										
Benzene	71-43-2	E611A/WT	0.0050	mg/kg	<0.0088 ^{DLHM}	----	----	----	----	----
Toluene	108-88-3	E611A/WT	0.050	mg/kg	<0.050	----	----	----	----	----
Ethylbenzene	100-41-4	E611A/WT	0.015	mg/kg	<0.022 ^{DLHM}	----	----	----	----	----
Xylenes, total	1330-20-7	E611A/WT	0.050	mg/kg	<0.050	----	----	----	----	----
Xylene, o-	95-47-6	E611A/WT	0.030	mg/kg	<0.030	----	----	----	----	----
Xylene, m+p-	179601-23-1	E611A/WT	0.030	mg/kg	<0.033 ^{DLHM}	----	----	----	----	----
VPH C6-C10	n/a	E581.VPH/WT	5.0	mg/kg	<5.0	----	----	----	----	----
VPH C6-C10 (less BTEX)	n/a	EC580C/WT	5.0	mg/kg	<5.0	----	----	----	----	----



Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

					Client sample ID	BH 15 0-0.15 m	BH 16 0-0.15 m	QAQC 02	BH 14 0.90 m	----
					Client sampling date / time	17-Oct-2024 11:30	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2402608-026	HA2402608-027	HA2402608-028	HA2402608-029	----
						Result	Result	Result	Result	----
Hydrocarbons										
EPH >C10-C16	n/a	E601F/WT	5.0	mg/kg		<5.0	----	----	----	----
EPH >C16-C21	n/a	E601F/WT	5.0	mg/kg		8.6	----	----	----	----
EPH >C21-C32	n/a	E601F/WT	5.0	mg/kg		95.3	----	----	----	----
EPH >C34-C50	n/a	E601F/WT	20	mg/kg		106	----	----	----	----
hydrocarbon resemblance	n/a	E601F/WT	-	none		LOF	----	----	----	----
mTPH (Tier I)	n/a	EC581D/WT	10	mg/kg		104	----	----	----	----
return to baseline at C32	n/a	E601F/WT	-	-		No	----	----	----	----
TEH >C10-C32	n/a	E601F/WT	10	mg/kg		104	----	----	----	----
Hydrocarbons Surrogates										
dotriacontane, n- (EPH)	n/a	E601F/WT	1.0	%		61.0	----	----	----	----
isobutylbenzene (EPH)	538-93-2	E601F/WT	1.0	%		93.9	----	----	----	----
isobutylbenzene (VPH)	538-93-2	E581.VPH/WT	1.0	%		81.3	----	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/WT	0.10	%		73.2	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/WT	0.10	%		84.6	----	----	----	----
Polychlorinated Biphenyls										
Aroclor 1016	12674-11-2	E687/WT	0.010	mg/kg		<0.010	----	----	----	----
Aroclor 1221	11104-28-2	E687/WT	0.010	mg/kg		<0.010	----	----	----	----
Aroclor 1232	11141-16-5	E687/WT	0.010	mg/kg		<0.010	----	----	----	----
Aroclor 1242	53469-21-9	E687/WT	0.010	mg/kg		<0.010	----	----	----	----
Aroclor 1248	12672-29-6	E687/WT	0.010	mg/kg		<0.010	----	----	----	----



Analytical Results

Sub-Matrix: Soil
 (Matrix: Soil/Solid)

					Client sample ID	BH 15 0-0.15 m	BH 16 0-0.15 m	QAQC 02	BH 14 0.90 m	----
					Client sampling date / time	17-Oct-2024 11:30	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2402608-026	HA2402608-027	HA2402608-028	HA2402608-029	----	----
					Result	Result	Result	Result	----	----
Polychlorinated Biphenyls										
Aroclor 1254	11097-69-1	E687/WT	0.010	mg/kg	<0.010	----	----	----	----	----
Aroclor 1260	11096-82-5	E687/WT	0.010	mg/kg	<0.010	----	----	----	----	----
Aroclor 1262	37324-23-5	E687/WT	0.010	mg/kg	<0.010	----	----	----	----	----
Aroclor 1268	11100-14-4	E687/WT	0.010	mg/kg	<0.010	----	----	----	----	----
Polychlorinated biphenyls [PCBs], total	n/a	E687/WT	0.030	mg/kg	<0.030	----	----	----	----	----
Polychlorinated Biphenyls Surrogates										
Decachlorobiphenyl	2051-24-3	E687/WT	0.1	%	135	----	----	----	----	----
Tetrachloro-m-xylene	877-09-8	E687/WT	0.1	%	110	----	----	----	----	----
Radiological Parameters										
Gross alpha	12587-46-1	GROSS A/B/3S	111	Bq/kg	----	See attached	----	----	----	----
Gross beta	12587-47-2	GROSS A/B/3S	148	Bq/kg	----	See attached	----	----	----	----
Radium-226	13982-63-3	GRT2N/3S	37	Bq/kg	----	see attached	----	----	----	----
Thorium-228	14274-82-9	GRT2N/3S	3.7	Bq/kg	----	see attached	----	----	----	----
Radium-228	15262-20-1	GRT2N/3S	3.7	Bq/kg	----	see attached	----	----	----	----
Lead-210	14255-04-0	GRT2N/3S	185	Bq/kg	----	see attached	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: HA2402608	Page	: 1 of 42
Amendment	: 4		
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Nadine Wambolt	Account Manager	: Andrew Martin
Address	: 137 Chain Lake Drive Halifax NS Canada B3S 1B3	Address	: 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2
Telephone	: 902.562.9880 ext. 5206	Telephone	: +1 902 707 4888
Project	: 24-8606	Date Samples Received	: 18-Oct-2024 16:00
PO	: ----	Issue Date	: 10-Feb-2025 09:59
C-O-C number	: ----		
Sampler	: Manpreet Kaur		
Site	:		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 29		
No. of samples analysed	: 29		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: Soil/Solid

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	HA2402608-001	SED 1	Copper	7440-50-8	E440	65.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	HA2402608-029	BH 14 0.90 m	Copper	7440-50-8	E440	34.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	HA2402608-001	SED 1	Molybdenum	7439-98-7	E440	62.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	HA2402608-001	SED 1	Uranium	7440-61-1	E440	50.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier Description

DUP-H Duplicate results outside ALS DQO, due to sample heterogeneity.

Laboratory Control Sample (LCS) Recoveries

Metals	QC-MRG2-1829587 002	----	Silver	7440-22-4	E440	63.4 % RRQC	80.0-120%	Recovery less than lower control limit

Result Qualifiers

Qualifier Description

RRQC Refer to report comments for information regarding this QC result.

Matrix: Water

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Total Metals	QC-1724407-001	----	Magnesium, total	7439-95-4	E420	0.0073 ^B mg/L	0.005 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier Description

B Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Hydrocarbons : EPH in Soil/Solid by GC-FID (RBCA)										
Glass soil jar/Teflon lined cap SED 7	E601F	17-Oct-2024	24-Oct-2024	14 days	6 days	✓	28-Oct-2024	40 days	4 days	✓
Hydrocarbons : EPH in Soil/Solid by GC-FID (RBCA)										
Glass soil jar/Teflon lined cap BH 12 0-0.15 m	E601F	17-Oct-2024	24-Oct-2024	14 days	7 days	✓	28-Oct-2024	40 days	4 days	✓
Hydrocarbons : EPH in Soil/Solid by GC-FID (RBCA)										
Glass soil jar/Teflon lined cap BH 13 0-0.15 m	E601F	17-Oct-2024	24-Oct-2024	14 days	7 days	✓	28-Oct-2024	40 days	4 days	✓
Hydrocarbons : EPH in Soil/Solid by GC-FID (RBCA)										
Glass soil jar/Teflon lined cap BH 14 0-0.15 m	E601F	17-Oct-2024	24-Oct-2024	14 days	7 days	✓	28-Oct-2024	40 days	4 days	✓
Hydrocarbons : EPH in Soil/Solid by GC-FID (RBCA)										
Glass soil jar/Teflon lined cap BH 15 0-0.15 m	E601F	17-Oct-2024	24-Oct-2024	14 days	7 days	✓	28-Oct-2024	40 days	4 days	✓
Hydrocarbons : VPH by Headspace GC-FID (Tier I RBCA)										
Glass soil methanol vial BH 14 0-0.15 m	E581.VPH	17-Oct-2024	24-Oct-2024	40 days	7 days	✓	24-Oct-2024	40 days	7 days	✓
Hydrocarbons : VPH by Headspace GC-FID (Tier I RBCA)										
Glass soil methanol vial BH 15 0-0.15 m	E581.VPH	17-Oct-2024	24-Oct-2024	40 days	7 days	✓	24-Oct-2024	40 days	7 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Hydrocarbons : VPH by Headspace GC-FID (Tier I RBCA)										
Glass soil methanol vial SED 7	E581.VPH	17-Oct-2024	24-Oct-2024	40 days	7 days	✓	24-Oct-2024	40 days	7 days	✓
Hydrocarbons : VPH by Headspace GC-FID (Tier I RBCA)										
Glass soil methanol vial BH 12 0-0.15 m	E581.VPH	17-Oct-2024	24-Oct-2024	40 days	7 days	✓	24-Oct-2024	40 days	8 days	✓
Hydrocarbons : VPH by Headspace GC-FID (Tier I RBCA)										
Glass soil methanol vial BH 13 0-0.15 m	E581.VPH	17-Oct-2024	24-Oct-2024	40 days	7 days	✓	24-Oct-2024	40 days	8 days	✓
Leachable Anions & Nutrients : Water Extractable Chloride by IC										
Glass soil jar/Teflon lined cap BH 16 0-0.15 m	E236.Cl	17-Oct-2024	28-Oct-2024	30 days	11 days	✓	29-Oct-2024	28 days	1 days	✓
Leachable Anions & Nutrients : Water Extractable Chloride by IC										
Glass soil jar/Teflon lined cap QAQC 04	E236.Cl	17-Oct-2024	28-Oct-2024	30 days	11 days	✓	29-Oct-2024	28 days	1 days	✓
Leachable Anions & Nutrients : Water Extractable Chloride by IC										
Glass soil jar/Teflon lined cap SED 10	E236.Cl	17-Oct-2024	28-Oct-2024	30 days	11 days	✓	29-Oct-2024	28 days	1 days	✓
Leachable Anions & Nutrients : Water Extractable Chloride by IC										
Glass soil jar/Teflon lined cap SED 3	E236.Cl	17-Oct-2024	28-Oct-2024	30 days	11 days	✓	29-Oct-2024	28 days	1 days	✓
Leachable Anions & Nutrients : Water Extractable Chloride by IC										
Glass soil jar/Teflon lined cap BH 7 0-0.15 m	E236.Cl	17-Oct-2024	28-Oct-2024	30 days	12 days	✓	29-Oct-2024	28 days	1 days	✓
Leachable Anions & Nutrients : Water Extractable Chloride by IC										
Glass soil jar/Teflon lined cap QAQC 02	E236.Cl	17-Oct-2024	28-Oct-2024	30 days	12 days	✓	29-Oct-2024	28 days	1 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH 14 0.90 m	E510	17-Oct-2024	04-Jan-2025	28 days	79 days	✖ EHT	07-Jan-2025	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH 12 0-0.15 m	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH 14 0-0.15 m	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH 15 0-0.15 m	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH 16 0-0.15 m	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap QAQC 04	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap SED 1	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap SED 10	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap SED 3	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap SED 4	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap SED 5	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap SED 6	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap SED 7	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap SED 8	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap SED 9	E510	17-Oct-2024	25-Oct-2024	28 days	8 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH 13 0-0.15 m	E510	17-Oct-2024	25-Oct-2024	28 days	9 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH 7 0-0.15 m	E510	17-Oct-2024	25-Oct-2024	28 days	9 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH 9 0-0.15 m	E510	17-Oct-2024	25-Oct-2024	28 days	9 days	✓	28-Oct-2024	28 days	2 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap QAQC 02	E510	17-Oct-2024	25-Oct-2024	28 days	9 days	✓	28-Oct-2024	28 days	2 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH 14 0.90 m	E440	17-Oct-2024	04-Jan-2025	180 days	79 days	✓	07-Jan-2025	180 days	83 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH 12 0-0.15 m	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH 14 0-0.15 m	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH 15 0-0.15 m	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH 16 0-0.15 m	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap QAQC 04	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED 1	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED 10	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED 3	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED 4	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED 5	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED 6	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED 7	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED 8	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED 9	E440	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH 7 0-0.15 m	E440	17-Oct-2024	25-Oct-2024	180 days	9 days	✓	26-Oct-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH 9 0-0.15 m	E440	17-Oct-2024	25-Oct-2024	180 days	9 days	✓	26-Oct-2024	180 days	10 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap QAQC 02	E440	17-Oct-2024	25-Oct-2024	180 days	9 days	✓	26-Oct-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH 13 0-0.15 m	E440	17-Oct-2024	25-Oct-2024	180 days	9 days	✓	26-Oct-2024	180 days	9 days	✓
Metals : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap BH 16 0-0.15 m	E484	17-Oct-2024	13-Dec-2024	180 days	57 days	✓	15-Dec-2024	180 days	2 days	✓
Metals : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap QAQC 02	E484	17-Oct-2024	13-Dec-2024	180 days	58 days	✓	15-Dec-2024	180 days	2 days	✓
Metals : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap QAQC 04	E484	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	28-Oct-2024	180 days	3 days	✓
Metals : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap SED 10	E484	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	28-Oct-2024	180 days	3 days	✓
Metals : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap SED 3	E484	17-Oct-2024	25-Oct-2024	180 days	8 days	✓	28-Oct-2024	180 days	3 days	✓
Metals : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap BH 7 0-0.15 m	E484	17-Oct-2024	25-Oct-2024	180 days	9 days	✓	28-Oct-2024	180 days	3 days	✓
Particle Size : CCME fine/coarse Particle Size Analysis by wet sieve										
Glass soil jar/Teflon lined cap BH 13 0-0.15 m	E178	17-Oct-2024	----	----	----		24-Oct-2024	180 days	7 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap BH 16 0-0.15 m	E100-L	17-Oct-2024	25-Oct-2024	30 days	8 days	✓	28-Oct-2024	30 days	11 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap QAQC 04	E100-L	17-Oct-2024	25-Oct-2024	30 days	8 days	✓	28-Oct-2024	30 days	11 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap SED 10	E100-L	17-Oct-2024	25-Oct-2024	30 days	8 days	✓	28-Oct-2024	30 days	11 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap SED 3	E100-L	17-Oct-2024	25-Oct-2024	30 days	8 days	✓	28-Oct-2024	30 days	11 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap BH 7 0-0.15 m	E100-L	17-Oct-2024	25-Oct-2024	30 days	9 days	✓	28-Oct-2024	30 days	11 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap BH 9 0-0.15 m	E100-L	17-Oct-2024	25-Oct-2024	30 days	9 days	✓	28-Oct-2024	30 days	11 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap QAQC 02	E100-L	17-Oct-2024	25-Oct-2024	30 days	9 days	✓	28-Oct-2024	30 days	11 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap SED 3	E144	17-Oct-2024	----	----	----		23-Oct-2024	----	5 days	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap SED 7	E144	17-Oct-2024	----	----	----		23-Oct-2024	----	5 days	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap BH 12 0-0.15 m	E144	17-Oct-2024	----	----	----		23-Oct-2024	----	6 days	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap BH 13 0-0.15 m	E144	17-Oct-2024	----	----	----		23-Oct-2024	----	6 days	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap BH 14 0-0.15 m	E144	17-Oct-2024	----	----	----		23-Oct-2024	----	6 days	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap BH 15 0-0.15 m	E144	17-Oct-2024	----	----	----		23-Oct-2024	----	6 days	
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH 16 0-0.15 m	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap QAQC 04	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap SED 1	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap SED 10	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap SED 3	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap SED 4	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap SED 5	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap SED 6	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap SED 7	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap SED 8	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap SED 9	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH 7 0-0.15 m	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH 9 0-0.15 m	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap QAQC 02	E108A	17-Oct-2024	23-Oct-2024	30 days	6 days	✓	25-Oct-2024	30 days	9 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Polychlorinated Biphenyls : PCB Aroclors by GC-MS										
Glass soil jar/Teflon lined cap BH 14 0-0.15 m	E687	17-Oct-2024	22-Oct-2024	365 days	5 days	✓	24-Oct-2024	40 days	2 days	✓
Polychlorinated Biphenyls : PCB Aroclors by GC-MS										
Glass soil jar/Teflon lined cap BH 15 0-0.15 m	E687	17-Oct-2024	22-Oct-2024	365 days	5 days	✓	24-Oct-2024	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs in Soil/solid by Hex:Ace GC-MS (Low Level CCME)										
Glass soil jar/Teflon lined cap BH 13 0-0.15 m	E641A-L	17-Oct-2024	23-Oct-2024	14 days	6 days	✓	24-Oct-2024	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs in Soil/solid by Hex:Ace GC-MS (Low Level CCME)										
Glass soil jar/Teflon lined cap SED 3	E641A-L	17-Oct-2024	23-Oct-2024	14 days	6 days	✓	24-Oct-2024	40 days	1 days	✓
Radiological Parameters : GEL Radiologicals Tier 2 Natural Package in Soil										
Glass soil jar/Teflon lined cap BH 16 0-0.15 m	GRT2N	17-Oct-2024	----	----	----		03-Feb-2025	----	109 days	
Radiological Parameters : Gross Alpha/Beta in Soil/Solid by GFPC										
Glass soil jar/Teflon lined cap BH 16 0-0.15 m	GROSS A/B	17-Oct-2024	----	----	----		30-Oct-2024	----	13 days	
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial BH 14 0-0.15 m	E611A	17-Oct-2024	24-Oct-2024	40 days	7 days	✓	24-Oct-2024	40 days	7 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial BH 15 0-0.15 m	E611A	17-Oct-2024	24-Oct-2024	40 days	7 days	✓	24-Oct-2024	40 days	7 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial SED 7	E611A	17-Oct-2024	24-Oct-2024	40 days	7 days	✓	24-Oct-2024	40 days	7 days	✓



Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial BH 12 0-0.15 m	E611A	17-Oct-2024	24-Oct-2024	40 days	7 days	✓	24-Oct-2024	40 days	8 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial BH 13 0-0.15 m	E611A	17-Oct-2024	24-Oct-2024	40 days	7 days	✓	24-Oct-2024	40 days	8 days	✓

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) QAQC 03	E298	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW 1	E298	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW 10	E298	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW 3	E298	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW 4	E298	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW 5	E298	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW 6	E298	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW 7	E298	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW 8	E298	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW 9	E298	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QAQC 03	E235.Cl	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW 1	E235.Cl	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW 10	E235.Cl	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW 3	E235.Cl	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW 4	E235.Cl	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Chloride in Water by IC										
HDPE SW 5	E235.Cl	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW 6	E235.Cl	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW 7	E235.Cl	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW 8	E235.Cl	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW 9	E235.Cl	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE QAQC 03	E378-U	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW 1	E378-U	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW 10	E378-U	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW 3	E378-U	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW 4	E378-U	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW 5	E378-U	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW 6	E378-U	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW 7	E378-U	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW 8	E378-U	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW 9	E378-U	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE QAQC 03	E235.F	17-Oct-2024	22-Oct-2024	28 days	5 days	✔	23-Oct-2024	28 days	6 days	✔
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW 1	E235.F	17-Oct-2024	22-Oct-2024	28 days	5 days	✔	23-Oct-2024	28 days	6 days	✔
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW 10	E235.F	17-Oct-2024	22-Oct-2024	28 days	5 days	✔	23-Oct-2024	28 days	6 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW 3	E235.F	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW 4	E235.F	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW 5	E235.F	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW 6	E235.F	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW 7	E235.F	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW 8	E235.F	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW 9	E235.F	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE QAQC 03	E235.NO3	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW 1	E235.NO3	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT



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Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW 10	E235.NO3	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW 3	E235.NO3	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW 4	E235.NO3	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW 5	E235.NO3	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW 6	E235.NO3	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW 7	E235.NO3	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW 8	E235.NO3	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW 9	E235.NO3	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE QAQC 03	E235.NO2	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW 1	E235.NO2	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW 10	E235.NO2	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW 3	E235.NO2	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW 4	E235.NO2	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW 5	E235.NO2	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW 6	E235.NO2	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW 7	E235.NO2	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW 8	E235.NO2	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW 9	E235.NO2	17-Oct-2024	22-Oct-2024	3 days	5 days	✖ EHT	23-Oct-2024	3 days	6 days	✖ EHT



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Sulfate in Water by IC										
HDPE QAQC 03	E235.SO4	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW 1	E235.SO4	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW 10	E235.SO4	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW 3	E235.SO4	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW 4	E235.SO4	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW 5	E235.SO4	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW 6	E235.SO4	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW 7	E235.SO4	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW 8	E235.SO4	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW 9	E235.SO4	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) QAQC 03	E355-L	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW 1	E355-L	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW 10	E355-L	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW 3	E355-L	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW 4	E355-L	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW 5	E355-L	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW 6	E355-L	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW 7	E355-L	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW 8	E355-L	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW 9	E355-L	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QAQC 03	E290	17-Oct-2024	22-Oct-2024	14 days	5 days	✓	23-Oct-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW 1	E290	17-Oct-2024	22-Oct-2024	14 days	5 days	✓	23-Oct-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW 10	E290	17-Oct-2024	22-Oct-2024	14 days	5 days	✓	23-Oct-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW 3	E290	17-Oct-2024	22-Oct-2024	14 days	5 days	✓	23-Oct-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW 4	E290	17-Oct-2024	22-Oct-2024	14 days	5 days	✓	23-Oct-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW 5	E290	17-Oct-2024	22-Oct-2024	14 days	5 days	✓	23-Oct-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW 6	E290	17-Oct-2024	22-Oct-2024	14 days	5 days	✓	23-Oct-2024	14 days	6 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Alkalinity Species by Titration										
HDPE SW 7	E290	17-Oct-2024	22-Oct-2024	14 days	5 days	✓	23-Oct-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW 8	E290	17-Oct-2024	22-Oct-2024	14 days	5 days	✓	23-Oct-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW 9	E290	17-Oct-2024	22-Oct-2024	14 days	5 days	✓	23-Oct-2024	14 days	6 days	✓
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW 3	E330	17-Oct-2024	----	----	----		24-Oct-2024	48 hrs	163 hrs	✖ EHTL
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW 4	E330	17-Oct-2024	----	----	----		24-Oct-2024	48 hrs	163 hrs	✖ EHTL
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW 1	E330	17-Oct-2024	----	----	----		24-Oct-2024	48 hrs	164 hrs	✖ EHTL
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW 6	E330	17-Oct-2024	----	----	----		28-Oct-2024	48 hrs	261 hrs	✖ EHTL
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW 9	E330	17-Oct-2024	----	----	----		28-Oct-2024	48 hrs	261 hrs	✖ EHT
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE QAQC 03	E330	17-Oct-2024	----	----	----		28-Oct-2024	48 hrs	262 hrs	✖ EHTL



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW 7	E330	17-Oct-2024	----	----	----		28-Oct-2024	48 hrs	262 hrs	✖ EHTL
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW 8	E330	17-Oct-2024	----	----	----		28-Oct-2024	48 hrs	262 hrs	✖ EHTL
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW 5	E330	17-Oct-2024	----	----	----		28-Oct-2024	48 hrs	263 hrs	✖ EHTL
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW 10	E330	17-Oct-2024	----	----	----		28-Oct-2024	48 hrs	264 hrs	✖ EHTL
Physical Tests : Conductivity in Water										
HDPE QAQC 03	E100	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE SW 1	E100	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE SW 10	E100	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE SW 3	E100	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE SW 4	E100	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Conductivity in Water										
HDPE SW 5	E100	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE SW 6	E100	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE SW 7	E100	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE SW 8	E100	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE SW 9	E100	17-Oct-2024	22-Oct-2024	28 days	5 days	✓	23-Oct-2024	28 days	6 days	✓
Physical Tests : pH by Meter										
HDPE SW 9	E108	17-Oct-2024	22-Oct-2024	0.25 hrs	115 hrs	✗ EHTR-FM	22-Oct-2024	0.25 hrs	120 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE QAQC 03	E108	17-Oct-2024	22-Oct-2024	0.25 hrs	116 hrs	✗ EHTR-FM	22-Oct-2024	0.25 hrs	121 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW 10	E108	17-Oct-2024	22-Oct-2024	0.25 hrs	118 hrs	✗ EHTR-FM	22-Oct-2024	0.25 hrs	123 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW 6	E108	17-Oct-2024	21-Oct-2024	0.25 hrs	95 hrs	✗ EHTR-FM	21-Oct-2024	0.25 hrs	95 hrs	✗ EHTR-FM



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Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter										
HDPE SW 7	E108	17-Oct-2024	21-Oct-2024	0.25 hrs	95 hrs	✖ EHTR-FM	21-Oct-2024	0.25 hrs	96 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW 4	E108	17-Oct-2024	21-Oct-2024	0.25 hrs	96 hrs	✖ EHTR-FM	21-Oct-2024	0.25 hrs	96 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW 3	E108	17-Oct-2024	21-Oct-2024	0.25 hrs	96 hrs	✖ EHTR-FM	21-Oct-2024	0.25 hrs	97 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW 5	E108	17-Oct-2024	21-Oct-2024	0.25 hrs	96 hrs	✖ EHTR-FM	21-Oct-2024	0.25 hrs	97 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW 8	E108	17-Oct-2024	21-Oct-2024	0.25 hrs	96 hrs	✖ EHTR-FM	21-Oct-2024	0.25 hrs	97 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW 1	E108	17-Oct-2024	21-Oct-2024	0.25 hrs	97 hrs	✖ EHTR-FM	21-Oct-2024	0.25 hrs	98 hrs	✖ EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE QAQC 03	E162	17-Oct-2024	----	----	----		23-Oct-2024	7 days	6 days	✔
Physical Tests : TDS by Gravimetry										
HDPE SW 1	E162	17-Oct-2024	----	----	----		23-Oct-2024	7 days	6 days	✔
Physical Tests : TDS by Gravimetry										
HDPE SW 10	E162	17-Oct-2024	----	----	----		23-Oct-2024	7 days	6 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TDS by Gravimetry										
HDPE SW 3	E162	17-Oct-2024	----	----	----		23-Oct-2024	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SW 4	E162	17-Oct-2024	----	----	----		23-Oct-2024	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SW 5	E162	17-Oct-2024	----	----	----		23-Oct-2024	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SW 6	E162	17-Oct-2024	----	----	----		23-Oct-2024	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SW 7	E162	17-Oct-2024	----	----	----		23-Oct-2024	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SW 8	E162	17-Oct-2024	----	----	----		23-Oct-2024	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SW 9	E162	17-Oct-2024	----	----	----		23-Oct-2024	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE QAQC 03	E121	17-Oct-2024	----	----	----		23-Oct-2024	3 days	6 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SW 1	E121	17-Oct-2024	----	----	----		23-Oct-2024	3 days	6 days	✖ EHT



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Turbidity by Nephelometry										
HDPE SW 10	E121	17-Oct-2024	----	----	----		23-Oct-2024	3 days	6 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SW 3	E121	17-Oct-2024	----	----	----		23-Oct-2024	3 days	6 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SW 4	E121	17-Oct-2024	----	----	----		23-Oct-2024	3 days	6 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SW 5	E121	17-Oct-2024	----	----	----		23-Oct-2024	3 days	6 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SW 6	E121	17-Oct-2024	----	----	----		23-Oct-2024	3 days	6 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SW 7	E121	17-Oct-2024	----	----	----		23-Oct-2024	3 days	6 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SW 8	E121	17-Oct-2024	----	----	----		23-Oct-2024	3 days	6 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SW 9	E121	17-Oct-2024	----	----	----		23-Oct-2024	3 days	6 days	✖ EHT
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW 1	E508	17-Oct-2024	23-Oct-2024	28 days	6 days	✓	24-Oct-2024	28 days	7 days	✓



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Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW 10	E508	17-Oct-2024	23-Oct-2024	28 days	6 days	✓	24-Oct-2024	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW 3	E508	17-Oct-2024	23-Oct-2024	28 days	6 days	✓	24-Oct-2024	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW 4	E508	17-Oct-2024	23-Oct-2024	28 days	6 days	✓	24-Oct-2024	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW 5	E508	17-Oct-2024	23-Oct-2024	28 days	6 days	✓	24-Oct-2024	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW 6	E508	17-Oct-2024	23-Oct-2024	28 days	6 days	✓	24-Oct-2024	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW 7	E508	17-Oct-2024	23-Oct-2024	28 days	6 days	✓	24-Oct-2024	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW 8	E508	17-Oct-2024	23-Oct-2024	28 days	6 days	✓	24-Oct-2024	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW 9	E508	17-Oct-2024	23-Oct-2024	28 days	6 days	✓	24-Oct-2024	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) QAQC 03	E508	17-Oct-2024	24-Oct-2024	28 days	7 days	✓	24-Oct-2024	28 days	7 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) QAQC 03	E420	17-Oct-2024	23-Oct-2024	180 days	5 days	✓	23-Oct-2024	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW 1	E420	17-Oct-2024	23-Oct-2024	180 days	5 days	✓	23-Oct-2024	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW 10	E420	17-Oct-2024	23-Oct-2024	180 days	5 days	✓	23-Oct-2024	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW 3	E420	17-Oct-2024	23-Oct-2024	180 days	5 days	✓	23-Oct-2024	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW 4	E420	17-Oct-2024	23-Oct-2024	180 days	5 days	✓	23-Oct-2024	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW 5	E420	17-Oct-2024	23-Oct-2024	180 days	5 days	✓	23-Oct-2024	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW 6	E420	17-Oct-2024	23-Oct-2024	180 days	5 days	✓	23-Oct-2024	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW 7	E420	17-Oct-2024	23-Oct-2024	180 days	5 days	✓	23-Oct-2024	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW 8	E420	17-Oct-2024	23-Oct-2024	180 days	5 days	✓	23-Oct-2024	180 days	6 days	✓

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 Work Order : HA2402608 Amendment 4
 Client : Dillon Consulting Limited
 Project : 24-8606



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method		Method	Sampling Date	Extraction / Preparation			Analysis				
Container / Client Sample ID(s)				Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
					Rec	Actual			Rec	Actual	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) SW 9		E420	17-Oct-2024	23-Oct-2024	180 days	5 days	✓	23-Oct-2024	180 days	6 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: Soil/Solid

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L	1723730	1	7	14.2	5.0	✓
pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received	E108A	1724808	1	20	5.0	5.0	✓
Moisture Content by Gravimetry	E144	1724666	1	20	5.0	5.0	✓
CCME fine/coarse Particle Size Analysis by wet sieve	E178	1728382	1	2	50.0	5.0	✓
Water Extractable Chloride by IC	E236.Cl	1736504	1	20	5.0	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1723728	2	19	10.5	5.0	✓
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484	1723731	2	6	33.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1723729	2	19	10.5	5.0	✓
VPH by Headspace GC-FID (Tier I RBCA)	E581.VPH	1727580	1	20	5.0	5.0	✓
EPH in Soil/Solid by GC-FID (RBCA)	E601F	1724873	1	14	7.1	5.0	✓
BTEX by Headspace GC-MS	E611A	1727579	1	20	5.0	5.0	✓
PAHs in Soil/solid by Hex:Ace GC-MS (Low Level CCME)	E641A-L	1723796	1	5	20.0	5.0	✓
PCB Aroclors by GC-MS	E687	1723746	1	10	10.0	5.0	✓
Laboratory Control Samples (LCS)							
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L	1723730	2	7	28.5	10.0	✓
pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received	E108A	1724808	1	20	5.0	5.0	✓
Moisture Content by Gravimetry	E144	1724666	1	20	5.0	5.0	✓
CCME fine/coarse Particle Size Analysis by wet sieve	E178	1728382	1	2	50.0	5.0	✓
Water Extractable Chloride by IC	E236.Cl	1736504	2	20	10.0	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1723728	4	19	21.0	10.0	✓
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484	1723731	4	6	66.6	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	1723729	4	19	21.0	10.0	✓
VPH by Headspace GC-FID (Tier I RBCA)	E581.VPH	1727580	1	20	5.0	5.0	✓
EPH in Soil/Solid by GC-FID (RBCA)	E601F	1724873	1	14	7.1	5.0	✓
BTEX by Headspace GC-MS	E611A	1727579	1	20	5.0	5.0	✓
PAHs in Soil/solid by Hex:Ace GC-MS (Low Level CCME)	E641A-L	1723796	1	5	20.0	5.0	✓
PCB Aroclors by GC-MS	E687	1723746	1	10	10.0	5.0	✓
Method Blanks (MB)							
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L	1723730	1	7	14.2	5.0	✓
Moisture Content by Gravimetry	E144	1724666	1	20	5.0	5.0	✓
Water Extractable Chloride by IC	E236.Cl	1736504	1	20	5.0	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1723728	2	19	10.5	5.0	✓
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484	1723731	2	6	33.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1723729	2	19	10.5	5.0	✓
VPH by Headspace GC-FID (Tier I RBCA)	E581.VPH	1727580	1	20	5.0	5.0	✓



Matrix: Soil/Solid

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Method Blanks (MB) - Continued							
EPH in Soil/Solid by GC-FID (RBCA)	E601F	1724873	1	14	7.1	5.0	✔
BTEX by Headspace GC-MS	E611A	1727579	1	20	5.0	5.0	✔
PAHs in Soil/solid by Hex:Ace GC-MS (Low Level CCME)	E641A-L	1723796	1	5	20.0	5.0	✔
PCB Aroclors by GC-MS	E687	1723746	1	10	10.0	5.0	✔
Matrix Spikes (MS)							
VPH by Headspace GC-FID (Tier I RBCA)	E581.VPH	1727580	1	20	5.0	5.0	✔
EPH in Soil/Solid by GC-FID (RBCA)	E601F	1724873	1	14	7.1	5.0	✔
BTEX by Headspace GC-MS	E611A	1727579	1	20	5.0	5.0	✔
PAHs in Soil/solid by Hex:Ace GC-MS (Low Level CCME)	E641A-L	1723796	1	5	20.0	5.0	✔
PCB Aroclors by GC-MS	E687	1723746	1	10	10.0	5.0	✔

Matrix: Water

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Conductivity in Water	E100	1723648	1	15	6.6	5.0	✔
pH by Meter	E108	1720881	2	30	6.6	5.0	✔
Turbidity by Nephelometry	E121	1725084	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1722525	1	15	6.6	5.2	✔
Chloride in Water by IC	E235.Cl	1723646	1	19	5.2	5.0	✔
Fluoride in Water by IC	E235.F	1723643	1	10	10.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1723645	1	14	7.1	5.0	✔
Nitrate in Water by IC	E235.NO3	1723644	1	15	6.6	5.0	✔
Sulfate in Water by IC	E235.SO4	1723647	1	14	7.1	5.0	✔
Alkalinity Species by Titration	E290	1723649	1	14	7.1	5.0	✔
Ammonia by Fluorescence	E298	1724219	1	11	9.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1727843	2	40	5.0	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1724217	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1723651	1	17	5.8	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1724407	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1724869	2	40	5.0	5.0	✔
Laboratory Control Samples (LCS)							
Conductivity in Water	E100	1723648	1	15	6.6	5.0	✔
pH by Meter	E108	1720881	2	30	6.6	5.0	✔
Turbidity by Nephelometry	E121	1725084	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1722525	1	15	6.6	5.2	✔
Chloride in Water by IC	E235.Cl	1723646	1	19	5.2	5.0	✔
Fluoride in Water by IC	E235.F	1723643	1	10	10.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1723645	1	14	7.1	5.0	✔
Nitrate in Water by IC	E235.NO3	1723644	1	15	6.6	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Control Samples (LCS) - Continued							
Sulfate in Water by IC	E235.SO4	1723647	1	14	7.1	5.0	✔
Alkalinity Species by Titration	E290	1723649	1	14	7.1	5.0	✔
Ammonia by Fluorescence	E298	1724219	1	11	9.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1727843	2	40	5.0	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1724217	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1723651	1	17	5.8	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1724407	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1724869	2	40	5.0	5.0	✔
Method Blanks (MB)							
Conductivity in Water	E100	1723648	1	15	6.6	5.0	✔
Turbidity by Nephelometry	E121	1725084	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1722525	1	15	6.6	5.2	✔
Chloride in Water by IC	E235.Cl	1723646	1	19	5.2	5.0	✔
Fluoride in Water by IC	E235.F	1723643	1	10	10.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1723645	1	14	7.1	5.0	✔
Nitrate in Water by IC	E235.NO3	1723644	1	15	6.6	5.0	✔
Sulfate in Water by IC	E235.SO4	1723647	1	14	7.1	5.0	✔
Alkalinity Species by Titration	E290	1723649	1	14	7.1	5.0	✔
Ammonia by Fluorescence	E298	1724219	1	11	9.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1727843	2	40	5.0	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1724217	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1723651	1	17	5.8	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1724407	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1724869	2	40	5.0	5.0	✔
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	1723646	1	19	5.2	5.0	✔
Fluoride in Water by IC	E235.F	1723643	1	10	10.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1723645	1	14	7.1	5.0	✔
Nitrate in Water by IC	E235.NO3	1723644	1	15	6.6	5.0	✔
Sulfate in Water by IC	E235.SO4	1723647	1	14	7.1	5.0	✔
Ammonia by Fluorescence	E298	1724219	1	11	9.0	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1724217	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1723651	1	17	5.8	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1724407	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1724869	2	40	5.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L ALS Environmental - Waterloo	Soil/Solid	CSSS Ch. 15 (mod)/APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a soil sample that has been added in a defined ratio of soil to deionized water, then shaken well and allowed to settle. Conductance is measured in the fluid that is observed in the upper layer.
pH by Meter (1:2 Soil:0.01M CaCl ₂ Extraction) - As Received	E108A ALS Environmental - Waterloo	Soil/Solid	MECP E3530	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C) and is carried out in accordance with procedures described in the Analytical Protocol (prescriptive method). A minimum 10g portion of the sample, as received, is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil by centrifuging, settling, or decanting and then analyzed using a pH meter and electrode. This method is equivalent to ASTM D4972 and is acceptable for topsoil analysis.
Moisture Content by Gravimetry	E144 ALS Environmental - Waterloo	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
CCME fine/coarse Particle Size Analysis by wet sieve	E178 ALS Environmental - Saskatoon	Soil/Solid	CCME Vol 4 Analytical Methods	An air-dried sample is reduced to < 2 mm size and mixed with a dispersing agent (sodium hexametaphosphate). The sample is washed through a 200 mesh (0.075 mm) sieve. The retained mass of sample is used to determine % sand fraction. If the percentage of sand is >50%, the soil is considered to be coarse textured soil. If the percentage of sand is <50%, the soil is considered to be fine textured.
Water Extractable Chloride by IC	E236.Cl ALS Environmental - Waterloo	Soil/Solid	EPA 300.1	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection using a soil sample that has been added in a defined ratio of soil to deionized water, then shaken well and allowed to settle. Anions are measured in the fluid that is observed in the upper layer.
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Waterloo	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484 ALS Environmental - Waterloo	Soil/Solid	SW846 6010C	A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Waterloo	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl, followed by CVAAS analysis.
VPH by Headspace GC-FID (Tier I RBCA)	E581.VPH ALS Environmental - Waterloo	Soil/Solid	Atlantic RBCA Version 3.1	VPH (Volatile Petroleum Hydrocarbons) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
EPH in Soil/Solid by GC-FID (RBCA)	E601F ALS Environmental - Waterloo	Soil/Solid	Atlantic RBCA Version 3.1	Sample Extracts are analyzed by GC-FID for RBCA Tier I hydrocarbon fractions C10-C16, C16-C21, C21-C32.
BTEX by Headspace GC-MS	E611A ALS Environmental - Waterloo	Soil/Solid	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs in Soil/solid by Hex:Ace GC-MS (Low Level CCME)	E641A-L ALS Environmental - Waterloo	Soil/Solid	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are extracted with hexane/acetone and analyzed by GC-MS. If reported, IACR (index of additive cancer risk, unitless) and B(a)P toxic potency equivalent (in soil concentration units) are calculated as per CCME PAH Soil Quality Guidelines fact sheet (2010) or ABT1.
PCB Aroclors by GC-MS	E687 ALS Environmental - Waterloo	Soil/Solid	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS
VPH C6-C10 (less BTEX) [RBCA]	EC580C ALS Environmental - Waterloo	Soil/Solid	Atlantic RBCA Version 3.1	VPH C6-C10 (less BTEX) is calculated as follows: VPH (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
Modified TPH (RBCA) Tier I	EC581D ALS Environmental - Waterloo	Soil/Solid	Atlantic RBCA Version 3.1	Modified TPH (RBCA), Tier I is the sum of PIRI Fraction (C6 - C10 - BTEX) + (>C10 - C16) +(>C16 - C21) + (>C21 - C32).
Gross Alpha/Beta in Soil/Solid by GFPC	GROSS A/B GEL Laboratories LLC - 2040 Savage Road Charleston South Carolina United States 29407	Soil/Solid	EPA 900.0/SW846 9310/SM 7110B Modified)	See Attached



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
GEL Radiologicals Tier 2 Natural Package in Soil	GRT2N GEL Laboratories LLC - 2040 Savage Road Charleston South Carolina United States 29407	Soil/Solid	DOE EML HASL-300 (Mod)	see attached report
Conductivity in Water	E100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Halifax	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 ALS Environmental - Waterloo	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 ALS Environmental - Halifax	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 ALS Environmental - Waterloo	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Colour (Apparent) by Spectrometer	E330 ALS Environmental - Waterloo	Water	APHA 2120 C (mod)	Colour (Apparent) is measured in an unfiltered sample spectrophotometrically using the single wavelength method. The colour contribution of settleable solids are not included in the result. This method is intended for potable waters. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L ALS Environmental - Waterloo	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove carbonate-based Inorganic Carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . Forms of carbon associated with inorganic or organic molecules (e.g. SCN and CN) are included in NPOC if they are not removed by purging under acidic conditions. Notably, NPOC excludes most volatile organic compounds and free cyanide. For samples where the majority of Total Carbon is inorganic, this method provides greater accuracy and reliability versus the TOC by subtraction method (TC minus TIC).
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Waterloo	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 ALS Environmental - Waterloo	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Waterloo	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ion Balance using Total Metals	EC101A ALS Environmental - Waterloo	Water	APHA 1030E	Cation Sum (using total metals), Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
Saturation Index using Laboratory pH (Ca-T)	EC105A ALS Environmental - Waterloo	Water	APHA 2330B	Langelier Index provides an indication of scale formation potential at a given pH and temperature, and is calculated as per APHA 2330B Saturation Index. Positive values indicate oversaturation with respect to CaCO ₃ . Negative values indicate undersaturation of CaCO ₃ . This calculation uses laboratory pH measurements and provides estimates of Langelier Index at temperatures of 4, 15, 20, 25, 66, and 77°C. Ryznar Stability Index is an alternative index used for scale formation and corrosion potential.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Waterloo	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Total Silicon as Silica (Calculation)	EC420.SiO ₂ ALS Environmental - Waterloo	Water	N/A	Total Silicon (as SiO ₂) is a calculated parameter. Total Silicon (as SiO ₂ mg/L) = 2.139 x Total Silicon (mg/L).
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 ALS Environmental - Waterloo	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Leach 1:2 Soil : 0.01CaCl ₂ - As Received for pH	EP108A ALS Environmental - Waterloo	Soil/Solid	MOEE E3137A	A minimum 10g portion of the sample, as received, is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil by centrifuging, settling or decanting and then analyzed using a pH meter and electrode.
Anions Leach 1:10 Soil:Water (Dry)	EP236 ALS Environmental - Waterloo	Soil/Solid	EPA 300.1	5 grams of dried soil is mixed with 50 grams of distilled water for a minimum of 30 minutes. The extract is filtered and analyzed by ion chromatography.
Digestion for Metals and Mercury	EP440 ALS Environmental - Waterloo	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
VOCs Methanol Extraction for Headspace Analysis	EP581 ALS Environmental - Waterloo	Soil/Solid	EPA 5035A (mod)	VOCs in samples are extracted with methanol. Extracts are then prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PHCs and PAHs Hexane-Acetone Tumbler Extraction	EP601 ALS Environmental - Waterloo	Soil/Solid	CCME PHC in Soil - Tier 1 (mod)	Samples are subsampled and Petroleum Hydrocarbons (PHC) and PAHs are extracted with 1:1 hexane:acetone using a rotary extractor.



Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PHCs Hexane-Acetone Tumbler Extraction (RBCA)	EP601F ALS Environmental - Waterloo	Soil/Solid	CCME PHC in Soil - Tier 1 (mod)	Samples are subsampled and Petroleum Hydrocarbons (PHC) are extracted with 1:1 hexane:acetone using a rotary extractor.
Pesticides, PCB, PAH, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 ALS Environmental - Waterloo	Soil/Solid	EPA 3570 (mod)	A homogenized subsample is extracted with organic solvents using a mechanical shaker.
Dry and Grind in Soil/Solid <60°C	EPP442 ALS Environmental - Saskatoon	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.
Preparation for Ammonia	EP298 ALS Environmental - Waterloo	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 ALS Environmental - Waterloo	Water		Preparation for Total Organic Carbon by Combustion

QUALITY CONTROL REPORT

Work Order	: HA2402608	Page	: 1 of 26
Amendment	: 4		
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Nadine Wambolt	Account Manager	: Andrew Martin
Address	: 137 Chain Lake Drive Halifax NS Canada B3S 1B3	Address	: 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2
Telephone	: 902.562.9880 ext. 5206	Telephone	: +1 902 707 4888
Project	: 24-8606	Date Samples Received	: 18-Oct-2024 16:00
PO	: ----	Date Analysis Commenced	: 21-Oct-2024
C-O-C number	: ----	Issue Date	: 10-Feb-2025 09:59
Sampler	: Manpreet Kaur		
Site	:		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 29		
No. of samples analysed	: 29		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
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Hedy Lai	Team Leader - Inorganics	Saskatoon Inorganics, Saskatoon, Saskatchewan
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Jon Fisher	Production Manager, Environmental	Waterloo Inorganics, Waterloo, Ontario
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Walt Kippenhuck	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario

Walt Kippenhuck

Supervisor - Inorganic

Waterloo Metals, Waterloo, Ontario



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1723730)											
HA2402608-002	SED 3	Conductivity (1:2 leachate)	----	E100-L	5.00	µS/cm	0.0941 mS/cm	99.6	5.68%	20%	----
Physical Tests (QC Lot: 1724666)											
HA2402607-001	Anonymous	Moisture	----	E144	0.25	%	16.7	18.5	10.4%	20%	----
Physical Tests (QC Lot: 1724808)											
HA2402608-001	SED 1	pH (1:2 soil:CaCl2-aq)	----	E108A	0.10	pH units	6.90	6.82	1.17%	5%	----
Particle Size (QC Lot: 1728382)											
HA2402608-024	BH 13 0-0.15 m	Sand (>0.075mm)	----	E178	1.0	%	64.8	66.5	2.67%	20%	----
Metals (QC Lot: 1723728)											
HA2402608-001	SED 1	Aluminum	7429-90-5	E440	50	mg/kg	14900	14100	5.55%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	1.96	1.73	12.5%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	22.8	22.8	0.276%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.64	0.50	0.14	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.121	0.104	0.017	Diff <2x LOR	----
		Chromium	7440-47-3	E440	0.50	mg/kg	9.55	12.1	23.5%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	6.53	7.71	16.5%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	24.2	12.2	65.6%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	25800	25500	1.17%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	7.50	6.64	12.1%	40%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	343	338	1.38%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.87	0.45	62.9%	40%	DUP-H
		Nickel	7440-02-0	E440	0.50	mg/kg	8.96	9.89	9.87%	30%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	17.5	22.4	24.6%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.95	1.17	50.1%	30%	DUP-H



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 1723728) - continued											
HA2402608-001	SED 1	Vanadium	7440-62-2	E440	0.20	mg/kg	35.8	41.5	14.9%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	40.9	44.3	7.88%	30%	----
Metals (QC Lot: 1723729)											
HA2402608-001	SED 1	Mercury	7439-97-6	E510	0.0050	mg/kg	<0.0050	0.0055	0.0005	Diff <2x LOR	----
Metals (QC Lot: 1723731)											
HA2402608-002	SED 3	Calcium, soluble ion content	7440-70-2	E484	0.50	mg/L	1.50	1.67	0.17	Diff <2x LOR	----
		Magnesium, soluble ion content	7439-95-4	E484	0.50	mg/L	1.14	1.26	0.12	Diff <2x LOR	----
		Sodium, soluble ion content	17341-25-2	E484	0.50	mg/L	0.65	0.70	0.05	Diff <2x LOR	----
Metals (QC Lot: 1806052)											
HA2402608-028	QAQC 02	Calcium, soluble ion content	7440-70-2	E484	0.50	mg/L	3.39	3.29	2.99%	30%	----
		Magnesium, soluble ion content	7439-95-4	E484	0.50	mg/L	0.73	0.72	0.009	Diff <2x LOR	----
		Sodium, soluble ion content	17341-25-2	E484	0.50	mg/L	0.57	0.56	0.009	Diff <2x LOR	----
Metals (QC Lot: 1829587)											
HA2402608-029	BH 14 0.90 m	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0428	0.0429	0.184%	40%	----
Metals (QC Lot: 1829588)											
HA2402608-029	BH 14 0.90 m	Aluminum	7429-90-5	E440	50	mg/kg	16000	14400	10.7%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	2.56	2.27	12.2%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	29.5	24.0	20.5%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.70	0.65	6.40%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	10.3	9.5	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	1.16	0.906	24.8%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	14.2	11.3	22.8%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	16.4	13.8	17.7%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	360	252	34.9%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	22700	17100	28.0%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	84.6	63.9	27.8%	40%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1620	1510	6.51%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.40	0.34	0.06	Diff <2x LOR	----
		Nickel	7440-02-0	E440	0.50	mg/kg	22.0	19.0	14.6%	30%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.14	0.15	0.007	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	94.2	108	13.9%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	1600	<1000	600	Diff <2x LOR	----



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 1829588) - continued											
HA2402608-029	BH 14 0.90 m	Thallium	7440-28-0	E440	0.050	mg/kg	0.188	0.158	0.030	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.17	1.08	7.61%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	33.4	29.6	12.3%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	467	362	25.4%	30%	----
Leachable Anions & Nutrients (QC Lot: 1736504)											
TY2411973-026	Anonymous	Chloride, soluble ion content	16887-00-6	E236.Cl	5.0	mg/kg	11.2	10.6	0.6	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1727579)											
HA2402607-001	Anonymous	Benzene	71-43-2	E611A	0.0050	mg/kg	0.664	0.663	0.114%	40%	----
		Ethylbenzene	100-41-4	E611A	0.015	mg/kg	0.211	0.211	0.360%	40%	----
		Toluene	108-88-3	E611A	0.050	mg/kg	1.67	1.64	1.88%	40%	----
		Xylene, m+p-	179601-23-1	E611A	0.030	mg/kg	0.995	0.993	0.230%	40%	----
		Xylene, o-	95-47-6	E611A	0.030	mg/kg	0.591	0.596	0.833%	40%	----
Hydrocarbons (QC Lot: 1724873)											
HA2402608-025	BH 14 0-0.15 m	EPH >C10-C16	n/a	E601F	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		EPH >C16-C21	n/a	E601F	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		EPH >C21-C32	n/a	E601F	5.0	mg/kg	29.2	27.7	5.24%	40%	----
		EPH >C34-C50	n/a	E601F	20	mg/kg	50	81	30	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1727580)											
HA2402607-001	Anonymous	VPH C6-C10	n/a	E581.VPH	5.0	mg/kg	13.9	14.0	0.2	Diff <2x LOR	----
Polycyclic Aromatic Hydrocarbons (QC Lot: 1723796)											
HA2402607-001	Anonymous	Acenaphthene	83-32-9	E641A-L	0.0178	mg/kg	18.5	17.7	4.40%	50%	----
		Acenaphthylene	208-96-8	E641A-L	0.0178	mg/kg	5.66	4.29	27.4%	50%	----
		Acridine	260-94-6	E641A-L	0.018	mg/kg	5.50	5.14	6.95%	50%	----
		Anthracene	120-12-7	E641A-L	0.0178	mg/kg	46.8	39.7	16.4%	50%	----
		Benz(a)anthracene	56-55-3	E641A-L	0.018	mg/kg	86.9	85.9	1.18%	50%	----
		Benzo(a)pyrene	50-32-8	E641A-L	0.018	mg/kg	81.8	84.3	3.02%	50%	----
		Benzo(b+j)fluoranthene	n/a	E641A-L	0.018	mg/kg	98.6	103	4.39%	50%	----
		Benzo(g,h,i)perylene	191-24-2	E641A-L	0.018	mg/kg	44.3	46.2	4.09%	50%	----
		Benzo(k)fluoranthene	207-08-9	E641A-L	0.018	mg/kg	38.3	38.1	0.478%	50%	----
		Chrysene	218-01-9	E641A-L	0.018	mg/kg	84.4	84.3	0.109%	50%	----
		Dibenz(a,h)anthracene	53-70-3	E641A-L	0.0178	mg/kg	12.1	12.5	3.20%	50%	----
		Fluoranthene	206-44-0	E641A-L	0.018	mg/kg	186	187	0.0927%	50%	----
		Fluorene	86-73-7	E641A-L	0.018	mg/kg	18.6	15.6	17.4%	50%	----



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Polycyclic Aromatic Hydrocarbons (QC Lot: 1723796) - continued											
HA2402607-001	Anonymous	Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.018	mg/kg	49.1	51.3	4.42%	50%	----
		Methylnaphthalene, 1-	90-12-0	E641A-L	0.018	mg/kg	4.83	4.17	14.7%	50%	----
		Methylnaphthalene, 2-	91-57-6	E641A-L	0.018	mg/kg	5.48	4.82	12.9%	50%	----
		Naphthalene	91-20-3	E641A-L	0.018	mg/kg	8.03	7.35	8.86%	50%	----
		Perylene	198-55-0	E641A-L	0.018	mg/kg	20.4	21.3	4.23%	50%	----
		Phenanthrene	85-01-8	E641A-L	0.018	mg/kg	171	154	10.7%	50%	----
		Pyrene	129-00-0	E641A-L	0.018	mg/kg	161	162	0.887%	50%	----
		Quinoline	91-22-5	E641A-L	0.018	mg/kg	0.581	0.484	18.1%	50%	----
Polychlorinated Biphenyls (QC Lot: 1723746)											
WT2431263-001	Anonymous	Aroclor 1016	12674-11-2	E687	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		Aroclor 1221	11104-28-2	E687	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		Aroclor 1232	11141-16-5	E687	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		Aroclor 1242	53469-21-9	E687	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		Aroclor 1248	12672-29-6	E687	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		Aroclor 1254	11097-69-1	E687	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		Aroclor 1260	11096-82-5	E687	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		Aroclor 1262	37324-23-5	E687	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		Aroclor 1268	11100-14-4	E687	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
Sub-Matrix: Water							Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1720881)											
HA2402133-001	Anonymous	pH	----	E108	0.10	pH units	7.11	7.12	0.0984%	4%	----
Physical Tests (QC Lot: 1722519)											
HA2402608-018	SW 9	pH	----	E108	0.10	pH units	7.90	7.83	0.839%	4%	----
Physical Tests (QC Lot: 1722525)											
HA2402608-011	SW 1	Solids, total dissolved [TDS]	----	E162	20	mg/L	240	241	0.416%	20%	----
Physical Tests (QC Lot: 1723648)											
HA2402608-013	SW 4	Conductivity	----	E100	1.0	µS/cm	324	326	0.615%	10%	----
Physical Tests (QC Lot: 1723649)											
HA2402608-013	SW 4	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	109	110	0.548%	20%	----
Physical Tests (QC Lot: 1725084)											
HA2402608-016	SW 7	Turbidity	----	E121	0.10	NTU	0.25	0.26	0.01	Diff <2x LOR	----
Physical Tests (QC Lot: 1727843)											



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1727843) - continued											
HA2402608-011	SW 1	Colour, apparent	----	E330	2.0	CU	3.6	4.2	0.6	Diff <2x LOR	----
Physical Tests (QC Lot: 1735370)											
HA2402608-014	SW 5	Colour, apparent	----	E330	2.0	CU	8.1	8.1	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1723643)											
HA2402608-011	SW 1	Fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1723644)											
HA2402608-011	SW 1	Nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	0.586	0.583	0.593%	20%	----
Anions and Nutrients (QC Lot: 1723645)											
HA2402608-011	SW 1	Nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1723646)											
HA2402608-011	SW 1	Chloride	16887-00-6	E235.Cl	0.50	mg/L	22.6	22.4	0.763%	20%	----
Anions and Nutrients (QC Lot: 1723647)											
HA2402608-011	SW 1	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	17.2	17.2	0.103%	20%	----
Anions and Nutrients (QC Lot: 1723651)											
HA2402608-012	SW 3	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1724219)											
BF2400368-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	1.06	1.05	1.26%	20%	----
Organic / Inorganic Carbon (QC Lot: 1724217)											
BF2400368-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	2.10	1.84	0.25	Diff <2x LOR	----
Total Metals (QC Lot: 1724407)											
HA2402587-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0615	0.0628	2.13%	20%	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00019	0.00018	0.00001	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.00450	0.00449	0.314%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	0.089	0.091	0.002	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000276	0.0000276	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	7.91	7.85	0.684%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	0.000039	0.000040	0.0000006	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00019	0.00019	0.0000005	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.433	0.426	1.49%	20%	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.130	0.132	1.62%	20%	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 1724407) - continued											
HA2402587-001	Anonymous	Lead, total	7439-92-1	E420	0.000050	mg/L	17.8 µg/L	0.0180	1.48%	20%	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0237	0.0227	4.20%	20%	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	0.705	0.706	0.175%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.0149	0.0165	10.0%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	0.00235	0.00235	0.0000004	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.050	mg/L	0.373	0.374	0.001	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	0.364	0.365	0.002	Diff <2x LOR	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00096	0.00102	0.00005	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	0.60	0.62	0.02	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	0.000012	0.000012	0.0000006	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	13.0	13.0	0.258%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.0102	0.0104	1.30%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	4.12	4.24	0.12	Diff <2x LOR	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	0.00035	0.00035	0.000005	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000012	0.000012	0.0000005	Diff <2x LOR	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	0.252	0.254	0.549%	20%	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 1724869)											
HA2402608-011	SW 1	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 1727768)											
HA2402608-020	QAQC 03	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1723730)						
Conductivity (1:2 leachate)	---	E100-L	5	µS/cm	<5.00	---
Physical Tests (QCLot: 1724666)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 1723728)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	---
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	---
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	---
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	---
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	---
Boron	7440-42-8	E440	5	mg/kg	<5.0	---
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	---
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	---
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	---
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	---
Iron	7439-89-6	E440	50	mg/kg	<50	---
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	---
Manganese	7439-96-5	E440	1	mg/kg	<1.0	---
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	---
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	---
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	---
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	---
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	---
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	---
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	---
Tin	7440-31-5	E440	2	mg/kg	<2.0	---
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	---
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	---
Zinc	7440-66-6	E440	2	mg/kg	<2.0	---
Metals (QCLot: 1723729)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 1723731)						
Calcium, soluble ion content	7440-70-2	E484	0.5	mg/L	<0.50	---



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1723731) - continued						
Magnesium, soluble ion content	7439-95-4	E484	0.5	mg/L	<0.50	----
Sodium, soluble ion content	17341-25-2	E484	0.5	mg/L	<0.50	----
Metals (QCLot: 1806052)						
Calcium, soluble ion content	7440-70-2	E484	0.5	mg/L	<0.50	----
Magnesium, soluble ion content	7439-95-4	E484	0.5	mg/L	<0.50	----
Sodium, soluble ion content	17341-25-2	E484	0.5	mg/L	<0.50	----
Metals (QCLot: 1829587)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1829588)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Leachable Anions & Nutrients (QCLot: 1736504)						
Chloride, soluble ion content	16887-00-6	E236.Cl	5	mg/kg	<10.0	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1727579)						
Benzene	71-43-2	E611A	0.005	mg/kg	<0.0050	----
Ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	----
Toluene	108-88-3	E611A	0.05	mg/kg	<0.050	----
Xylene, m+p-	179601-23-1	E611A	0.03	mg/kg	<0.030	----
Xylene, o-	95-47-6	E611A	0.03	mg/kg	<0.030	----
Hydrocarbons (QCLot: 1724873)						
EPH >C10-C16	n/a	E601F	5	mg/kg	<5.0	----
EPH >C16-C21	n/a	E601F	5	mg/kg	<5.0	----
EPH >C21-C32	n/a	E601F	5	mg/kg	<5.0	----
EPH >C34-C50	n/a	E601F	20	mg/kg	<20	----
Hydrocarbons (QCLot: 1727580)						
VPH C6-C10	n/a	E581.VPH	5	mg/kg	<5.0	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1723796)						
Acenaphthene	83-32-9	E641A-L	0.005	mg/kg	<0.0050	----
Acenaphthylene	208-96-8	E641A-L	0.005	mg/kg	<0.0050	----
Acridine	260-94-6	E641A-L	0.01	mg/kg	<0.010	----
Anthracene	120-12-7	E641A-L	0.004	mg/kg	<0.0040	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	mg/kg	<0.010	----
Benzo(a)pyrene	50-32-8	E641A-L	0.01	mg/kg	<0.010	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	mg/kg	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	mg/kg	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	mg/kg	<0.010	----
Chrysene	218-01-9	E641A-L	0.01	mg/kg	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	mg/kg	<0.0050	----
Fluoranthene	206-44-0	E641A-L	0.01	mg/kg	<0.010	----
Fluorene	86-73-7	E641A-L	0.01	mg/kg	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	mg/kg	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	mg/kg	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	mg/kg	<0.010	----
Naphthalene	91-20-3	E641A-L	0.01	mg/kg	<0.010	----
Perylene	198-55-0	E641A-L	0.01	mg/kg	<0.010	----
Phenanthrene	85-01-8	E641A-L	0.01	mg/kg	<0.010	----
Pyrene	129-00-0	E641A-L	0.01	mg/kg	<0.010	----
Quinoline	91-22-5	E641A-L	0.01	mg/kg	<0.010	----
Polychlorinated Biphenyls (QCLot: 1723746)						



Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polychlorinated Biphenyls (QCLot: 1723746) - continued						
Aroclor 1016	12674-11-2	E687	0.01	mg/kg	<0.010	----
Aroclor 1221	11104-28-2	E687	0.01	mg/kg	<0.010	----
Aroclor 1232	11141-16-5	E687	0.01	mg/kg	<0.010	----
Aroclor 1242	53469-21-9	E687	0.01	mg/kg	<0.010	----
Aroclor 1248	12672-29-6	E687	0.01	mg/kg	<0.010	----
Aroclor 1254	11097-69-1	E687	0.01	mg/kg	<0.010	----
Aroclor 1260	11096-82-5	E687	0.01	mg/kg	<0.010	----
Aroclor 1262	37324-23-5	E687	0.01	mg/kg	<0.010	----
Aroclor 1268	11100-14-4	E687	0.01	mg/kg	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1722525)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 1723648)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 1723649)						
Alkalinity, total (as CaCO ₃)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1725084)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 1727843)						
Colour, apparent	----	E330	2	CU	<2.0	----
Physical Tests (QCLot: 1735370)						
Colour, apparent	----	E330	2	CU	<2.0	----
Anions and Nutrients (QCLot: 1723643)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1723644)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1723645)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 1723646)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1723647)						
Sulfate (as SO ₄)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1723651)						



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 1723651) - continued						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1724219)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 1724217)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 1724407)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	# 0.0073	B
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1724407) - continued						
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 1724869)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 1727768)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1723730)									
Conductivity (1:2 leachate)	----	E100-L	5	µS/cm	1410 µS/cm	99.2	90.0	110	----
Physical Tests (QCLot: 1724666)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 1724808)									
pH (1:2 soil:CaCl2-aq)	----	E108A	----	pH units	7 pH units	101	98.0	102	----
Metals (QCLot: 1723728)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	98.6	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	100	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.7	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	100	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	95.6	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	97.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.3	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	97.6	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	98.8	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	99.2	80.0	120	----
Metals (QCLot: 1723729)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	80.0	120	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Target Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1723731)									
Calcium, soluble ion content	7440-70-2	E484	0.5	mg/L	300 mg/L	98.3	80.0	120	----
Magnesium, soluble ion content	7439-95-4	E484	0.5	mg/L	50 mg/L	94.2	80.0	120	----
Sodium, soluble ion content	17341-25-2	E484	0.5	mg/L	50 mg/L	94.8	80.0	120	----
Metals (QCLot: 1806052)									
Calcium, soluble ion content	7440-70-2	E484	0.5	mg/L	300 mg/L	109	80.0	120	----
Magnesium, soluble ion content	7439-95-4	E484	0.5	mg/L	50 mg/L	105	80.0	120	----
Sodium, soluble ion content	17341-25-2	E484	0.5	mg/L	50 mg/L	106	80.0	120	----
Metals (QCLot: 1829587)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	91.0	80.0	120	----
Metals (QCLot: 1829588)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	94.8	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	99.7	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	92.6	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	100	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	98.6	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	99.1	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	97.4	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	99.5	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	99.0	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	100	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	# 63.4	80.0	120	RRQC
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.0	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	93.8	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	91.5	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	95.7	80.0	120	----
Leachable Anions & Nutrients (QCLot: 1736504)									



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Target Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Leachable Anions & Nutrients (QCLot: 1736504) - continued									
Chloride, soluble ion content	16887-00-6	E236.Cl	5	mg/kg	5000 mg/kg	99.1	80.0	120	----
Volatile Organic Compounds (QCLot: 1727579)									
Benzene	71-43-2	E611A	0.005	mg/kg	3.48 mg/kg	110	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.015	mg/kg	3.48 mg/kg	91.6	70.0	130	----
Toluene	108-88-3	E611A	0.05	mg/kg	3.48 mg/kg	91.2	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.03	mg/kg	6.95 mg/kg	91.4	70.0	130	----
Xylene, o-	95-47-6	E611A	0.03	mg/kg	3.48 mg/kg	92.9	70.0	130	----
Hydrocarbons (QCLot: 1724873)									
EPH >C10-C16	n/a	E601F	5	mg/kg	645 mg/kg	109	70.0	130	----
EPH >C16-C21	n/a	E601F	5	mg/kg	553 mg/kg	91.7	70.0	130	----
EPH >C21-C32	n/a	E601F	5	mg/kg	499 mg/kg	101	70.0	130	----
EPH >C34-C50	n/a	E601F	20	mg/kg	663 mg/kg	94.6	70.0	130	----
Hydrocarbons (QCLot: 1727580)									
VPH C6-C10	n/a	E581.VPH	5	mg/kg	69.2 mg/kg	105	80.0	120	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1723796)									
Acenaphthene	83-32-9	E641A-L	0.005	mg/kg	0.5 mg/kg	84.5	60.0	130	----
Acenaphthylene	208-96-8	E641A-L	0.005	mg/kg	0.5 mg/kg	83.4	60.0	130	----
Acridine	260-94-6	E641A-L	0.01	mg/kg	0.5 mg/kg	79.2	60.0	130	----
Anthracene	120-12-7	E641A-L	0.004	mg/kg	0.5 mg/kg	82.5	60.0	130	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	mg/kg	0.5 mg/kg	82.8	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A-L	0.01	mg/kg	0.5 mg/kg	81.8	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	mg/kg	0.5 mg/kg	86.3	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	mg/kg	0.5 mg/kg	88.2	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	mg/kg	0.5 mg/kg	84.7	60.0	130	----
Chrysene	218-01-9	E641A-L	0.01	mg/kg	0.5 mg/kg	82.2	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	mg/kg	0.5 mg/kg	85.6	60.0	130	----
Fluoranthene	206-44-0	E641A-L	0.01	mg/kg	0.5 mg/kg	84.3	60.0	130	----
Fluorene	86-73-7	E641A-L	0.01	mg/kg	0.5 mg/kg	84.9	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	mg/kg	0.5 mg/kg	86.3	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	mg/kg	0.5 mg/kg	81.0	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	mg/kg	0.5 mg/kg	90.3	60.0	130	----
Naphthalene	91-20-3	E641A-L	0.01	mg/kg	0.5 mg/kg	86.1	60.0	130	----
Perylene	198-55-0	E641A-L	0.01	mg/kg	0.5 mg/kg	85.5	60.0	130	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1723796) - continued									
Phenanthrene	85-01-8	E641A-L	0.01	mg/kg	0.5 mg/kg	81.7	60.0	130	----
Pyrene	129-00-0	E641A-L	0.01	mg/kg	0.5 mg/kg	83.1	60.0	130	----
Quinoline	91-22-5	E641A-L	0.01	mg/kg	0.5 mg/kg	82.1	60.0	130	----
Polychlorinated Biphenyls (QCLot: 1723746)									
Aroclor 1016	12674-11-2	E687	0.01	mg/kg	0.012 mg/kg	118	60.0	140	----
Aroclor 1221	11104-28-2	E687	0.01	mg/kg	0.012 mg/kg	118	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.01	mg/kg	0.012 mg/kg	118	60.0	140	----
Aroclor 1242	53469-21-9	E687	0.01	mg/kg	0.012 mg/kg	118	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.01	mg/kg	0.012 mg/kg	102	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.01	mg/kg	0.012 mg/kg	105	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.01	mg/kg	0.012 mg/kg	116	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.01	mg/kg	0.012 mg/kg	116	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.01	mg/kg	0.012 mg/kg	116	60.0	140	----
Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1720881)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1722519)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1722525)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	94.9	85.0	115	----
Physical Tests (QCLot: 1723648)									
Conductivity	----	E100	1	µS/cm	1410 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 1723649)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	150 mg/L	97.8	85.0	115	----
Physical Tests (QCLot: 1725084)									
Turbidity	----	E121	0.1	NTU	200 NTU	94.5	85.0	115	----
Physical Tests (QCLot: 1727843)									
Colour, apparent	----	E330	2	CU	25 CU	101	70.0	130	----
Physical Tests (QCLot: 1735370)									
Colour, apparent	----	E330	2	CU	25 CU	91.3	70.0	130	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1723643)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.7	90.0	110	----
Anions and Nutrients (QCLot: 1723644)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	97.9	90.0	110	----
Anions and Nutrients (QCLot: 1723645)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	99.4	90.0	110	----
Anions and Nutrients (QCLot: 1723646)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.1	90.0	110	----
Anions and Nutrients (QCLot: 1723647)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1723651)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	101	80.0	120	----
Anions and Nutrients (QCLot: 1724219)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.0	85.0	115	----
Organic / Inorganic Carbon (QCLot: 1724217)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	106	80.0	120	----
Total Metals (QCLot: 1724407)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	99.8	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	107	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	108	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.012 mg/L	101	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.005 mg/L	100	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	0.05 mg/L	103	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	0.05 mg/L	96.7	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	98.2	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	2.5 mg/L	99.0	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.002 mg/L	106	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.012 mg/L	106	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.012 mg/L	104	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.012 mg/L	103	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	105	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	102	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.012 mg/L	98.9	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	2.5 mg/L	114	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.012 mg/L	106	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Target Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1724407) - continued									
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.012 mg/L	102	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	102	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	0.5 mg/L	112	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	2.5 mg/L	102	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.005 mg/L	104	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	105	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	0.5 mg/L	107	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	92.6	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	2.5 mg/L	113	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.012 mg/L	105	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	2.5 mg/L	112	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.005 mg/L	97.3	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	0.05 mg/L	103	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.005 mg/L	102	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	101	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.012 mg/L	103	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.005 mg/L	96.5	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0 mg/L	107	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	106	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	100	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.005 mg/L	101	80.0	120	----
Total Metals (QCLot: 1724869)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0 mg/L	99.3	80.0	120	----
Total Metals (QCLot: 1727768)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0 mg/L	103	80.0	120	----

Qualifiers

Qualifier	Description
RRQC	Refer to report comments for information regarding this QC result.



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Soil/Solid

Sub-Matrix: Soil/Solid					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1727579)										
HA2402607-001	Anonymous	Benzene	71-43-2	E611A	3.17 mg/kg	2.96 mg/kg	107	60.0	140	----
		Ethylbenzene	100-41-4	E611A	2.68 mg/kg	2.96 mg/kg	90.4	60.0	140	----
		Toluene	108-88-3	E611A	2.59 mg/kg	2.96 mg/kg	87.5	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	5.18 mg/kg	5.92 mg/kg	87.5	60.0	140	----
		Xylene, o-	95-47-6	E611A	2.64 mg/kg	2.96 mg/kg	89.2	60.0	140	----
Hydrocarbons (QCLot: 1724873)										
HA2402608-025	BH 14 0-0.15 m	EPH >C10-C16	n/a	E601F	497 mg/kg	513 mg/kg	96.8	60.0	140	----
		EPH >C16-C21	n/a	E601F	435 mg/kg	440 mg/kg	98.8	60.0	140	----
		EPH >C21-C32	n/a	E601F	394 mg/kg	398 mg/kg	99.0	60.0	140	----
		EPH >C34-C50	n/a	E601F	435 mg/kg	528 mg/kg	82.5	60.0	140	----
Hydrocarbons (QCLot: 1727580)										
HA2402607-001	Anonymous	VPH C6-C10	n/a	E581.VPH	53.0 mg/kg	59.2 mg/kg	89.6	60.0	140	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1723796)										
HA2402607-001	Anonymous	Acenaphthene	83-32-9	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Acenaphthylene	208-96-8	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Acridine	260-94-6	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Anthracene	120-12-7	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Benz(a)anthracene	56-55-3	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Benzo(a)pyrene	50-32-8	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Benzo(b+j)fluoranthene	n/a	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Benzo(g,h,i)perylene	191-24-2	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Benzo(k)fluoranthene	207-08-9	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Chrysene	218-01-9	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Dibenz(a,h)anthracene	53-70-3	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Fluoranthene	206-44-0	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Fluorene	86-73-7	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Methylnaphthalene, 1-	90-12-0	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Methylnaphthalene, 2-	91-57-6	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Naphthalene	91-20-3	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Perylene	198-55-0	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Phenanthrene	85-01-8	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Pyrene	129-00-0	E641A-L	ND mg/kg	----	ND	50.0	140	----
		Quinoline	91-22-5	E641A-L	ND mg/kg	----	ND	50.0	140	----
Polychlorinated Biphenyls (QCLot: 1723746)										
WT2431263-001	Anonymous	Aroclor 1016	12674-11-2	E687	0.010 mg/kg	0.01 mg/kg	98.8	50.0	150	----
		Aroclor 1221	11104-28-2	E687	0.010 mg/kg	0.01 mg/kg	98.8	50.0	150	----



Sub-Matrix: Soil/Solid					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Polychlorinated Biphenyls (QCLot: 1723746) - continued										
WT2431263-001	Anonymous	Aroclor 1232	11141-16-5	E687	0.010 mg/kg	0.01 mg/kg	98.8	50.0	150	----
		Aroclor 1242	53469-21-9	E687	0.008 mg/kg	0.01 mg/kg	75.4	50.0	150	----
		Aroclor 1248	12672-29-6	E687	0.010 mg/kg	0.01 mg/kg	98.8	50.0	150	----
		Aroclor 1254	11097-69-1	E687	0.007 mg/kg	0.01 mg/kg	65.1	50.0	150	----
		Aroclor 1260	11096-82-5	E687	0.006 mg/kg	0.01 mg/kg	63.8	50.0	150	----
		Aroclor 1262	37324-23-5	E687	0.012 mg/kg	0.01 mg/kg	117	50.0	150	----
		Aroclor 1268	11100-14-4	E687	0.012 mg/kg	0.01 mg/kg	117	50.0	150	----
Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1723643)										
HA2402608-011	SW 1	Fluoride	16984-48-8	E235.F	0.964 mg/L	1 mg/L	96.4	75.0	125	----
Anions and Nutrients (QCLot: 1723644)										
HA2402608-011	SW 1	Nitrate (as N)	14797-55-8	E235.NO3	2.42 mg/L	2.5 mg/L	96.9	75.0	125	----
Anions and Nutrients (QCLot: 1723645)										
HA2402608-011	SW 1	Nitrite (as N)	14797-65-0	E235.NO2	0.491 mg/L	0.5 mg/L	98.1	75.0	125	----
Anions and Nutrients (QCLot: 1723646)										
HA2402608-011	SW 1	Chloride	16887-00-6	E235.Cl	97.7 mg/L	100 mg/L	97.7	75.0	125	----
Anions and Nutrients (QCLot: 1723647)										
HA2402608-011	SW 1	Sulfate (as SO4)	14808-79-8	E235.SO4	97.1 mg/L	100 mg/L	97.1	75.0	125	----
Anions and Nutrients (QCLot: 1723651)										
HA2402608-012	SW 3	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0189 mg/L	0.02 mg/L	96.4	70.0	130	----
Anions and Nutrients (QCLot: 1724219)										
BF2400368-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1724217)										
BF2400368-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	5.44 mg/L	5 mg/L	109	70.0	130	----
Total Metals (QCLot: 1724407)										
HA2402587-002	Anonymous	Aluminum, total	7429-90-5	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0543 mg/L	0.05 mg/L	108	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0526 mg/L	0.05 mg/L	105	70.0	130	----
		Barium, total	7440-39-3	E420	0.0125 mg/L	0.012 mg/L	100	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.00491 mg/L	0.005 mg/L	98.2	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0493 mg/L	0.05 mg/L	98.5	70.0	130	----
		Boron, total	7440-42-8	E420	0.048 mg/L	0.05 mg/L	95.7	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00500 mg/L	0.005 mg/L	99.9	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	----	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00266 mg/L	0.002 mg/L	106	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0132 mg/L	0.012 mg/L	105	70.0	130	----

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 Work Order : HA2402608 Amendment 4
 Client : Dillon Consulting Limited
 Project : 24-8606



Sub-Matrix: Water

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 1724407) - continued										
HA2402587-002	Anonymous	Cobalt, total	7440-48-4	E420	0.0129 mg/L	0.012 mg/L	103	70.0	130	----
		Copper, total	7440-50-8	E420	ND mg/L	----	ND	70.0	130	----
		Iron, total	7439-89-6	E420	0.050 mg/L	0.05 mg/L	100	70.0	130	----
		Lead, total	7439-92-1	E420	0.0250 mg/L	0.025 mg/L	100	70.0	130	----
		Lithium, total	7439-93-2	E420	ND mg/L	----	ND	70.0	130	----
		Magnesium, total	7439-95-4	E420	2.83 mg/L	2.5 mg/L	113	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0123 mg/L	0.012 mg/L	98.4	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0130 mg/L	0.012 mg/L	104	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0255 mg/L	0.025 mg/L	102	70.0	130	----
		Phosphorus, total	7723-14-0	E420	0.517 mg/L	0.5 mg/L	103	70.0	130	----
		Potassium, total	7440-09-7	E420	2.49 mg/L	2.5 mg/L	99.6	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.00516 mg/L	0.005 mg/L	103	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0496 mg/L	0.05 mg/L	99.1	70.0	130	----
		Silicon, total	7440-21-3	E420	0.50 mg/L	0.5 mg/L	101	70.0	130	----
		Silver, total	7440-22-4	E420	0.00462 mg/L	0.005 mg/L	92.4	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	----	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	0.0125 mg/L	0.012 mg/L	100	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	----	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.00475 mg/L	0.005 mg/L	95.0	70.0	130	----
		Thallium, total	7440-28-0	E420	0.0493 mg/L	0.05 mg/L	98.6	70.0	130	----
		Thorium, total	7440-29-1	E420	0.00528 mg/L	0.005 mg/L	106	70.0	130	----
		Tin, total	7440-31-5	E420	0.0257 mg/L	0.025 mg/L	103	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0127 mg/L	0.012 mg/L	102	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.00485 mg/L	0.005 mg/L	97.0	70.0	130	----
		Uranium, total	7440-61-1	E420	0.000274 mg/L	0 mg/L	110	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0264 mg/L	0.025 mg/L	106	70.0	130	----
		Zinc, total	7440-66-6	E420	ND mg/L	----	ND	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.00522 mg/L	0.005 mg/L	104	70.0	130	----
Total Metals (QCLot: 1724869)										
HA2402608-012	SW 3	Mercury, total	7439-97-6	E508	0.0000983 mg/L	0 mg/L	98.3	70.0	130	----
Total Metals (QCLot: 1727768)										
HA2402613-001	Anonymous	Mercury, total	7439-97-6	E508	0.000101 mg/L	0 mg/L	101	70.0	130	----



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method			Low	High	
Physical Tests (QCLot: 1723730)									
QC-1723730-003	RM	Conductivity (1:2 leachate)	----	E100-L	3310 µS/cm	98.3	70.0	130	----
Particle Size (QCLot: 1728382)									
QC-1728382-001	RM	Sand (>0.075mm)	----	E178	40.1 %	98.7	88.0	112	----
Metals (QCLot: 1723728)									
QC-1723728-003	RM	Aluminum	7429-90-5	E440	22500 mg/kg	109	70.0	130	----
QC-1723728-003	RM	Antimony	7440-36-0	E440	24.8 mg/kg	85.8	70.0	130	----
QC-1723728-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	101	70.0	130	----
QC-1723728-003	RM	Barium	7440-39-3	E440	788 mg/kg	106	70.0	130	----
QC-1723728-003	RM	Beryllium	7440-41-7	E440	1.82 mg/kg	105	70.0	130	----
QC-1723728-003	RM	Cadmium	7440-43-9	E440	2.15 mg/kg	104	70.0	130	----
QC-1723728-003	RM	Chromium	7440-47-3	E440	56.9 mg/kg	103	70.0	130	----
QC-1723728-003	RM	Cobalt	7440-48-4	E440	32 mg/kg	102	70.0	130	----
QC-1723728-003	RM	Copper	7440-50-8	E440	969 mg/kg	108	70.0	130	----
QC-1723728-003	RM	Iron	7439-89-6	E440	32700 mg/kg	104	70.0	130	----
QC-1723728-003	RM	Lead	7439-92-1	E440	919 mg/kg	100	70.0	130	----
QC-1723728-003	RM	Manganese	7439-96-5	E440	8640 mg/kg	110	70.0	130	----
QC-1723728-003	RM	Molybdenum	7439-98-7	E440	25.1 mg/kg	105	70.0	130	----
QC-1723728-003	RM	Nickel	7440-02-0	E440	1000 mg/kg	112	70.0	130	----
QC-1723728-003	RM	Selenium	7782-49-2	E440	1.04 mg/kg	96.3	60.0	140	----
QC-1723728-003	RM	Silver	7440-22-4	E440	8.98 mg/kg	98.2	70.0	130	----
QC-1723728-003	RM	Strontium	7440-24-6	E440	41 mg/kg	105	70.0	130	----
QC-1723728-003	RM	Sulfur	7704-34-9	E440	3940 mg/kg	104	50.0	150	----
QC-1723728-003	RM	Thallium	7440-28-0	E440	0.907 mg/kg	97.1	70.0	130	----
QC-1723728-003	RM	Tin	7440-31-5	E440	3.79 mg/kg	101	40.0	160	----
QC-1723728-003	RM	Uranium	7440-61-1	E440	3.97 mg/kg	98.4	70.0	130	----
QC-1723728-003	RM	Vanadium	7440-62-2	E440	66.2 mg/kg	102	70.0	130	----
QC-1723728-003	RM	Zinc	7440-66-6	E440	828 mg/kg	102	70.0	130	----
Metals (QCLot: 1723729)									
QC-1723729-003	RM	Mercury	7439-97-6	E510	0.068 mg/kg	104	70.0	130	----
Metals (QCLot: 1723731)									
QC-1723731-003	RM	Calcium, soluble ion content	7440-70-2	E484	174 mg/L	99.6	70.0	130	----
QC-1723731-003	RM	Magnesium, soluble ion content	7439-95-4	E484	63.5 mg/L	100	70.0	130	----



Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					
Metals (QCLot: 1723731) - continued									
QC-1723731-003	RM	Sodium, soluble ion content	17341-25-2	E484	113 mg/L	96.5	70.0	130	----
Metals (QCLot: 1806052)									
QC-1806052-003	RM	Calcium, soluble ion content	7440-70-2	E484	174 mg/L	104	70.0	130	----
QC-1806052-003	RM	Magnesium, soluble ion content	7439-95-4	E484	63.5 mg/L	106	70.0	130	----
QC-1806052-003	RM	Sodium, soluble ion content	17341-25-2	E484	113 mg/L	109	70.0	130	----
Metals (QCLot: 1829587)									
QC-1829587-003	RM	Mercury	7439-97-6	E510	0.068 mg/kg	97.8	70.0	130	----
Metals (QCLot: 1829588)									
QC-1829588-003	RM	Aluminum	7429-90-5	E440	22500 mg/kg	104	70.0	130	----
QC-1829588-003	RM	Antimony	7440-36-0	E440	24.8 mg/kg	89.8	70.0	130	----
QC-1829588-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	102	70.0	130	----
QC-1829588-003	RM	Barium	7440-39-3	E440	788 mg/kg	109	70.0	130	----
QC-1829588-003	RM	Beryllium	7440-41-7	E440	1.82 mg/kg	97.1	70.0	130	----
QC-1829588-003	RM	Cadmium	7440-43-9	E440	2.15 mg/kg	102	70.0	130	----
QC-1829588-003	RM	Chromium	7440-47-3	E440	56.9 mg/kg	99.7	70.0	130	----
QC-1829588-003	RM	Cobalt	7440-48-4	E440	32 mg/kg	101	70.0	130	----
QC-1829588-003	RM	Copper	7440-50-8	E440	969 mg/kg	106	70.0	130	----
QC-1829588-003	RM	Iron	7439-89-6	E440	32700 mg/kg	103	70.0	130	----
QC-1829588-003	RM	Lead	7439-92-1	E440	919 mg/kg	97.1	70.0	130	----
QC-1829588-003	RM	Manganese	7439-96-5	E440	8640 mg/kg	108	70.0	130	----
QC-1829588-003	RM	Molybdenum	7439-98-7	E440	25.1 mg/kg	99.1	70.0	130	----
QC-1829588-003	RM	Nickel	7440-02-0	E440	1000 mg/kg	108	70.0	130	----
QC-1829588-003	RM	Selenium	7782-49-2	E440	1.04 mg/kg	108	60.0	140	----
QC-1829588-003	RM	Silver	7440-22-4	E440	8.98 mg/kg	93.5	70.0	130	----
QC-1829588-003	RM	Strontium	7440-24-6	E440	41 mg/kg	99.4	70.0	130	----
QC-1829588-003	RM	Sulfur	7704-34-9	E440	3940 mg/kg	101	50.0	150	----
QC-1829588-003	RM	Thallium	7440-28-0	E440	0.907 mg/kg	93.8	70.0	130	----
QC-1829588-003	RM	Tin	7440-31-5	E440	3.79 mg/kg	98.4	40.0	160	----
QC-1829588-003	RM	Uranium	7440-61-1	E440	3.97 mg/kg	86.4	70.0	130	----
QC-1829588-003	RM	Vanadium	7440-62-2	E440	66.2 mg/kg	102	70.0	130	----
QC-1829588-003	RM	Zinc	7440-66-6	E440	828 mg/kg	97.3	70.0	130	----
Leachable Anions & Nutrients (QCLot: 1736504)									
QC-1736504-003	RM	Chloride, soluble ion content	16887-00-6	E236.Cl	402 mg/kg	91.6	70.0	130	----

November 13, 2024

Mr. Andrew Martin
ALS Canada
60 Northland Road
Unit 1
Waterloo, Ontario N2V 2B8

Re: ALS Waterloo - Martin
Work Order: 692357
SDG: HA2402608

Dear Mr. Martin:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 28, 2024. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,



Max Gloth for
Julie Robinson
Project Manager

Purchase Order: WT
Chain of Custody: 217871
Enclosures

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report for

ALSC001 ALS Canada (NWMO)

Client SDG: HA2402608 GEL Work Order: 692357

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Julie Robinson.

Reviewed by



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Canada
Address : 60 Northland Road
Unit 1
Waterloo, Ontario N2V 2-B8
Contact: Mr. Andrew Martin
Project: ALS Waterloo - Martin

Report Date: November 13, 2024

Client Sample ID: HA2402608-027
Sample ID: 692357001
Matrix: Soil
Collect Date: 17-OCT-24
Receive Date: 28-OCT-24
Collector: Client
Moisture: 8.38%

Project: ALSC00223
Client ID: ALSC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Gross A/B, Solid "Dry Weight Corrected"</i>														
Alpha		14.7	+/-4.86	3.56	+/-5.67	4.00	pCi/g			CH7	11/08/24	1203	2698162	1
Beta		19.8	+/-4.03	3.94	+/-4.91	10.0	pCi/g							

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	GG	10/31/24	1403	2696060

The following Analytical Methods were performed

Method	Description
1	EPA 900.0/SW846 9310/SM 7110B Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration

Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: November 13, 2024

Page 1 of 2

Client : ALS Canada
60 Northland Road
Unit 1
Waterloo, Ontario
Contact: Mr. Andrew Martin
Workorder: 692357

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2698162										
QC1205905430	692357001	DUP									
Alpha		14.7		9.84	pCi/g	39.9		(0% - 100%)	CH7	11/08/24	12:03
		Uncert:	+/-4.86	+/-3.78							
		TPU:	+/-5.67	+/-4.27							
Beta		19.8		18.4	pCi/g	7.06		(0%-20%)			
		Uncert:	+/-4.03	+/-3.51							
		TPU:	+/-4.91	+/-4.39							
QC1205905433	LCS										
Alpha	106			106	pCi/g		100	(75%-125%)	CH7	11/08/24	12:03
		Uncert:		+/-9.54							
		TPU:		+/-23.5							
Beta	411			468	pCi/g		114	(75%-125%)			
		Uncert:		+/-15.7							
		TPU:		+/-69.0							
QC1205905429	MB										
Alpha			U	0.684	pCi/g				CH7	11/08/24	12:03
		Uncert:		+/-1.25							
		TPU:		+/-1.26							
Beta			U	1.46	pCi/g						
		Uncert:		+/-2.04							
		TPU:		+/-2.05							
QC1205905431	692357001	MS									
Alpha	114	14.7		113	pCi/g		86.2	(75%-125%)	CH7	11/08/24	12:03
		Uncert:	+/-4.86	+/-13.0							
		TPU:	+/-5.67	+/-27.1							
Beta	442	19.8		505	pCi/g		110	(75%-125%)			
		Uncert:	+/-4.03	+/-17.4							
		TPU:	+/-4.91	+/-74.1							
QC1205905432	692357001	MSD									
Alpha	106	14.7		99.2	pCi/g	13.1	79.7	(0%-20%)	CH7	11/12/24	13:44
		Uncert:	+/-4.86	+/-13.4							
		TPU:	+/-5.67	+/-24.9							
Beta	411	19.8		438	pCi/g	14.1	102	(0%-20%)			
		Uncert:	+/-4.03	+/-15.9							
		TPU:	+/-4.91	+/-62.6							

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 692357

Page 2 of 2

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
H	Analytical holding time was exceeded									
<	Result is less than value reported									
>	Result is greater than value reported									
UI	Gamma Spectroscopy--Uncertain identification									
BD	Results are either below the MDC or tracer recovery is low									
h	Preparation or preservation holding time was exceeded									
R	Sample results are rejected									
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.									
N/A	RPD or %Recovery limits do not apply.									
ND	Analyte concentration is not detected above the detection limit									
M	M if above MDC and less than LLD									
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
FA	Failed analysis.									
UJ	Gamma Spectroscopy--Uncertain identification									
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.									
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.									
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.									
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.									
N1	See case narrative									
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.									
**	Analyte is a Tracer compound									
M	REMP Result > MDC/CL and < RDL									
J	See case narrative for an explanation									

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

** Indicates analyte is a surrogate/tracer compound.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Radiochemistry
Technical Case Narrative
ALS Canada
SDG #: HA2402608
Work Order #: 692357

Product: Dry Weight

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 25

Preparation Batch: 2696060

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
692357001	HA2402608-027

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: GFPC Gross A/B, Solid

Analytical Method: EPA 900.0/SW846 9310/SM 7110B Modified

Analytical Procedure: GL-RAD-A-001B REV# 20

Analytical Batch: 2698162

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 25

Preparation Batch: 2696060

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
692357001	HA2402608-027
1205905429	Method Blank (MB)
1205905430	692357001(HA2402608-027) Sample Duplicate (DUP)
1205905431	692357001(HA2402608-027) Matrix Spike (MS)
1205905432	692357001(HA2402608-027) Matrix Spike Duplicate (MSD)
1205905433	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Gross Alpha/Beta Preparation Information

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

Recounts

Sample 1205905432 (HA2402608-027MSD) was recounted due to low recovery. The recount is reported.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

November 21, 2024

Mr. Andrew Martin
ALS Canada
60 Northland Road
Unit 1
Waterloo, Ontario N2V 2B8

Re: ALS Waterloo - Martin
Work Order: 692357
SDG: HA2402608

Dear Mr. Martin:

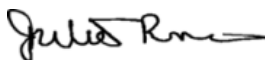
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 28, 2024. This revised data report has been prepared and reviewed in accordance with GEL's standard operating procedures. This report replaces the original version which is noted as SDG number HA2402608 in the left-hand footer of the data report.

The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,



Julie Robinson
Project Manager

Purchase Order: WT
Chain of Custody: 217871
Enclosures

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report for

ALSC001 ALS Canada (NWMO)

Client SDG: HA2402608 GEL Work Order: 692357

The Qualifiers in this report are defined as follows:

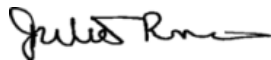
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Julie Robinson.

Reviewed by



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Canada
Address : 60 Northland Road
Unit 1
Waterloo, Ontario N2V 2-B8
Contact: Mr. Andrew Martin
Project: ALS Waterloo - Martin

Report Date: November 21, 2024

Client Sample ID: HA2402608-027
Sample ID: 692357001
Matrix: Soil
Collect Date: 17-OCT-24
Receive Date: 28-OCT-24
Collector: Client
Moisture: 8.38%

Project: ALSC00223
Client ID: ALSC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Gross A/B, Solid "Dry Weight Corrected"</i>														
Alpha		546	+/-180	132	+/-210	111	bq/kg			CH7	11/08/24	1203	2698162	1
Beta		732	+/-149	146	+/-182	148	bq/kg							

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	GG	10/31/24	1403	2696060

The following Analytical Methods were performed

Method	Description
1	EPA 900.0/SW846 9310/SM 7110B Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: November 21, 2024

Page 1 of 2

Client : ALS Canada
60 Northland Road
Unit 1
Waterloo, Ontario
Contact: Mr. Andrew Martin
Workorder: 692357

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time						
Rad Gas Flow																	
Batch	2698162																
QC1205905430	692357001	DUP															
Alpha		546		364	bq/kg	39.9		(0% - 100%)	CH7	11/08/24	12:03						
		Uncert:	+/-180	+/-140													
		TPU:	+/-210	+/-158													
Beta		732		682	bq/kg	7.06		(0%-20%)									
		Uncert:	+/-149	+/-130													
		TPU:	+/-182	+/-162													
QC1205905433	LCS																
Alpha	3920			3930	bq/kg		100	(75%-125%)	CH7	11/08/24	12:03						
		Uncert:															
		TPU:															
Beta	15200			17300	bq/kg		114	(75%-125%)									
		Uncert:															
		TPU:															
QC1205905429	MB																
Alpha			U	25.3	bq/kg					CH7	11/08/24	12:03					
		Uncert:															
		TPU:															
Beta			U	54.0	bq/kg												
		Uncert:															
		TPU:															
QC1205905431	692357001	MS															
Alpha	4220	546		4180	bq/kg		86.2	(75%-125%)	CH7	11/08/24	12:03						
		Uncert:	+/-180	+/-479													
		TPU:	+/-210	+/-1000													
Beta	16400	732		18700	bq/kg		110	(75%-125%)									
		Uncert:	+/-149	+/-645													
		TPU:	+/-182	+/-2740													
QC1205905432	692357001	MSD															
Alpha	3920	546		3670	bq/kg	13.1	79.7	(0%-20%)	CH7	11/12/24	13:44						
		Uncert:	+/-180	+/-497													
		TPU:	+/-210	+/-922													
Beta	15200	732		16200	bq/kg	14.1	102	(0%-20%)									
		Uncert:	+/-149	+/-587													
		TPU:	+/-182	+/-2320													

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 692357

Page 2 of 2

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
H	Analytical holding time was exceeded									
<	Result is less than value reported									
>	Result is greater than value reported									
UI	Gamma Spectroscopy--Uncertain identification									
BD	Results are either below the MDC or tracer recovery is low									
h	Preparation or preservation holding time was exceeded									
R	Sample results are rejected									
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.									
N/A	RPD or %Recovery limits do not apply.									
ND	Analyte concentration is not detected above the detection limit									
M	M if above MDC and less than LLD									
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
FA	Failed analysis.									
UJ	Gamma Spectroscopy--Uncertain identification									
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.									
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.									
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.									
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.									
N1	See case narrative									
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.									
**	Analyte is a Tracer compound									
M	REMP Result > MDC/CL and < RDL									
J	See case narrative for an explanation									

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

** Indicates analyte is a surrogate/tracer compound.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Radiochemistry
Technical Case Narrative
ALS Canada
SDG #: HA2402608
Work Order #: 692357

Product: Dry Weight

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 25

Preparation Batch: 2696060

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
692357001	HA2402608-027

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: GFPC Gross A/B, Solid

Analytical Method: EPA 900.0/SW846 9310/SM 7110B Modified

Analytical Procedure: GL-RAD-A-001B REV# 20

Analytical Batch: 2698162

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 25

Preparation Batch: 2696060

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
692357001	HA2402608-027
1205905429	Method Blank (MB)
1205905430	692357001(HA2402608-027) Sample Duplicate (DUP)
1205905431	692357001(HA2402608-027) Matrix Spike (MS)
1205905432	692357001(HA2402608-027) Matrix Spike Duplicate (MSD)
1205905433	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Gross Alpha/Beta Preparation Information

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

Recounts

Sample 1205905432 (HA2402608-027MSD) was recounted due to low recovery. The recount is reported.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

February 07, 2025

Mr. Andrew Martin
ALS Canada
60 Northland Road
Unit 1
Waterloo, Ontario N2V 2B8

Re: ALS Waterloo - Martin
Work Order: 703580
SDG: HA2402608-1

Dear Mr. Martin:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 28, 2024. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,

A handwritten signature in black ink that reads "Max Gloth".

Max Gloth for
Julie Robinson
Project Manager

Purchase Order: WT
Chain of Custody: 217871
Enclosures

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report for

ALSC001 ALS Canada (NWMO)

Client SDG: HA2402608-1 GEL Work Order: 703580

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Julie Robinson.

Reviewed by



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Canada
Address : 60 Northland Road
Unit 1
Waterloo, Ontario N2V 2-B8
Contact: Mr. Andrew Martin
Project: ALS Waterloo - Martin

Report Date: February 7, 2025

Client Sample ID: HA2402608-027
Sample ID: 703580001
Matrix: Soil
Collect Date: 17-OCT-24
Receive Date: 28-OCT-24
Collector: Client
Moisture: 8.38%

Project: ALSC00223
Client ID: ALSC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Analysis														
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>														
Thorium-228		42.4	+/-19.9	17.7	+/-20.6	3.70	Bq/kg			RM3	01/13/25	1519	2732201	1
Rad Gamma Spec Analysis														
<i>Gammasespec, Gamma, Solid (Radium-226/228 + Lead) "Dry Weight Corrected"</i>														
Lead-210		56.2	+/-21.7	21.3	+/-22.3	185	Bq/kg			RXF2	02/03/25	1525	2733808	2
Radium-226		74.0	+/-6.16	3.48	+/-9.45	3.70	Bq/kg							
Radium-228		54.5	+/-11.1	7.70	+/-13.2	3.70	Bq/kg							

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	GG	10/31/24	1403	2732109

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL-300, Th-01-RC Modified
2	DOE HASL 300, 4.5.2.3/Ga-01-R

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Thorium-229 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"	2732201	49.6	(15%-125%)

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Certificate of Analysis

Company : ALS Canada
Address : 60 Northland Road
Unit 1
Waterloo, Ontario N2V 2-B8

Report Date: February 7, 2025

Contact: Mr. Andrew Martin
Project: ALS Waterloo - Martin

Client Sample ID: HA2402608-027
Sample ID: 703580001

Project: ALSC00223
Client ID: ALSC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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QC Summary

Report Date: February 7, 2025

Page 1 of 3

Client : ALS Canada
60 Northland Road
Unit 1
Waterloo, Ontario
Contact: Mr. Andrew Martin
Workorder: 703580

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	2732201										
QC1205972792	703580001	DUP									
Thorium-228		42.4		51.0	Bq/kg	18.6		(0% - 100%)	RM3	01/13/25	15:20
		Uncert:	+/-19.9	+/-25.4							
		TPU:	+/-20.6	+/-26.3							
QC1205972793	LCS										
Thorium-228				677	Bq/kg				RM3	01/13/25	15:20
		Uncert:		+/-72.4							
		TPU:		+/-111							
Thorium-232	613			631	Bq/kg		103	(75%-125%)			
		Uncert:		+/-68.6							
		TPU:		+/-104							
QC1205972791	MB										
Thorium-228			U	0.439	Bq/kg				RM3	01/13/25	15:19
		Uncert:		+/-5.10							
		TPU:		+/-5.10							
Rad Gamma Spec											
Batch	2733808										
QC1205975528	703580001	DUP									
Lead-210		56.2		58.5	Bq/kg	4.06		(0% - 100%)	RXF2	02/03/25	09:39
		Uncert:	+/-21.7	+/-36.5							
		TPU:	+/-22.3	+/-36.9							
Radium-226		74.0		74.6	Bq/kg	.797		(0%-20%)			
		Uncert:	+/-6.16	+/-7.78							
		TPU:	+/-9.45	+/-9.89							
Radium-228		54.5		57.6	Bq/kg	5.41		(0%-20%)			
		Uncert:	+/-11.1	+/-14.2							
		TPU:	+/-13.2	+/-15.3							
QC1205975529	LCS										
Americium-241	17900			20700	Bq/kg		116	(75%-125%)	RXF2	02/03/25	09:39
		Uncert:		+/-516							
		TPU:		+/-2760							
Cesium-137	5480			5180	Bq/kg		94.6	(75%-125%)			
		Uncert:		+/-103							
		TPU:		+/-434							
Cobalt-60	2000			1940	Bq/kg		96.9	(75%-125%)			
		Uncert:		+/-80.3							
		TPU:		+/-262							
Lead-210				1.73E+05	Bq/kg						
		Uncert:		+/-14600							
		TPU:		+/-27300							
Radium-226			U	12.7	Bq/kg						

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QC Summary

Workorder: 703580

Page 2 of 3

Parmname	NOM	Sample	Qual	QC	Units	RPD %	REC %	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2733808										
Radium-228	Uncert:			+/-29.8							
	TPU:			+/-30.4							
			U	33.1	Bq/kg						
	Uncert:			+/-95.3							
QC1205975527 MB Lead-210	TPU:			+/-96.6							
			U	-6.82	Bq/kg				RXF2	02/03/2505:49	
	Uncert:			+/-10.6							
	TPU:			+/-11.1							
Radium-226			U	-0.349	Bq/kg						
	Uncert:			+/-2.07							
	TPU:			+/-2.07							
			U	-1.48	Bq/kg						
Radium-228	Uncert:			+/-4.48							
	TPU:			+/-4.53							

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported
- UI Gamma Spectroscopy--Uncertain identification
- BD Results are either below the MDC or tracer recovery is low
- h Preparation or preservation holding time was exceeded
- R Sample results are rejected
- ^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
- N/A RPD or %Recovery limits do not apply.
- ND Analyte concentration is not detected above the detection limit
- M M if above MDC and less than LLD
- NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- FA Failed analysis.
- UJ Gamma Spectroscopy--Uncertain identification
- Q One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- N1 See case narrative
- Y Other specific qualifiers were required to properly define the results. Consult case narrative.
- ** Analyte is a Tracer compound

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QC Summary

Workorder: 703580

Page 3 of 3

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

M REMP Result > MDC/CL and < RDL

x Subaliquot was taken. See Case Narrative for details.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

** Indicates analyte is a surrogate/tracer compound.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Radiochemistry
Technical Case Narrative
ALS Canada
SDG #: HA2402608-1
Work Order #: 703580

Product: Alphaspec Th, Solid

Analytical Method: DOE EML HASL-300, Th-01-RC Modified

Analytical Procedure: GL-RAD-A-038 REV# 19

Analytical Batch: 2732201

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 25

Preparation Batch: 2732109

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
703580001	HA2402608-027
1205972791	Method Blank (MB)
1205972792	703580001(HA2402608-027) Sample Duplicate (DUP)
1205972793	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Dry Weight

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 25

Preparation Batch: 2732109

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
703580001	HA2402608-027

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

This sample is a relog. The data for this batch was transferred from batch 2696060. 703580001 (HA2402608-027).

Product: Gammaspec, Gamma, Solid (Radium-226/228 + Lead)

Analytical Method: DOE HASL 300, 4.5.2.3/Ga-01-R

Analytical Procedure: GL-RAD-A-013 REV# 29

Analytical Batch: 2733808

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 25

Preparation Batch: 2732109

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#**Client Sample Identification**

703580001	HA2402608-027
1205975527	Method Blank (MB)
1205975528	703580001(HA2402608-027) Sample Duplicate (DUP)
1205975529	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information**RDL Met**

The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1205975527 (MB)	Radium-228	Result -1.48 < MDA 8.03 > RDL 3.7 Bq/kg

Technical Information**Recounts**

Sample 703580001 (HA2402608-027) was recounted due to high MDC. The recount is reported.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the

requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

CERTIFICATE OF ANALYSIS

Work Order	: HA2500162		
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Waterloo
Contact	: Nadine Wambolt	Account Manager	: Andrew Martin
Address	: 275 Charlotte Street Suite 206 Sydney Nova Scotia Canada B1P 1C6	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	: 902.562.9880 ext. 5206	Telephone	: +1 519 886 6910
Project	: 24-8606	Date Samples Received	: 15-Jan-2025 10:10
PO	: ----	Date Analysis Commenced	: 20-Jan-2025
C-O-C number	: 20-1022292	Issue Date	: 22-Jan-2025 10:54
Sampler	: CLIENT		
Site	: ----		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Nik Perkio	Senior Analyst	Metals, Waterloo, Ontario



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	Description
mg/kg	milligrams per kilogram

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.



Analytical Results

Sub-Matrix: Soil/Solid
 (Matrix: Soil/Solid)

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH1 0.30m	BH3 0-0.34m	BH10 1.0m	BH11 0.15m	BH12 0.47m
Client sampling date / time					15-Oct-2024 00:00	15-Oct-2024 00:00	15-Oct-2024 00:00	15-Oct-2024 00:00	15-Oct-2024 00:00	17-Oct-2024 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2500162-001	HA2500162-002	HA2500162-003	HA2500162-004	HA2500162-005	
					Result	Result	Result	Result	Result	
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg	21900	26400	23000	15200	23700	
Antimony	7440-36-0	E440/WT	0.10	mg/kg	<0.10	1.84	0.12	<0.10	<0.10	
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	2.70	2.86	3.36	2.57	3.28	
Barium	7440-39-3	E440/WT	0.50	mg/kg	34.3	31.3	46.4	18.8	40.4	
Beryllium	7440-41-7	E440/WT	0.10	mg/kg	0.77	0.85	1.65	0.80	0.93	
Boron	7440-42-8	E440/WT	5.0	mg/kg	<5.0	5.4	7.4	7.7	7.7	
Cadmium	7440-43-9	E440/WT	0.020	mg/kg	0.181	0.208	0.788	0.282	0.249	
Chromium	7440-47-3	E440/WT	0.50	mg/kg	21.6	28.9	20.8	13.4	28.0	
Cobalt	7440-48-4	E440/WT	0.10	mg/kg	12.5	16.0	10.2	8.96	16.4	
Copper	7440-50-8	E440/WT	0.50	mg/kg	25.1	33.8	34.4	46.2	79.0	
Iron	7439-89-6	E440/WT	50	mg/kg	27600	35700	16900	18600	31500	
Lead	7439-92-1	E440/WT	0.50	mg/kg	14.4	41.5	30.4	23.2	18.9	
Manganese	7439-96-5	E440/WT	1.0	mg/kg	613	560	558	723	854	
Mercury	7439-97-6	E510/WT	0.0050	mg/kg	0.0266	0.0282	0.0741	0.0113	0.0397	
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg	0.73	0.78	1.72	0.80	1.32	
Nickel	7440-02-0	E440/WT	0.50	mg/kg	20.4	27.5	17.8	13.2	25.6	
Selenium	7782-49-2	E440/WT	0.20	mg/kg	0.26	0.46	2.29	<0.20	0.44	
Silver	7440-22-4	E440/WT	0.10	mg/kg	<0.10	<0.10	0.10	<0.10	<0.10	
Strontium	7440-24-6	E440/WT	0.50	mg/kg	28.4	19.4	35.4	59.9	33.4	
Sulfur	7704-34-9	E440/WT	1000	mg/kg	<1000	<1000	4600	<1000	<1000	
Thallium	7440-28-0	E440/WT	0.050	mg/kg	0.107	0.122	0.240	0.086	0.144	



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH1 0.30m	BH3 0-0.34m	BH10 1.0m	BH11 0.15m	BH12 0.47m
Client sampling date / time						15-Oct-2024 00:00	15-Oct-2024 00:00	15-Oct-2024 00:00	15-Oct-2024 00:00	17-Oct-2024 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2500162-001	HA2500162-002	HA2500162-003	HA2500162-004	HA2500162-005
						Result	Result	Result	Result	Result
Metals										
Tin	7440-31-5	E440/WT	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	7440-61-1	E440/WT	0.050	mg/kg		1.18	1.89	29.6	1.72	2.75
Vanadium	7440-62-2	E440/WT	0.20	mg/kg		49.2	59.0	39.1	30.2	57.9
Zinc	7440-66-6	E440/WT	2.0	mg/kg		428	223	128	101	100

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH17 0-0.15m	BH18 0-0.15m	BH19 0-0.15m	25 DUPA	----
Client sampling date / time						14-Jan-2025 00:00	14-Jan-2025 00:00	14-Jan-2025 00:00	14-Jan-2025 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2500162-006	HA2500162-007	HA2500162-008	HA2500162-009	----
						Result	Result	Result	Result	----
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg		14100	14800	21300	15400	----
Antimony	7440-36-0	E440/WT	0.10	mg/kg		<0.10	<0.10	0.16	<0.10	----
Arsenic	7440-38-2	E440/WT	0.10	mg/kg		3.28	2.56	3.99	2.46	----
Barium	7440-39-3	E440/WT	0.50	mg/kg		13.1	25.1	58.6	28.4	----
Beryllium	7440-41-7	E440/WT	0.10	mg/kg		0.94	0.65	1.86	0.71	----
Boron	7440-42-8	E440/WT	5.0	mg/kg		5.7	10.5	14.6	11.3	----
Cadmium	7440-43-9	E440/WT	0.020	mg/kg		0.092	0.864	0.334	0.911	----
Chromium	7440-47-3	E440/WT	0.50	mg/kg		8.91	12.3	14.4	13.2	----
Cobalt	7440-48-4	E440/WT	0.10	mg/kg		7.82	13.6	15.3	13.7	----
Copper	7440-50-8	E440/WT	0.50	mg/kg		18.0	288	61.0	272	----



Analytical Results

Sub-Matrix: Soil/Solid
 (Matrix: Soil/Solid)

					Client sample ID	BH17 0-0.15m	BH18 0-0.15m	BH19 0-0.15m	25 DUPA	----
					Client sampling date / time	14-Jan-2025 00:00	14-Jan-2025 00:00	14-Jan-2025 00:00	14-Jan-2025 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2500162-006	HA2500162-007	HA2500162-008	HA2500162-009	----	----
					Result	Result	Result	Result	----	----
Metals										
Iron	7439-89-6	E440/WT	50	mg/kg	23700	16400	29400	16800	----	----
Lead	7439-92-1	E440/WT	0.50	mg/kg	4.97	65.3	14.1	66.8	----	----
Manganese	7439-96-5	E440/WT	1.0	mg/kg	451	1490	3250	1580	----	----
Mercury	7439-97-6	E510/WT	0.0050	mg/kg	0.0050	0.0465	0.239	0.0360	----	----
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg	0.32	0.36	0.80	0.38	----	----
Nickel	7440-02-0	E440/WT	0.50	mg/kg	10.3	18.8	20.5	19.6	----	----
Selenium	7782-49-2	E440/WT	0.20	mg/kg	<0.20	<0.20	0.36	<0.20	----	----
Silver	7440-22-4	E440/WT	0.10	mg/kg	<0.10	0.12	0.11	<0.10	----	----
Strontium	7440-24-6	E440/WT	0.50	mg/kg	24.4	90.1	85.1	92.9	----	----
Sulfur	7704-34-9	E440/WT	1000	mg/kg	<1000	<1000	<1000	<1000	----	----
Thallium	7440-28-0	E440/WT	0.050	mg/kg	0.062	0.163	0.207	0.172	----	----
Tin	7440-31-5	E440/WT	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	----	----
Uranium	7440-61-1	E440/WT	0.050	mg/kg	1.63	1.13	3.90	1.22	----	----
Vanadium	7440-62-2	E440/WT	0.20	mg/kg	34.4	29.7	49.8	32.4	----	----
Zinc	7440-66-6	E440/WT	2.0	mg/kg	42.9	353	90.7	356	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: HA2500162	Page	: 1 of 7
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Nadine Wambolt	Account Manager	: Andrew Martin
Address	: 275 Charlotte Street Suite 206 Sydney NS Canada B1P 1C6	Address	: 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2
Telephone	: 902.562.9880 ext. 5206	Telephone	: +1 902 707 4888
Project	: 24-8606	Date Samples Received	: 15-Jan-2025 10:10
PO	: ----	Issue Date	: 22-Jan-2025 10:54
C-O-C number	: 20-1022292		
Sampler	: CLIENT		
Site	:		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap 25 DUPA	E510	14-Jan-2025	20-Jan-2025	28 days	7 days	✓	21-Jan-2025	28 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH17 0-0.15m	E510	14-Jan-2025	20-Jan-2025	28 days	7 days	✓	21-Jan-2025	28 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH18 0-0.15m	E510	14-Jan-2025	20-Jan-2025	28 days	7 days	✓	21-Jan-2025	28 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH19 0-0.15m	E510	14-Jan-2025	20-Jan-2025	28 days	7 days	✓	21-Jan-2025	28 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH12 0.47m	E510	17-Oct-2024	20-Jan-2025	28 days	96 days	✖ EHTR	21-Jan-2025	28 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH1 0.30m	E510	15-Oct-2024	20-Jan-2025	28 days	98 days	✖ EHTR	21-Jan-2025	28 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH10 1.0m	E510	15-Oct-2024	20-Jan-2025	28 days	98 days	✖ EHTR	21-Jan-2025	28 days	1 days	✓



Matrix: Soil/Solid

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH11 0.15m	E510	15-Oct-2024	20-Jan-2025	28 days	98 days	✖ EHTR	21-Jan-2025	28 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap BH3 0-0.34m	E510	15-Oct-2024	20-Jan-2025	28 days	98 days	✖ EHTR	21-Jan-2025	28 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 25 DUPA	E440	14-Jan-2025	20-Jan-2025	180 days	7 days	✓	21-Jan-2025	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH17 0-0.15m	E440	14-Jan-2025	20-Jan-2025	180 days	7 days	✓	21-Jan-2025	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH18 0-0.15m	E440	14-Jan-2025	20-Jan-2025	180 days	7 days	✓	21-Jan-2025	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH19 0-0.15m	E440	14-Jan-2025	20-Jan-2025	180 days	7 days	✓	21-Jan-2025	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH12 0.47m	E440	17-Oct-2024	20-Jan-2025	180 days	96 days	✓	21-Jan-2025	180 days	97 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH1 0.30m	E440	15-Oct-2024	20-Jan-2025	180 days	98 days	✓	21-Jan-2025	180 days	99 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH10 1.0m	E440	15-Oct-2024	20-Jan-2025	180 days	98 days	✓	21-Jan-2025	180 days	99 days	✓

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 Work Order : HA2500162
 Client : Dillon Consulting Limited
 Project : 24-8606



Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method		Method	Sampling Date	Extraction / Preparation			Analysis				
Container / Client Sample ID(s)				Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
					Rec	Actual			Rec	Actual	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap BH11 0.15m		E440	15-Oct-2024	20-Jan-2025	180 days	98 days	✓	21-Jan-2025	180 days	99 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap BH3 0-0.34m		E440	15-Oct-2024	20-Jan-2025	180 days	98 days	✓	21-Jan-2025	180 days	99 days	✓

Legend & Qualifier Definitions

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	1842511	1	9	11.1	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1842512	1	9	11.1	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1842511	2	9	22.2	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1842512	2	9	22.2	10.0	✓
Method Blanks (MB)							
Mercury in Soil/Solid by CVAAS	E510	1842511	1	9	11.1	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1842512	1	9	11.1	5.0	✓



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

<i>Analytical Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Waterloo	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Waterloo	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl, followed by CVAAS analysis.
<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 ALS Environmental - Waterloo	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl. This method is intended to liberate metals that may be environmentally available.

QUALITY CONTROL REPORT

Work Order	: HA2500162	Page	: 1 of 6
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Nadine Wambolt	Account Manager	: Andrew Martin
Address	: 275 Charlotte Street Suite 206 Sydney NS Canada B1P 1C6	Address	: 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2
Telephone	: 902.562.9880 ext. 5206	Telephone	: +1 902 707 4888
Project	: 24-8606	Date Samples Received	: 15-Jan-2025 10:10
PO	: ----	Date Analysis Commenced	: 20-Jan-2025
C-O-C number	: 20-1022292	Issue Date	: 22-Jan-2025 10:54
Sampler	: CLIENT		
Site	:		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Nik Perkio	Senior Analyst	Waterloo Metals, Waterloo, Ontario



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 1842511)											
HA2500162-001	BH1 0.30m	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0266	0.0277	3.80%	40%	----
Metals (QC Lot: 1842512)											
HA2500162-001	BH1 0.30m	Aluminum	7429-90-5	E440	50	mg/kg	21900	22200	1.60%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	2.70	2.86	5.84%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	34.3	35.0	2.03%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.77	0.80	2.58%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	5.1	0.1	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.181	0.197	8.72%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	21.6	23.4	7.79%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	12.5	12.9	3.17%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	25.1	26.9	6.84%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	27600	29000	5.09%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	14.4	15.1	4.87%	40%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	613	635	3.53%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.73	0.79	7.86%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	20.4	21.3	4.56%	30%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.26	0.24	0.01	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	28.4	30.1	5.68%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.107	0.111	0.004	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.18	1.35	13.0%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	49.2	51.8	5.06%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	428	423	1.26%	30%	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1842511)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1842512)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1842511)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	97.5	80.0	120	----
Metals (QCLot: 1842512)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	92.7	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	98.4	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	97.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.1	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.2	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.6	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	98.3	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	95.6	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.4	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.4	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	95.9	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.6	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	99.4	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	95.2	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	100	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	96.0	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	98.8	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	100	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	92.1	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.9	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	91.1	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.2	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.6	80.0	120	----



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					
Metals (QCLot: 1842511)									
QC-1842511-003	RM	Mercury	7439-97-6	E510	0.068 mg/kg	98.1	70.0	130	----
Metals (QCLot: 1842512)									
QC-1842512-003	RM	Aluminum	7429-90-5	E440	22500 mg/kg	106	70.0	130	----
QC-1842512-003	RM	Antimony	7440-36-0	E440	24.8 mg/kg	84.4	70.0	130	----
QC-1842512-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	95.7	70.0	130	----
QC-1842512-003	RM	Barium	7440-39-3	E440	788 mg/kg	99.9	70.0	130	----
QC-1842512-003	RM	Beryllium	7440-41-7	E440	1.82 mg/kg	98.6	70.0	130	----
QC-1842512-003	RM	Cadmium	7440-43-9	E440	2.15 mg/kg	91.3	70.0	130	----
QC-1842512-003	RM	Chromium	7440-47-3	E440	56.9 mg/kg	97.6	70.0	130	----
QC-1842512-003	RM	Cobalt	7440-48-4	E440	32 mg/kg	96.0	70.0	130	----
QC-1842512-003	RM	Copper	7440-50-8	E440	969 mg/kg	103	70.0	130	----
QC-1842512-003	RM	Iron	7439-89-6	E440	32700 mg/kg	101	70.0	130	----
QC-1842512-003	RM	Lead	7439-92-1	E440	919 mg/kg	90.8	70.0	130	----
QC-1842512-003	RM	Manganese	7439-96-5	E440	8640 mg/kg	104	70.0	130	----
QC-1842512-003	RM	Molybdenum	7439-98-7	E440	25.1 mg/kg	92.4	70.0	130	----
QC-1842512-003	RM	Nickel	7440-02-0	E440	1000 mg/kg	104	70.0	130	----
QC-1842512-003	RM	Selenium	7782-49-2	E440	1.04 mg/kg	105	60.0	140	----
QC-1842512-003	RM	Silver	7440-22-4	E440	8.98 mg/kg	87.4	70.0	130	----
QC-1842512-003	RM	Strontium	7440-24-6	E440	41 mg/kg	94.7	70.0	130	----
QC-1842512-003	RM	Sulfur	7704-34-9	E440	3940 mg/kg	101	50.0	150	----
QC-1842512-003	RM	Thallium	7440-28-0	E440	0.907 mg/kg	87.8	70.0	130	----
QC-1842512-003	RM	Tin	7440-31-5	E440	3.79 mg/kg	86.2	40.0	160	----
QC-1842512-003	RM	Uranium	7440-61-1	E440	3.97 mg/kg	92.0	70.0	130	----
QC-1842512-003	RM	Vanadium	7440-62-2	E440	66.2 mg/kg	97.4	70.0	130	----
QC-1842512-003	RM	Zinc	7440-66-6	E440	828 mg/kg	96.1	70.0	130	----

CERTIFICATE OF ANALYSIS

Work Order	: HA2501752		
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Nadine Wambolt	Account Manager	: Andrew Martin
Address	: 275 Charlotte Street Suite 206 Sydney Nova Scotia Canada B1P 1C6	Address	: 13-100 Wright Ave Dartmouth NS Canada B3B 1L2
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Project	: 24-8606	Telephone	: +1 902 707 4888
PO	: ----	Date Samples Received	: 09-Jun-2025 15:30
C-O-C number	: ----	Date Analysis Commenced	: 12-Jun-2025
Sampler	: MK/EJM	Issue Date	: 17-Jun-2025 22:20
Site	: ----		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 53		
No. of samples analysed	: 53		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Greg Pokocky		Metals, Waterloo, Ontario
Greg Pokocky		Inorganics, Waterloo, Ontario
Hedy Lai		Inorganics, Saskatoon, Saskatchewan
Jiaxi Wang		Inorganics, Dartmouth, Nova Scotia
Jon Fisher		Inorganics, Waterloo, Ontario
Samuel Galarza		Centralized Prep, Waterloo, Ontario
Walt Kippenhuck		Metals, Waterloo, Ontario
Walt Kippenhuck		Inorganics, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	Description
-	no units
%	percent
CU	colour units (1 cu = 1 mg/l pt)
meq/L	milliequivalents per litre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units
µS/cm	microsiemens per centimetre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).





Analytical Results

Sub-Matrix: Soil/Solid
 (Matrix: Soil/Solid)

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH20 0-0.15m	BH20 0.5m	BH21 0-0.15m	BH21 0.5m	BH22 0-0.15m
Client sampling date / time					02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-001	HA2501752-002	HA2501752-003	HA2501752-004	HA2501752-005	
					Result	Result	Result	Result	Result	
Physical Tests										
pH (1:2 soil:CaCl2-aq)	----	E108A/WT	0.10	pH units	3.90	4.29	4.03	4.78	5.24	
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg	10800	25800	9230	21000	21400	
Antimony	7440-36-0	E440/WT	0.10	mg/kg	0.26	0.10	0.17	<0.10	0.12	
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	2.82	2.42	2.93	2.05	2.79	
Barium	7440-39-3	E440/WT	0.50	mg/kg	46.3	46.7	27.3	20.5	40.2	
Beryllium	7440-41-7	E440/WT	0.10	mg/kg	0.15	0.46	0.23	0.50	0.50	
Boron	7440-42-8	E440/WT	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	
Cadmium	7440-43-9	E440/WT	0.020	mg/kg	0.112	0.145	0.255	0.115	0.154	
Chromium	7440-47-3	E440/WT	0.50	mg/kg	10.3	18.6	7.96	18.0	15.9	
Cobalt	7440-48-4	E440/WT	0.10	mg/kg	3.17	10.0	3.32	9.94	8.43	
Copper	7440-50-8	E440/WT	0.50	mg/kg	9.33	17.3	8.16	9.68	14.0	
Iron	7439-89-6	E440/WT	50	mg/kg	19100	31800	15600	23900	31200	
Lead	7439-92-1	E440/WT	0.50	mg/kg	34.9	13.3	23.0	15.5	17.5	
Manganese	7439-96-5	E440/WT	1.0	mg/kg	139	375	104	348	400	
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg	0.55	0.54	0.96	0.87	1.26	
Nickel	7440-02-0	E440/WT	0.50	mg/kg	5.46	15.1	4.78	14.3	12.8	
Selenium	7782-49-2	E440/WT	0.20	mg/kg	0.72	0.63	1.09	0.43	0.50	
Silver	7440-22-4	E440/WT	0.10	mg/kg	0.16	<0.10	0.11	<0.10	<0.10	
Strontium	7440-24-6	E440/WT	0.50	mg/kg	11.1	18.4	14.0	17.9	22.2	
Sulfur	7704-34-9	E440/WT	1000	mg/kg	<1000	<1000	<1000	<1000	<1000	



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH20 0-0.15m	BH20 0.5m	BH21 0-0.15m	BH21 0.5m	BH22 0-0.15m
Client sampling date / time						02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-001	HA2501752-002	HA2501752-003	HA2501752-004	HA2501752-005
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/WT	0.050	mg/kg		0.088	0.088	0.074	0.062	0.108
Tin	7440-31-5	E440/WT	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	7440-61-1	E440/WT	0.050	mg/kg		0.666	0.869	0.640	0.801	1.86
Vanadium	7440-62-2	E440/WT	0.20	mg/kg		51.6	59.9	39.3	47.6	63.1
Zinc	7440-66-6	E440/WT	2.0	mg/kg		30.3	68.4	34.6	66.1	85.2

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH22 0.5m	BH23 0-0.15m	BH23 0.5m	BH23 0-0.5m	25DUP B
Client sampling date / time						02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-006	HA2501752-007	HA2501752-008	HA2501752-009	HA2501752-010
						Result	Result	Result	Result	Result
Physical Tests										
pH (1:2 soil:CaCl2-aq)	----	E108A/WT	0.10	pH units		5.21	4.79	4.84	----	4.91
Particle Size										
Sand (>0.075mm)	----	E178/SK	1.0	%		----	----	----	56.6	----
Fines (<0.075mm)	----	E178/SK	1.0	%		----	----	----	43.4	----
Texture class	----	E178/SK	-	-		----	----	----	Coarse	----
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg		19600	21500	22700	----	20800
Antimony	7440-36-0	E440/WT	0.10	mg/kg		<0.10	0.13	<0.10	----	0.13
Arsenic	7440-38-2	E440/WT	0.10	mg/kg		2.08	2.51	2.24	----	2.79
Barium	7440-39-3	E440/WT	0.50	mg/kg		29.4	37.8	30.9	----	35.8



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BH22 0.5m	BH23 0-0.15m	BH23 0.5m	BH23 0-0.5m	25DUP B
					Client sampling date / time	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-006	HA2501752-007	HA2501752-008	HA2501752-009	HA2501752-010
						Result	Result	Result	Result	Result
Metals										
Beryllium	7440-41-7	E440/WT	0.10	mg/kg		0.43	0.45	0.56	----	0.45
Boron	7440-42-8	E440/WT	5.0	mg/kg		<5.0	<5.0	<5.0	----	<5.0
Cadmium	7440-43-9	E440/WT	0.020	mg/kg		0.140	0.235	0.177	----	0.219
Chromium	7440-47-3	E440/WT	0.50	mg/kg		15.3	19.4	23.9	----	18.5
Cobalt	7440-48-4	E440/WT	0.10	mg/kg		7.77	11.2	14.2	----	11.3
Copper	7440-50-8	E440/WT	0.50	mg/kg		11.2	16.0	19.3	----	15.2
Iron	7439-89-6	E440/WT	50	mg/kg		29200	30400	29900	----	28700
Lead	7439-92-1	E440/WT	0.50	mg/kg		14.9	19.8	14.8	----	18.0
Manganese	7439-96-5	E440/WT	1.0	mg/kg		365	566	525	----	524
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg		1.52	1.02	0.87	----	0.99
Nickel	7440-02-0	E440/WT	0.50	mg/kg		9.94	15.0	19.0	----	13.9
Selenium	7782-49-2	E440/WT	0.20	mg/kg		0.37	0.50	0.34	----	0.44
Silver	7440-22-4	E440/WT	0.10	mg/kg		<0.10	<0.10	<0.10	----	<0.10
Strontium	7440-24-6	E440/WT	0.50	mg/kg		19.0	18.8	21.8	----	17.9
Sulfur	7704-34-9	E440/WT	1000	mg/kg		<1000	<1000	<1000	----	<1000
Thallium	7440-28-0	E440/WT	0.050	mg/kg		0.090	0.124	0.097	----	0.116
Tin	7440-31-5	E440/WT	2.0	mg/kg		<2.0	<2.0	<2.0	----	<2.0
Uranium	7440-61-1	E440/WT	0.050	mg/kg		1.53	1.20	1.57	----	1.16
Vanadium	7440-62-2	E440/WT	0.20	mg/kg		64.1	62.6	61.2	----	61.4
Zinc	7440-66-6	E440/WT	2.0	mg/kg		71.7	125	78.3	----	117

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH24 0-0.15m	BH24 0.5m	BH25 0-0.15m	BH25 0.44 m	BH26 0-0.15m
Client sampling date / time					02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-011	HA2501752-012	HA2501752-013	HA2501752-014	HA2501752-015	
					Result	Result	Result	Result	Result	
Physical Tests										
pH (1:2 soil:CaCl2-aq)	----	E108A/WT	0.10	pH units	4.68	4.99	4.34	----	7.37	
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg	22600	29500	18100	33300	10300	
Antimony	7440-36-0	E440/WT	0.10	mg/kg	0.14	<0.10	0.21	0.16	<0.10	
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	2.32	1.98	2.85	2.68	1.81	
Barium	7440-39-3	E440/WT	0.50	mg/kg	42.6	35.4	33.9	40.2	15.0	
Beryllium	7440-41-7	E440/WT	0.10	mg/kg	0.47	0.75	0.31	0.61	0.54	
Boron	7440-42-8	E440/WT	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	7.5	
Cadmium	7440-43-9	E440/WT	0.020	mg/kg	0.116	0.141	0.146	0.155	0.180	
Chromium	7440-47-3	E440/WT	0.50	mg/kg	22.5	28.0	15.8	24.5	10.2	
Cobalt	7440-48-4	E440/WT	0.10	mg/kg	9.58	15.2	5.33	12.5	7.34	
Copper	7440-50-8	E440/WT	0.50	mg/kg	13.3	14.7	6.48	8.16	60.4	
Iron	7439-89-6	E440/WT	50	mg/kg	32400	33200	27600	34400	14800	
Lead	7439-92-1	E440/WT	0.50	mg/kg	15.1	11.6	15.5	10.4	15.6	
Manganese	7439-96-5	E440/WT	1.0	mg/kg	334	336	335	460	625	
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg	1.14	0.74	0.65	0.68	0.53	
Nickel	7440-02-0	E440/WT	0.50	mg/kg	16.6	27.3	7.63	19.1	9.74	
Selenium	7782-49-2	E440/WT	0.20	mg/kg	0.50	0.48	0.64	0.58	<0.20	
Silver	7440-22-4	E440/WT	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	
Strontium	7440-24-6	E440/WT	0.50	mg/kg	16.0	13.8	9.48	10.8	66.3	
Sulfur	7704-34-9	E440/WT	1000	mg/kg	<1000	<1000	<1000	<1000	<1000	



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH24 0-0.15m	BH24 0.5m	BH25 0-0.15m	BH25 0.44 m	BH26 0-0.15m
Client sampling date / time						02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-011	HA2501752-012	HA2501752-013	HA2501752-014	HA2501752-015
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/WT	0.050	mg/kg		0.128	0.111	0.103	0.084	0.085
Tin	7440-31-5	E440/WT	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	7440-61-1	E440/WT	0.050	mg/kg		0.930	1.34	0.977	0.904	1.54
Vanadium	7440-62-2	E440/WT	0.20	mg/kg		59.2	54.1	64.6	62.8	23.2
Zinc	7440-66-6	E440/WT	2.0	mg/kg		104	111	68.0	122	75.9

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH27 0-0.15m	BH28 0-0.15m	BH29 0-0.15m	BH30 0-0.15m	BH31 0-0.15m
Client sampling date / time						02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-016	HA2501752-017	HA2501752-018	HA2501752-019	HA2501752-020
						Result	Result	Result	Result	Result
Physical Tests										
pH (1:2 soil:CaCl2-aq)	----	E108A/WT	0.10	pH units		----	----	4.64	----	----
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg		16800	9830	24200	22900	9980
Antimony	7440-36-0	E440/WT	0.10	mg/kg		<0.10	<0.10	0.13	0.14	<0.10
Arsenic	7440-38-2	E440/WT	0.10	mg/kg		2.42	2.34	2.49	2.73	1.66
Barium	7440-39-3	E440/WT	0.50	mg/kg		28.5	19.9	31.5	51.9	15.5
Beryllium	7440-41-7	E440/WT	0.10	mg/kg		0.80	0.35	0.55	0.50	0.42
Boron	7440-42-8	E440/WT	5.0	mg/kg		9.7	9.1	<5.0	<5.0	9.1
Cadmium	7440-43-9	E440/WT	0.020	mg/kg		0.243	0.828	0.118	0.226	0.394



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BH27 0-0.15m	BH28 0-0.15m	BH29 0-0.15m	BH30 0-0.15m	BH31 0-0.15m
					Client sampling date / time	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-016	HA2501752-017	HA2501752-018	HA2501752-019	HA2501752-020
						Result	Result	Result	Result	Result
Metals										
Chromium	7440-47-3	E440/WT	0.50	mg/kg		14.6	10.5	14.8	15.6	9.97
Cobalt	7440-48-4	E440/WT	0.10	mg/kg		15.3	12.9	7.62	6.39	6.16
Copper	7440-50-8	E440/WT	0.50	mg/kg		227	453	9.46	11.2	28.0
Iron	7439-89-6	E440/WT	50	mg/kg		22500	10800	27900	26200	13500
Lead	7439-92-1	E440/WT	0.50	mg/kg		15.9	37.1	15.8	14.1	42.3
Manganese	7439-96-5	E440/WT	1.0	mg/kg		729	954	391	315	664
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg		0.52	0.28	0.70	0.89	0.51
Nickel	7440-02-0	E440/WT	0.50	mg/kg		24.3	8.15	9.98	10.4	8.30
Selenium	7782-49-2	E440/WT	0.20	mg/kg		<0.20	<0.20	0.61	0.64	<0.20
Silver	7440-22-4	E440/WT	0.10	mg/kg		<0.10	0.11	<0.10	0.10	<0.10
Strontium	7440-24-6	E440/WT	0.50	mg/kg		50.2	126	14.4	16.0	84.4
Sulfur	7704-34-9	E440/WT	1000	mg/kg		<1000	<1000	<1000	<1000	<1000
Thallium	7440-28-0	E440/WT	0.050	mg/kg		0.131	0.101	0.111	0.113	0.083
Tin	7440-31-5	E440/WT	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	7440-61-1	E440/WT	0.050	mg/kg		1.56	0.839	1.06	1.21	1.41
Vanadium	7440-62-2	E440/WT	0.20	mg/kg		35.7	20.6	54.5	51.8	23.1
Zinc	7440-66-6	E440/WT	2.0	mg/kg		83.7	318	59.9	74.6	149

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH32 0-0.15m	BH33 0-0.15m	BH34 0-0.15m	BH35 0-0.15m	BH36 0-0.15m
Client sampling date / time					02-Jun-2025 00:00	03-Jun-2025 00:00	03-Jun-2025 00:00	03-Jun-2025 00:00	03-Jun-2025 00:00	03-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-021	HA2501752-022	HA2501752-023	HA2501752-024	HA2501752-025	
					Result	Result	Result	Result	Result	
Physical Tests										
pH (1:2 soil:CaCl2-aq)	----	E108A/WT	0.10	pH units	7.53	----	----	6.91	----	
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg	11300	34200	21100	20600	21000	
Antimony	7440-36-0	E440/WT	0.10	mg/kg	<0.10	0.17	0.16	0.13	0.10	
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	1.43	6.82	4.03	3.10	3.24	
Barium	7440-39-3	E440/WT	0.50	mg/kg	13.6	106	45.0	43.9	40.2	
Beryllium	7440-41-7	E440/WT	0.10	mg/kg	0.68	1.69	1.30	0.80	0.64	
Boron	7440-42-8	E440/WT	5.0	mg/kg	14.1	7.6	6.7	5.2	6.6	
Cadmium	7440-43-9	E440/WT	0.020	mg/kg	0.372	1.16	1.04	0.197	0.343	
Chromium	7440-47-3	E440/WT	0.50	mg/kg	10.2	28.1	17.1	16.2	23.4	
Cobalt	7440-48-4	E440/WT	0.10	mg/kg	6.78	20.8	8.74	11.9	15.7	
Copper	7440-50-8	E440/WT	0.50	mg/kg	32.9	107	41.2	18.6	134	
Iron	7439-89-6	E440/WT	50	mg/kg	19000	40000	15900	26700	29700	
Lead	7439-92-1	E440/WT	0.50	mg/kg	45.8	50.3	36.2	13.0	23.0	
Manganese	7439-96-5	E440/WT	1.0	mg/kg	648	2080	462	849	733	
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg	0.38	2.77	3.05	0.82	0.68	
Nickel	7440-02-0	E440/WT	0.50	mg/kg	10.9	28.8	16.2	14.3	22.2	
Selenium	7782-49-2	E440/WT	0.20	mg/kg	<0.20	2.64	3.40	0.26	0.34	
Silver	7440-22-4	E440/WT	0.10	mg/kg	<0.10	0.19	0.12	<0.10	<0.10	
Strontium	7440-24-6	E440/WT	0.50	mg/kg	89.0	19.5	30.1	22.3	24.3	
Sulfur	7704-34-9	E440/WT	1000	mg/kg	<1000	1200	5800	<1000	<1000	



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH32 0-0.15m	BH33 0-0.15m	BH34 0-0.15m	BH35 0-0.15m	BH36 0-0.15m
Client sampling date / time						02-Jun-2025 00:00	03-Jun-2025 00:00	03-Jun-2025 00:00	03-Jun-2025 00:00	03-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-021	HA2501752-022	HA2501752-023	HA2501752-024	HA2501752-025
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/WT	0.050	mg/kg		0.116	0.377	0.246	0.118	0.139
Tin	7440-31-5	E440/WT	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	7440-61-1	E440/WT	0.050	mg/kg		1.64	32.9	28.5	2.08	1.47
Vanadium	7440-62-2	E440/WT	0.20	mg/kg		21.1	60.5	37.3	48.4	53.5
Zinc	7440-66-6	E440/WT	2.0	mg/kg		143	223	132	69.6	124

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH37 0-0.15m	BH38 0-0.15m	25DUP C	25DUP D	25DUP G
Client sampling date / time						03-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	04-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-026	HA2501752-027	HA2501752-028	HA2501752-029	HA2501752-030
						Result	Result	Result	Result	Result
Physical Tests										
pH (1:2 soil:CaCl2-aq)	----	E108A/WT	0.10	pH units		----	----	----	7.49	----
Particle Size										
Sand (>0.075mm)	----	E178/SK	1.0	%		----	47.4	----	----	----
Fines (<0.075mm)	----	E178/SK	1.0	%		----	52.6	----	----	----
Texture class	----	E178/SK	-	-		----	Fine	----	----	----
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg		15300	25600	24500	11400	30300
Antimony	7440-36-0	E440/WT	0.10	mg/kg		<0.10	0.17	0.12	<0.10	0.12
Arsenic	7440-38-2	E440/WT	0.10	mg/kg		2.62	4.96	2.53	1.26	3.56
Barium	7440-39-3	E440/WT	0.50	mg/kg		31.6	42.4	32.4	12.5	62.0



Analytical Results

Sub-Matrix: Soil/Solid
 (Matrix: Soil/Solid)

					Client sample ID	BH37 0-0.15m	BH38 0-0.15m	25DUP C	25DUP D	25DUP G
					Client sampling date / time	03-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	02-Jun-2025 00:00	04-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-026	HA2501752-027	HA2501752-028	HA2501752-029	HA2501752-030
						Result	Result	Result	Result	Result
Metals										
Beryllium	7440-41-7	E440/WT	0.10	mg/kg		1.25	0.51	0.51	0.64	1.73
Boron	7440-42-8	E440/WT	5.0	mg/kg		11.3	<5.0	<5.0	12.8	7.5
Cadmium	7440-43-9	E440/WT	0.020	mg/kg		0.307	0.196	0.129	0.336	0.907
Chromium	7440-47-3	E440/WT	0.50	mg/kg		11.1	21.7	16.2	9.97	23.5
Cobalt	7440-48-4	E440/WT	0.10	mg/kg		11.9	8.62	7.63	5.71	11.7
Copper	7440-50-8	E440/WT	0.50	mg/kg		128	15.1	9.62	60.8	44.9
Iron	7439-89-6	E440/WT	50	mg/kg		22400	31300	28200	14500	20200
Lead	7439-92-1	E440/WT	0.50	mg/kg		25.2	20.7	14.7	41.6	27.8
Manganese	7439-96-5	E440/WT	1.0	mg/kg		1580	366	376	621	584
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg		0.62	0.71	0.64	0.32	1.89
Nickel	7440-02-0	E440/WT	0.50	mg/kg		12.8	14.9	10.3	10.4	20.4
Selenium	7782-49-2	E440/WT	0.20	mg/kg		<0.20	0.74	0.67	<0.20	2.71
Silver	7440-22-4	E440/WT	0.10	mg/kg		<0.10	0.11	<0.10	<0.10	0.11
Strontium	7440-24-6	E440/WT	0.50	mg/kg		81.2	10.3	12.3	82.6	29.9
Sulfur	7704-34-9	E440/WT	1000	mg/kg		<1000	<1000	<1000	<1000	4100
Thallium	7440-28-0	E440/WT	0.050	mg/kg		0.134	0.119	0.107	0.110	0.248
Tin	7440-31-5	E440/WT	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	7440-61-1	E440/WT	0.050	mg/kg		1.92	2.54	1.08	2.09	35.8
Vanadium	7440-62-2	E440/WT	0.20	mg/kg		40.8	59.2	55.2	18.7	46.7
Zinc	7440-66-6	E440/WT	2.0	mg/kg		115	90.8	61.5	132	140

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BH41 1.5m	BH42 0.45m	BH43 0-0.15m	BH44 0-0.15m	BH45 0-0.15m
					Client sampling date / time	04-Jun-2025 00:00	04-Jun-2025 00:00	03-Jun-2025 00:00	04-Jun-2025 00:00	04-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-031	HA2501752-032	HA2501752-033	HA2501752-034	HA2501752-035
						Result	Result	Result	Result	Result
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg		29100	22000	19000	36100	8960
Antimony	7440-36-0	E440/WT	0.10	mg/kg		0.10	0.12	0.12	1.86	5.75
Arsenic	7440-38-2	E440/WT	0.10	mg/kg		3.42	3.47	2.64	4.17	65.2
Barium	7440-39-3	E440/WT	0.50	mg/kg		60.7	43.0	48.8	125	266
Beryllium	7440-41-7	E440/WT	0.10	mg/kg		1.76	2.02	0.73	1.32	0.21
Boron	7440-42-8	E440/WT	5.0	mg/kg		6.4	15.3	5.3	<5.0	8.6
Cadmium	7440-43-9	E440/WT	0.020	mg/kg		0.841	0.326	0.203	0.434	21.6
Chromium	7440-47-3	E440/WT	0.50	mg/kg		21.9	15.6	15.0	18.9	89.8
Cobalt	7440-48-4	E440/WT	0.10	mg/kg		11.5	15.4	10.8	15.7	29.9
Copper	7440-50-8	E440/WT	0.50	mg/kg		44.0	97.0	16.8	19.2	141
Iron	7439-89-6	E440/WT	50	mg/kg		19300	30200	24800	38200	330000
Lead	7439-92-1	E440/WT	0.50	mg/kg		25.7	7.92	11.7	362	596
Manganese	7439-96-5	E440/WT	1.0	mg/kg		538	2850	847	1350	1320
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg		1.85	1.56	0.75	1.82	15.4
Nickel	7440-02-0	E440/WT	0.50	mg/kg		19.4	18.5	12.6	19.2	718
Selenium	7782-49-2	E440/WT	0.20	mg/kg		2.52	<0.20	0.28	1.24	0.46
Silver	7440-22-4	E440/WT	0.10	mg/kg		0.11	<0.10	<0.10	0.24	0.13
Strontium	7440-24-6	E440/WT	0.50	mg/kg		27.0	90.2	23.4	23.7	17.9
Sulfur	7704-34-9	E440/WT	1000	mg/kg		4000	<1000	<1000	<1000	<1000
Thallium	7440-28-0	E440/WT	0.050	mg/kg		0.236	0.179	0.114	0.183	0.055
Tin	7440-31-5	E440/WT	2.0	mg/kg		<2.0	<2.0	<2.0	59.2	8.8



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH41 1.5m	BH42 0.45m	BH43 0-0.15m	BH44 0-0.15m	BH45 0-0.15m
Client sampling date / time						04-Jun-2025 00:00	04-Jun-2025 00:00	03-Jun-2025 00:00	04-Jun-2025 00:00	04-Jun-2025 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-031	HA2501752-032	HA2501752-033	HA2501752-034	HA2501752-035
						Result	Result	Result	Result	Result
Metals										
Uranium	7440-61-1	E440/WT	0.050	mg/kg		36.0	2.60	1.93	2.01	0.399
Vanadium	7440-62-2	E440/WT	0.20	mg/kg		43.4	46.5	45.6	43.8	23.1
Zinc	7440-66-6	E440/WT	2.0	mg/kg		128	83.2	68.7	159	2140

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH46 0.70m	BH47 1.35m	SED11	SED12	SED13
Client sampling date / time						04-Jun-2025 00:00	04-Jun-2025 00:00	03-Jun-2025 13:27	03-Jun-2025 13:42	03-Jun-2025 13:57
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-036	HA2501752-037	HA2501752-040	HA2501752-041	HA2501752-042
						Result	Result	Result	Result	Result
Sample Preparation										
Dummy analyte	----	EP357/WT	1	-		----	----	Not Authorised	Not Authorised	Not Authorised
Particle Size										
Sand (>0.075mm)	----	E178/SK	1.0	%		----	----	----	----	<1.0
Fines (<0.075mm)	----	E178/SK	1.0	%		----	----	----	----	100
Texture class	----	E178/SK	-	-		----	----	----	----	Fine
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg		21800	13500	30000	10400	15600
Antimony	7440-36-0	E440/WT	0.10	mg/kg		0.10	<0.10	0.19	<0.15 ^{DLM}	0.16
Arsenic	7440-38-2	E440/WT	0.10	mg/kg		3.00	2.70	4.88	1.54	3.18
Barium	7440-39-3	E440/WT	0.50	mg/kg		36.5	22.8	66.0	50.5	76.3
Beryllium	7440-41-7	E440/WT	0.10	mg/kg		0.70	0.77	1.61	0.60	0.88



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BH46 0.70m	BH47 1.35m	SED11	SED12	SED13
					Client sampling date / time	04-Jun-2025 00:00	04-Jun-2025 00:00	03-Jun-2025 13:27	03-Jun-2025 13:42	03-Jun-2025 13:57
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-036	HA2501752-037	HA2501752-040	HA2501752-041	HA2501752-042
						Result	Result	Result	Result	Result
Metals										
Boron	7440-42-8	E440/WT	5.0	mg/kg		6.3	10.5	9.3	<7.5 ^{DLM}	<7.4 ^{DLM}
Cadmium	7440-43-9	E440/WT	0.020	mg/kg		0.315	0.639	0.545	0.417	0.567
Chromium	7440-47-3	E440/WT	0.50	mg/kg		21.2	12.1	26.6	8.47	13.2
Cobalt	7440-48-4	E440/WT	0.10	mg/kg		20.5	12.8	20.0	6.39	9.73
Copper	7440-50-8	E440/WT	0.50	mg/kg		80.7	172	68.0	34.2	47.8
Iron	7439-89-6	E440/WT	50	mg/kg		32300	19400	39400	11200	15400
Lead	7439-92-1	E440/WT	0.50	mg/kg		25.6	42.2	56.2	9.80	31.6
Manganese	7439-96-5	E440/WT	1.0	mg/kg		717	780	1470	300	300
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg		0.74	0.78	1.55	2.44	1.93
Nickel	7440-02-0	E440/WT	0.50	mg/kg		24.2	14.4	29.0	8.33	14.1
Selenium	7782-49-2	E440/WT	0.20	mg/kg		0.43	<0.20	0.54	1.42	1.21
Silver	7440-22-4	E440/WT	0.10	mg/kg		0.46	0.13	<0.10	<0.15 ^{DLM}	<0.15 ^{DLM}
Strontium	7440-24-6	E440/WT	0.50	mg/kg		38.3	84.1	32.0	12.0	12.1
Sulfur	7704-34-9	E440/WT	1000	mg/kg		<1000	1500	<1000	7000	3300
Thallium	7440-28-0	E440/WT	0.050	mg/kg		0.131	0.164	0.273	0.089	0.157
Tin	7440-31-5	E440/WT	2.0	mg/kg		<2.0	<2.0	<2.0	<3.0 ^{DLM}	<3.0 ^{DLM}
Uranium	7440-61-1	E440/WT	0.050	mg/kg		2.41	2.97	4.83	16.4	13.1
Vanadium	7440-62-2	E440/WT	0.20	mg/kg		48.3	29.0	65.9	25.8	33.0
Zinc	7440-66-6	E440/WT	2.0	mg/kg		100	250	203	90.4	165
Aggregate Organics										
Carbon, total organic [TOC]	----	E357/WT	0.10	%		----	----	2.50	8.39	7.46



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BH46 0.70m	BH47 1.35m	SED11	SED12	SED13
Client sampling date / time						04-Jun-2025 00:00	04-Jun-2025 00:00	03-Jun-2025 13:27	03-Jun-2025 13:42	03-Jun-2025 13:57
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-036	HA2501752-037	HA2501752-040	HA2501752-041	HA2501752-042
						Result	Result	Result	Result	Result
Aggregate Organics										
Organic matter	----	E357/WT	0.20	%		----	----	4.31	14.5	12.9

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	SED14	SED15	SED16	SED17	SED18
Client sampling date / time						03-Jun-2025 14:25	03-Jun-2025 15:12	03-Jun-2025 15:41	04-Jun-2025 11:05	04-Jun-2025 11:13
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-043	HA2501752-044	HA2501752-045	HA2501752-046	HA2501752-047
						Result	Result	Result	Result	Result
Sample Preparation										
Dummy analyte	----	EP357/WT	1	-		Not Authorised	Not Authorised	Not Authorised	Not Authorised	Not Authorised
Particle Size										
Sand (>0.075mm)	----	E178/SK	1.0	%		----	95.5	----	----	----
Fines (<0.075mm)	----	E178/SK	1.0	%		----	4.5	----	----	----
Texture class	----	E178/SK	-	-		----	Coarse	----	----	----
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg		14900	15000	12400	15200	18900
Antimony	7440-36-0	E440/WT	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	0.14
Arsenic	7440-38-2	E440/WT	0.10	mg/kg		1.80	1.74	1.98	3.12	4.32
Barium	7440-39-3	E440/WT	0.50	mg/kg		72.0	18.2	96.4	27.8	50.9
Beryllium	7440-41-7	E440/WT	0.10	mg/kg		0.58	0.86	0.40	0.51	0.72
Boron	7440-42-8	E440/WT	5.0	mg/kg		<5.0	<5.0	5.3	<5.0	<5.0
Cadmium	7440-43-9	E440/WT	0.020	mg/kg		0.211	0.082	0.647	0.117	0.187



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	SED14	SED15	SED16	SED17	SED18
					Client sampling date / time	03-Jun-2025 14:25	03-Jun-2025 15:12	03-Jun-2025 15:41	04-Jun-2025 11:05	04-Jun-2025 11:13
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-043	HA2501752-044	HA2501752-045	HA2501752-046	HA2501752-047
						Result	Result	Result	Result	Result
Metals										
Chromium	7440-47-3	E440/WT	0.50	mg/kg		12.3	9.44	15.5	15.3	20.0
Cobalt	7440-48-4	E440/WT	0.10	mg/kg		8.86	7.15	6.82	8.70	12.0
Copper	7440-50-8	E440/WT	0.50	mg/kg		14.2	17.8	432	11.5	15.6
Iron	7439-89-6	E440/WT	50	mg/kg		22200	24300	16900	24300	30400
Lead	7439-92-1	E440/WT	0.50	mg/kg		7.77	3.86	11.1	5.94	11.0
Manganese	7439-96-5	E440/WT	1.0	mg/kg		612	475	455	502	802
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg		0.42	0.21	0.45	0.57	0.77
Nickel	7440-02-0	E440/WT	0.50	mg/kg		11.0	10.5	8.91	10.3	19.2
Selenium	7782-49-2	E440/WT	0.20	mg/kg		0.27	<0.20	1.20	<0.20	0.30
Silver	7440-22-4	E440/WT	0.10	mg/kg		<0.10	<0.10	0.12	<0.10	<0.10
Strontium	7440-24-6	E440/WT	0.50	mg/kg		19.9	19.7	19.0	20.9	22.5
Sulfur	7704-34-9	E440/WT	1000	mg/kg		<1000	<1000	<1000	<1000	<1000
Thallium	7440-28-0	E440/WT	0.050	mg/kg		0.078	0.052	0.158	0.062	0.090
Tin	7440-31-5	E440/WT	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	7440-61-1	E440/WT	0.050	mg/kg		1.58	1.23	3.93	1.34	2.58
Vanadium	7440-62-2	E440/WT	0.20	mg/kg		39.0	36.6	36.1	38.8	48.7
Zinc	7440-66-6	E440/WT	2.0	mg/kg		94.6	43.6	489	43.5	60.8
Aggregate Organics										
Carbon, total organic [TOC]	----	E357/WT	0.10	%		1.34	0.61	3.40	0.56	1.70
Organic matter	----	E357/WT	0.20	%		2.31	1.05	5.86	0.96	2.93

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	25DUP E	----	----	----	----
					Client sampling date / time	03-Jun-2025 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-048	----	----	----	----	----
Result						----	----	----	----	----
Sample Preparation										
Dummy analyte	----	EP357/WT	1	-	Not Authorised	----	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/WT	50	mg/kg	15200	----	----	----	----	----
Antimony	7440-36-0	E440/WT	0.10	mg/kg	<0.10	----	----	----	----	----
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	1.68	----	----	----	----	----
Barium	7440-39-3	E440/WT	0.50	mg/kg	68.8	----	----	----	----	----
Beryllium	7440-41-7	E440/WT	0.10	mg/kg	0.58	----	----	----	----	----
Boron	7440-42-8	E440/WT	5.0	mg/kg	<5.0	----	----	----	----	----
Cadmium	7440-43-9	E440/WT	0.020	mg/kg	0.220	----	----	----	----	----
Chromium	7440-47-3	E440/WT	0.50	mg/kg	12.3	----	----	----	----	----
Cobalt	7440-48-4	E440/WT	0.10	mg/kg	8.51	----	----	----	----	----
Copper	7440-50-8	E440/WT	0.50	mg/kg	19.1	----	----	----	----	----
Iron	7439-89-6	E440/WT	50	mg/kg	22200	----	----	----	----	----
Lead	7439-92-1	E440/WT	0.50	mg/kg	9.52	----	----	----	----	----
Manganese	7439-96-5	E440/WT	1.0	mg/kg	604	----	----	----	----	----
Molybdenum	7439-98-7	E440/WT	0.10	mg/kg	0.40	----	----	----	----	----
Nickel	7440-02-0	E440/WT	0.50	mg/kg	10.5	----	----	----	----	----
Selenium	7782-49-2	E440/WT	0.20	mg/kg	0.22	----	----	----	----	----
Silver	7440-22-4	E440/WT	0.10	mg/kg	<0.10	----	----	----	----	----
Strontium	7440-24-6	E440/WT	0.50	mg/kg	20.9	----	----	----	----	----
Sulfur	7704-34-9	E440/WT	1000	mg/kg	<1000	----	----	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	25DUP E	----	----	----	----
Client sampling date / time					03-Jun-2025 00:00	----	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-048	----	----	----	----	----
Result					Result	----	----	----	----	----
Metals										
Thallium	7440-28-0	E440/WT	0.050	mg/kg	0.080	----	----	----	----	----
Tin	7440-31-5	E440/WT	2.0	mg/kg	<2.0	----	----	----	----	----
Uranium	7440-61-1	E440/WT	0.050	mg/kg	2.23	----	----	----	----	----
Vanadium	7440-62-2	E440/WT	0.20	mg/kg	40.1	----	----	----	----	----
Zinc	7440-66-6	E440/WT	2.0	mg/kg	94.5	----	----	----	----	----
Aggregate Organics										
Carbon, total organic [TOC]	----	E357/WT	0.10	%	1.33	----	----	----	----	----
Organic matter	----	E357/WT	0.20	%	2.29	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Surface Water (Matrix: Water)					Client sample ID	SW11	SW12	SW13	SW14	SW15
Client sampling date / time					03-Jun-2025 13:27	03-Jun-2025 13:42	03-Jun-2025 13:57	03-Jun-2025 14:25	03-Jun-2025 15:12	
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-049	HA2501752-050	HA2501752-051	HA2501752-052	HA2501752-053	
Result					Result	Result	Result	Result	Result	
Physical Tests										
Alkalinity, bicarbonate (as HCO ₃)	71-52-3	E290/WT	1.2	mg/L	110	112	112	163	110	
Alkalinity, carbonate (as CO ₃)	3812-32-6	E290/WT	1.0	mg/L	<0.6	<0.6	<0.6	<0.6	<0.6	
Alkalinity, hydroxide (as OH)	14280-30-9	E290/WT	1.0	mg/L	<0.3	<0.3	<0.3	<0.3	<0.3	
Alkalinity, total (as CaCO ₃)	----	E290/WT	1.0	mg/L	90.0	91.6	91.7	134	90.1	
Colour, apparent	----	E330/WT	2.0	CU	17.8	16.5	22.2	7.6	7.7	
Conductivity	----	E100/WT	1.0	µS/cm	216	222	210	274	263	



Analytical Results

Sub-Matrix: Surface Water

(Matrix: Water)

Sub-Matrix: Surface Water (Matrix: Water)					Client sample ID	SW11	SW12	SW13	SW14	SW15
Client sampling date / time					03-Jun-2025 13:27	03-Jun-2025 13:42	03-Jun-2025 13:57	03-Jun-2025 14:25	03-Jun-2025 15:12	
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-049	HA2501752-050	HA2501752-051	HA2501752-052	HA2501752-053	
					Result	Result	Result	Result	Result	
Physical Tests										
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/WT	0.50	mg/L	93.3	96.0	93.7	144	112	
Langelier index (@ 20°C)	----	EC105A/WT	0.010	-	-0.429	-0.110	-0.286	0.353	0.006	
Langelier index (@ 4°C)	----	EC105A/WT	0.010	-	-0.681	-0.362	-0.535	0.105	-0.243	
pH	----	E108/HA	0.10	pH units	7.59	7.89	7.71	8.08	7.94	
pH, saturation (@ 20°C)	----	EC105A/WT	0.010	pH units	8.02	8.00	8.00	7.73	7.93	
pH, saturation (@ 4°C)	----	EC105A/WT	0.010	pH units	8.27	8.25	8.24	7.97	8.18	
Solids, total dissolved [TDS]	----	E162/HA	10	mg/L	128	132	96	144	142	
Turbidity	----	E121/WT	0.10	NTU	0.86	0.77	0.99	0.31	0.11	
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L	0.0106	0.0450	0.0066	0.0133	<0.0050	
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L	11.0	11.7	9.49	6.24	14.6	
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L	0.050	0.048	0.044	0.032	0.051	
Nitrate (as N)	14797-55-8	E235.NO3/WT	0.020	mg/L	<0.020	<0.020	<0.020	<0.020	0.079	
Nitrate + Nitrite (as N)	----	EC235.N+N/WT	0.0032	mg/L	<0.0224	<0.0224	<0.0224	<0.0224	0.0790	
Nitrite (as N)	14797-65-0	E235.NO2/WT	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L	7.77	8.84	7.19	6.44	12.3	
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	----	E355-L/WT	0.50	mg/L	3.07	2.72	3.92	1.54	1.23	
Ion Balance										
Anion sum	----	EC101A/WT	0.10	meq/L	2.27	2.35	2.25	2.99	2.48	



Analytical Results

Sub-Matrix: Surface Water

(Matrix: Water)

					Client sample ID	SW11	SW12	SW13	SW14	SW15
					Client sampling date / time	03-Jun-2025 13:27	03-Jun-2025 13:42	03-Jun-2025 13:57	03-Jun-2025 14:25	03-Jun-2025 15:12
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-049	HA2501752-050	HA2501752-051	HA2501752-052	HA2501752-053	
					Result	Result	Result	Result	Result	
Ion Balance										
Cation sum (total)	----	EC101A/WT	0.10	meq/L	2.28	2.35	2.22	3.06	2.73	
Ion balance (cations/anions)	----	EC101A/WT	0.01	%	100	100	98.7	102	110	
Total Metals										
Aluminum, total	7429-90-5	E420/WT	0.0030	mg/L	0.0734	0.0290	0.0112	0.0366	0.0080	
Antimony, total	7440-36-0	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Arsenic, total	7440-38-2	E420/WT	0.00010	mg/L	0.00015	0.00015	0.00017	<0.00010	<0.00010	
Barium, total	7440-39-3	E420/WT	0.00010	mg/L	0.00783	0.00722	0.0102	0.0498	0.00600	
Beryllium, total	7440-41-7	E420/WT	0.000020	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	
Bismuth, total	7440-69-9	E420/WT	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Boron, total	7440-42-8	E420/WT	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	
Cadmium, total	7440-43-9	E420/WT	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000152	<0.0000050	
Calcium, total	7440-70-2	E420/WT	0.100	mg/L	24.3	25.1	24.3	32.9	30.2	
Cesium, total	7440-46-2	E420/WT	0.000010	mg/L	0.000014	<0.000010	<0.000010	0.000012	<0.000010	
Chromium, total	7440-47-3	E420/WT	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Cobalt, total	7440-48-4	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Copper, total	7440-50-8	E420/WT	0.00050	mg/L	0.00095	0.00066	<0.00050	0.00054	0.00053	
Iron, total	7439-89-6	E420/WT	0.010	mg/L	0.546	0.221	0.331	0.041	<0.010	
Lead, total	7439-92-1	E420/WT	0.000050	mg/L	0.000140	0.000060	0.000064	<0.000050	<0.000050	
Lithium, total	7439-93-2	E420/WT	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Magnesium, total	7439-95-4	E420/WT	0.0050	mg/L	7.92	8.10	8.02	14.9	8.97	
Manganese, total	7439-96-5	E420/WT	0.00010	mg/L	0.0859	0.0720	0.101	0.00652	0.00188	



Analytical Results

Sub-Matrix: Surface Water

(Matrix: Water)

					Client sample ID	SW11	SW12	SW13	SW14	SW15
					Client sampling date / time	03-Jun-2025 13:27	03-Jun-2025 13:42	03-Jun-2025 13:57	03-Jun-2025 14:25	03-Jun-2025 15:12
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-049	HA2501752-050	HA2501752-051	HA2501752-052	HA2501752-053	
					Result	Result	Result	Result	Result	
Total Metals										
Molybdenum, total	7439-98-7	E420/WT	0.000050	mg/L	0.000414	0.000476	0.000496	0.000376	0.000428	
Nickel, total	7440-02-0	E420/WT	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Phosphorus, total	7723-14-0	E420/WT	0.050	mg/L	0.066	<0.050	<0.050	<0.050	<0.050	
Potassium, total	7440-09-7	E420/WT	0.050	mg/L	0.534	0.580	0.541	0.567	0.664	
Rubidium, total	7440-17-7	E420/WT	0.00020	mg/L	0.00120	0.00124	0.00118	0.00143	0.00126	
Selenium, total	7782-49-2	E420/WT	0.000050	mg/L	0.000060	0.000076	0.000052	0.000077	0.000069	
Silicon (as SiO ₂), total	7631-86-9	EC420.SiO ₂ /WT	0.25	mg/L	2.46	2.91	2.22	5.24	5.56	
Silicon, total	7440-21-3	E420/WT	0.10	mg/L	1.15	1.36	1.04	2.45	2.60	
Silver, total	7440-22-4	E420/WT	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium, total	7440-23-5	E420/WT	0.050	mg/L	8.58	9.21	7.30	3.85	10.8	
Strontium, total	7440-24-6	E420/WT	0.00020	mg/L	0.0401	0.0394	0.0410	0.0299	0.0380	
Sulfur, total	7704-34-9	E420/WT	0.50	mg/L	2.81	3.16	2.62	2.22	4.45	
Tellurium, total	13494-80-9	E420/WT	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
Thallium, total	7440-28-0	E420/WT	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Thorium, total	7440-29-1	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Tin, total	7440-31-5	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Titanium, total	7440-32-6	E420/WT	0.00030	mg/L	0.00173	0.00069	<0.00030	0.00117	<0.00030	
Tungsten, total	7440-33-7	E420/WT	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Uranium, total	7440-61-1	E420/WT	0.000010	mg/L	0.000967	0.00114	0.000956	0.00194	0.00202	
Vanadium, total	7440-62-2	E420/WT	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Zinc, total	7440-66-6	E420/WT	0.0030	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	



Analytical Results

Sub-Matrix: Surface Water

(Matrix: Water)

					Client sample ID	SW11	SW12	SW13	SW14	SW15
					Client sampling date / time	03-Jun-2025 13:27	03-Jun-2025 13:42	03-Jun-2025 13:57	03-Jun-2025 14:25	03-Jun-2025 15:12
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-049	HA2501752-050	HA2501752-051	HA2501752-052	HA2501752-053
						Result	Result	Result	Result	Result
Total Metals										
Zirconium, total	7440-67-7	E420/WT	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Surface Water

(Matrix: Water)

					Client sample ID	SW16	25DUP F	----	----	----
					Client sampling date / time	03-Jun-2025 15:41	03-Jun-2025 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		HA2501752-054	HA2501752-055	----	----	----
						Result	Result	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as HCO ₃)	71-52-3	E290/WT	1.2	mg/L		187	126	----	----	----
Alkalinity, carbonate (as CO ₃)	3812-32-6	E290/WT	1.0	mg/L		<0.6	<0.6	----	----	----
Alkalinity, hydroxide (as OH)	14280-30-9	E290/WT	1.0	mg/L		<0.3	<0.3	----	----	----
Alkalinity, total (as CaCO ₃)	----	E290/WT	1.0	mg/L		153	103	----	----	----
Colour, apparent	----	E330/WT	2.0	CU		2.7	10.4	----	----	----
Conductivity	----	E100/WT	1.0	µS/cm		310	259	----	----	----
Hardness (as CaCO ₃), from total Ca/Mg	----	EC100A/WT	0.50	mg/L		166	111	----	----	----
Langelier index (@ 20°C)	----	EC105A/WT	0.010	-		0.370	-0.029	----	----	----
Langelier index (@ 4°C)	----	EC105A/WT	0.010	-		0.122	-0.278	----	----	----
pH	----	E108/HA	0.10	pH units		8.00	7.85	----	----	----
pH, saturation (@ 20°C)	----	EC105A/WT	0.010	pH units		7.63	7.88	----	----	----
pH, saturation (@ 4°C)	----	EC105A/WT	0.010	pH units		7.88	8.13	----	----	----
Solids, total dissolved [TDS]	----	E162/HA	10	mg/L		163	139	----	----	----



Analytical Results

Sub-Matrix: Surface Water

(Matrix: Water)

					Client sample ID	SW16	25DUP F	----	----	----
					Client sampling date / time	03-Jun-2025 15:41	03-Jun-2025 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-054	HA2501752-055	----	----	----	----
					Result	Result	----	----	----	----
Physical Tests										
Turbidity	----	E121/WT	0.10	NTU	<0.10	<0.10	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L	<0.0050	0.0075	----	----	----	----
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L	6.15	14.6	----	----	----	----
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L	0.034	0.050	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3/WT	0.020	mg/L	<0.020	0.074	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/WT	0.0032	mg/L	<0.0224	0.0740	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2/WT	0.010	mg/L	<0.010	<0.010	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L	<0.0010	<0.0010	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L	6.82	12.3	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	----	E355-L/WT	0.50	mg/L	<0.50	1.08	----	----	----	----
Ion Balance										
Anion sum	----	EC101A/WT	0.10	meq/L	3.37	2.73	----	----	----	----
Cation sum (total)	----	EC101A/WT	0.10	meq/L	3.47	2.70	----	----	----	----
Ion balance (cations/anions)	----	EC101A/WT	0.01	%	103	98.9	----	----	----	----
Total Metals										
Aluminum, total	7429-90-5	E420/WT	0.0030	mg/L	<0.0030	0.0118	----	----	----	----
Antimony, total	7440-36-0	E420/WT	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
Arsenic, total	7440-38-2	E420/WT	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
Barium, total	7440-39-3	E420/WT	0.00010	mg/L	0.0644	0.00597	----	----	----	----



Analytical Results

Sub-Matrix: Surface Water

(Matrix: Water)

					Client sample ID	SW16	25DUP F	----	----	----
					Client sampling date / time	03-Jun-2025 15:41	03-Jun-2025 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-054	HA2501752-055	----	----	----	----
					Result	Result	----	----	----	----
Total Metals										
Beryllium, total	7440-41-7	E420/WT	0.000020	mg/L	<0.000020	<0.000020	----	----	----	----
Bismuth, total	7440-69-9	E420/WT	0.000050	mg/L	<0.000050	<0.000050	----	----	----	----
Boron, total	7440-42-8	E420/WT	0.010	mg/L	<0.010	<0.010	----	----	----	----
Cadmium, total	7440-43-9	E420/WT	0.0000050	mg/L	0.0000219	0.0000050	----	----	----	----
Calcium, total	7440-70-2	E420/WT	0.100	mg/L	36.6	29.8	----	----	----	----
Cesium, total	7440-46-2	E420/WT	0.000010	mg/L	0.000015	<0.000010	----	----	----	----
Chromium, total	7440-47-3	E420/WT	0.00050	mg/L	<0.00050	<0.00050	----	----	----	----
Cobalt, total	7440-48-4	E420/WT	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
Copper, total	7440-50-8	E420/WT	0.00050	mg/L	0.00067	0.00056	----	----	----	----
Iron, total	7439-89-6	E420/WT	0.010	mg/L	<0.010	0.014	----	----	----	----
Lead, total	7439-92-1	E420/WT	0.000050	mg/L	<0.000050	<0.000050	----	----	----	----
Lithium, total	7439-93-2	E420/WT	0.0010	mg/L	<0.0010	<0.0010	----	----	----	----
Magnesium, total	7439-95-4	E420/WT	0.0050	mg/L	18.0	8.85	----	----	----	----
Manganese, total	7439-96-5	E420/WT	0.00010	mg/L	<0.00010	0.00210	----	----	----	----
Molybdenum, total	7439-98-7	E420/WT	0.000050	mg/L	0.000318	0.000434	----	----	----	----
Nickel, total	7440-02-0	E420/WT	0.00050	mg/L	<0.00050	<0.00050	----	----	----	----
Phosphorus, total	7723-14-0	E420/WT	0.050	mg/L	<0.050	<0.050	----	----	----	----
Potassium, total	7440-09-7	E420/WT	0.050	mg/L	0.622	0.656	----	----	----	----
Rubidium, total	7440-17-7	E420/WT	0.00020	mg/L	0.00147	0.00130	----	----	----	----
Selenium, total	7782-49-2	E420/WT	0.000050	mg/L	0.000119	0.000099	----	----	----	----
Silicon (as SiO ₂), total	7631-86-9	EC420.SiO ₂ /WT	0.25	mg/L	5.71	5.52	----	----	----	----



Analytical Results

Sub-Matrix: Surface Water

(Matrix: Water)

					Client sample ID	SW16	25DUP F	----	----	----
					Client sampling date / time	03-Jun-2025 15:41	03-Jun-2025 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501752-054	HA2501752-055	----	----	----	----
					Result	Result	----	----	----	----
Total Metals										
Silicon, total	7440-21-3	E420/WT	0.10	mg/L	2.67	2.58	----	----	----	----
Silver, total	7440-22-4	E420/WT	0.000010	mg/L	<0.000010	<0.000010	----	----	----	----
Sodium, total	7440-23-5	E420/WT	0.050	mg/L	3.43	10.8	----	----	----	----
Strontium, total	7440-24-6	E420/WT	0.00020	mg/L	0.0268	0.0375	----	----	----	----
Sulfur, total	7704-34-9	E420/WT	0.50	mg/L	2.39	4.30	----	----	----	----
Tellurium, total	13494-80-9	E420/WT	0.00020	mg/L	<0.00020	<0.00020	----	----	----	----
Thallium, total	7440-28-0	E420/WT	0.000010	mg/L	<0.000010	<0.000010	----	----	----	----
Thorium, total	7440-29-1	E420/WT	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
Tin, total	7440-31-5	E420/WT	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
Titanium, total	7440-32-6	E420/WT	0.00030	mg/L	<0.00030	<0.00030	----	----	----	----
Tungsten, total	7440-33-7	E420/WT	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
Uranium, total	7440-61-1	E420/WT	0.000010	mg/L	0.00239	0.00197	----	----	----	----
Vanadium, total	7440-62-2	E420/WT	0.00050	mg/L	<0.00050	<0.00050	----	----	----	----
Zinc, total	7440-66-6	E420/WT	0.0030	mg/L	0.0068	<0.0030	----	----	----	----
Zirconium, total	7440-67-7	E420/WT	0.00020	mg/L	<0.00020	<0.00020	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: HA2501752	Page	: 1 of 30
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Nadine Wambolt	Account Manager	: Andrew Martin
Address	: 275 Charlotte Street Suite 206 Sydney NS Canada B1P 1C6	Address	: 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2
Telephone	: 902.562.9880 ext. 5206	Telephone	: +1 902 707 4888
Project	: 24-8606	Date Samples Received	: 09-Jun-2025 15:30
PO	: ----	Issue Date	: 17-Jun-2025 22:18
C-O-C number	: ----		
Sampler	: MK/EJM		
Site	:		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 53		
No. of samples analysed	: 53		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: Water

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Total Metals	HA2501752-049	SW11	Aluminum, total	7429-90-5	E420	33.5 % DUP-H	20%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Total Organic Carbon by Wet Oxidation and Titration										
Glass soil jar/Teflon lined cap SED17	E357	04-Jun-2025	17-Jun-2025	28 days	13 days	✓	17-Jun-2025	28 days	13 days	✓
Aggregate Organics : Total Organic Carbon by Wet Oxidation and Titration										
Glass soil jar/Teflon lined cap SED18	E357	04-Jun-2025	17-Jun-2025	28 days	13 days	✓	17-Jun-2025	28 days	13 days	✓
Aggregate Organics : Total Organic Carbon by Wet Oxidation and Titration										
Glass soil jar/Teflon lined cap SED11	E357	03-Jun-2025	17-Jun-2025	28 days	14 days	✓	17-Jun-2025	28 days	14 days	✓
Aggregate Organics : Total Organic Carbon by Wet Oxidation and Titration										
Glass soil jar/Teflon lined cap SED12	E357	03-Jun-2025	17-Jun-2025	28 days	14 days	✓	17-Jun-2025	28 days	14 days	✓
Aggregate Organics : Total Organic Carbon by Wet Oxidation and Titration										
Glass soil jar/Teflon lined cap SED13	E357	03-Jun-2025	17-Jun-2025	28 days	14 days	✓	17-Jun-2025	28 days	14 days	✓
Aggregate Organics : Total Organic Carbon by Wet Oxidation and Titration										
Glass soil jar/Teflon lined cap SED14	E357	03-Jun-2025	17-Jun-2025	28 days	14 days	✓	17-Jun-2025	28 days	14 days	✓
Aggregate Organics : Total Organic Carbon by Wet Oxidation and Titration										
Glass soil jar/Teflon lined cap SED15	E357	03-Jun-2025	17-Jun-2025	28 days	14 days	✓	17-Jun-2025	28 days	14 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Total Organic Carbon by Wet Oxidation and Titration										
Glass soil jar/Teflon lined cap SED16	E357	03-Jun-2025	17-Jun-2025	28 days	14 days	✓	17-Jun-2025	28 days	14 days	✓
Aggregate Organics : Total Organic Carbon by Wet Oxidation and Titration										
Glass soil jar/Teflon lined cap 25DUP E	E357	03-Jun-2025	17-Jun-2025	28 days	15 days	✓	17-Jun-2025	28 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED15	E440	03-Jun-2025	13-Jun-2025	180 days	10 days	✓	13-Jun-2025	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH44 0-0.15m	E440	04-Jun-2025	16-Jun-2025	180 days	12 days	✓	16-Jun-2025	180 days	12 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH45 0-0.15m	E440	04-Jun-2025	16-Jun-2025	180 days	12 days	✓	16-Jun-2025	180 days	12 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH46 0.70m	E440	04-Jun-2025	16-Jun-2025	180 days	12 days	✓	16-Jun-2025	180 days	12 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH47 1.35m	E440	04-Jun-2025	16-Jun-2025	180 days	12 days	✓	16-Jun-2025	180 days	12 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED17	E440	04-Jun-2025	16-Jun-2025	180 days	12 days	✓	16-Jun-2025	180 days	12 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED18	E440	04-Jun-2025	16-Jun-2025	180 days	12 days	✓	16-Jun-2025	180 days	12 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 25DUP E	E440	03-Jun-2025	16-Jun-2025	180 days	13 days	✓	16-Jun-2025	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 25DUP G	E440	04-Jun-2025	16-Jun-2025	180 days	13 days	✓	17-Jun-2025	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH41 1.5m	E440	04-Jun-2025	16-Jun-2025	180 days	13 days	✓	17-Jun-2025	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH42 0.45m	E440	04-Jun-2025	16-Jun-2025	180 days	13 days	✓	17-Jun-2025	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH43 0-0.15m	E440	03-Jun-2025	16-Jun-2025	180 days	13 days	✓	16-Jun-2025	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED11	E440	03-Jun-2025	16-Jun-2025	180 days	13 days	✓	16-Jun-2025	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED12	E440	03-Jun-2025	16-Jun-2025	180 days	13 days	✓	16-Jun-2025	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED13	E440	03-Jun-2025	16-Jun-2025	180 days	13 days	✓	16-Jun-2025	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED14	E440	03-Jun-2025	16-Jun-2025	180 days	13 days	✓	16-Jun-2025	180 days	13 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SED16	E440	03-Jun-2025	16-Jun-2025	180 days	13 days	✓	16-Jun-2025	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH33 0-0.15m	E440	03-Jun-2025	16-Jun-2025	180 days	14 days	✓	16-Jun-2025	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH34 0-0.15m	E440	03-Jun-2025	16-Jun-2025	180 days	14 days	✓	16-Jun-2025	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH35 0-0.15m	E440	03-Jun-2025	16-Jun-2025	180 days	14 days	✓	16-Jun-2025	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH36 0-0.15m	E440	03-Jun-2025	16-Jun-2025	180 days	14 days	✓	16-Jun-2025	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH37 0-0.15m	E440	03-Jun-2025	16-Jun-2025	180 days	14 days	✓	16-Jun-2025	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 25DUP B	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 25DUP C	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 25DUP D	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH20 0.5m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH20 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH21 0.5m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH21 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH22 0.5m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH22 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH23 0.5m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH23 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH24 0.5m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH24 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH25 0.44 m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH25 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH26 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH27 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH28 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH29 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH30 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH31 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH32 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap BH38 0-0.15m	E440	02-Jun-2025	16-Jun-2025	180 days	15 days	✓	16-Jun-2025	180 days	15 days	✓
Particle Size : CCME fine/coarse Particle Size Analysis by wet sieve										
LDPE bag SED13	E178	03-Jun-2025	----	----	----		16-Jun-2025	180 days	13 days	✓
Particle Size : CCME fine/coarse Particle Size Analysis by wet sieve										
Glass soil jar/Teflon lined cap SED15	E178	03-Jun-2025	----	----	----		16-Jun-2025	180 days	13 days	✓
Particle Size : CCME fine/coarse Particle Size Analysis by wet sieve										
Glass soil jar/Teflon lined cap BH23 0-0.5m	E178	02-Jun-2025	----	----	----		16-Jun-2025	180 days	15 days	✓
Particle Size : CCME fine/coarse Particle Size Analysis by wet sieve										
Glass soil jar/Teflon lined cap BH38 0-0.15m	E178	02-Jun-2025	----	----	----		16-Jun-2025	180 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH35 0-0.15m	E108A	03-Jun-2025	13-Jun-2025	30 days	10 days	✓	16-Jun-2025	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap 25DUP B	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap 25DUP D	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH20 0.5m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH20 0-0.15m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH21 0.5m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH21 0-0.15m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH22 0.5m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH22 0-0.15m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH23 0.5m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH23 0-0.15m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH24 0.5m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓



Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH24 0-0.15m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH25 0-0.15m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH26 0-0.15m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH29 0-0.15m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap BH32 0-0.15m	E108A	02-Jun-2025	13-Jun-2025	30 days	11 days	✓	16-Jun-2025	30 days	11 days	✓

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW12	E298	03-Jun-2025	13-Jun-2025	28 days	10 days	✓	16-Jun-2025	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW13	E298	03-Jun-2025	13-Jun-2025	28 days	10 days	✓	16-Jun-2025	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW14	E298	03-Jun-2025	13-Jun-2025	28 days	10 days	✓	16-Jun-2025	28 days	10 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW15	E298	03-Jun-2025	13-Jun-2025	28 days	10 days	✓	16-Jun-2025	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW16	E298	03-Jun-2025	13-Jun-2025	28 days	10 days	✓	16-Jun-2025	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) 25DUP F	E298	03-Jun-2025	13-Jun-2025	28 days	11 days	✓	16-Jun-2025	28 days	11 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW11	E298	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	16-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 25DUP F	E235.Cl	03-Jun-2025	12-Jun-2025	28 days	10 days	✓	13-Jun-2025	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW11	E235.Cl	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW12	E235.Cl	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW13	E235.Cl	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW14	E235.Cl	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Chloride in Water by IC										
HDPE SW15	E235.Cl	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW16	E235.Cl	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW11	E378-U	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	12-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW12	E378-U	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	12-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW13	E378-U	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	12-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW14	E378-U	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	12-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW15	E378-U	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	12-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE SW16	E378-U	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	12-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE 25DUP F	E378-U	03-Jun-2025	12-Jun-2025	3 days	9 days	✖ EHTR	12-Jun-2025	3 days	9 days	✖ EHTR



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride in Water by IC										
HDPE 25DUP F	E235.F	03-Jun-2025	12-Jun-2025	28 days	10 days	✓	13-Jun-2025	28 days	10 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW11	E235.F	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW12	E235.F	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW13	E235.F	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW14	E235.F	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW15	E235.F	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW16	E235.F	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW11	E235.NO3	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW12	E235.NO3	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW13	E235.NO3	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW14	E235.NO3	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW15	E235.NO3	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW16	E235.NO3	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Nitrate in Water by IC										
HDPE 25DUP F	E235.NO3	03-Jun-2025	12-Jun-2025	3 days	9 days	✖ EHTR	13-Jun-2025	3 days	9 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW11	E235.NO2	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW12	E235.NO2	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW13	E235.NO2	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW14	E235.NO2	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW15	E235.NO2	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW16	E235.NO2	03-Jun-2025	12-Jun-2025	3 days	8 days	✖ EHTR	13-Jun-2025	3 days	8 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC										
HDPE 25DUP F	E235.NO2	03-Jun-2025	12-Jun-2025	3 days	9 days	✖ EHTR	13-Jun-2025	3 days	9 days	✖ EHTR
Anions and Nutrients : Sulfate in Water by IC										
HDPE 25DUP F	E235.SO4	03-Jun-2025	12-Jun-2025	28 days	10 days	✓	13-Jun-2025	28 days	10 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW11	E235.SO4	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW12	E235.SO4	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW13	E235.SO4	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW14	E235.SO4	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW15	E235.SO4	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW16	E235.SO4	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW12	E355-L	03-Jun-2025	13-Jun-2025	28 days	10 days	✓	16-Jun-2025	28 days	10 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW13	E355-L	03-Jun-2025	13-Jun-2025	28 days	10 days	✓	16-Jun-2025	28 days	10 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW14	E355-L	03-Jun-2025	13-Jun-2025	28 days	10 days	✓	16-Jun-2025	28 days	10 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW15	E355-L	03-Jun-2025	13-Jun-2025	28 days	10 days	✓	16-Jun-2025	28 days	10 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW16	E355-L	03-Jun-2025	13-Jun-2025	28 days	10 days	✓	16-Jun-2025	28 days	10 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) 25DUP F	E355-L	03-Jun-2025	13-Jun-2025	28 days	11 days	✓	16-Jun-2025	28 days	11 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SW11	E355-L	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 25DUP F	E290	03-Jun-2025	12-Jun-2025	14 days	10 days	✓	13-Jun-2025	14 days	10 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Alkalinity Species by Titration										
HDPE SW11	E290	03-Jun-2025	12-Jun-2025	14 days	9 days	✓	13-Jun-2025	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW12	E290	03-Jun-2025	12-Jun-2025	14 days	9 days	✓	13-Jun-2025	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW13	E290	03-Jun-2025	12-Jun-2025	14 days	9 days	✓	13-Jun-2025	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW14	E290	03-Jun-2025	12-Jun-2025	14 days	9 days	✓	13-Jun-2025	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW15	E290	03-Jun-2025	12-Jun-2025	14 days	9 days	✓	13-Jun-2025	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW16	E290	03-Jun-2025	12-Jun-2025	14 days	9 days	✓	13-Jun-2025	14 days	9 days	✓
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW16	E330	03-Jun-2025	----	----	----		13-Jun-2025	48 hrs	236 hrs	✖ EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW15	E330	03-Jun-2025	----	----	----		13-Jun-2025	48 hrs	237 hrs	✖ EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW12	E330	03-Jun-2025	----	----	----		13-Jun-2025	48 hrs	238 hrs	✖ EHTR



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW13	E330	03-Jun-2025	----	----	----		13-Jun-2025	48 hrs	238 hrs	✖ EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW14	E330	03-Jun-2025	----	----	----		13-Jun-2025	48 hrs	238 hrs	✖ EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE SW11	E330	03-Jun-2025	----	----	----		13-Jun-2025	48 hrs	239 hrs	✖ EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE 25DUP F	E330	03-Jun-2025	----	----	----		13-Jun-2025	48 hrs	252 hrs	✖ EHTR
Physical Tests : Conductivity in Water										
HDPE 25DUP F	E100	03-Jun-2025	12-Jun-2025	28 days	10 days	✔	13-Jun-2025	28 days	10 days	✔
Physical Tests : Conductivity in Water										
HDPE SW11	E100	03-Jun-2025	12-Jun-2025	28 days	9 days	✔	13-Jun-2025	28 days	9 days	✔
Physical Tests : Conductivity in Water										
HDPE SW12	E100	03-Jun-2025	12-Jun-2025	28 days	9 days	✔	13-Jun-2025	28 days	9 days	✔
Physical Tests : Conductivity in Water										
HDPE SW13	E100	03-Jun-2025	12-Jun-2025	28 days	9 days	✔	13-Jun-2025	28 days	9 days	✔
Physical Tests : Conductivity in Water										
HDPE SW14	E100	03-Jun-2025	12-Jun-2025	28 days	9 days	✔	13-Jun-2025	28 days	9 days	✔



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Conductivity in Water										
HDPE SW15	E100	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE SW16	E100	03-Jun-2025	12-Jun-2025	28 days	9 days	✓	13-Jun-2025	28 days	9 days	✓
Physical Tests : pH by Meter										
HDPE SW16	E108	03-Jun-2025	12-Jun-2025	0.25 hrs	209 hrs	✗ EHTR-FM	12-Jun-2025	0.25 hrs	209 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW14	E108	03-Jun-2025	12-Jun-2025	0.25 hrs	210 hrs	✗ EHTR-FM	12-Jun-2025	0.25 hrs	210 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW15	E108	03-Jun-2025	12-Jun-2025	0.25 hrs	210 hrs	✗ EHTR-FM	12-Jun-2025	0.25 hrs	210 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW11	E108	03-Jun-2025	12-Jun-2025	0.25 hrs	211 hrs	✗ EHTR-FM	12-Jun-2025	0.25 hrs	211 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW12	E108	03-Jun-2025	12-Jun-2025	0.25 hrs	211 hrs	✗ EHTR-FM	12-Jun-2025	0.25 hrs	211 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW13	E108	03-Jun-2025	12-Jun-2025	0.25 hrs	211 hrs	✗ EHTR-FM	12-Jun-2025	0.25 hrs	211 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE 25DUP F	E108	03-Jun-2025	12-Jun-2025	0.25 hrs	225 hrs	✗ EHTR-FM	12-Jun-2025	0.25 hrs	225 hrs	✗ EHTR-FM



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TDS by Gravimetry										
HDPE 25DUP F	E162	03-Jun-2025	----	----	----		12-Jun-2025	7 days	10 days	✖ EHT
Physical Tests : TDS by Gravimetry										
HDPE SW11	E162	03-Jun-2025	----	----	----		12-Jun-2025	7 days	9 days	✖ EHT
Physical Tests : TDS by Gravimetry										
HDPE SW12	E162	03-Jun-2025	----	----	----		12-Jun-2025	7 days	9 days	✖ EHT
Physical Tests : TDS by Gravimetry										
HDPE SW13	E162	03-Jun-2025	----	----	----		12-Jun-2025	7 days	9 days	✖ EHT
Physical Tests : TDS by Gravimetry										
HDPE SW14	E162	03-Jun-2025	----	----	----		12-Jun-2025	7 days	9 days	✖ EHT
Physical Tests : TDS by Gravimetry										
HDPE SW15	E162	03-Jun-2025	----	----	----		12-Jun-2025	7 days	9 days	✖ EHT
Physical Tests : TDS by Gravimetry										
HDPE SW16	E162	03-Jun-2025	----	----	----		12-Jun-2025	7 days	9 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE 25DUP F	E121	03-Jun-2025	----	----	----		12-Jun-2025	3 days	9 days	✖ EHTR
Physical Tests : Turbidity by Nephelometry										
HDPE SW11	E121	03-Jun-2025	----	----	----		12-Jun-2025	3 days	9 days	✖ EHTR



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Turbidity by Nephelometry										
HDPE SW12	E121	03-Jun-2025	----	----	----		12-Jun-2025	3 days	9 days	✖ EHTR
Physical Tests : Turbidity by Nephelometry										
HDPE SW13	E121	03-Jun-2025	----	----	----		12-Jun-2025	3 days	9 days	✖ EHTR
Physical Tests : Turbidity by Nephelometry										
HDPE SW14	E121	03-Jun-2025	----	----	----		12-Jun-2025	3 days	9 days	✖ EHTR
Physical Tests : Turbidity by Nephelometry										
HDPE SW15	E121	03-Jun-2025	----	----	----		12-Jun-2025	3 days	9 days	✖ EHTR
Physical Tests : Turbidity by Nephelometry										
HDPE SW16	E121	03-Jun-2025	----	----	----		12-Jun-2025	3 days	9 days	✖ EHTR
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) 25DUP F	E420	03-Jun-2025	12-Jun-2025	180 days	9 days	✔	12-Jun-2025	180 days	9 days	✔
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW11	E420	03-Jun-2025	12-Jun-2025	180 days	9 days	✔	12-Jun-2025	180 days	9 days	✔
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW12	E420	03-Jun-2025	12-Jun-2025	180 days	9 days	✔	12-Jun-2025	180 days	9 days	✔
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW13	E420	03-Jun-2025	12-Jun-2025	180 days	9 days	✔	12-Jun-2025	180 days	9 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW14	E420	03-Jun-2025	12-Jun-2025	180 days	9 days	✓	12-Jun-2025	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW15	E420	03-Jun-2025	12-Jun-2025	180 days	9 days	✓	12-Jun-2025	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW16	E420	03-Jun-2025	12-Jun-2025	180 days	9 days	✓	12-Jun-2025	180 days	9 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended
 EHTR: Exceeded ALS recommended hold time prior to sample receipt.
 EHT: Exceeded ALS recommended hold time prior to analysis.
 Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received	E108A	2049691	2	21	9.5	5.0	✔
CCME fine/coarse Particle Size Analysis by wet sieve	E178	2054203	1	5	20.0	5.0	✔
Total Organic Carbon by Wet Oxidation and Titration	E357	2052347	1	9	11.1	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	2047816	5	47	10.6	5.0	✔
Laboratory Control Samples (LCS)							
pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received	E108A	2049691	2	21	9.5	5.0	✔
CCME fine/coarse Particle Size Analysis by wet sieve	E178	2054203	1	5	20.0	5.0	✔
Total Organic Carbon by Wet Oxidation and Titration	E357	2052347	2	9	22.2	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	2047816	10	47	21.2	10.0	✔
Method Blanks (MB)							
Total Organic Carbon by Wet Oxidation and Titration	E357	2052347	1	9	11.1	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	2047816	5	47	10.6	5.0	✔

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Conductivity in Water	E100	2047286	1	13	7.6	5.0	✔
pH by Meter	E108	2047345	1	20	5.0	5.0	✔
Turbidity by Nephelometry	E121	2047600	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	2047687	1	19	5.2	5.2	✔
Chloride in Water by IC	E235.Cl	2047283	1	13	7.6	5.0	✔
Fluoride in Water by IC	E235.F	2047281	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	2047282	1	13	7.6	5.0	✔
Nitrate in Water by IC	E235.NO3	2047280	1	19	5.2	5.0	✔
Sulfate in Water by IC	E235.SO4	2047284	1	14	7.1	5.0	✔
Alkalinity Species by Titration	E290	2047287	1	13	7.6	5.0	✔
Ammonia by Fluorescence	E298	2048236	2	40	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	2050484	1	19	5.2	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	2048240	2	40	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2047289	1	19	5.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	2046916	1	15	6.6	5.0	✔
Laboratory Control Samples (LCS)							
Conductivity in Water	E100	2047286	1	13	7.6	5.0	✔
pH by Meter	E108	2047345	1	20	5.0	5.0	✔
Turbidity by Nephelometry	E121	2047600	1	20	5.0	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Control Samples (LCS) - Continued							
TDS by Gravimetry	E162	2047687	1	19	5.2	5.2	✔
Chloride in Water by IC	E235.Cl	2047283	1	13	7.6	5.0	✔
Fluoride in Water by IC	E235.F	2047281	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	2047282	1	13	7.6	5.0	✔
Nitrate in Water by IC	E235.NO3	2047280	1	19	5.2	5.0	✔
Sulfate in Water by IC	E235.SO4	2047284	1	14	7.1	5.0	✔
Alkalinity Species by Titration	E290	2047287	1	13	7.6	5.0	✔
Ammonia by Fluorescence	E298	2048236	2	40	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	2050484	1	19	5.2	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	2048240	2	40	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2047289	1	19	5.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	2046916	1	15	6.6	5.0	✔
Method Blanks (MB)							
Conductivity in Water	E100	2047286	1	13	7.6	5.0	✔
Turbidity by Nephelometry	E121	2047600	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	2047687	1	19	5.2	5.2	✔
Chloride in Water by IC	E235.Cl	2047283	1	13	7.6	5.0	✔
Fluoride in Water by IC	E235.F	2047281	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	2047282	1	13	7.6	5.0	✔
Nitrate in Water by IC	E235.NO3	2047280	1	19	5.2	5.0	✔
Sulfate in Water by IC	E235.SO4	2047284	1	14	7.1	5.0	✔
Alkalinity Species by Titration	E290	2047287	1	13	7.6	5.0	✔
Ammonia by Fluorescence	E298	2048236	2	40	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	2050484	1	19	5.2	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	2048240	2	40	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2047289	1	19	5.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	2046916	1	15	6.6	5.0	✔
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	2047283	1	13	7.6	5.0	✔
Fluoride in Water by IC	E235.F	2047281	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	2047282	1	13	7.6	5.0	✔
Nitrate in Water by IC	E235.NO3	2047280	1	19	5.2	5.0	✔
Sulfate in Water by IC	E235.SO4	2047284	1	14	7.1	5.0	✔
Ammonia by Fluorescence	E298	2048236	2	40	5.0	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	2048240	2	40	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2047289	1	19	5.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	2046916	1	15	6.6	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:0.01M CaCl ₂ Extraction) - As Received	E108A ALS Environmental - Waterloo	Soil/Solid	MECP E3530	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C) and is carried out in accordance with procedures described in the Analytical Protocol (prescriptive method). A minimum 10g portion of the sample, as received, is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil by centrifuging, settling, or decanting and then analyzed using a pH meter and electrode. This method is equivalent to ASTM D4972 and is acceptable for topsoil analysis.
CCME fine/coarse Particle Size Analysis by wet sieve	E178 ALS Environmental - Saskatoon	Soil/Solid	CCME Vol 4 Analytical Methods	An air-dried sample is reduced to < 2 mm size and mixed with a dispersing agent (sodium hexametaphosphate). The sample is washed through a 200 mesh (0.075 mm) sieve. The retained mass of sample is used to determine % sand fraction. If the percentage of sand is >50%, the soil is considered to be coarse textured soil. If the percentage of sand is <50%, the soil is considered to be fine textured.
Total Organic Carbon by Wet Oxidation and Titration	E357 ALS Environmental - Waterloo	Soil/Solid	CSSS (2008) 21.3.2 (mod)	Total Organic Carbon is determined by wet oxidation digestion using potassium dichromate and sulfuric acid (Walkley-Black). Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelen factor.
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Waterloo	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Conductivity in Water	E100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Halifax	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 ALS Environmental - Waterloo	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TDS by Gravimetry	E162 ALS Environmental - Halifax	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at $180 \pm 2^{\circ}\text{C}$ for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Waterloo	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Colour (Apparent) by Spectrometer	E330 ALS Environmental - Waterloo	Water	APHA 2120 C (mod)	Colour (Apparent) is measured in an unfiltered sample spectrophotometrically using the single wavelength method. The colour contribution of settleable solids are not included in the result. This method is intended for potable waters. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L ALS Environmental - Waterloo	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove carbonate-based Inorganic Carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . Forms of carbon associated with inorganic or organic molecules (e.g. SCN and CN) are included in NPOC if they are not removed by purging under acidic conditions. Notably, NPOC excludes most volatile organic compounds and free cyanide. For samples where the majority of Total Carbon is inorganic, this method provides greater accuracy and reliability versus the TOC by subtraction method (TC minus TIC).
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Waterloo	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Waterloo	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed as CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because hardness is a property of water due to dissolved divalent cations. In non-turbid waters, Hardness from total Ca/Mg is normally comparable to Dissolved Hardness, but may be biased high if particulate forms of Ca or Mg are present.
Ion Balance using Total Metals	EC101A ALS Environmental - Waterloo	Water	APHA 1030E	Cation Sum (using total metals), Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
Saturation Index using Laboratory pH (Ca-T)	EC105A ALS Environmental - Waterloo	Water	APHA 2330B	Langelier Index provides an indication of scale formation potential at a given pH and temperature, and is calculated as per APHA 2330B Saturation Index. Positive values indicate oversaturation with respect to CaCO ₃ . Negative values indicate undersaturation of CaCO ₃ . This calculation uses laboratory pH measurements and provides estimates of Langelier Index at temperatures of 4, 15, 20, 25, 66, and 77°C. Ryznar Stability Index is an alternative index used for scale formation and corrosion potential.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Waterloo	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Silicon as Silica (Calculation)	EC420.SiO2 ALS Environmental - Waterloo	Water	N/A	Total Silicon (as SiO2) is a calculated parameter. Total Silicon (as SiO2 mg/L) = 2.139 x Total Silicon (mg/L).
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil : 0.01CaCl2 - As Received for pH	EP108A ALS Environmental - Waterloo	Soil/Solid	MOEE E3137A	A minimum 10g portion of the sample, as received, is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil by centrifuging, settling or decanting and then analyzed using a pH meter and electrode.
Digestion for Metals and Mercury	EP440 ALS Environmental - Waterloo	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <60°C	EPP442 ALS Environmental - Saskatoon	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.
Preparation for Ammonia	EP298 ALS Environmental - Waterloo	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 ALS Environmental - Waterloo	Water		Preparation for Total Organic Carbon by Combustion

QUALITY CONTROL REPORT

Work Order	: HA2501752	Page	: 1 of 27
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Nadine Wambolt	Account Manager	: Andrew Martin
Address	: 275 Charlotte Street Suite 206 Sydney NS Canada B1P 1C6	Address	: 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2
Telephone	: 902.562.9880 ext. 5206	Telephone	: +1 902 707 4888
Project	: 24-8606	Date Samples Received	: 09-Jun-2025 15:30
PO	: ----	Date Analysis Commenced	: 12-Jun-2025
C-O-C number	: ----	Issue Date	: 17-Jun-2025 22:18
Sampler	: MK/EJM		
Site	:		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 53		
No. of samples analysed	: 53		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Greg Pokocky	Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Hedy Lai	Team Leader - Inorganics	Saskatoon Inorganics, Saskatoon, Saskatchewan
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Walt Kippenhuck	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
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General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 2049691)											
HA2501752-001	BH20 0-0.15m	pH (1:2 soil:CaCl2-aq)	----	E108A	0.10	pH units	3.90	3.93	0.03	Diff <2x LOR	----
Physical Tests (QC Lot: 2049810)											
HA2501752-006	BH22 0.5m	pH (1:2 soil:CaCl2-aq)	----	E108A	0.10	pH units	5.21	5.16	0.964%	5%	----
Particle Size (QC Lot: 2054203)											
HA2501752-009	BH23 0-0.5m	Sand (>0.075mm)	----	E178	1.0	%	56.6	55.9	1.19%	20%	----
Metals (QC Lot: 2047816)											
HA2501752-001	BH20 0-0.15m	Aluminum	7429-90-5	E440	50	mg/kg	10800	10500	3.12%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.26	0.22	0.04	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	2.82	2.76	2.23%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	46.3	43.4	6.54%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.15	0.15	0.001	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.112	0.108	0.004	Diff <2x LOR	----
		Chromium	7440-47-3	E440	0.50	mg/kg	10.3	9.21	10.9%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	3.17	3.18	0.299%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	9.33	9.39	0.681%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	19100	19100	0.0930%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	34.9	32.0	8.65%	40%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	139	139	0.230%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.55	0.62	11.4%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	5.46	6.05	10.1%	30%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.72	0.70	0.02	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.16	0.16	0.005	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	11.1	11.4	2.55%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.088	0.083	0.004	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.666	0.684	2.72%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	51.6	49.6	3.85%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	30.3	29.3	3.31%	30%	----



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 2048063)											
HA2501778-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	4290	4010	6.74%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	0.97	0.89	9.04%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	23.5	20.4	14.1%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		Chromium	7440-47-3	E440	0.50	mg/kg	4.27	4.15	2.81%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	1.01	0.94	6.61%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	1.11	1.04	0.06	Diff <2x LOR	----
		Iron	7439-89-6	E440	50	mg/kg	2580	2400	7.12%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	3.20	3.12	2.68%	40%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	21.7	20.0	8.18%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	4.52	4.40	2.83%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	3.01	2.82	0.20	Diff <2x LOR	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	6.57	6.53	0.552%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.052	<0.050	0.002	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.182	0.173	0.009	Diff <2x LOR	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	9.84	9.44	4.22%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	6.2	6.1	0.08	Diff <2x LOR	----
Metals (QC Lot: 2049811)											
HA2501752-019	BH30 0-0.15m	Aluminum	7429-90-5	E440	50	mg/kg	22900	21100	8.09%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.14	0.14	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	2.73	2.61	4.50%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	51.9	48.1	7.55%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.50	0.44	0.06	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.226	0.208	7.94%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	15.6	14.2	9.23%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	6.39	5.48	15.3%	30%	----



Sub-Matrix: Soil/Solid

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 2049811) - continued											
HA2501752-019	BH30 0-0.15m	Copper	7440-50-8	E440	0.50	mg/kg	11.2	10.5	6.68%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	26200	23700	10.2%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	14.1	12.5	12.2%	40%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	315	258	19.9%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.89	0.84	6.30%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	10.4	9.02	14.6%	30%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.64	0.59	0.06	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.10	<0.10	0.003	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	16.0	14.3	11.0%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.113	0.096	0.017	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.21	1.06	13.4%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	51.8	46.7	10.3%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	74.6	68.0	9.23%	30%	----
Metals (QC Lot: 2049963)											
HA2501752-030	25DUP G	Aluminum	7429-90-5	E440	50	mg/kg	30300	31300	3.03%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.12	0.12	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	3.56	3.62	1.94%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	62.0	60.5	2.36%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	1.73	1.78	2.64%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	7.5	7.5	0.01	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.907	0.861	5.19%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	23.5	23.7	1.09%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.7	11.7	0.124%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	44.9	45.1	0.311%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	20200	20000	0.522%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	27.8	27.7	0.650%	40%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	584	581	0.548%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.89	1.91	0.932%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	20.4	20.1	1.29%	30%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	2.71	2.74	1.05%	30%	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.11	0.11	0.0007	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	29.9	30.2	1.03%	40%	----



Sub-Matrix: Soil/Solid

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 2049963) - continued											
HA2501752-030	25DUP G	Sulfur	7704-34-9	E440	1000	mg/kg	4100	4100	40	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.248	0.240	0.008	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	35.8	35.8	0.0314%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	46.7	46.8	0.343%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	140	138	1.12%	30%	----
Metals (QC Lot: 2050353)											
HA2501752-033	BH43 0-0.15m	Aluminum	7429-90-5	E440	50	mg/kg	19000	19000	0.230%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.12	0.15	0.03	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	2.64	2.87	8.61%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	48.8	48.0	1.63%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.73	0.76	4.53%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	5.3	5.1	0.2	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.203	0.212	4.29%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	15.0	14.8	0.742%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	10.8	11.2	4.07%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	16.8	17.9	6.36%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	24800	24700	0.118%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	11.7	12.4	5.78%	40%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	847	856	1.09%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.75	0.74	1.61%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	12.6	13.1	4.24%	30%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.28	0.27	0.02	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	23.4	22.4	4.67%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.114	0.113	0.0008	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.93	2.02	4.31%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	45.6	45.7	0.0524%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	68.7	68.3	0.543%	30%	----
Aggregate Organics (QC Lot: 2052347)											
HA2501752-040	SED11	Carbon, total organic [TOC]	----	E357	0.10	%	2.50	2.37	5.14%	20%	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 2047286)											
WT2514700-001	Anonymous	Conductivity	----	E100	1.0	µS/cm	274	274	0.00%	10%	----
Physical Tests (QC Lot: 2047287)											
WT2514700-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	77.7	78.5	0.999%	20%	----
Physical Tests (QC Lot: 2047345)											
HA2501736-001	Anonymous	pH	----	E108	0.10	pH units	6.54	6.56	0.153%	4%	----
Physical Tests (QC Lot: 2047600)											
HA2501752-049	SW11	Turbidity	----	E121	0.10	NTU	0.86	0.87	0.005	Diff <2x LOR	----
Physical Tests (QC Lot: 2047687)											
HA2501752-049	SW11	Solids, total dissolved [TDS]	----	E162	20	mg/L	128	123	4	Diff <2x LOR	----
Physical Tests (QC Lot: 2050484)											
HA2501752-049	SW11	Colour, apparent	----	E330	2.0	CU	17.8	18.3	0.5	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2047280)											
WT2514700-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2047281)											
WT2514700-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2047282)											
WT2514700-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2047283)											
WT2514700-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2047284)											
WT2514700-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	52.7	52.7	0.0704%	20%	----
Anions and Nutrients (QC Lot: 2047289)											
HA2501546-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0070	0.0068	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2048236)											
WT2514278-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	2.50	mg/L	95.9	91.6	4.54%	20%	----
Anions and Nutrients (QC Lot: 2050091)											
HA2501545-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.106	0.106	0.378%	20%	----
Organic / Inorganic Carbon (QC Lot: 2048240)											
HA2501752-049	SW11	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	3.07	3.69	0.62	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 2050090)											
HA2501752-050	SW12	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	2.72	3.00	0.28	Diff <2x LOR	----
Total Metals (QC Lot: 2046916)											
HA2501752-049	SW11	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0734	0.0524	33.5%	20%	DUP-H



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 2046916) - continued											
HA2501752-049	SW11	Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00015	0.00014	0.00002	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.00783	0.00781	0.256%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.100	mg/L	24.3	24.7	1.53%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	0.000014	0.000011	0.000003	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00095	0.00077	0.00018	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.546	0.517	5.39%	20%	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	0.000140	0.000134	0.000006	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	7.92	8.09	2.22%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.0859	0.0860	0.179%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000414	0.000414	0.0000001	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.050	mg/L	0.066	<0.050	0.016	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	0.534	0.546	2.23%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00120	0.00124	0.00004	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.000060	0.000058	0.000002	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	1.15	1.14	1.21%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	8.58	8.83	2.76%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.0401	0.0404	0.685%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	2.81	2.71	0.10	Diff <2x LOR	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	0.00173	0.00152	0.00021	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 2046916) - continued											
HA2501752-049	SW11	Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000967	0.000969	0.248%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 2047816)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Metals (QCLot: 2048063)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 2048063) - continued						
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Metals (QCLot: 2049811)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 2049811) - continued						
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Metals (QCLot: 2049963)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Metals (QCLot: 2050353)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 2050353) - continued						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Aggregate Organics (QCLot: 2052347)						
Carbon, total organic [TOC]	----	E357	0.1	%	<0.10	----

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 2047286)						
Conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 2047287)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.2	----
Physical Tests (QCLot: 2047600)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 2047687)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 2050484)						
Colour, apparent	----	E330	2	CU	<2.0	----
Anions and Nutrients (QCLot: 2047280)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2047281)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2047282)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 2047283)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 2047284)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 2047289)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 2048236)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 2050091)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 2048240)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 2050090)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 2046916)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 2046916) - continued						
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 2049691)									
pH (1:2 soil:CaCl2-aq)	----	E108A	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 2049810)									
pH (1:2 soil:CaCl2-aq)	----	E108A	----	pH units	7 pH units	100	98.0	102	----
Metals (QCLot: 2047816)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.5	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	96.3	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	99.5	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	97.7	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	91.6	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.6	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	91.9	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	94.7	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.9	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	96.1	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	96.5	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.6	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	97.4	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	94.2	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	98.8	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.9	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	86.4	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	94.6	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	93.3	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	95.9	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	96.5	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	93.0	80.0	120	----
Metals (QCLot: 2048063)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	105	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----



Sub-Matrix: Soil/Solid

Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 2048063) - continued									
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	95.7	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	104	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	98.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	104	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	100	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	94.0	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	95.6	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	98.4	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	106	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	105	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
Metals (QCLot: 2049811)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.7	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	91.8	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	93.3	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	97.5	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	99.8	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.4	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	103	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	99.1	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----



Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 2049811) - continued									
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	99.9	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	114	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	92.6	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	107	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.9	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	99.8	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	96.6	80.0	120	----
Metals (QCLot: 2049963)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	91.9	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.4	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	97.6	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.1	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	101	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	98.2	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	103	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	99.9	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	94.7	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	94.2	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	103	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	95.8	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	95.4	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	105	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.2	80.0	120	----
Metals (QCLot: 2050353)									



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 2050353) - continued									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	100	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.2	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	98.7	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	95.1	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	98.8	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	97.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.7	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	96.8	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	99.0	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	90.1	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	92.4	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	95.4	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.1	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	100	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.3	80.0	120	----
Aggregate Organics (QCLot: 2052347)									
Carbon, total organic [TOC]	----	E357	0.1	%	42.1 %	101	80.0	120	----
Sub-Matrix: Water									
					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 2047286)									
Conductivity	----	E100	1	µS/cm	1410 µS/cm	101	90.0	110	----
Physical Tests (QCLot: 2047287)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	150 mg/L	107	85.0	115	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 2047345)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 2047600)									
Turbidity	----	E121	0.1	NTU	200 NTU	99.5	85.0	115	----
Physical Tests (QCLot: 2047687)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	99.1	85.0	115	----
Physical Tests (QCLot: 2050484)									
Colour, apparent	----	E330	2	CU	25 CU	112	85.0	115	----
Anions and Nutrients (QCLot: 2047280)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 2047281)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 2047282)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 2047283)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	98.6	90.0	110	----
Anions and Nutrients (QCLot: 2047284)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 2047289)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	105	80.0	120	----
Anions and Nutrients (QCLot: 2048236)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.3	85.0	115	----
Anions and Nutrients (QCLot: 2050091)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.1	85.0	115	----
Organic / Inorganic Carbon (QCLot: 2048240)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	102	80.0	120	----
Organic / Inorganic Carbon (QCLot: 2050090)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	102	80.0	120	----
Total Metals (QCLot: 2046916)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	110	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	108	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	113	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.012 mg/L	111	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.005 mg/L	105	80.0	120	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 2046916) - continued									
Bismuth, total	7440-69-9	E420	0.00005	mg/L	0.05 mg/L	106	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	0.05 mg/L	103	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	111	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	2.5 mg/L	106	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.002 mg/L	102	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.012 mg/L	111	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.012 mg/L	108	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.012 mg/L	109	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	110	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	106	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.012 mg/L	102	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	2.5 mg/L	117	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.012 mg/L	108	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.012 mg/L	105	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	108	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	0.5 mg/L	111	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	2.5 mg/L	105	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.005 mg/L	111	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	108	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	0.5 mg/L	106	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	2.5 mg/L	111	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.012 mg/L	108	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	2.5 mg/L	105	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.005 mg/L	104	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	0.05 mg/L	107	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.005 mg/L	105	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	107	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.012 mg/L	107	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.005 mg/L	106	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0 mg/L	104	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	110	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	108	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.005 mg/L	104	80.0	120	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 2047280)										
WT2514700-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	2.48 mg/L	2.5 mg/L	99.4	75.0	125	----
Anions and Nutrients (QCLot: 2047281)										
WT2514700-001	Anonymous	Fluoride	16984-48-8	E235.F	1.02 mg/L	1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 2047282)										
WT2514700-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.504 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 2047283)										
WT2514700-001	Anonymous	Chloride	16887-00-6	E235.Cl	98.4 mg/L	100 mg/L	98.4	75.0	125	----
Anions and Nutrients (QCLot: 2047284)										
WT2514700-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	98.1 mg/L	100 mg/L	98.1	75.0	125	----
Anions and Nutrients (QCLot: 2047289)										
HA2501546-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0196 mg/L	0.02 mg/L	99.9	70.0	130	----
Anions and Nutrients (QCLot: 2048236)										
WT2514278-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 2050091)										
HA2501545-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 2048240)										
HA2501752-049	SW11	Carbon, total organic [TOC]	----	E355-L	5.78 mg/L	5 mg/L	116	70.0	130	----
Organic / Inorganic Carbon (QCLot: 2050090)										
HA2501752-050	SW12	Carbon, total organic [TOC]	----	E355-L	5.32 mg/L	5 mg/L	106	70.0	130	----
Total Metals (QCLot: 2046916)										
HA2501752-050	SW12	Aluminum, total	7429-90-5	E420	0.0955 mg/L	0.1 mg/L	95.5	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0524 mg/L	0.05 mg/L	105	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0536 mg/L	0.05 mg/L	107	70.0	130	----
		Barium, total	7440-39-3	E420	0.0122 mg/L	0.012 mg/L	97.2	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.00500 mg/L	0.005 mg/L	100	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0496 mg/L	0.05 mg/L	99.1	70.0	130	----
		Boron, total	7440-42-8	E420	0.050 mg/L	0.05 mg/L	101	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00507 mg/L	0.005 mg/L	101	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	----	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00245 mg/L	0.002 mg/L	98.0	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0131 mg/L	0.012 mg/L	105	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0127 mg/L	0.012 mg/L	102	70.0	130	----
		Copper, total	7440-50-8	E420	0.0126 mg/L	0.012 mg/L	101	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 2046916) - continued										
HA2501752-050	SW12	Iron, total	7439-89-6	E420	ND mg/L	----	ND	70.0	130	----
		Lead, total	7439-92-1	E420	0.0251 mg/L	0.025 mg/L	100	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0130 mg/L	0.012 mg/L	104	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	----	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	----	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0126 mg/L	0.012 mg/L	100	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0253 mg/L	0.025 mg/L	101	70.0	130	----
		Phosphorus, total	7723-14-0	E420	0.536 mg/L	0.5 mg/L	107	70.0	130	----
		Potassium, total	7440-09-7	E420	2.48 mg/L	2.5 mg/L	99.4	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.00501 mg/L	0.005 mg/L	100	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0516 mg/L	0.05 mg/L	103	70.0	130	----
		Silicon, total	7440-21-3	E420	ND mg/L	----	ND	70.0	130	----
		Silver, total	7440-22-4	E420	0.00473 mg/L	0.005 mg/L	94.6	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	----	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	----	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	----	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.00487 mg/L	0.005 mg/L	97.4	70.0	130	----
		Thallium, total	7440-28-0	E420	0.0505 mg/L	0.05 mg/L	101	70.0	130	----
		Thorium, total	7440-29-1	E420	0.00508 mg/L	0.005 mg/L	102	70.0	130	----
		Tin, total	7440-31-5	E420	0.0254 mg/L	0.025 mg/L	102	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0125 mg/L	0.012 mg/L	99.9	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.00489 mg/L	0.005 mg/L	97.7	70.0	130	----
		Uranium, total	7440-61-1	E420	ND mg/L	----	ND	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0265 mg/L	0.025 mg/L	106	70.0	130	----
		Zinc, total	7440-66-6	E420	0.0246 mg/L	0.025 mg/L	98.3	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.00484 mg/L	0.005 mg/L	96.7	70.0	130	----



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method			Low	High	
Particle Size (QCLot: 2054203)									
QC-2054203-001	RM	Sand (>0.075mm)	----	E178	40.1 %	101	88.0	112	----
Metals (QCLot: 2047816)									
QC-2047816-003	RM	Aluminum	7429-90-5	E440	22500 mg/kg	106	70.0	130	----
QC-2047816-003	RM	Antimony	7440-36-0	E440	24.8 mg/kg	94.6	70.0	130	----
QC-2047816-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	97.7	70.0	130	----
QC-2047816-003	RM	Barium	7440-39-3	E440	788 mg/kg	101	70.0	130	----
QC-2047816-003	RM	Beryllium	7440-41-7	E440	1.82 mg/kg	101	70.0	130	----
QC-2047816-003	RM	Cadmium	7440-43-9	E440	2.15 mg/kg	95.6	70.0	130	----
QC-2047816-003	RM	Chromium	7440-47-3	E440	56.9 mg/kg	98.7	70.0	130	----
QC-2047816-003	RM	Cobalt	7440-48-4	E440	32 mg/kg	98.4	70.0	130	----
QC-2047816-003	RM	Copper	7440-50-8	E440	969 mg/kg	104	70.0	130	----
QC-2047816-003	RM	Iron	7439-89-6	E440	32700 mg/kg	104	70.0	130	----
QC-2047816-003	RM	Lead	7439-92-1	E440	919 mg/kg	97.9	70.0	130	----
QC-2047816-003	RM	Manganese	7439-96-5	E440	8640 mg/kg	105	70.0	130	----
QC-2047816-003	RM	Molybdenum	7439-98-7	E440	25.1 mg/kg	99.3	70.0	130	----
QC-2047816-003	RM	Nickel	7440-02-0	E440	1000 mg/kg	104	70.0	130	----
QC-2047816-003	RM	Selenium	7782-49-2	E440	1.04 mg/kg	108	60.0	140	----
QC-2047816-003	RM	Silver	7440-22-4	E440	8.98 mg/kg	94.0	70.0	130	----
QC-2047816-003	RM	Strontium	7440-24-6	E440	41 mg/kg	99.2	70.0	130	----
QC-2047816-003	RM	Sulfur	7704-34-9	E440	3940 mg/kg	87.6	50.0	150	----
QC-2047816-003	RM	Thallium	7440-28-0	E440	0.907 mg/kg	97.7	70.0	130	----
QC-2047816-003	RM	Tin	7440-31-5	E440	3.79 mg/kg	98.9	40.0	160	----
QC-2047816-003	RM	Uranium	7440-61-1	E440	3.97 mg/kg	103	70.0	130	----
QC-2047816-003	RM	Vanadium	7440-62-2	E440	66.2 mg/kg	98.8	70.0	130	----
QC-2047816-003	RM	Zinc	7440-66-6	E440	828 mg/kg	96.4	70.0	130	----
Metals (QCLot: 2048063)									
QC-2048063-003	RM	Aluminum	7429-90-5	E440	22500 mg/kg	107	70.0	130	----
QC-2048063-003	RM	Antimony	7440-36-0	E440	24.8 mg/kg	89.0	70.0	130	----
QC-2048063-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	100	70.0	130	----
QC-2048063-003	RM	Barium	7440-39-3	E440	788 mg/kg	98.5	70.0	130	----
QC-2048063-003	RM	Beryllium	7440-41-7	E440	1.82 mg/kg	96.2	70.0	130	----
QC-2048063-003	RM	Cadmium	7440-43-9	E440	2.15 mg/kg	104	70.0	130	----
QC-2048063-003	RM	Chromium	7440-47-3	E440	56.9 mg/kg	106	70.0	130	----



Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					
Metals (QCLot: 2048063) - continued									
QC-2048063-003	RM	Cobalt	7440-48-4	E440	32 mg/kg	102	70.0	130	----
QC-2048063-003	RM	Copper	7440-50-8	E440	969 mg/kg	107	70.0	130	----
QC-2048063-003	RM	Iron	7439-89-6	E440	32700 mg/kg	108	70.0	130	----
QC-2048063-003	RM	Lead	7439-92-1	E440	919 mg/kg	93.6	70.0	130	----
QC-2048063-003	RM	Manganese	7439-96-5	E440	8640 mg/kg	106	70.0	130	----
QC-2048063-003	RM	Molybdenum	7439-98-7	E440	25.1 mg/kg	97.6	70.0	130	----
QC-2048063-003	RM	Nickel	7440-02-0	E440	1000 mg/kg	105	70.0	130	----
QC-2048063-003	RM	Selenium	7782-49-2	E440	1.04 mg/kg	98.8	60.0	140	----
QC-2048063-003	RM	Silver	7440-22-4	E440	8.98 mg/kg	95.5	70.0	130	----
QC-2048063-003	RM	Strontium	7440-24-6	E440	41 mg/kg	91.7	70.0	130	----
QC-2048063-003	RM	Sulfur	7704-34-9	E440	3940 mg/kg	103	50.0	150	----
QC-2048063-003	RM	Thallium	7440-28-0	E440	0.907 mg/kg	97.6	70.0	130	----
QC-2048063-003	RM	Tin	7440-31-5	E440	3.79 mg/kg	99.3	40.0	160	----
QC-2048063-003	RM	Uranium	7440-61-1	E440	3.97 mg/kg	92.3	70.0	130	----
QC-2048063-003	RM	Vanadium	7440-62-2	E440	66.2 mg/kg	103	70.0	130	----
QC-2048063-003	RM	Zinc	7440-66-6	E440	828 mg/kg	101	70.0	130	----
Metals (QCLot: 2049811)									
QC-2049811-003	RM	Aluminum	7429-90-5	E440	22500 mg/kg	101	70.0	130	----
QC-2049811-003	RM	Antimony	7440-36-0	E440	24.8 mg/kg	98.9	70.0	130	----
QC-2049811-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	98.4	70.0	130	----
QC-2049811-003	RM	Barium	7440-39-3	E440	788 mg/kg	100	70.0	130	----
QC-2049811-003	RM	Beryllium	7440-41-7	E440	1.82 mg/kg	91.0	70.0	130	----
QC-2049811-003	RM	Cadmium	7440-43-9	E440	2.15 mg/kg	97.1	70.0	130	----
QC-2049811-003	RM	Chromium	7440-47-3	E440	56.9 mg/kg	99.8	70.0	130	----
QC-2049811-003	RM	Cobalt	7440-48-4	E440	32 mg/kg	97.9	70.0	130	----
QC-2049811-003	RM	Copper	7440-50-8	E440	969 mg/kg	105	70.0	130	----
QC-2049811-003	RM	Iron	7439-89-6	E440	32700 mg/kg	102	70.0	130	----
QC-2049811-003	RM	Lead	7439-92-1	E440	919 mg/kg	92.4	70.0	130	----
QC-2049811-003	RM	Manganese	7439-96-5	E440	8640 mg/kg	103	70.0	130	----
QC-2049811-003	RM	Molybdenum	7439-98-7	E440	25.1 mg/kg	99.1	70.0	130	----
QC-2049811-003	RM	Nickel	7440-02-0	E440	1000 mg/kg	104	70.0	130	----
QC-2049811-003	RM	Selenium	7782-49-2	E440	1.04 mg/kg	107	60.0	140	----
QC-2049811-003	RM	Silver	7440-22-4	E440	8.98 mg/kg	94.8	70.0	130	----
QC-2049811-003	RM	Strontium	7440-24-6	E440	41 mg/kg	94.5	70.0	130	----
QC-2049811-003	RM	Sulfur	7704-34-9	E440	3940 mg/kg	90.4	50.0	150	----
QC-2049811-003	RM	Thallium	7440-28-0	E440	0.907 mg/kg	98.1	70.0	130	----
QC-2049811-003	RM	Tin	7440-31-5	E440	3.79 mg/kg	101	40.0	160	----



Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					
Metals (QCLot: 2049811) - continued									
QC-2049811-003	RM	Uranium	7440-61-1	E440	3.97 mg/kg	87.0	70.0	130	----
QC-2049811-003	RM	Vanadium	7440-62-2	E440	66.2 mg/kg	99.2	70.0	130	----
QC-2049811-003	RM	Zinc	7440-66-6	E440	828 mg/kg	95.6	70.0	130	----
Metals (QCLot: 2049963)									
QC-2049963-003	RM	Aluminum	7429-90-5	E440	22500 mg/kg	108	70.0	130	----
QC-2049963-003	RM	Antimony	7440-36-0	E440	24.8 mg/kg	84.4	70.0	130	----
QC-2049963-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	92.9	70.0	130	----
QC-2049963-003	RM	Barium	7440-39-3	E440	788 mg/kg	110	70.0	130	----
QC-2049963-003	RM	Beryllium	7440-41-7	E440	1.82 mg/kg	93.3	70.0	130	----
QC-2049963-003	RM	Cadmium	7440-43-9	E440	2.15 mg/kg	94.7	70.0	130	----
QC-2049963-003	RM	Chromium	7440-47-3	E440	56.9 mg/kg	111	70.0	130	----
QC-2049963-003	RM	Cobalt	7440-48-4	E440	32 mg/kg	99.2	70.0	130	----
QC-2049963-003	RM	Copper	7440-50-8	E440	969 mg/kg	107	70.0	130	----
QC-2049963-003	RM	Iron	7439-89-6	E440	32700 mg/kg	105	70.0	130	----
QC-2049963-003	RM	Lead	7439-92-1	E440	919 mg/kg	92.7	70.0	130	----
QC-2049963-003	RM	Manganese	7439-96-5	E440	8640 mg/kg	111	70.0	130	----
QC-2049963-003	RM	Molybdenum	7439-98-7	E440	25.1 mg/kg	99.3	70.0	130	----
QC-2049963-003	RM	Nickel	7440-02-0	E440	1000 mg/kg	110	70.0	130	----
QC-2049963-003	RM	Selenium	7782-49-2	E440	1.04 mg/kg	90.4	60.0	140	----
QC-2049963-003	RM	Silver	7440-22-4	E440	8.98 mg/kg	88.1	70.0	130	----
QC-2049963-003	RM	Strontium	7440-24-6	E440	41 mg/kg	97.4	70.0	130	----
QC-2049963-003	RM	Sulfur	7704-34-9	E440	3940 mg/kg	93.8	50.0	150	----
QC-2049963-003	RM	Thallium	7440-28-0	E440	0.907 mg/kg	88.2	70.0	130	----
QC-2049963-003	RM	Tin	7440-31-5	E440	3.79 mg/kg	95.5	40.0	160	----
QC-2049963-003	RM	Uranium	7440-61-1	E440	3.97 mg/kg	93.0	70.0	130	----
QC-2049963-003	RM	Vanadium	7440-62-2	E440	66.2 mg/kg	101	70.0	130	----
QC-2049963-003	RM	Zinc	7440-66-6	E440	828 mg/kg	92.4	70.0	130	----
Metals (QCLot: 2050353)									
QC-2050353-003	RM	Aluminum	7429-90-5	E440	22500 mg/kg	98.7	70.0	130	----
QC-2050353-003	RM	Antimony	7440-36-0	E440	24.8 mg/kg	87.9	70.0	130	----
QC-2050353-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	94.1	70.0	130	----
QC-2050353-003	RM	Barium	7440-39-3	E440	788 mg/kg	98.8	70.0	130	----
QC-2050353-003	RM	Beryllium	7440-41-7	E440	1.82 mg/kg	97.4	70.0	130	----
QC-2050353-003	RM	Cadmium	7440-43-9	E440	2.15 mg/kg	93.6	70.0	130	----
QC-2050353-003	RM	Chromium	7440-47-3	E440	56.9 mg/kg	97.2	70.0	130	----
QC-2050353-003	RM	Cobalt	7440-48-4	E440	32 mg/kg	95.5	70.0	130	----
QC-2050353-003	RM	Copper	7440-50-8	E440	969 mg/kg	101	70.0	130	----



Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					
Metals (QCLot: 2050353) - continued									
QC-2050353-003	RM	Iron	7439-89-6	E440	32700 mg/kg	94.0	70.0	130	----
QC-2050353-003	RM	Lead	7439-92-1	E440	919 mg/kg	89.1	70.0	130	----
QC-2050353-003	RM	Manganese	7439-96-5	E440	8640 mg/kg	102	70.0	130	----
QC-2050353-003	RM	Molybdenum	7439-98-7	E440	25.1 mg/kg	92.5	70.0	130	----
QC-2050353-003	RM	Nickel	7440-02-0	E440	1000 mg/kg	98.5	70.0	130	----
QC-2050353-003	RM	Selenium	7782-49-2	E440	1.04 mg/kg	99.2	60.0	140	----
QC-2050353-003	RM	Silver	7440-22-4	E440	8.98 mg/kg	90.4	70.0	130	----
QC-2050353-003	RM	Strontium	7440-24-6	E440	41 mg/kg	89.4	70.0	130	----
QC-2050353-003	RM	Sulfur	7704-34-9	E440	3940 mg/kg	76.4	50.0	150	----
QC-2050353-003	RM	Thallium	7440-28-0	E440	0.907 mg/kg	88.8	70.0	130	----
QC-2050353-003	RM	Tin	7440-31-5	E440	3.79 mg/kg	90.9	40.0	160	----
QC-2050353-003	RM	Uranium	7440-61-1	E440	3.97 mg/kg	81.3	70.0	130	----
QC-2050353-003	RM	Vanadium	7440-62-2	E440	66.2 mg/kg	97.2	70.0	130	----
QC-2050353-003	RM	Zinc	7440-66-6	E440	828 mg/kg	93.4	70.0	130	----
Aggregate Organics (QCLot: 2052347)									
QC-2052347-003	RM	Carbon, total organic [TOC]	----	E357	0.637 %	92.4	70.0	130	----



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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

COC Number: 22 -

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Environmental Division
Halifax

Work Order Reference
HA2501752



Telephone : + 1 902 707 4885

Report To Contact and company name below will appear on the final report		Reports / Recipients		Turnaround Time (TAT) Requested	
Company:	Dillon Consulting	Select Report Format:	☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)	☒ Routine [R] if received by 3pm M-F - no surcharges apply	
Contact:	Nadine Wambolt	Merge QC/QCI Reports with COA	☒ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum	
Phone:	902.565.8539	☐ Compare Results to Criteria on Report - provide details below if box checked		☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum	
Company address below will appear on the final report		Select Distribution:	☒ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum	
Street:	275 Charlotte Street	Email 1 or Fax	nwambolt@dillon.ca	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum	
City/Province:	Sydney, Nova Scotia	Email 2	jmarsh@dillon.ca	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge	
Postal Code:	B1P 1C6	Email 3		Additional fees may apply to rush requests on weekends	
Invoice To		Invoice Recipients		Date and Time Required for all E&P TATs:	
Same as Report To ☒ YES ☐ NO		Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX		For all tests with rush TATs requested, please call	
Copy of Invoice with Report ☐ YES ☐ NO		Email 1 or Fax nwambolt@dillon.ca		Analysis Req	
Company:		Email 2		Indicate Filtered (F), Preserved (P) or Filtered and	
Contact:					

Project Information		Oil and Gas Required Fields (client use)	
ALS Client Code / QUOTE #:	ALS 2025 Atlantic Rates Dillon Consulting	AFE/Cost Center:	PO#
Job / Project #:	24-8606	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (ALS use only):	HA2501752	ALS Contact:	Abby van deer Jagt/Andrew Martin	Sampler:	MK/EJM

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS									
	BH20 0-0.15m	2-Jun-25		Soil	1	R	R							
	BH20 0.5m	2-Jun-25		Soil	1	R	R							
	BH21 0-0.15m	2-Jun-25		Soil	1	R	R							
	BH21 0.5m	2-Jun-25		Soil	1	R	R							
	BH22 0-0.15m	2-Jun-25		Soil	1	R	R							
	BH22 0.5m	2-Jun-25		Soil	1	R	R							
	BH23 0-0.15m	2-Jun-25		Soil	1	R	R							
	BH23 0.5m	2-Jun-25		Soil	1	R	R							
	BH23 0-0.5m	2-Jun-25		Soil	1			R						
	2SDUP B	2-Jun-25		Soil	1	R	R							
	BH24 0-0.15m	2-Jun-25		Soil	1	R	R							
	BH24 0.5m	2-Jun-25		Soil	1	R	R							

Drinking Water (DW) Samples¹ (client use)		Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)	
Are samples taken from a Regulated DW System? ☐ YES ☐ NO		Written IDs on top of soils/sediment jars supercede any pre-labelled IDs	
Are samples for human consumption/ use? ☐ YES ☐ NO			

SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (ALS use only)	
Released by:	Date:	Received by:	Date:
		Shore	9 June 2025

SAMPLE RECEIPT DETAILS (ALS use only)			
Cooling Method: ☐ NONE ☒ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED			
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A			
INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	
7.9		5.9 / 6.6	
FINAL SHIPMENT RECEPTION (ALS use only)			
Received by:		Date:	

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY

YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

COC Number: **22 -**

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MAY 2023 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form **LEGIBLY**. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.



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Chain of Custody (COC) / Analytical Request Form

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COC Number: 22 -

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Report To Contact and company name below will appear on the final report		Reports / Recipients		Turnaround Time (TAT) Requested		AFFIX ALS BARCODE LABEL HERE (ALS use only)																																					
Company:	Dillon Consulting	Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)		☒ Routine [R] if received by 3pm M-F - no surcharges apply ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.																																							
Contact:	Nadine Wambolt	Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A																																									
Phone:	902.565.8539	☐ Compare Results to Criteria on Report - provide details below if box checked Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX																																									
Company address below will appear on the final report		Email 1 or Fax nwambolt@dillon.ca		Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.																																							
Street:	275 Charlotte Street	Email 2 jmarsh@dillon.ca		Date and Time Required for all E&P TATs:																																							
City/Province:	Sydney, Nova Scotia	Email 3																																									
Postal Code:	B1P 1C8																																										
Invoice To		Invoice Recipients		Analysis Request																																							
Same as Report To ☒ YES ☐ NO		Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX		For all tests with rush TATs requested, please contact your AM to confirm availability.																																							
Copy of Invoice with Report ☐ YES ☐ NO		Email 1 or Fax nwambolt@dillon.ca		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																																							
Company:		Email 2		<table border="1"> <tr> <th rowspan="2">NUMBER OF CONTAINERS</th> <th colspan="16"></th> <th rowspan="2">SAMPLES ON HOLD</th> <th rowspan="2">EXTENDED STORAGE REQUIRED</th> <th rowspan="2">SUSPECTED HAZARD (see notes)</th> </tr> <tr> <th>Metals</th> <th>pH</th> <th>Grain Size</th> <th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th> </tr> </table>				NUMBER OF CONTAINERS																	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)	Metals	pH	Grain Size													
NUMBER OF CONTAINERS																	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)																								
	Metals	pH	Grain Size																																								
Contact:																																											
Project Information		Oil and Gas Required Fields (client use)																																									
ALS Client Code / QUOTE #: ALS 2025 Atlantic Rates Dillon Consulting		AFE/Cost Center:		PO#																																							
Job / Project #: 24-8606		Major/Minor Code:		Routing Code:																																							
PO / AFE:		Requisitioner:																																									
LSD:		Location:																																									
ALS Lab Work Order # (ALS use only):		ALS Contact: Abby van deer Jagt/Andrew Martin		Sampler: MIKE/JM																																							
ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type																																							
	BH36 0-0.15m	3-Jun-25		Soil	2	R																																					
	BH37 0-0.15m	3-Jun-25		Soil	1	R																																					
	BH38 0-0.15m	2-Jun-25		Soil	1	R																																					
	25DUP C	2-Jun-25		Soil	1	R																																					
	25DUP D	2-Jun-25		Soil	1	R	R																																				
	25DUP G	4-Jun-25		Soil	1	R																																					
	BH41 1.5m	4-Jun-25		Soil	1	R																																					
	BH42 0.45m	4-Jun-25		Soil	1	R																																					
	BH43 0-0.15m	3-Jun-25		Soil	1	R																																					
	BH44 0-0.15m	4-Jun-25		Soil	1	R																																					
	BH45 0-0.15m	4-Jun-25		Soil	1	R																																					
	BH46 0.70m	4-Jun-25		Soil	1	R																																					
Drinking Water (DW) Samples¹ (client use)		Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)		SAMPLE RECEIPT DETAILS (ALS use only)																																							
Are samples taken from a Regulated DW System? ☐ YES ☐ NO		Written IDs on top of soils/sediment jars supercede any pre-labelled IDs		Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED																																							
Are samples for human consumption/ use? ☐ YES ☐ NO				Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A																																							
				INITIAL COOLER TEMPERATURES °C																																							
				FINAL COOLER TEMPERATURES °C																																							
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (ALS use only)		FINAL SHIPMENT RECEPTION (ALS use only)																																							
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:																																				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: HA2501775	Laboratory	: ALS Environmental - Halifax
Client	: Dillon Consulting Limited	Account Manager	: Andrew Martin
Contact	: Nadine Wambolt	Address	: 13-100 Wright Ave
Address	: 275 Charlotte Street Suite 206 Sydney Nova Scotia Canada B1P 1C6		: Dartmouth NS Canada B3B 1L2
Telephone	: 902.562.9880 ext. 5206	E-mail	: andrew.martin@alsglobal.com
Project	: 24-8606	Telephone	: +1 902 707 4888
PO	: ----	Date Samples Received	: 09-Jun-2025 15:30
C-O-C number	: ----	Date Analysis Commenced	: 07-Jul-2025
Sampler	: MK/EJM	Issue Date	: 07-Jul-2025 17:20
Site	: ----		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Andrew Martin		Internal Subcontracting, North Vancouver, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	Description
-	no units
%	percent
kg	kilograms
pH units	pH units
tCaCO ₃ /kt	tons CaCO ₃ per kiloton

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.



Analytical Results

Sub-Matrix: Soil/Solid
 (Matrix: Soil/Solid)

					Client sample ID	BH10 1.0m	SED8 0-0.15m	----	----	----
					Client sampling date / time	04-Jun-2025 00:00	04-Jun-2025 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	HA2501775-038	HA2501775-039	----	----	----	----
					Result	Result	----	----	----	----
Acid Base Accounting										
Fizz rating	----	OA-VOL08/1L	1	-	2	3	----	----	----	----
Maximum potential acidity [MPA]	----	OA-VOL08/1L	0.3	tCaCO ₃ /k	11.9	16.3	----	----	----	----
Net neutralization potential [NNP]	----	OA-VOL08/1L	1	tCaCO ₃ /k	54	297	----	----	----	----
Neutralization potential [NP]	----	OA-VOL08/1L	1	tCaCO ₃ /k	66	313	----	----	----	----
Neutralization potential ratio [NPR], (NP/MPA)	----	OA-VOL08/1L	0.01	-	5.56	19.26	----	----	----	----
pH (1:1 soil:water)	----	OA-ELE07/1L	0.10	pH units	7.10	7.10	----	----	----	----
Sulfur, total	7704-34-9	S-IR08/1L	0.01	%	0.38	0.52	----	----	----	----
Weight, sample received	n/a	WEI-21/1L	0.02	kg	0.38	0.90	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: HA2501775	Page	: 1 of 5
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Nadine Wambolt	Account Manager	: Andrew Martin
Address	: 275 Charlotte Street Suite 206 Sydney NS Canada B1P 1C6	Address	: 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2
Telephone	: 902.562.9880 ext. 5206	Telephone	: +1 902 707 4888
Project	: 24-8606	Date Samples Received	: 09-Jun-2025 15:30
PO	: ----	Issue Date	: 07-Jul-2025 17:20
C-O-C number	: ----		
Sampler	: MK/EJM		
Site	:		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Acid Base Accounting : Acid Base Accounting (Regular Sobek)										
LDPE bag BH10 1.0m	OA-VOL08	04-Jun-2025	----	----	----		07-Jul-2025	----	----	
Acid Base Accounting : Acid Base Accounting (Regular Sobek)										
LDPE bag SED8 0-0.15m	OA-VOL08	04-Jun-2025	----	----	----		07-Jul-2025	----	----	
Acid Base Accounting : Total Sulfur by Combustion and IR										
LDPE bag BH10 1.0m	S-IR08	04-Jun-2025	----	----	----		07-Jul-2025	----	----	
Acid Base Accounting : Total Sulfur by Combustion and IR										
LDPE bag SED8 0-0.15m	S-IR08	04-Jun-2025	----	----	----		07-Jul-2025	----	----	
Physical Tests : Saturated Paste pH										
LDPE bag BH10 1.0m	OA-ELE07	04-Jun-2025	----	----	----		07-Jul-2025	----	----	
Physical Tests : Saturated Paste pH										
LDPE bag SED8 0-0.15m	OA-ELE07	04-Jun-2025	----	----	----		07-Jul-2025	----	----	
Sample Preparation : Received Sample Weight										
LDPE bag BH10 1.0m	WEI-21	04-Jun-2025	----	----	----		07-Jul-2025	180 days	33 days	✓

Page : 3 of 5
 Work Order : HA2501775
 Client : Dillon Consulting Limited
 Project : 24-8606



Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method		Method	Sampling Date	Extraction / Preparation			Analysis				
Container / Client Sample ID(s)				Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
					Rec	Actual			Rec	Actual	
Sample Preparation : Received Sample Weight											
LDPE bag SED8 0-0.15m		WEI-21	04-Jun-2025	----	----	----		07-Jul-2025	180 days	33 days	✔

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

- No Quality Control data available for this section.



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Saturated Paste pH	OA-ELE07 ALS Minerals (North Vancouver) - 2103 Dollarton Hwy North Vancouver British Columbia Canada V7H 0A7	Soil/Solid	ALS Minerals OA-ELE07	Sample mix with water in 1:1 ratio to make a paste, pH is then determined.
Acid Base Accounting (Regular Sobek)	OA-VOL08 ALS Minerals (North Vancouver) - 2103 Dollarton Hwy North Vancouver British Columbia Canada V7H 0A7	Soil/Solid	ALS Minerals OA-VOL08	Determine the acid generation power of a sample as tonne CaCO ₃ per kilo-tonne.
Total Sulfur by Combustion and IR	S-IR08 ALS Minerals (North Vancouver) - 2103 Dollarton Hwy North Vancouver British Columbia Canada V7H 0A7	Soil/Solid	ALS Minerals S-IR08	A prepared sample is heated to approximately 1350°C in an induction furnace with oxygen stream. Sulfur dioxide released from the sample are measured by IR (Leco analyzer) and the Total Sulfur result is provided.
Received Sample Weight	WEI-21 ALS Minerals (North Vancouver) - 2103 Dollarton Hwy North Vancouver British Columbia Canada V7H 0A7	Soil/Solid	ALS Minerals WEI-21	Weigh out sample received.

QUALITY CONTROL REPORT

Work Order	: HA2501775	Page	: 1 of 2
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Nadine Wambolt	Account Manager	: Andrew Martin
Address	: 275 Charlotte Street Suite 206 Sydney NS Canada B1P 1C6	Address	: 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2
Telephone	: 902.562.9880 ext. 5206	Telephone	: +1 902 707 4888
Project	: 24-8606	Date Samples Received	: 09-Jun-2025 15:30
PO	: ----	Date Analysis Commenced	: 07-Jul-2025
C-O-C number	: ----	Issue Date	: 07-Jul-2025 17:19
Sampler	: MK/EJM		
Site	:		
Quote number	: HA24-DICL100-2 - Frenchvale Mine		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.
This Quality Control Report contains the following information:

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Andrew Martin	Project Manager	ALS Minerals (North Vancouver) Internal Subcontracting, North Vancouver, British Columbia



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: ALS ENVIRONMENTAL HALIFAX
100 WRIGHT AVE UNIT 13
DARTMOUTH NS B3B 1L2

Page: 1
Total # Pages: 2 (A)
Plus Appendix Pages
Finalized Date: 7-JUL-2025
Account: ALSHAL

CERTIFICATE VA25173488

Project: HA2501775

This report is for 2 samples of Soil submitted to our lab in Vancouver, BC, Canada on 12-JUN-2025.

The following have access to data associated with this certificate:

ABBY VAN DER JAGT

ANDREW MARTIN

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-21	Sample logging - ClientBarCode
SCR-41	Screen to -180um and save both
DISP-01	Disposal of all sample fractions

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
OA-VOL08	Basic Acid Base Accounting	
S-IR08	Total Sulphur (IR Spectroscopy)	LECO
OA-ELE07	Paste pH	

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:

Saa Traxler, Director, North Vancouver Operations



ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

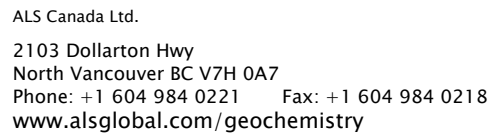
To: ALS ENVIRONMENTAL HALIFAX
100 WRIGHT AVE UNIT 13
DARTMOUTH NS B3B 1L2

Page: 2 - A
Total # Pages: 2 (A)
Plus Appendix Pages
Finalized Date: 7-JUL-2025
Account: ALSHAL

Project: HA2501775

CERTIFICATE OF ANALYSIS VA25173488

Sample Description	Method Analyte Units LOD	WEI-21	OA-VOL08	OA-ELE07	OA-VOL08	OA-VOL08	OA-VOL08	S-IR08	OA-VOL08
		Recvd Wt.	NP	pH	NNP	MPA	Ratio (N	S	FIZZ RAT
		kg	tCaCO3/1Kt	Unity	tCaCO3/1Kt	tCaCO3/1Kt	Unity	%	Unity
		0.02	1	0.1	1	0.3	0.01	0.01	1
HA2501775-038		0.38	66	7.1	54	11.9	5.56	0.38	2
HA2501775-039		0.90	313	7.1	297	16.3	19.26	0.52	3



Page: Appendix 1
Total # Appendix Pages: 1
Finalized Date: 7-JUL-2025
Account: ALSHAL

CERTIFICATE OF ANALYSIS VA25173488

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

DISP-01	LOG-21	OA-ELE07
SCR-41	S-IR08	WEI-21

OA-VOL08



www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

COC Number: 22 -

Page 1 of 6

Environmental Division
Halifax

Work Order Reference
HA2501752



Telephone : + 1 902 707 4885

Report To Contact and company name below will appear on the final report		Reports / Recipients		Turnaround Time (TAT) Requested																																	
Company:	Dillon Consulting	Select Report Format:	☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)	☒ Routine [R] if received by 3pm M-F - no surcharges apply																																	
Contact:	Nadine Wambolt	Merge QC/QCI Reports with COA	☒ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum																																	
Phone:	902.565.8539	☐ Compare Results to Criteria on Report - provide details below if box checked		☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum																																	
Company address below will appear on the final report		Select Distribution:	☒ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum																																	
Street:	275 Charlotte Street	Email 1 or Fax	nwambolt@dillon.ca	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum																																	
City/Province:	Sydney, Nova Scotia	Email 2	jmarsh@dillon.ca	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge																																	
Postal Code:	B1P 1C6	Email 3		Additional fees may apply to rush requests on weekends																																	
Invoice To		Invoice Recipients		Analysis Req																																	
Same as Report To ☒ YES ☐ NO		Select Invoice Distribution:		For all tests with rush TATs requested, please co																																	
Copy of Invoice with Report ☐ YES ☐ NO		☒ EMAIL ☐ MAIL ☐ FAX		Indicate Filtered (F), Preserved (P) or Filtered and																																	
Company:		Email 1 or Fax nwambolt@dillon.ca		<table border="1"> <tr> <th colspan="2">NUMBER OF CONTAINERS</th> <th colspan="2">Metals</th> <th colspan="2">pH</th> <th colspan="2">Grain Size</th> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>		NUMBER OF CONTAINERS		Metals		pH		Grain Size																									
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LSD:		Location:																																			
ALS Lab Work Order # (ALS use only): HA2501752		ALS Contact: Abby van deer Jagt/Andrew Martin		Sampler: MK/EJM																																	
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	BH20 0-0.15m	2-Jun-25		Soil	1 R R																																
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Released by:	Date:	Time:	Received by:	Date:	Time:																																
			Shore	9 June 2025	3:30																																

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Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page 2 of 6

Canada Toll Free: 1 800 668 9878

Report To Contact and company name below will appear on the final report Company: Dillon Consulting Contact: Nadine Wambolt Phone: 902.565.8539 Company address below will appear on the final report Street: 275 Charlotte Street City/Province: Sydney, Nova Scotia Postal Code: B1P 1C6 Invoice To Same as Report To ☒ YES ☐ NO Copy of Invoice with Report ☐ YES ☐ NO Company: Contact:			Reports / Recipients Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL) Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A ☐ Compare Results to Criteria on Report - provide details below if box checked Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX Email 1 or Fax nwambolt@dillon.ca Email 2 jmarsh@dillon.ca Email 3 Invoice Recipients Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX Email 1 or Fax nwambolt@dillon.ca Email 2			Turnaround Time (TAT) Requested ☒ Routine [R] if received by 3pm M-F - no surcharges apply ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests. Date and Time Required for all E&P TATs:			AFFIX ALS BARCODE LABEL HERE (ALS use only)																																																										
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Your Project #: 24-8606
Site Location: FRENCHVALE

Attention: Nadine Wambolt

Dillon Consulting Limited
275 Charlotte St
Sydney, NS
CANADA B1P 1C6

Report Date: 2025/06/16
Report #: R8557966
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C566847

Received: 2025/06/09, 10:15

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
TEH in Soil (PIRI) (1, 2)	2	2025/06/10	2025/06/10	ATL SOP 00111	Atl. RBCA v3.1 m
Moisture (1)	2	N/A	2025/06/10	ATL SOP 00001	OMOE Handbook 1983 m
ModTPH (T1) Calc. for Soil (1)	2	N/A	2025/06/12	N/A	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (1, 3)	2	N/A	2025/06/11	ATL SOP 00119	Atl. RBCA v3.1 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, EPA, APHA or the Quebec Ministry of Environment.

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.

(1) This test was performed by Bureau Veritas Bedford, 200 Bluewater Rd Suite 105, Bedford, NS, B4B 1G9

(2) Soils are reported on a dry weight basis unless otherwise specified.

(3) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.



Your Project #: 24-8606
Site Location: FRENCHVALE

Attention: Nadine Wambolt

Dillon Consulting Limited
275 Charlotte St
Sydney, NS
CANADA B1P 1C6

Report Date: 2025/06/16
Report #: R8557966
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C566847

Received: 2025/06/09, 10:15

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas

16 Jun 2025 11:31:26

Please direct all questions regarding this Certificate of Analysis to:

Natalie MacAskill, Key Account Specialist
Email: Natalie.MacAskill@bureauveritas.com
Phone# (902)567-1255 Ext:17

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C566847

Report Date: 2025/06/16

Dillon Consulting Limited

Client Project #: 24-8606

Site Location: FRENCHVALE

RESULTS OF ANALYSES OF SOIL

Bureau Veritas ID		ARRX01	ARRX02		
Sampling Date		2025/06/04	2025/06/04		
	UNITS	BH44 0-0.15M	BH45 0-0.15M	RDL	QC Batch
Inorganics					
Moisture	%	52	26	1.0	9945959
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					



BUREAU
VERITAS

Bureau Veritas Job #: C566847

Report Date: 2025/06/16

Dillon Consulting Limited

Client Project #: 24-8606

Site Location: FRENCHVALE

ATLANTIC RBCA HYDROCARBONS (SOIL)

Bureau Veritas ID		ARRX01	ARRX02		
Sampling Date		2025/06/04	2025/06/04		
	UNITS	BH44 0-0.15M	BH45 0-0.15M	RDL	QC Batch
Petroleum Hydrocarbons					
Benzene	mg/kg	<0.0050	<0.0050	0.0050	9947278
Toluene	mg/kg	<0.050	<0.050	0.050	9947278
Ethylbenzene	mg/kg	<0.010	<0.010	0.010	9947278
Total Xylenes	mg/kg	<0.050	<0.050	0.050	9947278
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	2.5	9947278
>C10-C16 Hydrocarbons	mg/kg	<10	<10	10	9946282
>C16-C21 Hydrocarbons	mg/kg	41	25	10	9946282
>C21-<C32 Hydrocarbons	mg/kg	150	170	15	9946282
Modified TPH (Tier1)	mg/kg	190	190	15	9945028
Reached Baseline at C32	mg/kg	Yes	Yes	N/A	9946282
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	COMMENT (1)	N/A	9946282
Surrogate Recovery (%)					
Isobutylbenzene - Extractable	%	100	102		9946282
n-Dotriacontane - Extractable	%	95	93		9946282
Isobutylbenzene - Volatile	%	99	97		9947278
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Unidentified compound(s) in fuel / lube range. Possible lube oil fraction.					



**BUREAU
VERITAS**

Bureau Veritas Job #: C566847
Report Date: 2025/06/16

Dillon Consulting Limited
Client Project #: 24-8606
Site Location: FRENCHVALE

GENERAL COMMENTS

Results relate only to the items tested.



QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9945959	RMC	RPD		Moisture	2025/06/10	6.7		%	25
9946282	MSK	Matrix Spike		Isobutylbenzene - Extractable	2025/06/10		103	%	60 - 130
				n-Dotriacontane - Extractable	2025/06/10		106	%	60 - 130
				>C10-C16 Hydrocarbons	2025/06/10		101	%	30 - 130
				>C16-C21 Hydrocarbons	2025/06/10		104	%	30 - 130
				>C21-<C32 Hydrocarbons	2025/06/10		104	%	30 - 130
9946282	MSK	Spiked Blank		Isobutylbenzene - Extractable	2025/06/10		101	%	60 - 130
				n-Dotriacontane - Extractable	2025/06/10		106	%	60 - 130
				>C10-C16 Hydrocarbons	2025/06/10		96	%	60 - 130
				>C16-C21 Hydrocarbons	2025/06/10		99	%	60 - 130
				>C21-<C32 Hydrocarbons	2025/06/10		98	%	60 - 130
9946282	MSK	Method Blank		Isobutylbenzene - Extractable	2025/06/10		98	%	60 - 130
				n-Dotriacontane - Extractable	2025/06/10		104	%	60 - 130
				>C10-C16 Hydrocarbons	2025/06/10	<10		mg/kg	
				>C16-C21 Hydrocarbons	2025/06/10	<10		mg/kg	
				>C21-<C32 Hydrocarbons	2025/06/10	<15		mg/kg	
9946282	MSK	RPD		>C10-C16 Hydrocarbons	2025/06/10	NC		%	50
				>C16-C21 Hydrocarbons	2025/06/10	NC		%	50
				>C21-<C32 Hydrocarbons	2025/06/10	NC		%	50
9947278	KCS	Matrix Spike		Isobutylbenzene - Volatile	2025/06/11		99	%	60 - 130
				Benzene	2025/06/11		86	%	60 - 130
				Toluene	2025/06/11		89	%	60 - 130
				Ethylbenzene	2025/06/11		92	%	60 - 130
				Total Xylenes	2025/06/11		93	%	60 - 130
9947278	KCS	Spiked Blank		Isobutylbenzene - Volatile	2025/06/11		90	%	60 - 130
				Benzene	2025/06/11		91	%	60 - 140
				Toluene	2025/06/11		93	%	60 - 140
				Ethylbenzene	2025/06/11		92	%	60 - 140
				Total Xylenes	2025/06/11		93	%	60 - 140
9947278	KCS	Method Blank		Isobutylbenzene - Volatile	2025/06/11		95	%	60 - 130
				Benzene	2025/06/11	<0.0050		mg/kg	
				Toluene	2025/06/11	<0.050		mg/kg	
				Ethylbenzene	2025/06/11	<0.010		mg/kg	
				Total Xylenes	2025/06/11	<0.050		mg/kg	
				C6 - C10 (less BTEX)	2025/06/11	<2.5		mg/kg	
9947278	KCS	RPD		Benzene	2025/06/11	NC		%	50
				Toluene	2025/06/11	NC		%	50
				Ethylbenzene	2025/06/11	NC		%	50
				Total Xylenes	2025/06/11	NC		%	50
				C6 - C10 (less BTEX)	2025/06/11	NC		%	50

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C566847

Report Date: 2025/06/16

Dillon Consulting Limited

Client Project #: 24-8606

Site Location: FRENCHVALE

VALIDATION SIGNATURE PAGE

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

Phil Deveau, Scientific Specialist (Organics)

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 Kathy Martin, Laboratory Manager responsible for Nova Scotia Environmental laboratory operations.

Appendix D

Human Health Screening Table

Table D-1: Analytical data for metals in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.

			Location														
			Sample ID	BH1 (0-0.15m)	BH1 (0.30m)	BH2 (0-0.15m)	QAQC 01	BH3 (0-0.15m)	BH3 (0.34m)	BH4 (0-0.15m)	BH5 (0-0.15m)	BH6 (0-0.15m)	BH7	BH7 (0-0.15 m)	QAQC 02	BH8 (0-0.15m)	BH9 (0-0.15 m)
			Depth	0-0.15m	0.30m	0-0.15m	0-0.15m	0-0.15m	0.34m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m
			Sample Type	Normal	Normal	Normal	Duplicate (BH2 (0-0.15m))	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Duplicate (BH7 0-0.15)	Normal	Normal
			Date	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	17 Oct 2024	17 Oct 2024	15 Oct 2024	17 Oct 2024
	Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone													
Particle Size																	
% >75µm	%	1	NGA	-	-	-	-	-	-	-	-	-	75.5	-	-	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	-	-	-	-	-	-	-	-	24.5	-	-	-	-
Texture	N/A		NGA	-	-	-	-	-	-	-	-	-	Coarse	-	-	-	-
Soluble Parameters																	
Soluble Magnesium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	<0.50	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	<0.50	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	-	-	-	-	-	-	-	-	-	<5.0	<5.0	-	-
General Chemistry																	
Moisture Content	%	0.25	NGA	-	16.8	-	8.34	10.8	16.7	-	11.5	55.4	7.91	7.43	-	6.48	-
pH (Lab)	pH Units	0.1	NGA	-	7.25	-	7.85	-	7	-	7.67	7	7.98	-	7.86	7.89	7.17
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	113	-	123	-	153	-	146	403	100	-	94.5	94.4	229
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	-	-	-	-	-	-	-	-	-	<0.10	<0.10	-	-
Metals																	
Aluminium	mg/kg	50	15400 ^a	28000	20,700	21,900	6,160	5,470	25,900	26,400	12,700	7,920	6,340	-	8,580	7,150	8,180
Antimony	mg/kg	0.1	7.5 ^b	2	<0.10	<0.10	0.11	<0.10	1.34	1.84	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10
Arsenic	mg/kg	0.1	31 ^c	16.8	2.52	2.7	2.66	1.71	2.82	2.86	2.11	1.78	1.47	-	1.88	1.65	1.2
Barium	mg/kg	0.5	10000 ^c	120	34.8	34.3	15.3	13	31.7	31.3	16.1	33.9	10.6	-	17.4	15.6	9.14
Beryllium	mg/kg	0.1	110 ^c	1	0.74	0.77	0.28	0.26	0.82	0.85	0.77	0.44	0.31	-	0.44	0.34	0.41
Boron (Total)	mg/kg	5	4300 ^b	0.62	<5.0	<5.0	<5.0	<5.0	5.4	<5.0	<5.0	<5.0	<5.0	-	9.5	8.1	6.5
Cadmium	mg/kg	0.02	49 ^c	0.4	0.286	0.181	0.696	0.589	0.287	0.208	0.302	0.373	0.42	-	0.429	0.358	0.109
Chromium (Total, III+VI)	mg/kg	0.5	630 ^c	81	20.4	21.6	5.12	4.66	26.6	28.9	13.2	8.42	9.42	-	7.45	6.54	12
Cobalt	mg/kg	0.1	22 ^b	26	12.2	12.5	4.68	4.37	14.8	16	7.57	4.65	4.23	-	7.74	6.6	4.46
Copper	mg/kg	0.5	4000 ^c	49	285	25.1	56.3	64.3	42.3	33.8	35.8	15.1	9.41	-	114	99.2	8.24
Iron	mg/kg	50	11000 ^a	52000	26,000	27,600	6,280	6,180	36,200	35,700	16,800	9,570	9,070	-	13,300	9,510	7,820
Lead	mg/kg	0.5	82 ^c	84	20	14.4	36	34.8	38.9	41.5	34.8	27.4	58.3	-	23.5	22.6	7.08
Manganese	mg/kg	1	360 ^a	4340	585	613	553	510	565	560	702	824	655	-	934	870	664
Mercury	mg/kg	0.005	24 ^c	0.121	0.025	0.0266	0.0204	0.0156	0.0268	0.0282	0.0075	0.0382	<0.0050	-	0.0189	0.0167	<0.0050
Molybdenum	mg/kg	0.1	110 ^b	1.1	0.64	0.73	0.33	0.34	0.81	0.78	0.57	1.24	0.51	-	0.38	0.29	1.14
Nickel	mg/kg	0.5	310 ^c	48	18.9	20.4	5.78	5.25	24.7	27.5	10.2	6.55	9.73	-	8.83	7.4	8.26
Calcium Dissolved	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	1.32	-	-
Selenium	mg/kg	0.2	125 ^c	0.8	0.26	0.26	<0.20	<0.20	0.48	0.46	<0.20	0.76	<0.20	-	<0.20	<0.20	<0.20
Silver	mg/kg	0.1	77 ^b	0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10
Strontium	mg/kg	0.5	9400 ^a	5.3	45.6	28.4	127	128	21.2	19.4	64.8	64.4	86.2	-	108	97.2	64.1
Sulphur	mg/kg	1000	280000 ^{a,d}	-	<1000	<1,000	<1000	<1000	<1000	<1,000	<1000	1600	<1000	-	<1000	<1000	<1000
Thallium	mg/kg	0.05	1 ^c	0.4	0.124	0.107	0.073	0.07	0.132	0.122	0.1	0.074	0.077	-	0.095	0.077	0.096
Tin	mg/kg	2	9400 ^a	0.7	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-	<2.0	<2.0	<2.0
Uranium	mg/kg	0.05	33 ^c	1.2	1.35	1.18	1.44	1.08	1.47	1.89	2.27	11.8	1.71	-	1.52	1.18	4.93
Vanadium	mg/kg	0.2	78 ^{a,e}	86	46.4	49.2	13.2	12.4	55	59	29.8	17.1	15.2	-	22	18.1	16.3
Zinc	mg/kg	2	16000 ^c	270	631	428	199	191	382	223	133	86.2	175	-	141	127	51.4

Notes

 Shaded cells indicate an exceedance over the guideline.

Bold and Italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a USEPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to 1x10⁻⁵ risk level.

^b MECP (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact S1 Risk; Institutional land use.

^c Canadian Council of Ministers of the Environment (CCME). Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact pathway; coarse soils; 10-5 risk level (1 in 100,000) where applicable.

^d Guideline is for sulphuric acid.

^e While a MOECC (2011) S1 soil component for vanadium is available, it was less than background. Therefore, the more recent US-EPA health-based Regional Screening Level (RSL) – Residential Soil Table (HQ=1), November, 2024 was used. RSL was divided by 5 to adjust from a hazard quotient of 1.0 to 0.2.

Table D-1: Analytical data for metals in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.

Table D-1: Analytical data for metals in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.			Location	BH10		BH11	BH12		BH13	BH14		BH15	BH16	BH17	BH18		BH19
			Sample ID	BH10 (0-0.15m)	BH10 (1.0m)	BH11 (0.15m)	BH12 (0-0.15 m)	BH12 (0.47m)	BH13 (0-0.15 m)	BH14 (0-0.15 m)	BH14 (0.90m)	BH15 (0-0.15m)	BH16 (0-0.15m)	BH17 (0-0.15m)	BH18 (0-0.15m)	25DUPA	BH19 (0-0.15m)
			Depth	0-0.15m	1.0m	0.15m	0-0.15m	0.47m	0-0.15m	0-0.15m	0.90m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m
			Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Duplicate of BH18 0-0.15m	Normal
			Date	15 Oct 2024	15 Oct 2024	15 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	14 Jan 2025	14 Jan 2025	14 Jan 2025
	Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone													
Particle Size																	
% >75um	%	1	NGA	-	-	-	-	-	64.8	-	-	-	-	-	-	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	-	-	-	-	35.2	-	-	-	-	-	-	-	-
Texture	N/A		NGA	-	-	-	-	-	Coarse	-	-	-	-	-	-	-	-
Soluble Parameters																	
Soluble Magnesium	mg/L	0.5	NGA	-	16.6	-	-	-	-	-	-	-	-	-	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	6.2	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	33.6	-	-	-	-	-	-	-	<5.0	-	-	-	-
General Chemistry																	
Moisture Content	%	0.25	NGA	-	-	-	-	35.4	-	28.1	15.7	-	57.5	-	-	-	-
pH (Lab)	pH Units	0.1	NGA	-	7.03	-	-	-	-	-	-	-	7.22	-	-	-	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	650	-	-	-	-	-	-	-	121	-	-	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	0.19	-	-	-	-	-	-	-	0.1	-	-	-	-
Metals																	
Aluminium	mg/kg	50	15400 ^a	28000	26,300	23,000	15,200	17,700	23,700	9,680	13,600	16,000	8,200	15,200	14,100	14,800	15,400
Antimony	mg/kg	0.1	7.5 ^b	2	<0.10	0.12	<0.10	0.17	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.16
Arsenic	mg/kg	0.1	31 ^c	16.8	3.51	3.36	2.57	2.86	3.28	2.1	2.12	2.56	1.66	2.03	3.28	2.56	2.46
Barium	mg/kg	0.5	10000 ^c	120	63	46.4	18.8	28.8	40.4	15.6	25.7	29.5	18.1	17.3	13.1	25.1	28.4
Beryllium	mg/kg	0.1	110 ^c	1	1.8	1.65	0.8	1.08	0.93	0.47	0.76	0.7	0.4	0.95	0.94	0.65	0.71
Boron (Total)	mg/kg	5	4300 ^b	0.62	<5.0	7.4	7.7	8.1	7.7	7.5	9.7	10.3	10.7	6.8	5.7	10.5	11.3
Cadmium	mg/kg	0.02	49 ^c	0.4	0.995	0.788	0.282	0.402	0.249	0.239	1.05	1.16	0.414	0.155	0.092	0.864	0.911
Chromium (Total, III+VI)	mg/kg	0.5	630 ^c	81	19.7	20.8	13.4	15.1	28	9.35	11.6	14.2	7.08	9.71	8.91	12.3	13.2
Cobalt	mg/kg	0.1	22 ^b	26	10.6	10.2	8.96	13	16.4	6.58	11.4	16.4	7.24	8.68	7.82	13.6	13.7
Copper	mg/kg	0.5	4000 ^c	49	43.8	34.4	46.2	53.8	79	56.2	194	360	106	24.5	18	288	272
Iron	mg/kg	50	11000 ^a	52000	20,000	16,900	18,600	24,300	31,500	13,200	16,000	22,700	10,800	19,600	23,700	16,400	16,800
Lead	mg/kg	0.5	82 ^c	84	28.3	30.4	23.2	26.2	18.9	20.2	50	84.6	20.8	9.48	4.97	65.3	66.8
Manganese	mg/kg	1	360 ^a	4340	825	558	723	1,390	854	869	1,210	1,620	1,020	686	451	1,490	1,580
Mercury	mg/kg	0.005	24 ^c	0.121	0.125	0.0741	0.0113	0.0295	0.0397	0.0135	0.0291	0.0428	0.0165	0.0095	0.005	0.0465	0.036
Molybdenum	mg/kg	0.1	110 ^b	1.1	1.53	1.72	0.8	0.76	1.32	0.5	0.49	0.4	0.34	0.39	0.32	0.36	0.38
Nickel	mg/kg	0.5	310 ^c	48	18	17.8	13.2	18	25.6	8.17	15.1	22	8.15	10.4	10.3	18.8	19.6
Calcium Dissolved	mg/L	0.5	NGA	-	49.4	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.2	125 ^c	0.8	2.92	2.29	<0.20	0.36	0.44	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver	mg/kg	0.1	77 ^b	0.5	0.14	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	0.14	<0.10	<0.10	<0.10	0.12	<0.10
Strontium	mg/kg	0.5	9400 ^a	5.3	32.1	35.4	59.9	35.9	33.4	78	102	94.2	109	52.2	24.4	90.1	92.9
Sulphur	mg/kg	1000	280000 ^{a,d}	-	2500	4,600	<1,000	<1000	<1,000	<1000	<1000	1,600	<1000	<1000	<1,000	<1,000	<1,000
Thallium	mg/kg	0.05	1 ^c	0.4	0.243	0.24	0.086	0.14	0.144	0.078	0.141	0.188	0.088	0.099	0.062	0.163	0.172
Tin	mg/kg	2	9400 ^a	0.7	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	mg/kg	0.05	33 ^c	1.2	32	29.6	1.72	5.31	2.75	1.43	1.08	1.17	1.57	1.76	1.63	1.13	1.22
Vanadium	mg/kg	0.2	78 ^{a,e}	86	39.9	39.1	30.2	40.6	57.9	22.2	27	33.4	19.4	35.6	34.4	29.7	32.4
Zinc	mg/kg	2	16000 ^c	270	119	128	101	87.4	100	94.5	253	467	139	57.5	42.9	353	356

Notes

 Shaded cells indicate an exceedance over the guideline.

Bold and italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a USEPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to 1x10⁻⁵ risk level.

^b MECP (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact S1 Risk; Institutional land use.

^c Canadian Council of Ministers of the Environment (CCME). Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact pathway; coarse soils; 10-5 risk level (1 in 100,000) where applicable.

^d Guideline is for sulphuric acid.

^e While a MOECC (2011) S1 soil component for vanadium is available, it was less than background. Therefore, the more recent US-EPA health-based Regional Screening Level (RSL) – Residential Soil Table (HQ=1), November, 2024 was used. RSL was divided by 5 to adjust from a hazard quotient of 1.0 to 0.2.

Table D-1: Analytical data for metals in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.

Location			BH20		BH21		BH22		BH23				BH24		BH25	
Sample ID			BH20 0-0.15m	BH20 0.5m	BH21 0-0.15m	BH21 0.5m	BH22 0-0.15m	BH22 0.5m	BH23 0-0.5m	BH23 0-0.15m	BH23 0.5m	25DUP B	BH24 0-0.15m	BH24 0.5m	BH25 0-0.15m	BH25 0.44 m
Depth			0-0.15m	0.50m	0-0.15m	0.5m	0-0.15m	0.5	0-0.15m	0-0.15m	0.5m	0.5m	0-0.15m	0.5m	0-0.15m	0.44m
Sample Type			Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Date			02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025
	Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone												
Particle Size																
% >75µm	%	1	NGA	-	-	-	-	-	56.6	-	56.6	-	-	-	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	-	-	-	-	43.4	-	43.4	-	-	-	-	-
Texture	N/A		NGA	-	-	-	-	-	Coarse	-	Coarse	-	-	-	-	-
Soluble Parameters																
Soluble Magnesium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-
General Chemistry																
Moisture Content	%	0.25	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1	NGA	-	3.9	4.29	4.03	4.78	5.24	5.21	-	4.79	4.84	4.91	4.68	4.34
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Aluminium	mg/kg	50	15400 ^a	28000	10,800	25,800	9,230	21,000	21,400	19,600	-	21,500	22,700	20,800	22,600	29,500
Antimony	mg/kg	0.1	7.5 ^b	2	0.26	0.1	0.17	<0.10	0.12	<0.10	-	0.13	<0.10	0.13	0.14	<0.10
Arsenic	mg/kg	0.1	31 ^c	16.8	2.82	2.42	2.93	2.05	2.79	2.08	-	2.51	2.24	2.79	2.32	1.98
Barium	mg/kg	0.5	10000 ^c	120	46.3	46.7	27.3	20.5	40.2	29.4	-	37.8	30.9	35.8	42.6	35.4
Beryllium	mg/kg	0.1	110 ^c	1	0.15	0.46	0.23	0.5	0.5	0.43	-	0.45	0.56	0.45	0.47	0.75
Boron (Total)	mg/kg	5	4300 ^b	0.62	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	-	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium	mg/kg	0.02	49 ^c	0.4	0.112	0.145	0.255	0.115	0.154	0.14	-	0.235	0.177	0.219	0.116	0.141
Chromium (Total, III+VI)	mg/kg	0.5	630 ^c	81	10.3	18.6	7.96	18	15.9	15.3	-	19.4	23.9	18.5	22.5	28
Cobalt	mg/kg	0.1	22 ^b	26	3.17	10	3.32	9.94	8.43	7.77	-	11.2	14.2	11.3	9.58	15.2
Copper	mg/kg	0.5	4000 ^c	49	9.33	17.3	8.16	9.68	14	11.2	-	16	19.3	15.2	13.3	14.7
Iron	mg/kg	50	11000 ^a	52000	19,100	31,800	15,600	23,900	31,200	29,200	-	30,400	29,900	28,700	32,400	33,200
Lead	mg/kg	0.5	82 ^c	84	34.9	13.3	23	15.5	17.5	14.9	-	19.8	14.8	18	15.1	11.6
Manganese	mg/kg	1	360 ^a	4340	139	375	104	348	400	365	-	566	525	524	334	336
Mercury	mg/kg	0.005	24 ^c	0.121	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	0.1	110 ^b	1.1	0.55	0.54	0.96	0.87	1.26	1.52	-	1.02	0.87	0.99	1.14	0.74
Nickel	mg/kg	0.5	310 ^c	48	5.46	15.1	4.78	14.3	12.8	9.94	-	15	19	13.9	16.6	27.3
Calcium Dissolved	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.2	125 ^c	0.8	0.72	0.63	1.09	0.43	0.5	0.37	-	0.5	0.34	0.44	0.5	0.48
Silver	mg/kg	0.1	77 ^b	0.5	0.16	<0.10	0.11	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10	<0.10
Strontium	mg/kg	0.5	9400 ^a	5.3	11.1	18.4	14	17.9	22.2	19	-	18.8	21.8	17.9	16	13.8
Sulphur	mg/kg	1000	280000 ^{a,d}	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	-	<1,000	<1,000	<1,000	<1,000	<1,000
Thallium	mg/kg	0.05	1 ^c	0.4	0.088	0.088	0.074	0.062	0.108	0.09	-	0.124	0.097	0.116	0.128	0.111
Tin	mg/kg	2	9400 ^a	0.7	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	mg/kg	0.05	33 ^c	1.2	0.666	0.869	0.64	0.801	1.86	1.53	-	1.2	1.57	1.16	0.93	1.34
Vanadium	mg/kg	0.2	78 ^{a,e}	86	51.6	59.9	39.3	47.6	63.1	64.1	-	62.6	61.2	61.4	59.2	54.1
Zinc	mg/kg	2	16000 ^c	270	30.3	68.4	34.6	66.1	85.2	71.7	-	125	78.3	117	104	111

Notes

Shaded cells indicate an exceedance over the guideline.

Bold and italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a USEPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to 1x10⁻⁵ risk level.

^b MECP (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact S1 Risk; Institutional land use.

^c Canadian Council of Ministers of the Environment (CCME). Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact pathway; coarse soils; 10-5 risk level (1 in 100,000) where applicable.

^d Guideline is for sulphuric acid.

^e While a MOECC (2011) S1 soil component for vanadium is available, it was less than background. Therefore, the more recent US-EPA health-based Regional Screening Level (RSL) – Residential Soil Table (HQ=1), November, 2024 was used. RSL was divided by 5 to adjust from a hazard quotient of 1.0 to 0.2.

Table D-1: Analytical data for metals in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.

			Location	BH26	BH27	BH28	BH29		BH30	BH31	BH32		BH33	BH34	BH35	BH36	BH37
			Sample ID	BH26 0-0.15m	BH27 0-0.15m	BH28 0-0.15m	BH29 0-0.15m	25DUP C	BH30 0-0.15m	BH31 0-0.15m	BH32 0-0.15m	25DUP D	BH33 0-0.15m	BH34 0-0.15m	BH35 0-0.15m	BH36 0-0.15m	BH37 0-0.15m
			Depth	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m
			Sample Type	Normal	Normal	Normal	Normal	Duplicate of BH29 (0-0.15m)	Normal	Normal	Normal	Duplicate of BH32 (0-0.15m)	Normal	Normal	Normal	Normal	Normal
			Date	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025
	Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone													
Particle Size																	
% >75µm	%	1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texture	N/A		NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soluble Parameters																	
Soluble Magnesium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
General Chemistry																	
Moisture Content	%	0.25	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1	NGA	-	7.37	-	-	4.64	-	-	-	7.53	7.49	-	-	6.91	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																	
Aluminium	mg/kg	50	15400 ^a	28000	10,300	16,800	9,830	24,200	24,500	22,900	9,980	11,300	11,400	34,200	21,100	20,600	21,000
Antimony	mg/kg	0.1	7.5 ^b	2	<0.10	<0.10	<0.10	0.13	0.12	0.14	<0.10	<0.10	<0.10	0.17	0.16	0.13	0.1
Arsenic	mg/kg	0.1	31 ^c	16.8	1.81	2.42	2.34	2.49	2.53	2.73	1.66	1.43	1.26	6.82	4.03	3.1	3.24
Barium	mg/kg	0.5	10000 ^c	120	15	28.5	19.9	31.5	32.4	51.9	15.5	13.6	12.5	106	45	43.9	40.2
Beryllium	mg/kg	0.1	110 ^c	1	0.54	0.8	0.35	0.55	0.51	0.5	0.42	0.68	0.64	1.69	1.3	0.8	0.64
Boron (Total)	mg/kg	5	4300 ^b	0.62	7.5	9.7	9.1	<5.0	<5.0	<5.0	9.1	14.1	12.8	7.6	6.7	5.2	6.6
Cadmium	mg/kg	0.02	49 ^c	0.4	0.18	0.243	0.828	0.118	0.129	0.226	0.394	0.372	0.336	1.16	1.04	0.197	0.343
Chromium (Total, III+VI)	mg/kg	0.5	630 ^c	81	10.2	14.6	10.5	14.8	16.2	15.6	9.97	10.2	9.97	28.1	17.1	16.2	23.4
Cobalt	mg/kg	0.1	22 ^b	26	7.34	15.3	12.9	7.62	7.63	6.39	6.16	6.78	5.71	20.8	8.74	11.9	15.7
Copper	mg/kg	0.5	4000 ^c	49	60.4	227	453	9.46	9.62	11.2	28	32.9	60.8	107	41.2	18.6	134
Iron	mg/kg	50	11000 ^a	52000	14,800	22,500	10,800	27,900	28,200	26,200	13,500	19,000	14,500	40,000	15,900	26,700	29,700
Lead	mg/kg	0.5	82 ^c	84	15.6	15.9	37.1	15.8	14.7	14.1	42.3	45.8	41.6	50.3	36.2	13	23
Manganese	mg/kg	1	360 ^a	4340	625	729	954	391	376	315	664	648	621	2,080	462	849	733
Mercury	mg/kg	0.005	24 ^c	0.121	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	0.1	110 ^b	1.1	0.53	0.52	0.28	0.7	0.64	0.89	0.51	0.38	0.32	2.77	3.05	0.82	0.68
Nickel	mg/kg	0.5	310 ^c	48	9.74	24.3	8.15	9.98	10.3	10.4	8.3	10.9	10.4	28.8	16.2	14.3	22.2
Calcium Dissolved	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.2	125 ^c	0.8	<0.20	<0.20	<0.20	0.61	0.67	0.64	<0.20	<0.20	<0.20	2.64	3.4	0.26	0.34
Silver	mg/kg	0.1	77 ^b	0.5	<0.10	<0.10	0.11	<0.10	<0.10	0.1	<0.10	<0.10	<0.10	0.19	0.12	<0.10	<0.10
Strontium	mg/kg	0.5	9400 ^a	5.3	66.3	50.2	126	14.4	12.3	16	84.4	89	82.6	19.5	30.1	22.3	24.3
Sulphur	mg/kg	1000	280000 ^{a,d}	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	1,200	5,800	<1,000	<1,000
Thallium	mg/kg	0.05	1 ^c	0.4	0.085	0.131	0.101	0.111	0.107	0.113	0.083	0.116	0.11	0.377	0.246	0.118	0.139
Tin	mg/kg	2	9400 ^a	0.7	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	mg/kg	0.05	33 ^c	1.2	1.54	1.56	0.839	1.06	1.08	1.21	1.41	1.64	2.09	32.9	28.5	2.08	1.47
Vanadium	mg/kg	0.2	78 ^{a,e}	86	23.2	35.7	20.6	54.5	55.2	51.8	23.1	21.1	18.7	60.5	37.3	48.4	53.5
Zinc	mg/kg	2	16000 ^c	270	75.9	83.7	318	59.9	61.5	74.6	149	143	132	223	132	69.6	124

Notes

Shaded cells indicate an exceedance over the guideline.

Bold and italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a USEPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to 1x10⁻⁵ risk level.

^b MECP (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact S1 Risk; Institutional land use.

^c Canadian Council of Ministers of the Environment (CCME). Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact pathway; coarse soils; 10-5 risk level (1 in 100,000) where applicable.

^d Guideline is for sulphuric acid.

^e While a MOECC (2011) S1 soil component for vanadium is available, it was less than background. Therefore, the more recent US-EPA health-based Regional Screening Level (RSL) – Residential Soil Table (HQ=1), November, 2024 was used. RSL was divided by 5 to adjust from a hazard quotient of 1.0 to 0.2.

Table D-1: Analytical data for metals in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.

Table D-1: Analytical data for metals in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.				Location	BH38	BH41		BH42	BH43	BH44	BH45	BH46	BH47
				Sample ID	BH38 0-0.15m	BH41 1.5m	25DUP G	BH42 0.45m	BH43 0-0.15m	BH44 0-0.15m	BH45 0-0.15m	BH46 0.70m	BH47 1.35m
				Depth	0-0.15m	1.5m	1.5m	0.45m	0-0.15m	0-0.15m	0-0.15m	0.70m	1.35m
				Sample Type	Normal	Normal	Duplicate of BH41 (1.5m)	Normal	Normal	Normal	Normal	Normal	Normal
				Date	02 Jun 2025	04 Jun 2025	04 Jun 2025	04 Jun 2025	03 Jun 2025	04 Jun 2025	04 Jun 2025	04 Jun 2025	04 Jun 2025
	Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone									
Particle Size													
% >75µm	%	1	NGA	-	47.4	-	-	-	-	-	-	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	52.6	-	-	-	-	-	-	-	-
Texture	N/A		NGA	-	Fine	-	-	-	-	-	-	-	-
Soluble Parameters													
Soluble Magnesium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	-	-	-	-	-	-	-	-	-
General Chemistry													
Moisture Content	%	0.25	NGA	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1	NGA	-	-	-	-	-	-	-	-	-	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	-	-	-	-	-	-	-	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	-	-	-	-	-	-	-	-	-
Metals													
Aluminium	mg/kg	50	15400 ^a	28000	25,600	29,100	30,300	22,000	19,000	36,100	8,960	21,800	13,500
Antimony	mg/kg	0.1	7.5 ^b	2	0.17	0.1	0.12	0.12	0.12	1.86	5.75	0.1	<0.10
Arsenic	mg/kg	0.1	31 ^c	16.8	4.96	3.42	3.56	3.47	2.64	4.17	65.2	3	2.7
Barium	mg/kg	0.5	10000 ^c	120	42.4	60.7	62	43	48.8	125	266	36.5	22.8
Beryllium	mg/kg	0.1	110 ^c	1	0.51	1.76	1.73	2.02	0.73	1.32	0.21	0.7	0.77
Boron (Total)	mg/kg	5	4300 ^b	0.62	<5.0	6.4	7.5	15.3	5.3	<5.0	8.6	6.3	10.5
Cadmium	mg/kg	0.02	49 ^c	0.4	0.196	0.841	0.907	0.326	0.203	0.434	21.6	0.315	0.639
Chromium (Total, III+VI)	mg/kg	0.5	630 ^c	81	21.7	21.9	23.5	15.6	15	18.9	89.8	21.2	12.1
Cobalt	mg/kg	0.1	22 ^b	26	8.62	11.5	11.7	15.4	10.8	15.7	29.9	20.5	12.8
Copper	mg/kg	0.5	4000 ^c	49	15.1	44	44.9	97	16.8	19.2	141	80.7	172
Iron	mg/kg	50	11000 ^a	52000	31,300	19,300	20,200	30,200	24,800	38,200	330,000	32,300	19,400
Lead	mg/kg	0.5	82 ^c	84	20.7	25.7	27.8	7.92	11.7	362	596	25.6	42.2
Manganese	mg/kg	1	360 ^a	4340	366	538	584	2,850	847	1,350	1,320	717	780
Mercury	mg/kg	0.005	24 ^c	0.121	-	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	0.1	110 ^b	1.1	0.71	1.85	1.89	1.56	0.75	1.82	15.4	0.74	0.78
Nickel	mg/kg	0.5	310 ^c	48	14.9	19.4	20.4	18.5	12.6	19.2	718	24.2	14.4
Calcium Dissolved	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.2	125 ^c	0.8	0.74	2.52	2.71	<0.20	0.28	1.24	0.46	0.43	<0.20
Silver	mg/kg	0.1	77 ^b	0.5	0.11	0.11	0.11	<0.10	<0.10	0.24	0.13	0.46	0.13
Strontium	mg/kg	0.5	9400 ^a	5.3	10.3	27	29.9	90.2	23.4	23.7	17.9	38.3	84.1
Sulphur	mg/kg	1000	280000 ^{a,d}	-	<1,000	4,000	4,100	<1,000	<1,000	<1,000	<1,000	<1,000	1,500
Thallium	mg/kg	0.05	1 ^c	0.4	0.119	0.236	0.248	0.179	0.114	0.183	0.055	0.131	0.164
Tin	mg/kg	2	9400 ^a	0.7	<2.0	<2.0	<2.0	<2.0	<2.0	59.2	8.8	<2.0	<2.0
Uranium	mg/kg	0.05	33 ^c	1.2	2.54	36	35.8	2.6	1.93	2.01	0.399	2.41	2.97
Vanadium	mg/kg	0.2	78 ^{a,e}	86	59.2	43.4	46.7	46.5	45.6	43.8	23.1	48.3	29
Zinc	mg/kg	2	16000 ^c	270	90.8	128	140	83.2	68.7	159	2,140	100	250

Notes

 Shaded cells indicate an exceedance over the guideline.

Bold and Italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a USEPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to 1x10⁻⁵ risk level.

^b MECP (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact S1 Risk; Institutional land use.

^c Canadian Council of Ministers of the Environment (CCME). Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact pathway; coarse soils; 10-5 risk level (1 in 100,000) where applicable.

^d Guideline is for sulphuric acid.

^e While a MOECC (2011) S1 soil component for vanadium is available, it was less than background. Therefore, the more recent US-EPA health-based Regional Screening Level (RSL) – Residential Soil Table (HQ=1), November, 2024 was used. RSL was divided by 5 to adjust from a hazard quotient of 1.0 to 0.2.

Table D-1: Analytical data for metals in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.

					Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SoQG and Regional Background Concentration	Number of Non-Detects Above the SoQG
	Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone									
Particle Size													
% >75µm	%	1	NGA	-	5	0	5	47.4	47.4	75.5	75.5	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	5	0	5	24.5	24.5	52.6	52.6	-	-
Texture	N/A		NGA	-	5	0	0	0	-	-	-	-	-
Soluble Parameters													
Soluble Magnesium	mg/L	0.5	NGA	-	2	1	1	<0.50	16.6	16.6	16.6	-	-
Soluble Sodium	mg/L	0.5	NGA	-	2	1	1	<0.50	6.2	6.2	6.2	-	-
Chloride (2:1)	ug/g	5	NGA	-	4	3	1	<5.0	33.6	33.6	33.6	-	-
General Chemistry													
Moisture Content	%	0.25	NGA	-	13	0	13	6.48	6.48	57.5	57.5	-	-
pH (Lab)	pH Units	0.1	NGA	-	29	0	29	3.9	3.9	8.02	8.02	-	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	12	0	12	94.4	94.4	650	650	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	4	2	2	<0.10	0.1	0.19	0.19	-	-
Metals													
Aluminium	mg/kg	50	15400 ^a	28000	63	0	63	5160	5160	36100	36100	6	0
Antimony	mg/kg	0.1	7.5 ^b	2	63	33	30	<0.10	0.1	5.75	5.75	0	0
Arsenic	mg/kg	0.1	31 ^c	16.8	63	0	63	1	1	65.2	65.2	1	0
Barium	mg/kg	0.5	10000 ^c	120	63	0	63	8.74	8.74	266	266	0	0
Beryllium	mg/kg	0.1	110 ^c	1	63	0	63	0.15	0.15	2.02	2.02	0	0
Boron (Total)	mg/kg	5	4300 ^b	0.62	63	28	35	<5.0	5.2	15.3	15.3	0	0
Cadmium	mg/kg	0.02	49 ^c	0.4	63	0	63	0.088	0.088	21.6	21.6	0	0
Chromium (Total, III+VI)	mg/kg	0.5	630 ^c	81	63	0	63	4.66	4.66	89.8	89.8	0	0
Cobalt	mg/kg	0.1	22 ^b	26	63	0	63	3.17	3.17	29.9	29.9	1	0
Copper	mg/kg	0.5	4000 ^c	49	63	0	63	6.48	6.48	453	453	0	0
Iron	mg/kg	50	11000 ^a	52000	63	0	63	6180	6180	330000	330000	1	0
Lead	mg/kg	0.5	82 ^c	84	63	0	63	4.97	4.97	596	596	3	0
Manganese	mg/kg	1	360 ^a	4340	63	0	63	104	104	3250	3250	0	0
Mercury	mg/kg	0.005	24 ^c	0.121	27	3	24	<0.0050	0.005	0.239	0.239	0	0
Molybdenum	mg/kg	0.1	110 ^b	1.1	63	0	63	0.28	0.28	15.4	15.4	0	0
Nickel	mg/kg	0.5	310 ^c	48	63	0	63	4.78	4.78	718	718	1	0
Calcium Dissolved	mg/L	0.5	NGA	-	2	0	2	1.32	1.32	49.4	49.4	-	-
Selenium	mg/kg	0.2	125 ^c	0.8	63	26	37	<0.20	0.26	3.4	3.4	0	0
Silver	mg/kg	0.1	77 ^b	0.5	63	45	18	<0.10	0.1	0.46	0.46	0	0
Strontium	mg/kg	0.5	9400 ^a	5.3	63	0	63	9.48	9.48	128	128	0	0
Sulphur	mg/kg	1000	280000 ^{a,d}	-	63	54	9	<1000	1200	5800	5800	0	0
Thallium	mg/kg	0.05	1 ^c	0.4	63	0	63	0.055	0.055	0.377	0.377	0	0
Tin	mg/kg	2	9400 ^a	0.7	63	61	2	<2.0	8.8	59.2	59.2	0	0
Uranium	mg/kg	0.05	33 ^c	1.2	63	0	63	0.399	0.399	36	36	2	0
Vanadium	mg/kg	0.2	78 ^{a,e}	86	63	0	63	12.3	12.3	64.6	64.6	0	0
Zinc	mg/kg	2	16000 ^c	270	63	0	63	30.3	30.3	2140	2140	0	0

Notes

 Shaded cells indicate an exceedance over the guideline.

Bold and Italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a USEPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to 1x10⁻⁵ risk level.

^b MECP (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact S1 Risk; Institutional land use.

^c Canadian Council of Ministers of the Environment (CCME). Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact pathway; coarse soils; 10⁻⁵ risk level (1 in 100,000) where applicable.

^d Guideline is for sulphuric acid.

^e While a MOECC (2011) S1 soil component for vanadium is available, it was less than background. Therefore, the more recent US-EPA health-based Regional Screening Level (RSL) – Residential Soil Table (HQ=1), November, 2024 was used. RSL was divided by 5 to adjust from a hazard quotient of 1.0 to 0.2.



Table D-2: Analytical data for BTEX and PHCs in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.

			Field ID	BH1 (0-0.15m)	BH2 (0-0.15m)		BH3 (0-0.15m)	BH4 (0-0.15m)	BH5 (0-0.15m)	BH12 (0-0.15m)	BH13 (0-0.15m)	BH14 (0-0.15m)	BH15 (0-0.15m)	BH44 (0-0.15m)	BH45 (0-0.15m)
			Sample Type	Normal	Normal	QAQC 01 Duplicate BH2 (0-0.15m)	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
			Depth	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m
			Date	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	04 Jun 2024	04 Jun 2024
	Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})												
BTEX															
Benzene	mg/kg	0.005	980 ^a	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0057	<0.0050	<0.0050	<0.0050	<0.0088	<0.0050	<0.0050
Toluene	mg/kg	0.05	1,400 ^a	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ethylbenzene	mg/kg	0.015	3,100 ^a	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.022	<0.010	<0.010
Xylene Total	mg/kg	0.05	1,800 ^a	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Petroleum Hydrocarbons (PHCs)															
>C10-C16 fraction of mTPH	%	1	10,000 ^b	<1	<1	<1	<1	<1	7	<1	<1	<1	<1	-	-
>C16-C21 fraction of mTPH	%	1	23,000 ^b	<1	<1	<1	16	<1	7	21	10	<1	8	-	-
>C21-C32 fraction of mTPH	%	1	23,000 ^b	100	<1	<1	84	100	86	79	90	100	92	-	-
C6-C10 fraction of mTPH	%	1	19,000 ^b	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
VPH (C6-C10 - BTEX)	mg/kg	5	19,000 ^b	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.5	<2.5
EPH >C10-C16	mg/kg	5	10,000 ^b	<5.0	<5.0	<5.0	<5.0	<5.0	10.5	<5.0	<5.0	<5.0	<5.0	<10	<10
EPH >C16-C21	mg/kg	5	23,000 ^b	<5.0	<5.0	<5.0	16.7	<5.0	11.6	12.5	11.5	<5.0	8.6	41	25
EPH >C21-C32	mg/kg	5	23,000 ^b	17.6	<5.0	<5.0	90.1	7.8	136	46	108	29.2	95.3	150	170
Modified TPH (Tier 1)	mg/kg	10	21,000 ^{a,c}												
				18***	<10	<10	107	<10	158***	58***	120***	29***	104***	190**	190**
EPH >C34-C50	mg/kg	20	RES	25	<20	<20	76	21	312	86	138	50	106	-	-
Reached Baseline at C32	-		NGA	No	Yes	Yes	No	No	No	No	No	No	No	Yes	Yes
Hydrocarbon Resemblance	none		NGA	LOF	N/A	N/A	NR	LOF	LOF	LOF	LOF	LOF	LOF	Unidentified Compound in Fuel/Lube Range. Possible LOF	Unidentified Compound in Fuel/Lube Range. Possible LOF

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

LOF = Lube Oil Fraction; RES = Residual PHC formation. Calculated value exceeds 30,000 mg/kg and solubility for PHC fraction.

^a Canadian Council of Ministers of the Environment (CCME). Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact pathway; coarse soils; 10-5 risk level (1 in 100,000) where applicable.

^b CCME (2008) Canada Wide Standards (CWS) for Petroleum Hydrocarbons in Soil; Table 2 Pathway Specific Tier 1 Levels for PHC for Coarse Grained Surface Soils. Commercial Land Use, Direct Contact.

^c Guideline is for 'lube oil' fraction.

*** Modified TPH (Lube Oil)



Table D-2: Analytical data for BTEX and PHCs in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.

				Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SoQG	Number of Non-Detects Above the SoQG
	Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})									
BTEX												
Benzene	mg/kg	0.005	980 ^a	12	12	0	<0.0050	-	<0.0050	-	0	0
Toluene	mg/kg	0.05	1,400 ^a	12	12	0	<0.050	-	<0.050	-	0	0
Ethylbenzene	mg/kg	0.015	3,100 ^a	12	12	0	<0.015	-	<0.015	-	0	0
Xylene Total	mg/kg	0.05	1,800 ^a	12	12	0	<0.050	-	<0.050	-	0	0
Petroleum Hydrocarbons (PHCs)												
>C10-C16 fraction of mTPH	%	1	10,000 ^b	10	9	1	<1	7	7	7	0	0
>C16-C21 fraction of mTPH	%	1	23,000 ^b	10	5	5	<1	7	21	21	0	0
>C21-C32 fraction of mTPH	%	1	23,000 ^b	10	2	8	<1	79	100	100	0	0
C6-C10 fraction of mTPH	%	1	19,000 ^b	10	10	0	<1	-	<1	-	0	0
VPH (C6-C10 - BTEX)	mg/kg	5	19,000 ^b	12	12	0	<5.0	-	<5.0	-	0	0
EPH >C10-C16	mg/kg	5	10,000 ^b	12	11	1	<5.0	10.5	10.5	10.5	0	0
EPH >C16-C21	mg/kg	5	23,000 ^b	12	5	7	<5.0	8.6	41	41	0	0
EPH >C21-C32	mg/kg	5	23,000 ^b	12	2	10	<5.0	7.8	170	170	0	0
Modified TPH (Tier 1)	mg/kg	10	21,000 ^{a,c}	12	3	1	<10	107	107	107	0	0
EPH >C34-C50	mg/kg	20	RES	10	2	8	<20	21	312	312	-	-
Reached Baseline at C32	-		NGA	12	0	0	0	-	-	-	-	-
Hydrocarbon Resemblance	none		NGA	12	0	0	0	-	-	-	-	-

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

LOF = Lube Oil Fraction; RES = Residual PHC formation. Calculated value exceeds 30,000 mg/kg and solubility for PHC fraction

^a Canadian Council of Ministers of the Environment (CCME). Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact pathway; coarse soils; 10-5 risk level (1 in 100,000) where applicable.

^b CCME (2008) Canada Wide Standards (CWS) for Petroleum Hydrocarbons in Soil; Table 2 Pathway Specific Tier 1 Levels for PHC for Coarse Grained Surface Soils. Commercial Land Use, Direct Contact.

^c Guideline is for 'lube oil' fraction.

*** Modified TPH (Lube Oil)



Table D-3: Analytical data for PAHs in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.

Former Frechvale mine site compared to human health-based soil quality guidelines.				Field ID	BH1 (0-0.15m)	BH2 (0-0.15m)		BH3 (0-0.15m)	BH6 (0-0.15m)	BH7 (0-0.15m)	BH8 (0-0.15m)	BH13 (0-0.15 m)	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SoQG	Number of Non-Detects Above the SoQG
Sample Type	Depth	Date	Human Health Soil Quality Guideline (SoQG _{HH})	Normal	Normal	QAQC 01 Duplicate (BH2 (0-0.15m))	Normal	Normal	Normal	Normal	Normal										
				0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m									
				15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	17 Oct 2024									
	Unit	EQL																			
Polycyclic Aromatic Hydrocarbons (PAHs)																					
1-Methylnaphthalene	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	-	-
2-Methylnaphthalene	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	-	-
1 & 2 Methylnaphthalene	mg/kg	0.015	72 ^{b,e}	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	8	8	0	<0.015	-	<0.015	-	0	0
Acenaphthene	mg/kg	0.005	8300 ^a	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	8	0	<0.0050	-	<0.0050	-	0	0
Acenaphthylene	mg/kg	0.005	7.8 ^b	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	8	0	<0.0050	-	<0.0050	-	0	0
Acridine	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	-	-
Anthracene	mg/kg	0.004	41000 ^a	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	8	8	0	<0.0040	-	<0.0040	-	0	0
Benzo(a)anthracene	mg/kg	0.01	See B(a)P TPE	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	-	-
Benzo(a)pyrene	mg/kg	0.01	See B(a)P TPE	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.01	See B(a)P TPE	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	-	-
Benzo(b+j+k)fluoranthene	mg/kg	0.015	See B(a)P TPE	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	8	8	0	<0.015	-	<0.015	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.01	See B(a)P TPE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.010	8	8	0	<0.025	-	<0.025	-	-	-
Benzo(k)fluoranthene	mg/kg	0.01	See B(a)P TPE	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	-	-
Chrysene	mg/kg	0.01	See B(a)P TPE	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	-	-
Dibenzo(a,h)anthracene	mg/kg	0.005	See B(a)P TPE	<0.0125	<0.0125	<0.0125	<0.0125	<0.0125	<0.0125	<0.0125	<0.0125	<0.0050	8	8	0	<0.0125	-	<0.0125	-	-	-
Fluorene	mg/kg	0.01	4300 ^a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	0	0
Fluoranthene	mg/kg	0.01	5600 ^a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	0	0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	See B(a)P TPE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.010	8	8	0	<0.025	-	<0.025	-	-	-
Naphthalene	mg/kg	0.01	3000 ^a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	0	0
Perylene	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	-	-
Phenanthrene	mg/kg	0.01	41000 ^a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	0	0
Pyrene	mg/kg	0.01	3300 ^a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	0	0
Quinoline	mg/kg	0.01	1.8 ^d	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	8	0	<0.010	-	<0.010	-	0	0
B(A)P TPE	mg/kg	0.02	5.3 ^{c,f}	0.02985	0.02985	0.02985	0.02985	0.02985	0.02985	0.02985	0.02985	0.0207	8	0	8	0.0207	0.0207	0.02985	0.02985	0	0

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

^a Alberta Environmental Protection (AEP) (2024) Tier 1 Soil and Groundwater Remediation Guidelines. Appendix A, Table A-4 Surface Soil Remediation Guideline Values for Commercial Land Use, Direct Soil Contact.

^b MOECC (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact S1 Risk; Residential land use.

^c Canadian Council of Ministers of the Environment (CCME), Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact pathway; coarse soils; 10-5 risk level (1 in 100,000) where applicable.

^d USEPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to

^e Guideline for individual methylnaphthalene isomers were not available, guideline is to be applied to the sum of 1- & 2-methylnaphthalene.

^f Benzo(a)pyrene Total Potency Equivalents (B[a]P TPE) is the sum of estimated cancer potency relative to B(a)P TPE for all potentially carcinogenic unsubstituted PAHs. B(a)P TPE was calculated by multiplying the concentration of each PAH in the sample by the B(a)P TPE Potency Equivalence Factor (PEF) provided by the CCME (2010). Values have been rounded to three significant figures.



Table D-4: Analytical data for PCBs in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.

Table D-4: Analytical data for PCBs in soil for the former Frenchvale mine site compared to human health-based soil quality guidelines.				Field ID	BH1 (0-0.15m)	BH2 (0-0.15m)		BH3 (0-0.15m)	BH14 (0-0.15m)	BH15 (0-0.15m)	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SoQG	Number of Non-Detects Above the SoQG
				Sample Type	Normal	Normal	QAQC 01 Duplicate BH2	Normal	Normal	Normal									
				Depth	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m									
				Date	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	17 Oct 2024	17 Oct 2024									
		Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})															
Polychlorinated Biphenyls (PCBs)																			
Arochlor 1016	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1221	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1232	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1242	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1248	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1254	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1260	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1268	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1262	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
PCBs (Sum of total)		mg/kg	0.03	0.13 ^a	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	6	6	0	<0.030	-	<0.030	-	0	0



Table D-5: Analytical data for metals in sediment for the former Frenchvale mine site compared to human health-based soil quality guidelines.

Table D-5: Analytical data for metals in sediment for the former Frenchvale mine site compared to human health-based soil quality guidelines.				Sample ID	SED1	SED3	SED4	SED5	SED6	SED7	SED8	SED9	SED10	SED11	SED12	SED13	SED14
	Sample Type	Depth	Date		Normal	Normal	QAQC 04	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	25 DUP E
					0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m
					17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	03 Jun 2025	03 Jun 2025	03 Jun 2025
	Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})														
Particle Size																	
% >75um	%	1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	-
Sieve Analysis - 75 Åµm (passing)	%	1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	100	-
Grain Size	%		NGA	-	-	-	-	-	-	-	-	-	-	-	-	Fine	-
Organic Matter	%	0.17	NGA	-	-	-	-	-	-	-	-	-	-	4	15	13	2
Soluble Parameters																	
Soluble Magnesium	mg/L	0.5	NGA	-	1	1	-	-	-	-	-	-	5	-	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	1	1	-	-	-	-	-	-	8	-	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	10	9	-	-	-	-	-	-	34	-	-	-	-
General Chemistry																	
Moisture Content	%	0.25	NGA	-	11	-	-	-	-	14	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1	NGA	7	8	8	6	7	7	7	6	7	7	-	-	-	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	94	103	-	-	-	-	-	-	298	-	-	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	<0.10	0	-	-	-	-	-	-	0	-	-	-	-
Total Organic Carbon (TOC)	mg/kg	1,000	NGA	-	-	-	-	-	-	-	-	-	-	25,000	83,900	74,600	13,400
Metals																	
Aluminium	mg/kg	50	15400 ^a	14,900	4,260	5,500	11,800	11,700	6,980	5,750	27,000	17,500	13,400	30,000	10,400	15,600	14,900
Antimony	mg/kg	0.1	7.5 ^b	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	<0.10	<0.10	0	<0.15	0	<0.10
Arsenic	mg/kg	0.1	31 ^c	2	2	1	2	2	1	1	5	3	2	5	2	3	2
Barium	mg/kg	0.5	10000 ^c	23	8	7	22	26	9	13	55	65	23	66	51	76	72
Beryllium	mg/kg	0.1	110 ^c	1	0	0	1	1	0	0	1	1	1	2	1	1	1
Boron	mg/kg	5	4300 ^b	<5.0	<5.0	<5.0	9	11	6	5	13	<5.0	8	9	<7.5	<7.4	<5.0
Cadmium	mg/kg	0.02	49 ^c	0	0	0	0	0	0	0	1	0	0	1	0	1	0
Chromium (Total, III+VI)	mg/kg	0.5	630 ^c	10	4	5	11	11	8	8	27	14	12	27	8	13	12
Cobalt	mg/kg	0.1	22 ^b	7	4	2	7	8	4	4	19	10	9	20	6	10	9
Copper	mg/kg	0.5	4000 ^c	24	14	5	43	32	25	13	85	25	50	68	34	48	14
Iron	mg/kg	50	11000 ^a	25,800	8,780	7,920	17,600	14,200	12,700	13,900	27,200	26,100	20,200	39,400	11,200	15,400	22,200
Lead	mg/kg	0.5	154 ^c	8	11	28	14	41	6	12	116	7	19	56	10	32	8
Manganese	mg/kg	1	360 ^a	343	486	422	934	1,010	771	822	1,390	3,270	836	1,470	300	300	612
Mercury	mg/kg	0.005	24 ^c	<0.0050	<0.0050	<0.0050	0	0	0	0	0	0	0	-	-	-	-
Molybdenum	mg/kg	0.1	110 ^b	1	0	0	0	0	0	3	2	1	1	2	2	2	0
Nickel	mg/kg	0.5	310 ^c	9	4	3	9	11	6	5	29	15	11	29	8	14	11
Calcium Dissolved	mg/L	0.5	NGA	-	2	2	-	-	-	-	-	-	12	-	-	-	-
Selenium	mg/kg	0.2	125 ^c	<0.20	<0.20	<0.20	0	<0.20	<0.20	<0.20	0	0	0	1	1	1	0
Silver	mg/kg	0.1	77 ^b	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	<0.10	0	<0.10	<0.15	<0.15	<0.10
Strontium	mg/kg	0.5	9400 ^a	18	77	71	67	66	65	77	42	18	68	32	12	12	20
Sulphur	mg/kg	1,000	280,000 ^{a,d}	<1000	<1000	<1000	<1000	<1000	<1000	<1000	5,500	<1000	<1000	<1,000	7,000	3,300	<1,000
Thallium	mg/kg	0.05	1 ^c	<0.050	<0.050	<0.050	0	0	<0.050	<0.050	0	0	0	0	0	0	0
Tin	mg/kg	2	9400 ^a	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<3.0	<3.0	<2.0
Uranium	mg/kg	0.05	33 ^c	2	1	1	2	2	1	1	6	3	4	5	16	13	2
Vanadium	mg/kg	0.2	78 ^{a,e}	36	13	13	28	26	17	14	57	45	30	66	26	33	39
Zinc	mg/kg	2	16000 ^c	41	46	29	86	154	41	49	406	72	90	203	90	165	95

Notes
Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

^a USEPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10-6 to 1x 10-5 risk level.

^b MOECC (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact SW1 Risk

^c CCME,Canadian Environmental Quality Guidelines for Soil and Groundwater, Human Health Soil quality Guideline for Commercial Land use, the 1x10-5 risk factor was used where applicable.

^d Guideline is for sulphuric acid

^e While a MOECC (2011) S1 soil component for vanadium is available, it was less than background. Therefore, the more recent US- EPA health-based Regional Screening Level (RSL) – Residential Soil Table (HQ=1), November, 2024 was used. RSL was divided by 5 to adjust from a hazard quotient of 1.0 to 0.2.



Table D-5: Analytical data for metals in sediment for the former Frenchvale mine site compared to human health-based soil quality guidelines.

Table D-5: Analytical data for metals in sediment for the former Frenchvale mine site compared to human health-based soil quality guidelines.				Sample ID	SED15	SED16	SED17	SED18	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SoQG	Number of Non-Detects Above the SoQG
				Sample Type	Normal	Normal	Normal	Normal									
				Depth	0-0.15m	0-0.15m	0-0.15m	0-0.15m									
				Date	03 Jun 2025	03 Jun 2025	04 Jun 2025	04 Jun 2025									
	Unit	EQL	Human Health Soil Quality Guideline (SoQG _{HH})														
Particle Size																	
% >75um	%	1	NGA	96	-	-	-	2	1	1	<1.0	95.5	95.5	95.5	-	-	
Sieve Analysis - 75 Åµm (passing)	%	1	NGA	5	-	-	-	2	0	2	4.5	4.5	100	100	-	-	
Grain Size	%		NGA	Coarse	-	-	-	2	0	0	0	-	-	-	-	-	
Organic Matter	%	0.17	NGA	1	6	1	3	9	0	9	0.96	0.96	14.5	14.5	-	-	
Soluble Parameters																	
Soluble Magnesium	mg/L	0.5	NGA	-	-	-	-	3	0	3	1.14	1.14	4.66	4.66	-	-	
Soluble Sodium	mg/L	0.5	NGA	-	-	-	-	3	0	3	0.65	0.65	7.95	7.95	-	-	
Chloride (2:1)	ug/g	5	NGA	-	-	-	-	3	0	3	8.5	8.5	33.8	33.8	-	-	
General Chemistry																	
Moisture Content	%	0.25	NGA	-	-	-	-	2	0	2	11.4	11.4	13.6	13.6	-	-	
pH (Lab)	pH Units	0.1	NGA	-	-	-	-	10	0	10	6.38	6.38	7.61	7.61	-	-	
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	-	-	-	3	0	3	94.1	94.1	298	298	-	-	
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	-	-	-	3	1	2	<0.10	0.12	0.49	0.49	-	-	
Total Organic Carbon (TOC)	mg/kg	1,000	NGA	6,100	34,000	5,600	17,000	9	0	9	5600	5600	83900	83900	-	-	
Metals																	
Aluminium	mg/kg	50	15400 ^a	15,000	12,400	15,200	18,900	19	0	19	4260	4260	30000	30000	5	0	
Antimony	mg/kg	0.1	7.5 ^b	<0.10	<0.10	<0.10	0	19	15	4	<0.10	0.14	0.19	0.19	0	0	
Arsenic	mg/kg	0.1	31 ^c	2	2	3	4	19	0	19	0.64	0.64	4.92	4.92	0	0	
Barium	mg/kg	0.5	10000 ^c	18	96	28	51	19	0	19	7.34	7.34	96.4	96.4	0	0	
Beryllium	mg/kg	0.1	110 ^c	1	0	1	1	19	0	19	0.21	0.21	1.61	1.61	0	0	
Boron	mg/kg	5	4300 ^b	<5.0	5	<5.0	<5.0	19	11	8	<5.0	5.3	13.4	13.4	0	0	
Cadmium	mg/kg	0.02	49 ^c	0	1	0	0	19	0	19	0.071	0.071	1.06	1.06	0	0	
Chromium (Total, III+VI)	mg/kg	0.5	630 ^c	9	16	15	20	19	0	19	4.35	4.35	26.8	26.8	0	0	
Cobalt	mg/kg	0.1	22 ^b	7	7	9	12	19	0	19	2.26	2.26	20	20	0	0	
Copper	mg/kg	0.5	4000 ^c	18	432	12	16	19	0	19	5.1	5.1	432	432	0	0	
Iron	mg/kg	50	11000 ^a	24,300	16,900	24,300	30,400	19	0	19	7920	7920	39400	39400	17	0	
Lead	mg/kg	0.5	154 ^c	4	11	6	11	19	0	19	3.86	3.86	116	116	0	0	
Manganese	mg/kg	1	360 ^a	475	455	502	802	19	0	19	300	300	3270	3270	16	0	
Mercury	mg/kg	0.005	24 ^c	-	-	-	-	10	3	7	<0.0050	0.0058	0.0418	0.0418	0	0	
Molybdenum	mg/kg	0.1	110 ^b	0	0	1	1	19	0	19	0.19	0.19	2.88	2.88	0	0	
Nickel	mg/kg	0.5	310 ^c	11	9	10	19	19	0	19	3.28	3.28	29	29	0	0	
Calcium Dissolved	mg/L	0.5	NGA	-	-	-	-	3	0	3	1.5	1.5	12.1	12.1	-	-	
Selenium	mg/kg	0.2	125 ^c	<0.20	1	<0.20	0	19	8	11	<0.20	0.22	1.42	1.42	0	0	
Silver	mg/kg	0.1	77 ^b	<0.10	0	<0.10	<0.10	19	16	3	<0.10	0.11	0.17	0.17	0	0	
Strontium	mg/kg	0.5	9400 ^a	20	19	21	23	19	0	19	12	12	76.9	76.9	0	0	
Sulphur	mg/kg	1,000	280,000 ^{a,d}	<1,000	<1,000	<1,000	<1,000	19	16	3	<1000	3300	7000	7000	0	0	
Thallium	mg/kg	0.05	1 ^c	0	0	0	0	19	5	14	<0.050	0.052	0.286	0.286	0	0	
Tin	mg/kg	2	9400 ^a	<2.0	<2.0	<2.0	<2.0	19	19	0	<2.0	-	<2.0	-	0	0	
Uranium	mg/kg	0.05	33 ^c	1	4	1	3	19	0	19	0.729	0.729	16.4	16.4	0	0	
Vanadium	mg/kg	0.2	78 ^{a,e}	37	36	39	49	19	0	19	12.5	12.5	65.9	65.9	0	0	
Zinc	mg/kg	2	16000 ^c	44	489	44	61	19	0	19	28.6	28.6	489	489	0	0	

Notes
Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

^a USEPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to 1x 10⁻⁵ risk level.

^b MOECC (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact SW1 Risk

^c CCME,Canadian Environmental Quality Guidelines for Soil and Groundwater, Human Health Soil quality Guideline for Commercial Land use, the 1x10⁻⁵ risk factor was used where applicable.

^d Guideline is for sulphuric acid

^e While a MOECC (2011) S1 soil component for vanadium is available, it was less than background. Therefore, the more recent US-EPA health-based Regional Screening Level (RSL) – Residential Soil Table (HQ=1), November, 2024 was used. RSL was divided by 5 to adjust from a hazard quotient of 1.0 to 0.2.

Table D-6: Analytical data for BTEX and PHCs in sediment for the former Frenchvale mine site compared to human health-based soil quality

Table D-6: Analytical data for BTEX and PHCs in sediment for the former Frenchvale mine site compared to human health-based soil quality				Sample ID	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SoQG	Number of Non-Detects Above the SoQG
				Sample Type									
				Depth									
				Date									
			Human Health Soil Quality Guideline (SoQG _{HH})	SED7									
	Unit	EQL		Normal									
				0-0.15m									
				17 Oct 2024									
BTEX													
Benzene	mg/kg	0.005	980 ^a	<0.0050	1	1	0	<0.0050	-	<0.0050	-	0	0
Toluene	mg/kg	0.05	1400 ^a	<0.050	1	1	0	<0.050	-	<0.050	-	0	0
Ethylbenzene	mg/kg	0.015	3100 ^a	<0.015	1	1	0	<0.015	-	<0.015	-	0	0
Xylene (o)	mg/kg	0.03	NGA	<0.030	1	1	0	<0.030	-	<0.030	-	-	-
Xylene (m & p)	mg/kg	0.03	NGA	<0.030	1	1	0	<0.030	-	<0.030	-	-	-
Xylene Total	mg/kg	0.05	1800 ^a	<0.050	1	1	0	<0.050	-	<0.050	-	0	0
Petroleum Hydrocarbons (PHCs)													
>C10-C16 fraction of mTPH	%	1	10,000 ^b	<1	1	1	0	<1	-	<1	-	0	0
>C16-C21 fraction of mTPH	%	1	23,000 ^b	<1	1	1	0	<1	-	<1	-	0	0
>C21-C32_frac	%	1	23,000 ^b	100	1	0	1	100	100	100	100	0	0
C6-C10 fraction of mTPH	%	1	19,000 ^b	<1	1	1	0	<1	-	<1	-	0	0
VPH (C6-C10 - BTEX)	mg/kg	5	19,000 ^b	≤5.0	1	1	0	<5.0	-	<5.0	-	0	0
EPH >C10-C16	mg/kg	5	10,000 ^b	<5.0	1	1	0	<5.0	-	<5.0	-	0	0
EPH >C16-C21	mg/kg	5	23,000 ^b	≤5.0	1	1	0	<5.0	-	<5.0	-	0	0
EPH >C21-C32	mg/kg	5	23,000 ^b	9	1	0	1	9	8.7	9	8.7	0	0
EPH >C34-C50	mg/kg	20	RES	≤20	1	1	0	<20	-	<20	-	-	-
TEH >C10-C32	mg/kg	10	NGA	≤10	1	1	0	<10	-	<10	-	-	-
Modified TPH (Tier 1)	mg/kg	10	21,000 ^{a,c}	≤10	1	1	0	<10	-	<10	-	0	0
Reached Baseline at C32	-		NGA	Yes	1	0	0	-	-	-	-	-	-
Hydrocarbon Resemblance	none		NGA	LOF	1	0	0	-	-	-	-	-	-

Notes
Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

LOF = Lube Oil Fraction; RES = Residual PHC formation. Calculated value exceeds 30,000 mg/kg and solubility for PHC fraction.

^a ARBC (2021) Human Health Based Tier II Pathway-Specific Standards (PSS) for Soil - Commercial Land Use

^b CCME CWS (2008) Table 2 Pathway Specific Tier 1 Levels for PHC for Coarse Grained Surface Soils

^c Guideline is for 'lube oil' fraction.

Table D-7: Analytical data for PAHs in sediment for the former Frenchvale mine site compared to human health-based soil quality guidelines.

			Human Health Soil Quality Guideline (SoQG _{HH})	Sample ID	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SoQG	Number of Non-Detects Above the SoQG
				Sample Type									
				Depth									
				Date									
				SED3									
				Normal									
				0-0.15m									
				17 Oct 2024									
	Unit	EQL											
Polycyclic Aromatic Hydrocarbons (PAHs)													
1-Methylnaphthalene	mg/kg	0.01	72 ^b	<0.010	1	1	0	<0.010	-	<0.010	-	0	0
2-Methylnaphthalene	mg/kg	0.01	73 ^b	<0.010	1	1	0	<0.010	-	<0.010	-	0	0
1 & 2 Methylnaphthalene	mg/kg	0.015	74 ^b	<0.015	1	1	0	<0.015	-	<0.015	-	0	0
Acenaphthene	mg/kg	0.005	8300 ^a	<0.0050	1	1	0	<0.0050	-	<0.0050	-	0	0
Acenaphthylene	mg/kg	0.005	7.8 ^b	<0.0050	1	1	0	<0.0050	-	<0.0050	-	0	0
Acridine	mg/kg	0.01	NGA	<0.010	1	1	0	<0.010	-	<0.010	-	-	-
Anthracene	mg/kg	0.004	41000 ^a	<0.0040	1	1	0	<0.0040	-	<0.0040	-	0	0
Benzo(a)anthracene	mg/kg	0.01	See B(a)P TPE	<0.010	1	1	0	<0.010	-	<0.010	-	-	-
Benzo(a)pyrene	mg/kg	0.01	See B(a)P TPE	<0.010	1	1	0	<0.010	-	<0.010	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.01	See B(a)P TPE	<0.010	1	1	0	<0.010	-	<0.010	-	-	-
Benzo(b+j+k)fluoranthene	mg/kg	0.015	See B(a)P TPE	<0.015	1	1	0	<0.015	-	<0.015	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.01	See B(a)P TPE	<0.010	1	1	0	<0.010	-	<0.010	-	-	-
Benzo(k)fluoranthene	mg/kg	0.01	See B(a)P TPE	<0.010	1	1	0	<0.010	-	<0.010	-	-	-
Chrysene	mg/kg	0.01	See B(a)P TPE	<0.010	1	1	0	<0.010	-	<0.010	-	-	-
Dibenzo(a,h)anthracene	mg/kg	0.005	See B(a)P TPE	<0.0050	1	1	0	<0.0050	-	<0.0050	-	-	-
Fluorene	mg/kg	0.01	4300 ^a	<0.010	1	1	0	<0.010	-	<0.010	-	0	0
Fluoranthene	mg/kg	0.01	5600 ^a	<0.010	1	1	0	<0.010	-	<0.010	-	0	0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	See B(a)P TPE	<0.010	1	1	0	<0.010	-	<0.010	-	-	-
Naphthalene	mg/kg	0.01	3000 ^a	<0.010	1	1	0	<0.010	-	<0.010	-	0	0
Perylene	mg/kg	0.01	NGA	<0.010	1	1	0	<0.010	-	<0.010	-	-	-
Phenanthrene	mg/kg	0.01	41000 ^a	<0.010	1	1	0	<0.010	-	<0.010	-	0	0
Pyrene	mg/kg	0.01	3300 ^a	<0.010	1	1	0	<0.010	-	<0.010	-	0	0
Quinoline	mg/kg	0.01	1.8 ^d	<0.010	1	1	0	<0.010	-	<0.010	-	0	0
B(A)P TPE	mg/kg	0.02	5.3 ^{c,†}	0.0207	1	0	1	0.207	0.0207	0.0207	0.0207	0	0

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

^a Alberta Environmental Protection (AEP) (2024) Tier 1 Soil and Groundwater Remediation Guidelines. Appendix A, Table A-4 Surface Soil Remediation Guideline Values for Commercial Land Use, Direct Soil Contact.

^b MECP (2011) Soil Components for Table 3, Full Depth, Non-Potable Water Scenario, Coarse Textured Soil, Soil Contact S1 Risk; Residential land use.

^c Canadian Council of Ministers of the Environment (CCME). Canadian Environmental Quality Guidelines (CEQG): Soil Quality Guidelines for the Protection of Human Health. Commercial land use; Soil contact

^d US EPA (2024) Regional Screening Levels (RSL), Resident Soil table (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to

^e Guideline for individual methylnaphthalene isomers were not available, guideline is to be applied to the sum of 1- & 2-methylnaphthalene.

[†] Benzo(a)pyrene Total Potency Equivalents (B(a)P TPE) is the sum of estimated cancer potency relative to B(a)P TPE for all potentially carcinogenic unsubstituted PAHs. B(a)P TPE was calculated by multiplying the concentration of each PAH in the sample by the B(a)P TPE Potency Equivalence Factor (PEF) provided by the CCME (2010). Values have been rounded to three significant figures.



Table D-8: Analytical data for metals in surface water for the former Frenchvale mine site compared to human health-based surface water quality guidelines.

				Sample ID	SW1	SW3	SW4	SW5	SW6	SW7	SW8	SW9	SW10	SW11	SW12	SW13	SW14	SW15	SW16	
				Normal	Normal	Normal	Normal	Normal	QA/QC 03	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	
				Sample Type	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	25 DUP F	SW16
				Date	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025
				Human Health Surface Water Quality Guideline (SWQG _{HH})																
				Unit	EQL															
Calculated Parameters																				
Anions Total	meq/L	0.1	NGA	4.37	3.76	3.22	3.73	3.4	3.41	3.15	3.85	3.36	2.56	2.27	2.35	2.25	2.99	2.48	2.73	3.37
Cations Total	meq/L	0.1	NGA	4.54	3.8	3.26	3.91	3.54	3.47	3.25	4.42	3.5	2.67	2.28	2.35	2.22	3.06	2.73	2.7	3.47
Ionic Balance	%	0.01	NGA	104	101	101	105	104	102	103	115	104	104	100	100	98.7	102	110	98.9	103
Langelier Index (@ 20C)	N/A	0.01	NGA	0.867	0.26	0.197	0.223	0.24	0.389	-0.392	-0.034	0.061	-0.473	-0.429	-0.11	-0.286	0.353	0.006	-0.029	0.37
Langelier Index (@ 4C)	N/A	0.01	NGA	0.621	0.011	-0.051	-0.028	-0.009	0.142	-0.643	-0.285	-0.188	-0.724	-0.681	-0.362	-0.535	0.105	-0.243	-0.278	0.122
Saturation @ 4c	-	0.01	NGA	7.72	7.93	8.1	7.91	7.99	8	8.1	7.78	8.09	8.22	8.27	8.25	8.24	7.97	8.18	8.13	7.88
Saturation pH (@ 20C)	N/A	0.01	NGA	7.47	7.68	7.85	7.66	7.74	7.75	7.85	7.53	7.84	7.97	8.02	8	8	7.73	7.93	7.88	7.63
NA																				
Colour, Apparent	CU	2	NGA	3.6	6.6	3.4	8.1	4.1	5.7	4.6	73.8	<2.0	8	17.8	16.5	22.2	7.6	7.7	10.4	2.7
General Chemistry																				
Carbonate	mg/L	1	NGA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Alkalinity (total)	mg/L	1	NGA	167	127	109	126	119	120	106	157	111	89.3	90	91.6	91.7	134	90.1	103	153
Bicarbonate	mg/L	1	NGA	203	155	133	153	145	147	130	192	135	109	110	112	112	163	110	126	187
Hardness as CaCO3 (Measured)	mg/L	0.5	NGA	205	163	125	170	148	145	125	177	125	108	93.3	96	93.7	144	112	111	166
Ammonia as N	mg/L	0.005	NGA	0.0239	0.0089	0.0182	0.0061	0.0112	0.0079	0.0113	0.0233	0.0212	0.0124	0.0106	0.045	0.0066	0.0133	<0.0050	0.0075	<0.0050
Total Organic Carbon (TOC)	mg/L	0.5	NGA	1.98	2.37	1.74	2.75	1.46	1.98	1.5	9.11	1.28	2.86	3.07	2.72	3.92	1.54	1.23	1.08	<0.50
Ortho Phosphate as P (filtered)	mg/L	0.001	NGA	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Fluoride	mg/L	0.02	NGA	<0.020	0.025	0.045	0.026	0.039	0.037	0.041	0.053	0.053	0.026	0.05	0.048	0.044	0.032	0.051	0.05	0.034
Chloride	mg/L	0.5	NGA	22.6	30.1	26.2	29.1	25.4	25.4	26	19.8	29.9	18	11	11.7	9.49	6.24	14.6	14.6	6.15
Hydroxide	mg/L	1	NGA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrate (as N)	mg/L	0.02	NGA	0.586	<0.020	0.116	<0.020	0.092	0.092	0.126	<0.020	0.181	0.207	<0.020	<0.020	<0.020	<0.020	0.079	0.074	<0.020
Nitrite (as N)+C31	mg/L	0.01	NGA	<0.010	<0.010	<0.010	<0.010	0.012	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrite + Nitrate as N	mg/L	0.0224	NGA	0.586	<0.0224	0.116	<0.0224	0.104	0.103	0.126	<0.0224	0.181	0.207	<0.0224	<0.0224	<0.0224	0.079	0.074	<0.0224	<0.0224
pH (Lab)	pH Units	0.1	NGA	8.34	7.94	8.05	7.88	7.98	8.14	7.46	7.5	7.9	7.5	7.59	7.89	7.71	8.08	7.94	7.85	8
Electrical Conductivity (Lab)	µS/cm	1	NGA	419	374	324	379	336	338	317	373	333	256	216	222	210	274	263	259	310
Sulphate	mg/L	0.3	NGA	17.2	18.1	13.8	18.8	14	13.9	13.9	7.1	13.6	12.3	7.77	8.84	7.19	6.44	12.3	12.3	6.82
Total Dissolved Solids (TDS) - Measured	mg/L	20	NGA	240	224	180	229	192	195	166	209	188	148	128	132	96	144	142	139	163
Turbidity	NTU	0.1	NGA	<0.10	0.28	0.32	0.2	0.3	0.19	0.25	11.8	0.13	0.26	0.86	0.77	0.99	0.31	0.11	<0.10	<0.10
Metals																				
Aluminium	mg/L	0.003	2.9 ^a	0.0262	0.0102	0.0109	0.0165	0.0122	0.0085	0.0143	0.361	0.0117	0.0195	0.0734	0.029	0.0112	0.0366	0.008	0.0118	<0.0030
Antimony	mg/L	0.0001	0.006 ^a	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.0001	0.01 ^{a,ALARA}	0.00011	0.00014	0.00013	0.00013	0.00013	0.00011	0.00013	0.00043	0.00026	<0.00010	0.00015	0.00015	0.00017	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.0001	2.00 ^a	0.0151	0.00811	0.00959	0.0108	0.00747	0.00719	0.00949	0.0194	0.015	0.00657	0.00783	0.00722	0.0102	0.0498	0.006	0.00597	0.0644
Beryllium	mg/L	0.00002	0.005 ^b	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000025	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth	mg/L	0.00005	NGA	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.01	5 ^a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.000005	0.007 ^a	0.0000071	<0.0000050	<0.0000050	<0.0000050	0.0000056	<0.0000050	<0.0000050	0.0000203	<0.0000050	0.0000161	<0.0000050	<0.0000050	<0.0000050	0.0000152	<0.0000050	0.000005	0.0000219
Chromium (Total, III+VI)	mg/L	0.0005	0.05 ^a	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00064	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.0001	0.0012 ^b	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	0.00013	<0.00010	0.00057	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.0005	2 ^a	0.00099	0.00084	<0.00050	0.00091	<0.00050	<0.00050	0.00050	0.00229	<0.00050	0.00057	0.00095	0.00066	<0.00050	0.00054	0.00053	0.00056	0.00067
Iron	mg/L	0.01	2.8 ^b	0.025	0.056	0.132	0.036	0.296	0.262	0.115	7.22	0.014	0.013	0.546	0.221	0.331	0.041	<0.010	0.014	<0.010
Lead	mg/L	0.00005	0.005 ^{a,ALARA}	<0.000050	<0.000050	<0.000050	0.000063	<0.000050	<0.000050	<0.000050	0.000975	<0.000050	0.00009	0.00014	0.00006	0.000064	<0.000050	<0.000050	<0.000050	<0.000050
Magnesium	mg/L	0.005	NGA	18.2	14.6	11.4	14.6	13.1	13	11.3	15.1	11	9.38	7.92	8.1	8.02	14.9	8.97	8.85	18
Manganese	mg/L	0.0001	0.12 ^a	0.00706	0.0199	0.0466	0.00439	0.164	0.151	0.042	1.15	0.00539	0.00276	0.0859	0.072	0.101	0.00652	0.00188	0.0021	<0.0010
Mercury	mg/L	0.000005	0.001 ^a	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	-	-	-	-	-	-	-
Molybdenum	mg/L	0.00005</																		



Table D-8: Analytical data for metals in surface water for the former Frenchvale mine site compared to human health-based surface water quality guidelines.

			Human Health Surface Water Quality Guideline (SWQG _{H#})	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SWQG	Number of Non-Detects Above the SWQG
	Unit	EQL										
Calculated Parameters												
Anions Total	meq/L	0.1	NGA	17	0	17	2.25	2.25	4.37	4.37	-	-
Cations Total	meq/L	0.1	NGA	17	0	17	2.22	2.22	4.54	4.54	-	-
Ionic Balance	%	0.01	NGA	17	0	17	98.7	98.7	115	115	-	-
Langelier Index (@ 20C)	N/A	0.01	NGA	17	0	17	-0.473	-0.473	0.867	0.867	-	-
Langelier Index (@ 4C)	N/A	0.01	NGA	17	0	17	-0.724	-0.724	0.621	0.621	-	-
Saturation @ 4c	-	0.01	NGA	17	0	17	7.72	7.72	8.27	8.27	-	-
Saturation pH (@ 20C)	N/A	0.01	NGA	17	0	17	7.47	7.47	8.02	8.02	-	-
NA												
Colour, Apparent	CU	2	NGA	17	1	16	<2.0	2.7	73.8	73.8	-	-
General Chemistry												
Carbonate	mg/L	1	NGA	17	17	0	<1.0	-	<1.0	-	-	-
Alkalinity (total)	mg/L	1	NGA	17	0	17	89.3	89.3	167	167	-	-
Bicarbonate	mg/L	1	NGA	17	0	17	109	109	203	203	-	-
Hardness as CaCO3 (Measured)	mg/L	0.5	NGA	17	0	17	93.3	93.3	205	205	-	-
Ammonia as N	mg/L	0.005	NGA	17	2	15	<0.0050	0.0061	0.045	0.045	-	-
Total Organic Carbon (TOC)	mg/L	0.5	NGA	17	1	16	<0.50	1.08	9.11	9.11	-	-
Ortho Phosphate as P (filtered)	mg/L	0.001	NGA	17	16	1	<0.0010	0.0013	0.0013	0.0013	-	-
Fluoride	mg/L	0.02	NGA	17	1	16	<0.020	0.025	0.053	0.053	-	-
Chloride	mg/L	0.5	NGA	17	0	17	6.15	6.15	30.1	30.1	-	-
Hydroxide	mg/L	1	NGA	17	17	0	<1.0	-	<1.0	-	-	-
Nitrate (as N)	mg/L	0.02	NGA	17	8	9	<0.020	0.074	0.586	0.586	-	-
Nitrite (as N)+C31	mg/L	0.01	NGA	17	15	2	<0.010	0.011	0.012	0.012	-	-
Nitrite + Nitrate as N	mg/L	0.0224	NGA	17	8	9	<0.0224	0.074	0.586	0.586	-	-
pH (Lab)	pH Units	0.1	NGA	17	0	17	7.46	7.46	8.34	8.34	-	-
Electrical Conductivity (Lab)	µS/cm	1	NGA	17	0	17	210	210	419	419	-	-
Sulphate	mg/L	0.3	NGA	17	0	17	6.44	6.44	18.8	18.8	-	-
Total Dissolved Solids (TDS) - Measured	mg/L	20	NGA	17	0	17	96	96	240	240	-	-
Turbidity	NTU	0.1	NGA	17	3	14	<0.10	0.11	11.8	11.8	-	-
Metals												
Aluminium	mg/L	0.003	2.9 ^a	17	1	16	<0.0030	0.008	0.361	0.361	0	0
Antimony	mg/L	0.0001	0.006 ^a	17	17	0	<0.00010	-	<0.00010	-	0	0
Arsenic	mg/L	0.0001	0.01 ^{a, ALARA}	17	5	12	<0.00010	0.00011	0.00043	0.00043	0	0
Barium	mg/L	0.0001	2.00 ^a	17	0	17	0.00597	0.00597	0.0644	0.0644	0	0
Beryllium	mg/L	0.00002	0.005 ^b	17	16	1	<0.000020	0.000025	0.000025	0.000025	0	0
Bismuth	mg/L	0.00005	NGA	17	17	0	<0.000050	-	<0.000050	-	-	-
Boron	mg/L	0.01	5 ^a	17	17	0	<0.010	-	<0.010	-	0	0
Cadmium	mg/L	0.000005	0.007 ^a	17	10	7	<0.0000050	0.000005	0.0000219	0.0000219	0	0
Chromium (Total, III+VI)	mg/L	0.0005	0.05 ^a	17	16	1	<0.00050	0.00064	0.00064	0.00064	0	0
Cobalt	mg/L	0.0001	0.0012 ^b	17	14	3	<0.00010	0.00013	0.00057	0.00057	0	0
Copper	mg/L	0.0005	2 ^a	17	6	11	<0.00050	0.00053	0.00229	0.00229	0	0
Iron	mg/L	0.01	2.8 ^b	17	2	15	<0.010	0.013	7.22	7.22	1	0
Lead	mg/L	0.00005	0.005 ^{a, ALARA}	17	11	6	<0.000050	0.00006	0.000975	0.000975	0	0
Magnesium	mg/L	0.005	NGA	17	0	17	7.92	7.92	18.2	18.2	-	-
Manganese	mg/L	0.0001	0.12 ^a	17	1	16	<0.00010	0.00188	1.15	1.15	3	0
Mercury	mg/L	0.000005	0.001 ^a	10	10	0	<0.0000050	-	<0.0000050	-	0	0
Molybdenum	mg/L	0.00005	0.02 ^b	17	0	17	0.000306	0.000306	0.000667	0.000667	0	0
Nickel	mg/L	0.0005	0.078 ^b	17	16	1	<0.00050	0.00054	0.00054	0.00054	0	0
Silica (SiO2)	mg/L	0.21	NGA	17	0	17	2.22	2.22	9.5	9.5	-	-
Calcium Dissolved	mg/L	0.1	NGA	10	0	10	27.8	27.8	52	52	-	-
Calcium, Total	mg/L	0.1	NGA	7	0	7	24.3	24.3	36.6	36.6	-	-
Potassium	mg/L	0.05	NGA	17	0	17	0.534	0.534	1.22	1.22	-	-
Selenium	mg/L	0.00005	0.05 ^a	17	3	14	<0.000050	0.000052	0.000119	0.000119	0	0
Cesium	mg/L	0.00001	NGA	17	11	6	<0.000010	0.00001	0.000064	0.000064	-	-
Rubidium	mg/L	0.0002	NGA	17	0	17	0.00118	0.00118	0.00232	0.00232	-	-
Tellurium	mg/L	0.0002	NGA	17	17	0	<0.00020	-	<0.00020	-	-	-
Thorium	mg/L	0.0001	NGA	17	17	0	<0.00010	-	<0.00010	-	-	-
Tungsten	mg/L	0.0001	NGA	17	17	0	<0.00010	-	<0.00010	-	-	-
Lithium	mg/L	0.001	NGA	17	17	0	<0.0010	-	<0.0010	-	-	-
Silver	mg/L	0.00001	0.0188 ^b	17	17	0	<0.000010	-	<0.000010	-	0	0
Silicon	mg/L	0.1	NGA	17	0	17	1.04	1.04	4.44	4.44	-	-
Sodium	mg/L	0.05	200 ^{a, (AO)}	17	0	17	3.43	3.43	22.7	22.7	0	0
Strontium	mg/L	0.0002	7.0 ^a	17	0	17	0.0268	0.0268	0.0876	0.0876	0	0
Sulphur as S	mg/L	0.5	NGA	17	0	17	2.22	2.22	6.99	6.99	-	-
Titanium	mg/L	0.0003	NGA	17	13	4	<0.00050	0.00069	0.00912	0.00912	-	-
Thallium	mg/L	0.00001	0.00004 ^b	17	17	0	<0.000010	-	<0.000010	-	0	0
Tin	mg/L	0.0001	NGA	17	17	0	<0.00010	-	<0.00010	-	-	-
Uranium	mg/L	0.00001	0.02 ^a	17	0	17	0.000956	0.000956	0.00356	0.00356	0	0
Vanadium	mg/L	0.0005	0.0172 ^b	17	15	2	<0.00050	0.00051	0.0014	0.0014	0	0
Zinc	mg/L	0.003	1.2 ^b	17	13	4	<0.0030	0.0038	0.0068	0.0068	0	0
Zirconium	mg/L	0.0002	NGA	17	17	0	<0.00020	-	<0.00020	-	-	-
Phosphorus	mg/L	0.05	NGA	17	14	3	<0.050	0.05	0.151	0.151	-	-

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

ALARA = as low as reasonably achievable; AO - Aesthetic Objective

^a Health Canada Drinking Water Guidelines (March, 2025).
^b USEPA (2024) Regional Screening Levels (RSL) for tap water (HQ=1), November, 2024. For non-carcinogens, the original RSL has been divided by 5 to adjust from a target hazard quotient of 1.0 to a target hazard quotient of 0.2. For carcinogens, the original RSL was multiplied RSL by 10 to convert from a 1x10⁻⁶ to 1x 10⁻⁵ risk level.

Appendix E

Ecological Health Screening Tables



Table E-1: Analytical data for metals in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.

Table E-1: Analytical data for metals in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.					Location	BH1		BH2		BH3		BH4	BH5	BH6	BH7		BH8	BH9		
Sample ID	Depth	Sample Type	Date			BH1 (0-0.15m)	BH1 (0.30m)	BH2 (0-0.15m)	QAQC 01	BH3 (0-0.15m)	BH3 (0.34m)	BH4 (0-0.15m)	BH5 (0-0.15m)	BH6 (0-0.15m)	BH7	BH7 (0-0.15 m)	QAQC 02	BH8 (0-0.15m)	BH9 (0-0.15 m)	
						0-0.15m	0.30m	0-0.15m	0-0.15m	0-0.15m	0.34m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	
						Normal	Normal	Normal	Duplicate (BH2 (0-0.15m))	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Duplicate (BH7 0-0.15)	Normal	Normal	
						15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	17 Oct 2024	17 Oct 2024	15 Oct 2024	17 Oct 2024
	Unit	EQL	Ecological Health Soil Quality Guideline (SoQG _E)	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone																
Particle Size	%	1	NGA	-	-	-	-	-	-	-	-	-	-	-	75.5	-	-	-	-	
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	-	-	-	-	-	-	-	-	-	-	24.5	-	-	-	-	
Texture	N/A		NGA	-	-	-	-	-	-	-	-	-	-	-	Coarse	-	-	-	-	
Soluble Parameters																				
Soluble Magnesium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	<0.50	-	-	-	
Soluble Sodium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	<0.50	-	-	-	
Chloride (2:1)	ug/g	5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	<5.0	<5.0	-	-	
General Chemistry																				
Moisture Content	%	0.25	NGA	-	16.8	-	8.34	10.8	16.7	-	11.5	55.4	7.91	7.43	-	-	-	6.48	-	
pH (Lab)	pH Units	0.1	NGA	-	7.25	-	7.85	-	7	-	7.67	7	7.98	-	7.86	7.89	8.02	7.17		
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	113	-	123	-	153	-	146	403	100	-	94.5	94.4	95.9	229		
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	-	-	-	-	-	-	-	-	-	-	<0.10	<0.10	-	-		
Metals																				
Aluminium	mg/kg	50	NGA	28,000	20700	21900	6160	5470	25900	26400	12700	7920	6340	-	8580	7150	5160	8180		
Antimony	mg/kg	0.1	40 ^a	2	<0.10	<0.10	0.11	<0.10	1.34	1.84	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10		
Arsenic	mg/kg	0.1	26 ^b	16.8	2.52	2.7	2.66	1.71	2.82	2.86	2.11	1.78	1.47	-	1.88	1.65	1	1.2		
Barium	mg/kg	0.5	670 ^c	120	34.8	34.3	15.3	13	31.7	31.3	16.1	33.9	10.6	-	17.4	15.6	8.74	9.14		
Beryllium	mg/kg	0.1	8 ^a	1	0.74	0.77	0.28	0.26	0.82	0.85	0.77	0.44	0.31	-	0.44	0.34	0.31	0.41		
Boron	mg/kg	5	120 ^c	0.62	≤5.0	≤5.0	≤5.0	≤5.0	≤5.0	5.4	≤5.0	≤5.0	≤5.0	-	9.5	8.1	≤5.0	6.5		
Cadmium	mg/kg	0.02	1.9 ^c	0.4	0.286	0.181	0.696	0.589	0.287	0.208	0.302	0.373	0.42	-	0.429	0.358	0.088	0.109		
Chromium (Total, III+VI)	mg/kg	0.5	87 ^b	81	20.4	21.6	5.12	4.66	26.6	28.9	13.2	8.42	9.42	-	7.45	6.54	8.19	12		
Cobalt	mg/kg	0.1	80 ^c	26	12.2	12.5	4.68	4.37	14.8	16	7.57	4.65	4.23	-	7.74	6.6	3.27	4.46		
Copper	mg/kg	0.5	91 ^b	49	285	25.1	56.3	64.3	42.3	33.8	35.8	15.1	9.41	-	114	99.2	10.5	8.24		
Iron	mg/kg	50	NGA	52,000	26000	27600	6280	6180	26200	35700	16800	9570	9070	-	13300	9510	6220	7820		
Lead	mg/kg	0.5	32 ^c	84	20	14.4	36	34.8	38.9	41.5	34.8	27.4	58.3	-	23.5	22.6	7.28	7.08		
Manganese	mg/kg	1	220 ^d	4,340	585	613	553	510	565	560	702	824	655	-	934	870	638	664		
Mercury	mg/kg	0.005	20 ^c	0.121	0.025	0.0266	0.0204	0.0156	0.0268	0.0282	0.0075	0.0382	<0.0050	-	0.0189	0.0167	<0.0050	<0.0050		
Molybdenum	mg/kg	0.1	40 ^a	1.1	0.64	0.73	0.33	0.34	0.81	0.78	0.57	1.24	0.51	-	0.38	0.29	0.29	1.14		
Nickel	mg/kg	0.5	89 ^b	48	18.9	20.4	5.78	5.25	24.7	27.5	10.2	6.55	9.73	-	8.83	7.4	5.7	8.26		
Calcium Dissolved	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	1.32	-	-	-		
Selenium	mg/kg	0.2	2.9 ^b	0.8	0.26	0.26	<0.20	<0.20	0.48	0.46	<0.20	0.76	<0.20	-	<0.20	<0.20	<0.20	<0.20		
Silver	mg/kg	0.1	40 ^a	0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10		
Strontium	mg/kg	0.5	950 ^e	5.3	45.6	28.4	127	128	21.2	19.4	64.8	64.4	86.2	-	108	97.2	74.7	64.1		
Sulfur	mg/kg	1000	500 ^a	-	≤1000	≤1,000	≤1000	≤1000	≤1000	≤1,000	≤1000	1600	≤1000	-	≤1000	≤1000	≤1000	≤1000		
Thallium	mg/kg	0.05	3.6 ^b	0.4	0.124	0.107	0.073	0.07	0.132	0.122	0.1	0.074	0.077	-	0.095	0.077	0.089	0.096		
Tin	mg/kg	2	300 ^a	0.7	≤2.0	≤2.0	≤2.0	≤2.0	≤2.0	≤2.0	≤2.0	≤2.0	≤2.0	-	≤2.0	≤2.0	≤2.0	≤2.0		
Uranium	mg/kg	0.05	33 ^c	1.2	1.35	1.18	1.44	1.08	1.47	1.89	2.27	11.8	1.71	-	1.52	1.18	2.53	4.93		
Vanadium	mg/kg	0.2	18 ^c	86	46.4	49.2	13.2	12.4	55	59	29.8	17.1	15.2	-	22	18.1	12.3	16.3		
Zinc	mg/kg	2	340 ^c	270	631	428	199	191	382	223	133	86.2	175	-	141	127	34.8	51.4		

Notes

Shaded cells indicate an exceedance over the guideline.

Bold and Italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a Exceedance over regional background only as no guideline was available.

^a Alberta Environmental Protection (AEP) (2024) Tier 1 Soil and Groundwater Remediation Guidelines, Appendix A, Table A-4 surface soils, commercial land use, coarse-grained soil. Lowest of eco direct soil contact and protection of freshwater aquatic life guidelines.

^b CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion guidelines.

^c MECP. 2011. Soil Components for Table 3 - Full Depth, Non-potable Water Scenario. Commercial land use, coarse-grained soil. Lowest of the soil component values plants & soil organisms and mammals & birds.

^d US EPA. 2007. Manganese Eco-SSLs. Lowest of plants, soil invertebrates, avian and mammalian eco-SSLs.

^e State of Oregon, Department of Environmental Quality. 2020. Commercial land use, soil. Table 1a. Risk Based Concentrations for Plants, Invertebrates, and Wildlife Exposed to Soils. Ground feeding mammals guideline fo non-threatened species.

Table E-1: Analytical data for metals in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.

Location					BH10		BH11	BH12		BH13	BH14		BH15	BH16	BH17	BH18		BH19
Sample ID					BH10 (0-0.15m)	BH10 (1.0m)	BH11 (0.15m)	BH12 (0-0.15 m)	BH12 (0.47m)	BH13 (0-0.15 m)	BH14 (0-0.15 m)	BH14 (0.90m)	BH15 (0-0.15m)	BH16 (0-0.15m)	BH17 (0-0.15m)	BH18 (0-0.15m)	25DUPA	BH19 (0-0.15m)
Depth					0-0.15m	1.0m	0.15m	0-0.15m	0.47m	0-0.15m	0-0.15m	0.90m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m
Sample Type					Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Duplicate of BH18 0-0.15m	Normal
Date					15 Oct 2024	15 Oct 2024	15 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	14 Jan 2025	14 Jan 2025	14 Jan 2025	14 Jan 2025
	Unit	EQL	Ecological Health Soil Quality Guideline (SoQG _E)	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone														
Particle Size																		
% >75µm	%	1	NGA	-	-	-	-	-	-	64.8	-	-	-	-	-	-	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	-	-	-	-	-	35.2	-	-	-	-	-	-	-	-
Texture	N/A		NGA	-	-	-	-	-	-	Coarse	-	-	-	-	-	-	-	-
Soluble Parameters																		
Soluble Magnesium	mg/L	0.5	NGA	-	16.6	-	-	-	-	-	-	-	-	-	-	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	6.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	33.6	-	-	-	-	-	-	-	-	<5.0	-	-	-	-
General Chemistry																		
Moisture Content	%	0.25	NGA	-	-	-	-	35.4	-	28.1	15.7	-	57.5	-	-	-	-	-
pH (Lab)	pH Units	0.1	NGA	-	7.03	-	-	-	-	-	-	-	-	7.22	-	-	-	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	650	-	-	-	-	-	-	-	-	121	-	-	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	0.19	-	-	-	-	-	-	-	-	0.1	-	-	-	-
Metals																		
Aluminium	mg/kg	50	NGA	28,000	26300	23000	15200	17700	23700	9680	13600	16000	8200	15200	14100	14800	15400	21300
Antimony	mg/kg	0.1	40 ^a	2	<0.10	0.12	<0.10	0.17	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.16
Arsenic	mg/kg	0.1	26 ^b	16.8	3.51	3.36	2.57	2.86	3.28	2.1	2.12	2.56	1.66	2.03	3.28	2.56	2.46	3.99
Barium	mg/kg	0.5	670 ^c	120	63	46.4	18.8	28.8	40.4	15.6	25.7	29.5	18.1	17.3	13.1	25.1	28.4	58.6
Beryllium	mg/kg	0.1	8 ^a	1	1.8	1.65	0.8	1.08	0.93	0.47	0.76	0.7	0.4	0.95	0.94	0.65	0.71	1.86
Boron	mg/kg	5	120 ^c	0.62	<i>≤5.0</i>	7.4	7.7	8.1	7.7	7.5	9.7	10.3	10.7	6.8	5.7	10.5	11.3	14.6
Cadmium	mg/kg	0.02	1.9 ^c	0.4	0.995	0.788	0.282	0.402	0.249	0.239	1.05	1.16	0.414	0.155	0.092	0.864	0.911	0.334
Chromium (Total, III+VI)	mg/kg	0.5	87 ^b	81	19.7	20.8	13.4	15.1	28	9.35	11.6	14.2	7.08	9.71	8.91	12.3	13.2	14.4
Cobalt	mg/kg	0.1	80 ^c	26	10.6	10.2	8.96	13	16.4	6.58	11.4	16.4	7.24	8.68	7.82	13.6	13.7	15.3
Copper	mg/kg	0.5	91 ^b	49	43.8	34.4	46.2	53.8	79	56.2	194	360	106	24.5	18	288	272	61
Iron	mg/kg	50	NGA	52,000	20000	16900	18600	24300	31500	13200	16000	22700	10800	19600	23700	16400	16800	29400
Lead	mg/kg	0.5	32 ^c	84	28.3	30.4	23.2	26.2	18.9	20.2	50	84.6	20.8	9.48	4.97	65.3	66.8	14.1
Manganese	mg/kg	1	220 ^d	4,340	825	558	723	1390	854	869	1210	1620	1020	686	451	1490	1580	3250
Mercury	mg/kg	0.005	20 ^c	0.121	0.125	0.0741	0.0113	0.0295	0.0397	0.0135	0.0291	0.0428	0.0165	0.0095	0.005	0.0465	0.036	0.239
Molybdenum	mg/kg	0.1	40 ^a	1.1	1.53	1.72	0.8	0.76	1.32	0.5	0.49	0.4	0.34	0.39	0.32	0.36	0.38	0.8
Nickel	mg/kg	0.5	89 ^b	48	18	17.8	13.2	18	25.6	8.17	15.1	22	8.15	10.4	10.3	18.8	19.6	20.5
Calcium Dissolved	mg/L	0.5	NGA	-	49.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.2	2.9 ^b	0.8	2.92	2.29	<0.20	0.36	0.44	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.36
Silver	mg/kg	0.1	40 ^a	0.5	0.14	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	0.14	<0.10	<0.10	<0.10	0.12	<0.10	0.11
Strontium	mg/kg	0.5	950 ^e	5.3	32.1	35.4	59.9	35.9	33.4	78	102	94.2	109	52.2	24.4	90.1	92.9	85.1
Sulfur	mg/kg	1000	500 ^a	-	2500	4600	<1,000	<1000	<1,000	<1000	<1000	1600	<1000	<1000	<1,000	<1,000	<1,000	<1,000
Thallium	mg/kg	0.05	3.6 ^b	0.4	0.243	0.24	0.086	0.14	0.144	0.078	0.141	0.188	0.088	0.099	0.062	0.163	0.172	0.207
Tin	mg/kg	2	300 ^a	0.7	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>	<i>≤2.0</i>
Uranium	mg/kg	0.05	33 ^c	1.2	32	29.6	1.72	5.31	2.75	1.43	1.08	1.17	1.57	1.76	1.63	1.13	1.22	3.9
Vanadium	mg/kg	0.2	18 ^c	86	39.9	39.1	30.2	40.6	57.9	22.2	27	33.4	19.4	35.6	34.4	29.7	32.4	49.8
Zinc	mg/kg	2	340 ^c	270	119	128	101	87.4	100	94.5	253	467	139	57.5	42.9	353	356	90.7

Notes

 Shaded cells indicate an exceedance over the guideline.

Bold and Italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a Exceedance over regional background only as no guideline was available.

^a Alberta Environmental Protection (AEP) (2024) Tier 1 Soil and Groundwater Remediation Guidelines, Appendix A, Table A-4 surface soils, commercial land use, coarse-grained soil. Lowest of eco direct soil contact and protection of freshwater aquatic life guidelines.

^b CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion guidelines.

^c MECP. 2011. Soil Components for Table 3 - Full Depth, Non-potable Water Scenario. Commercial land use, coarse-grained soil. Lowest of the soil component values plants & soil organisms and mammals & birds.

^d US EPA. 2007. Manganese Eco-SSLs. Lowest of plants, soil invertebrates, avian and mammalian eco-SSLs.

^e State of Oregon, Department of Environmental Quality. 2020. Commercial land use, soil. Table 1a. Risk Based Concentrations for Plants, Invertebrates, and Wildlife Exposed to Soils. Ground feeding mammals guideline fo non-threatened species.

Table E-1: Analytical data for metals in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.

Location					BH20		BH21		BH22		BH23				BH24		BH25	
Sample ID					BH20 0-0.15m	BH20 0.5m	BH21 0-0.15m	BH21 0.5m	BH22 0-0.15m	BH22 0.5m	BH23 0-0.5m	BH23 0-0.15m	BH23 0.5m	25DUP B	BH24 0-0.15m	BH24 0.5m	BH25 0-0.15m	BH25 0.44 m
Depth					0-0.15m	0.50m	0-0.15m	0.5m	0-0.15m		0-0.15m	0-0.15m	0.5m	0.5m	0-0.15m	0.5m	0-0.15m	0.44m
Sample Type					Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Date					02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025
	Unit	EQL	Ecological Health Soil Quality Guideline (SoQG _E)	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone														
Particle Size																		
% >75µm	%	1	NGA	-	-	-	-	-	-	-	56.6	-	56.6	-	-	-	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	-	-	-	-	-	-	43.4	-	43.4	-	-	-	-	-
Texture	N/A		NGA	-	-	-	-	-	-	-	Coarse	-	Coarse	-	-	-	-	-
Soluble Parameters																		
Soluble Magnesium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
General Chemistry																		
Moisture Content	%	0.25	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1	NGA	-	3.9	4.29	4.03	4.78	5.24	5.21	-	4.79	4.84	4.91	4.68	4.99	4.34	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Aluminium	mg/kg	50	NGA	28,000	10800	25800	9230	21000	21400	19600	-	21500	22700	20800	22600	29500	18100	33300
Antimony	mg/kg	0.1	40 ^a	2	0.26	0.1	0.17	<0.10	0.12	<0.10	-	0.13	<0.10	0.13	0.14	<0.10	0.21	0.16
Arsenic	mg/kg	0.1	26 ^b	16.8	2.82	2.42	2.93	2.05	2.79	2.08	-	2.51	2.24	2.79	2.32	1.98	2.85	2.68
Barium	mg/kg	0.5	670 ^c	120	46.3	46.7	27.3	20.5	40.2	29.4	-	37.8	30.9	35.8	42.6	35.4	33.9	40.2
Beryllium	mg/kg	0.1	8 ^a	1	0.15	0.46	0.23	0.5	0.5	0.43	-	0.45	0.56	0.45	0.47	0.75	0.31	0.61
Boron	mg/kg	5	120 ^c	0.62	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium	mg/kg	0.02	1.9 ^c	0.4	0.112	0.145	0.255	0.115	0.154	0.14	-	0.235	0.177	0.219	0.116	0.141	0.146	0.155
Chromium (Total, III+VI)	mg/kg	0.5	87 ^b	81	10.3	18.6	7.96	18	15.9	15.3	-	19.4	23.9	18.5	22.5	28	15.8	24.5
Cobalt	mg/kg	0.1	80 ^c	26	3.17	10	3.32	9.94	8.43	7.77	-	11.2	14.2	11.3	9.58	15.2	5.33	12.5
Copper	mg/kg	0.5	91 ^b	49	9.33	17.3	8.16	9.68	14	11.2	-	16	19.3	15.2	13.3	14.7	6.48	8.16
Iron	mg/kg	50	NGA	52,000	19100	31800	15600	23900	31200	29200	-	30400	29900	28700	32400	33200	27600	34400
Lead	mg/kg	0.5	32 ^c	84	34.9	13.3	23	15.5	17.5	14.9	-	19.8	14.8	18	15.1	11.6	15.5	10.4
Manganese	mg/kg	1	220 ^d	4,340	139	375	104	348	400	365	-	566	525	524	334	336	335	460
Mercury	mg/kg	0.005	20 ^c	0.121	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	0.1	40 ^a	1.1	0.55	0.54	0.96	0.87	1.26	1.52	-	1.02	0.87	0.99	1.14	0.74	0.65	0.68
Nickel	mg/kg	0.5	89 ^b	48	5.46	15.1	4.78	14.3	12.8	9.94	-	15	19	13.9	16.6	27.3	7.63	19.1
Calcium Dissolved	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.2	2.9 ^b	0.8	0.72	0.63	1.09	0.43	0.5	0.37	-	0.5	0.34	0.44	0.5	0.48	0.64	0.58
Silver	mg/kg	0.1	40 ^a	0.5	0.16	<0.10	0.11	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Strontium	mg/kg	0.5	950 ^e	5.3	11.1	18.4	14	17.9	22.2	19	-	18.8	21.8	17.9	16	13.8	9.48	10.8
Sulfur	mg/kg	1000	500 ^a	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000
Thallium	mg/kg	0.05	3.6 ^b	0.4	0.088	0.088	0.074	0.062	0.108	0.09	-	0.124	0.097	0.116	0.128	0.111	0.103	0.084
Tin	mg/kg	2	300 ^a	0.7	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	mg/kg	0.05	33 ^c	1.2	0.666	0.869	0.64	0.801	1.86	1.53	-	1.2	1.57	1.16	0.93	1.34	0.977	0.904
Vanadium	mg/kg	0.2	18 ^c	86	51.6	59.9	39.3	47.6	63.1	64.1	-	62.6	61.2	61.4	59.2	54.1	64.6	62.8
Zinc	mg/kg	2	340 ^c	270	30.3	68.4	34.6	66.1	85.2	71.7	-	125	78.3	117	104	111	68	122

Notes

Shaded cells indicate an exceedance over the guideline.

Bold and Italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a Exceedance over regional background only as no guideline was available.

^a Alberta Environmental Protection (AEP) (2024) Tier 1 Soil and Groundwater Remediation Guidelines, Appendix A, Table A-4 surface soils, commercial land use, coarse-grained soil. Lowest of eco direct soil contact and protection of freshwater aquatic life guidelines.

^b CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion guidelines.

^c MECP. 2011. Soil Components for Table 3 - Full Depth, Non-potable Water Scenario. Commercial land use, coarse-grained soil. Lowest of the soil component values plants & soil organisms and mammals & birds.

^d US EPA. 2007. Manganese Eco-SSLs. Lowest of plants, soil invertebrates, avian and mammalian eco-SSLs.

^e State of Oregon, Department of Environmental Quality. 2020. Commercial land use, soil. Table 1a. Risk Based Concentrations for Plants, Invertebrates, and Wildlife Exposed to Soils. Ground feeding mammals guideline fo non-threatened species.

Table E-1: Analytical data for metals in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.

Location					BH26	BH27	BH28	BH29		BH30	BH31	BH32		BH33	BH34	BH35	BH36	BH37
Sample ID					BH26 0-0.15m	BH27 0-0.15m	BH28 0-0.15m	BH29 0-0.15m	25DUP C	BH30 0-0.15m	BH31 0-0.15m	BH32 0-0.15m	25DUP D	BH33 0-0.15m	BH34 0-0.15m	BH35 0-0.15m	BH36 0-0.15m	BH37 0-0.15m
Depth					0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m
Sample Type					Normal	Normal	Normal	Normal	Duplicate of BH29 (0-0.15m)	Normal	Normal	Normal	Duplicate of BH32 (0-0.15m)	Normal	Normal	Normal	Normal	Normal
Date					02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	02 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025
	Unit	EQL	Ecological Health Soil Quality Guideline (SoQG _E)	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone														
Particle Size																		
% >75µm	%	1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texture	N/A		NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soluble Parameters																		
Soluble Magnesium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
General Chemistry																		
Moisture Content	%	0.25	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1	NGA	-	7.37	-	-	4.64	-	-	-	7.53	7.49	-	-	6.91	-	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Aluminium	mg/kg	50	NGA	28,000	10300	16800	9830	24200	24500	22900	9980	11300	11400	34200	21100	20600	21000	15300
Antimony	mg/kg	0.1	40 ^a	2	<0.10	<0.10	<0.10	0.13	0.12	0.14	<0.10	<0.10	<0.10	0.17	0.16	0.13	0.1	<0.10
Arsenic	mg/kg	0.1	26 ^b	16.8	1.81	2.42	2.34	2.49	2.53	2.73	1.66	1.43	1.26	6.82	4.03	3.1	3.24	2.62
Barium	mg/kg	0.5	670 ^c	120	15	28.5	19.9	31.5	32.4	51.9	15.5	13.6	12.5	106	45	43.9	40.2	31.6
Beryllium	mg/kg	0.1	8 ^a	1	0.54	0.8	0.35	0.55	0.51	0.5	0.42	0.68	0.64	1.69	1.3	0.8	0.64	1.25
Boron	mg/kg	5	120 ^c	0.62	7.5	9.7	9.1	<5.0	<5.0	<5.0	9.1	14.1	12.8	7.6	6.7	5.2	6.6	11.3
Cadmium	mg/kg	0.02	1.9 ^c	0.4	0.18	0.243	0.828	0.118	0.129	0.226	0.394	0.372	0.336	1.16	1.04	0.197	0.343	0.307
Chromium (Total, III+VI)	mg/kg	0.5	87 ^b	81	10.2	14.6	10.5	14.8	16.2	15.6	9.97	10.2	9.97	28.1	17.1	16.2	23.4	11.1
Cobalt	mg/kg	0.1	80 ^c	26	7.34	15.3	12.9	7.62	7.63	6.39	6.16	6.78	5.71	20.8	8.74	11.9	15.7	11.9
Copper	mg/kg	0.5	91 ^b	49	60.4	227	453	9.46	9.62	11.2	28	32.9	60.8	107	41.2	18.6	134	128
Iron	mg/kg	50	NGA	52,000	14800	22500	10800	27900	28200	26200	13500	19000	14500	40000	15900	26700	29700	22400
Lead	mg/kg	0.5	32 ^c	84	15.6	15.9	37.1	15.8	14.7	14.1	42.3	45.8	41.6	50.3	36.2	13	23	25.2
Manganese	mg/kg	1	220 ^d	4,340	625	729	954	391	376	315	664	648	621	2080	462	849	733	1580
Mercury	mg/kg	0.005	20 ^c	0.121	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	0.1	40 ^a	1.1	0.53	0.52	0.28	0.7	0.64	0.89	0.51	0.38	0.32	2.77	3.05	0.82	0.68	0.62
Nickel	mg/kg	0.5	89 ^b	48	9.74	24.3	8.15	9.98	10.3	10.4	8.3	10.9	10.4	28.8	16.2	14.3	22.2	12.8
Calcium Dissolved	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.2	2.9 ^b	0.8	<0.20	<0.20	<0.20	0.61	0.67	0.64	<0.20	<0.20	<0.20	2.64	3.4	0.26	0.34	<0.20
Silver	mg/kg	0.1	40 ^a	0.5	<0.10	<0.10	0.11	<0.10	<0.10	0.1	<0.10	<0.10	<0.10	0.19	0.12	<0.10	<0.10	<0.10
Strontium	mg/kg	0.5	950 ^e	5.3	66.3	50.2	126	14.4	12.3	16	84.4	89	82.6	19.5	30.1	22.3	24.3	81.2
Sulfur	mg/kg	1000	500 ^a	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	1200	5800	<1,000	<1,000	<1,000
Thallium	mg/kg	0.05	3.6 ^b	0.4	0.085	0.131	0.101	0.111	0.107	0.113	0.083	0.116	0.11	0.377	0.246	0.118	0.139	0.134
Tin	mg/kg	2	300 ^a	0.7	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	mg/kg	0.05	33 ^c	1.2	1.54	1.56	0.839	1.06	1.08	1.21	1.41	1.64	2.09	32.9	28.5	2.08	1.47	1.92
Vanadium	mg/kg	0.2	18 ^c	86	23.2	35.7	20.6	54.5	55.2	51.8	23.1	21.1	18.7	60.5	37.3	48.4	53.5	40.8
Zinc	mg/kg	2	340 ^c	270	75.9	83.7	318	59.9	61.5	74.6	149	143	132	223	132	69.6	124	115

Notes

Shaded cells indicate an exceedance over the guideline.

Bold and Italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a Exceedance over regional background only as no guideline was available.

^a Alberta Environmental Protection (AEP) (2024) Tier 1 Soil and Groundwater Remediation Guidelines, Appendix A, Table A-4 surface soils, commercial land use, coarse-grained soil. Lowest of eco direct soil contact and protection of freshwater aquatic life guidelines.

^b CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion guidelines.

^c MECP. 2011. Soil Components for Table 3 - Full Depth, Non-potable Water Scenario. Commercial land use, coarse-grained soil. Lowest of the soil component values plants & soil organisms and mammals & birds.

^d US EPA. 2007. Manganese Eco-SSLs. Lowest of plants, soil invertebrates, avian and mammalian eco-SSLs.

^e State of Oregon, Department of Environmental Quality. 2020. Commercial land use, soil. Table 1a. Risk Based Concentrations for Plants, Invertebrates, and Wildlife Exposed to Soils. Ground feeding mammals guideline fo non-threatened species.

Table E-1: Analytical data for metals in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.

Table E-1: Analytical data for metals in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.					Location	BH38	BH41		BH42	BH43	BH44	BH45	BH46	BH47
	Sample ID					BH38 0-0.15m	BH41 1.5m	25DUP G	BH42 0.45m	BH43 0-0.15m	BH44 0-0.15m	BH45 0-0.15m	BH46 0.70m	BH47 1.35m
	Depth					0-0.15m	1.5m	1.5m	0.45m	0-0.15m	0-0.15m	0-0.15m	0.70m	1.35m
	Sample Type					Normal	Normal	Duplicate of BH41 (1.5m)	Normal	Normal	Normal	Normal	Normal	Normal
	Date					02 Jun 2025	04 Jun 2025	04 Jun 2025	04 Jun 2025	03 Jun 2025	04 Jun 2025	04 Jun 2025	04 Jun 2025	04 Jun 2025
			Ecological Health Soil Quality Guideline (SoQG _E)	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone										
	Unit	EQL												
Particle Size														
% >75µm	%	1	NGA	-	47.4	-	-	-	-	-	-	-	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	52.6	-	-	-	-	-	-	-	-	-
Texture	N/A		NGA	-	Fine	-	-	-	-	-	-	-	-	-
Soluble Parameters														
Soluble Magnesium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	-	-	-	-	-	-	-	-	-	-
General Chemistry														
Moisture Content	%	0.25	NGA	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1	NGA	-	-	-	-	-	-	-	-	-	-	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	-	-	-	-	-	-	-	-	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	-	-	-	-	-	-	-	-	-	-
Metals														
Aluminium	mg/kg	50	NGA	28,000	25600	29100	30300	22000	19000	36100	8960	21800	13500	
Antimony	mg/kg	0.1	40 ^a	2	0.17	0.1	0.12	0.12	0.12	1.86	5.75	0.1	<0.10	
Arsenic	mg/kg	0.1	26 ^b	16.8	4.96	3.42	3.56	3.47	2.64	4.17	65.2	3	2.7	
Barium	mg/kg	0.5	670 ^c	120	42.4	60.7	62	43	48.8	125	266	36.5	22.8	
Beryllium	mg/kg	0.1	8 ^a	1	0.51	1.76	1.73	2.02	0.73	1.32	0.21	0.7	0.77	
Boron	mg/kg	5	120 ^c	0.62	≤5.0	6.4	7.5	15.3	5.3	≤5.0	8.6	6.3	10.5	
Cadmium	mg/kg	0.02	1.9 ^c	0.4	0.196	0.841	0.907	0.326	0.203	0.434	21.6	0.315	0.639	
Chromium (Total, III+VI)	mg/kg	0.5	87 ^b	81	21.7	21.9	23.5	15.6	15	18.9	89.8	21.2	12.1	
Cobalt	mg/kg	0.1	80 ^c	26	8.62	11.5	11.7	15.4	10.8	15.7	29.9	20.5	12.8	
Copper	mg/kg	0.5	91 ^b	49	15.1	44	44.9	97	16.8	19.2	141	80.7	172	
Iron	mg/kg	50	NGA	52,000	31300	19300	20200	30200	24800	38200	330000	32300	19400	
Lead	mg/kg	0.5	32 ^c	84	20.7	25.7	27.8	7.92	11.7	362	596	25.6	42.2	
Manganese	mg/kg	1	220 ^d	4,340	366	538	584	2850	847	1350	1320	717	780	
Mercury	mg/kg	0.005	20 ^c	0.121	-	-	-	-	-	-	-	-	-	
Molybdenum	mg/kg	0.1	40 ^a	1.1	0.71	1.85	1.89	1.56	0.75	1.82	15.4	0.74	0.78	
Nickel	mg/kg	0.5	89 ^b	48	14.9	19.4	20.4	18.5	12.6	19.2	718	24.2	14.4	
Calcium Dissolved	mg/L	0.5	NGA	-	-	-	-	-	-	-	-	-	-	
Selenium	mg/kg	0.2	2.9 ^b	0.8	0.74	2.52	2.71	<0.20	0.28	1.24	0.46	0.43	<0.20	
Silver	mg/kg	0.1	40 ^a	0.5	0.11	0.11	0.11	<0.10	<0.10	0.24	0.13	0.46	0.13	
Strontium	mg/kg	0.5	950 ^e	5.3	10.3	27	29.9	90.2	23.4	23.7	17.9	38.3	84.1	
Sulfur	mg/kg	1000	500 ^a	-	≤1,000	4000	4100	≤1,000	≤1,000	≤1,000	≤1,000	≤1,000	1500	
Thallium	mg/kg	0.05	3.6 ^b	0.4	0.119	0.236	0.248	0.179	0.114	0.183	0.055	0.131	0.164	
Tin	mg/kg	2	300 ^a	0.7	≤2.0	≤2.0	≤2.0	≤2.0	≤2.0	59.2	8.8	≤2.0	≤2.0	
Uranium	mg/kg	0.05	33 ^c	1.2	2.54	36	35.8	2.6	1.93	2.01	0.399	2.41	2.97	
Vanadium	mg/kg	0.2	18 ^c	86	59.2	43.4	46.7	46.5	45.6	43.8	23.1	48.3	29	
Zinc	mg/kg	2	340 ^c	270	90.8	128	140	83.2	68.7	159	2140	100	250	

Notes

Shaded cells indicate an exceedance over the guideline.

Bold and Italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

^a Exceedance over regional background only as no guideline was available.

^a Alberta Environmental Protection (AEP) (2024) Tier 1 Soil and Groundwater Remediation Guidelines, Appendix A, Table A-4 surface soils, commercial land use, coarse-grained soil. Lowest of eco direct soil contact and protection of freshwater aquatic life guidelines.

^b CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion guidelines.

^c MECP. 2011. Soil Components for Table 3 - Full Depth, Non-potable Water Scenario. Commercial land use, coarse-grained soil. Lowest of the soil component values plants & soil organisms and mammals & birds.

^d US EPA. 2007. Manganese Eco-SSLs. Lowest of plants, soil invertebrates, avian and mammalian eco-SSLs.

^e State of Oregon, Department of Environmental Quality. 2020. Commercial land use, soil. Table 1a. Risk Based Concentrations for Plants, Invertebrates, and Wildlife Exposed to Soils. Ground feeding mammals guideline fo non-threatened species.

Table E-1: Analytical data for metals in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.

					Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SoQG and Regional Background Concentration	Number of Non-Detects Above the SQG
	Unit	EQL	Ecological Health Soil Quality Guideline (SoQG _E)	Environment Canada's Background Soil Database Maximum Concentration for Highlands Soil Zone									
Particle Size													
% >75µm	%	1	NGA	-	5	0	5	47.4	47.4	75.5	75.5	-	-
Sieve Analysis - 75 µm (passing)	%	1	NGA	-	5	0	5	24.5	24.5	52.6	52.6	-	-
Texture	N/A		NGA	-	5	0	0	0	-	-	-	-	-
Soluble Parameters													
Soluble Magnesium	mg/L	0.5	NGA	-	2	1	1	<0.50	16.6	16.6	16.6	-	-
Soluble Sodium	mg/L	0.5	NGA	-	2	1	1	<0.50	6.2	6.2	6.2	-	-
Chloride (2:1)	ug/g	5	NGA	-	4	3	1	<5.0	33.6	33.6	33.6	-	-
General Chemistry													
Moisture Content	%	0.25	NGA	-	13	0	13	6.48	6.48	57.5	57.5	-	-
pH (Lab)	pH Units	0.1	NGA	-	29	0	29	3.9	3.9	8.02	8.02	-	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	12	0	12	94.4	94.4	650	650	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	4	2	2	<0.10	0.1	0.19	0.19	-	-
Metals													
Aluminium	mg/kg	50	NGA	28,000	63	0	63	5160	5160	36100	36100	6*	-
Antimony	mg/kg	0.1	40 ^a	2	63	33	30	<0.10	0.1	5.75	5.75	0	0
Arsenic	mg/kg	0.1	26 ^b	16.8	63	0	63	1	1	65.2	65.2	1	0
Barium	mg/kg	0.5	670 ^c	120	63	0	63	8.74	8.74	266	266	0	0
Beryllium	mg/kg	0.1	8 ^a	1	63	0	63	0.15	0.15	2.02	2.02	0	0
Boron	mg/kg	5	120 ^c	0.62	63	28	35	<5.0	5.2	15.3	15.3	0	0
Cadmium	mg/kg	0.02	1.9 ^c	0.4	63	0	63	0.088	0.088	21.6	21.6	1	0
Chromium (Total, III+VI)	mg/kg	0.5	87 ^b	81	63	0	63	4.66	4.66	89.8	89.8	1	0
Cobalt	mg/kg	0.1	80 ^c	26	63	0	63	3.17	3.17	29.9	29.9	0	0
Copper	mg/kg	0.5	91 ^b	49	63	0	63	6.48	6.48	453	453	16	0
Iron	mg/kg	50	NGA	52,000	63	0	63	6180	6180	330000	330000	1*	-
Lead	mg/kg	0.5	32 ^c	84	63	0	63	4.97	4.97	596	596	3	0
Manganese	mg/kg	1	220 ^d	4,340	63	0	63	104	104	3250	3250	0	0
Mercury	mg/kg	0.005	20 ^c	0.121	27	3	24	<0.0050	0.005	0.239	0.239	0	0
Molybdenum	mg/kg	0.1	40 ^a	1.1	63	0	63	0.28	0.28	15.4	15.4	0	0
Nickel	mg/kg	0.5	89 ^b	48	63	0	63	4.78	4.78	718	718	1	0
Calcium Dissolved	mg/L	0.5	NGA	-	2	0	2	1.32	1.32	49.4	49.4	-	-
Selenium	mg/kg	0.2	2.9 ^b	0.8	63	26	37	<0.20	0.26	3.4	3.4	2	0
Silver	mg/kg	0.1	40 ^a	0.5	63	45	18	<0.10	0.1	0.46	0.46	0	0
Strontium	mg/kg	0.5	950 ^e	5.3	63	0	63	9.48	9.48	128	128	0	0
Sulfur	mg/kg	1000	500 ^a	-	63	54	9	<1000	1200	5800	5800	9	54
Thallium	mg/kg	0.05	3.6 ^b	0.4	63	0	63	0.055	0.055	0.377	0.377	0	0
Tin	mg/kg	2	300 ^a	0.7	63	61	2	<2.0	8.8	59.2	59.2	0	0
Uranium	mg/kg	0.05	33 ^c	1.2	63	0	63	0.399	0.399	36	36	2	0
Vanadium	mg/kg	0.2	18 ^c	86	63	0	63	12.3	12.3	64.6	64.6	0	0
Zinc	mg/kg	2	340 ^c	270	63	0	63	30.3	30.3	2140	2140	7	0

Notes

Shaded cells indicate an exceedance over the guideline.

Bold and Italicized values indicate an exceedance over the regional background concentration.

NGA = No Guideline Available

* Exceedance over regional background only as no guideline was available.

^a Alberta Environmental Protection (AEP) (2024) Tier 1 Soil and Groundwater Remediation Guidelines, Appendix A, Table A-4 surface soils, commercial land use, coarse-grained soil. Lowest of eco direct soil contact and protection of freshwater aquatic life guidelines.

^b CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion guidelines.

^c MECP. 2011. Soil Components for Table 3 - Full Depth, Non-potable Water Scenario. Commercial land use, coarse-grained soil. Lowest of the soil component values plants & soil organisms and mammals & birds.

^d US EPA. 2007. Manganese Eco-SSLs. Lowest of plants, soil invertebrates, avian and mammalian eco-SSLs.

^e State of Oregon, Department of Environmental Quality. 2020. Commercial land use, soil. Table 1a. Risk Based Concentrations for Plants, Invertebrates, and Wildlife Exposed to Soils. Ground feeding mammals guideline fo non-threatened species.



Table E-2: Analytical data for BTEX and PHCs in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.

			Field ID	BH1 (0-0.15m)	BH2 (0-0.15m)		BH3 (0-0.15m)	BH4 (0-0.15m)	BH5 (0-0.15m)	BH12 (0-0.15m)	BH13 (0-0.15m)	BH14 (0-0.15m)	BH15 (0-0.15m)	BH44 (0-0.15m)	BH45 (0-0.15m)
			Sample Type	Normal	Normal	QAQC 01 Duplicate BH2 (0-0.15m)	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
			Depth	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m
			Date	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	04 Jun 2024	04 Jun 2024
	Unit	EQL	Ecological Health Soil Quality Guideline (SoQG _e)												
BTEX															
Benzene	mg/kg	0.005	180 ^a	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0057	<0.0050	<0.0050	<0.0050	<0.0088	<0.0050	<0.0050
Toluene	mg/kg	0.05	250 ^a	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ethylbenzene	mg/kg	0.015	300 ^a	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.022	<0.010	<0.010
Xylene Total	mg/kg	0.05	350 ^a	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Petroleum Hydrocarbons (PHCs)															
VPH (C6-C10 - BTEX)	mg/kg	5	320 ^b	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.5	<2.5
EPH >C10-C16	mg/kg	5	260 ^b	<5.0	<5.0	<5.0	<5.0	<5.0	11	<5.0	<5.0	<5.0	<5.0	<10	<10
EPH >C16-C21	mg/kg	5	1700 ^b	<5.0	<5.0	<5.0	17	<5.0	12	13	12	<5.0	9	41	25
EPH >C21-C32	mg/kg	5	1700 ^b	18	<5.0	<5.0	90	8	136	46	108	29	95	150	170
Modified TPH (Tier 1)	mg/kg	10	NGA	18***	<10	<10	107	<10	158***	58***	120***	29***	104***	190**	190**
EPH >C34-C50	mg/kg	20	3300 ^b	25	<20	<20	76	21	312	86	138	50	106	-	-
Reached Baseline at C32	-		NGA	No	Yes	Yes	No	No	No	No	No	No	No	Yes	Yes
Hydrocarbon Resemblance	none		NGA	LOF	N/A	N/A	NR	LOF	LOF	LOF	LOF	LOF	LOF	ound in Fuel/Lube R	ound in Fuel/Lube R

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

LOF = Lube Oil Fraction; RES = Residual PHC formation. Calculated value exceeds 30,000 mg/kg and solubility for PHC fraction.

^a CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion guidelines.

^b CCME. 2008. Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale - Supporting Techni

*** Modified TPH (Lube Oil)



Table E-2: Analytical data for BTEX and PHCs in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.

				Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SQG	Number of Non-Detects Above the SQG
	Unit	EQL	Ecological Health Soil Quality Guideline (SoQG _e)									
BTEX												
Benzene	mg/kg	0.005	180 ^a	12	12	0	<0.0050	-	<0.0050	-	0	0
Toluene	mg/kg	0.05	250 ^a	12	12	0	<0.050	-	<0.050	-	0	0
Ethylbenzene	mg/kg	0.015	300 ^a	12	12	0	<0.015	-	<0.015	-	0	0
Xylene Total	mg/kg	0.05	350 ^a	12	12	0	<0.050	-	<0.050	-	0	0
Petroleum Hydrocarbons (PHCs)												
VPH (C6-C10 - BTEX)	mg/kg	5	320 ^b	12	12	0	<5.0	-	<5.0	-	0	0
EPH >C10-C16	mg/kg	5	260 ^b	12	11	1	<5.0	11	11	11	0	0
EPH >C16-C21	mg/kg	5	1700 ^b	12	5	7	<5.0	9	41	41	0	0
EPH >C21-C32	mg/kg	5	1700 ^b	12	2	10	<5.0	8	170	170	0	0
Modified TPH (Tier 1)	mg/kg	10	NGA	12	3	1	<10	107	107	107	-	-
EPH >C34-C50	mg/kg	20	3300 ^b	10	2	8	<20	21	312	312	0	0
Reached Baseline at C32	-		NGA	12	0	0	0	-	-	-	-	-
Hydrocarbon Resemblance	none		NGA	12	0	0	0	-	-	-	-	-

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

LOF = Lube Oil Fraction; RES = Residual PHC formation. Calculated value exceeds 30,000 mg/kg and solubility for PHC fraction

^a CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion guidelines.

^b CCME. 2008. Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale - Supporting Technical Information

*** Modified TPH (Lube Oil)



Table E-3: Analytical data for PAHs in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.

Table E-3: Analytical data for PAHs in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.				Field ID	BH1 (0-0.15m)	BH2 (0-0.15m)		BH3 (0-0.15m)	BH6 (0-0.15m)	BH7 (0-0.15m)	BH8 (0-0.15m)	BH13 (0-0.15 m)	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SQG	Number of Non-Detects Above the SQG
					Normal	Normal	QAQC 01 Duplicate (BH2 (0-0.15m)	Normal	Normal	Normal	Normal	Normal									
					0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m									
					15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	17 Oct 2024									
Sample Type				Depth																	
Date																					
				</																	

Notes
Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

^a CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion

^b No soil and food ingestion guideline was available for commercial land use; conservatively used value for residential / parkland land use.

^c No guideline for benzo(b+j)fluoranthene was available, the guideline for benzo(b)fluoranthene was applied

^d No guideline for benzo(k)fluoranthene was available, the guideline for benzo(b)fluoranthene was applied

^e MOECC. 2011. Soil Components for Table 3 - Full Depth, Non-potable Water Scenario. Commercial land use, coarse-grained soil. Lowest of the soil component values for plants & soil organisms and mammals & birds.

^f FEQG. 2020. Table 2 Federal Soils Quality Guidelines. Comerical land use, coarse-grained soil.



Table E-4: Analytical data for PCBs in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.

Table E-4: Analytical data for PCBs in soil for the former Frenchvale mine site compared to ecological health-based soil quality guidelines.				Field ID	BH1 (0-0.15m)	BH2 (0-0.15m)		BH3 (0-0.15m)	BH14 (0-0.15m)	BH15 (0-0.15m)	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SQG	Number of Non-Detects Above the SQG
Sample Type				Normal	Normal	QAQC 01 Duplicate	Normal	Normal	Normal										
Depth				0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m										
Date				15 Oct 2024	15 Oct 2024	15 Oct 2024	15 Oct 2024	17 Oct 2024	17 Oct 2024										
	Unit	EQL	Ecological Health Soil Quality Guideline (SoQG _E)																
Polychlorinated Biphenyls (PCBs)																			
Arochlor 1016	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1221	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1232	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1242	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1248	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1254	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1260	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1268	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
Arochlor 1262	mg/kg	0.01	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	6	0	<0.010	-	<0.010	-	-	-
PCBs (Sum of total)	mg/kg	0.03	33 ^a	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	6	6	0	<0.030	-	<0.030	-	0	0

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

^a CCME. Fact sheets. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Soil quality guidelines for ecological health. Commercial land use; lowest of soil contact and soil and food ingestion guideline.



Table E-5: Analytical data for metals in sediment for the former Frenchvale mine site compared to ecological health-based sediment quality guidelines.

Table E-5: Analytical data for metals in sediment for the former Frenchvale mine site compared to ecological health-based sediment quality guidelines.				Sample ID	SED1	SED3	SED4	SED5	SED6	SED7	SED8	SED9	SED10	SED11	SED12	SED13	SED14	
Sample Type	Normal	Normal	QAQC 04	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	25 DUP E
Depth	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m	0-0.15m
Date	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025
	Unit	EQL	Ecological Health Sediment Quality Guideline (SoQGE)															
Particle Size																		
% >75um	%	1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	-	-
Sieve Analysis - 75 Åµm (passing)	%	1	NGA	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-
Grain Size	%		NGA	-	-	-	-	-	-	-	-	-	-	-	-	Fine	-	-
Organic Matter	%	0.17	NGA	-	-	-	-	-	-	-	-	-	-	4.31	14.5	12.9	2.31	2.29
Soluble Parameters																		
Soluble Magnesium	mg/L	0.5	NGA	-	1.14	1.24	-	-	-	-	-	-	4.66	-	-	-	-	-
Soluble Sodium	mg/L	0.5	NGA	-	0.65	0.85	-	-	-	-	-	-	7.95	-	-	-	-	-
Chloride (2:1)	ug/g	5	NGA	-	9.5	8.5	-	-	-	-	-	-	33.8	-	-	-	-	-
General Chemistry																		
Moisture Content	%	0.25	NGA	-	11.4	-	-	-	-	13.6	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1	NGA	6.9	7.51	7.61	6.43	7.01	7.17	7.09	6.38	6.64	6.97	-	-	-	-	-
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	94.1	103	-	-	-	-	-	-	298	-	-	-	-	-
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	<0.10	0.12	-	-	-	-	-	-	0.49	-	-	-	-	-
Total Organic Carbon (TOC)	mg/kg	1,000	NGA	-	-	-	-	-	-	-	-	-	-	25,000	83,900	74600	13,400	13,300
Metals																		
Aluminium	mg/kg	50	NGA	14,900	4,260	5,500	11,800	11,700	6,980	5,750	27,000	17,500	13,400	30,000	10,400	15,600	14,900	15,200
Antimony	mg/kg	0.1	25 ^a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	<0.10	<0.10	0	<0.15	0	<0.10	<0.10
Arsenic	mg/kg	0.1	17 ^{b, e}	2	2	1	2	2	1	1	5	3	2	5	2	3	2	2
Barium	mg/kg	0.5	NGA	23	8	7	22	26	9	13	55	65	23	66	51	76	72	69
Beryllium	mg/kg	0.1	NGA	1	0	0	1	1	0	0	1	1	1	2	1	1	1	1
Boron	mg/kg	5	NGA	<5.0	<5.0	<5.0	9	11	6	5	13	<5.0	8	9	<7.5	<7.4	<5.0	<5.0
Cadmium	mg/kg	0.02	3.5 ^{b, e}	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0
Chromium (Total, III+VI)	mg/kg	0.5	90 ^{b, e}	10	4	5	11	11	8	8	27	14	12	27	8	13	12	12
Cobalt	mg/kg	0.1	NGA	7	4	2	7	8	4	4	19	10	9	20	6	10	9	9
Copper	mg/kg	0.5	197 ^{b, e}	24	14	5	43	32	25	13	85	25	50	68	34	48	14	19
Iron	mg/kg	50	43,766 ^{c, f}	25,800	8,780	7,920	17,600	14,200	12,700	13,900	27,200	26,100	20,200	39,400	11,200	15,400	22,200	22,200
Lead	mg/kg	0.5	91.3 ^{b, e}	8	11	28	14	41	6	12	116	7	19	56	10	32	8	10
Manganese	mg/kg	1	1100 ^{c, f}	343	486	422	934	1,010	771	822	1,390	3,270	836	1,470	300	300	612	604
Mercury	mg/kg	0.005	0.486 ^{b, e}	<0.0050	<0.0050	<0.0050	0	0	0	0	0	0	0	-	-	-	-	-
Molybdenum	mg/kg	0.1	NGA	1	0	0	0	0	0	3	2	1	1	2	2	2	0	0
Nickel	mg/kg	0.5	75 ^{c, f}	9	4	3	9	11	6	5	29	15	11	29	8	14	11	11
Calcium Dissolved	mg/L	0.5	NGA	-	2	2	-	-	-	-	-	-	12	-	-	-	-	-
Selenium	mg/kg	0.2	2 ^{d, g}	<0.20	<0.20	<0.20	0	<0.20	<0.20	<0.20	0	0	0	1	1	1	0	0
Silver	mg/kg	0.1	0.5 ^{c, h}	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	<0.10	0	<0.10	<0.15	<0.15	<0.10	<0.10
Strontium	mg/kg	0.5	NGA	18	77	71	67	66	65	77	42	18	68	32	12	12	20	21
Sulphur	mg/kg	1,000	NGA	<1000	<1000	<1000	<1000	<1000	<1000	<1000	5,500	<1000	<1000	<1,000	7,000	3,300	<1,000	<1,000
Thallium	mg/kg	0.05	NGA	<0.050	<0.050	<0.050	0	0	<0.050	<0.050	0	0	0	0	0	0	0	0
Tin	mg/kg	2	NGA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<3.0	<3.0	<2.0	<2.0
Uranium	mg/kg	0.05	NGA	2	1	1	2	2	1	1	6	3	4	5	16	13	2	2
Vanadium	mg/kg	0.2	NGA	36	13	13	28	26	17	14	57	45	30	66	26	33	39	40
Zinc	mg/kg	2	315 ^{b, e}	41	46	29	86	154	41	49	406	72	90	203	90	165	95	95

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

^a Simpson S.L., Batley, G.B. and Chariton, A.A. 2013. Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines. CSIRO Land and Water Science Report 08/07. CSIRO Land and Water. Recommended SQG-high value.

^b CCME. Fact sheets. Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Freshwater sediment quality

^c BCMOECC. 2025. British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Table 2 Working Sediment Quality Guidelines.

^d Ambient Water Quality Guidelines for Selenium. Technical Report. Update. April, 2014. Water Protection and Sustainability Branch, Environmental Sustainability and Strategic Policy Division, British Columbia Ministry of Environment.

^e PEL guidelines used.

^f Upper quality guideline used.

^g No upper quality guidelines available. Alert concentration applied as guideline..

^h No upper quality guidelines available. Lower quality guideline applied.



Table E-5: Analytical data for metals in sediment for the former Frenchvale mine site compared to ecological health-based sediment quality guidelines.

Table E-5: Analytical data for metals in sediment for the former Frenchvale mine site compared to ecological health-based sediment quality guidelines.				Sample ID				Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SedQG	Number of Non-Detects Above the SedQG	
				Sample Type	SED15	SED16	SED17										SED18
				Depth	Normal	Normal	Normal										Normal
				Date	0-0.15m	0-0.15m	0-0.15m										0-0.15m
				03 Jun 2025	03 Jun 2025	04 Jun 2025	04 Jun 2025										
	Unit	EQL	Ecological Health Sediment Quality Guideline (SoQG _E)														
Particle Size																	
% >75um	%	1	NGA	95.5	-	-	-	2	1	1	<1.0	95.5	95.5	95.5	-	-	
Sieve Analysis - 75 Åµm (passing)	%	1	NGA	4.5	-	-	-	2	0	2	4.5	4.5	100	100	-	-	
Grain Size	%		NGA	Coarse	-	-	-	2	0	0	0	-	-	-	-	-	
Organic Matter	%	0.17	NGA	1.05	5.86	0.96	2.93	9	0	9	0.96	0.96	14.5	14.5	-	-	
Soluble Parameters																	
Soluble Magnesium	mg/L	0.5	NGA	-	-	-	-	3	0	3	1.14	1.14	4.66	4.66	-	-	
Soluble Sodium	mg/L	0.5	NGA	-	-	-	-	3	0	3	0.65	0.65	7.95	7.95	-	-	
Chloride (2:1)	ug/g	5	NGA	-	-	-	-	3	0	3	8.5	8.5	33.8	33.8	-	-	
General Chemistry																	
Moisture Content	%	0.25	NGA	-	-	-	-	2	0	2	11.4	11.4	13.6	13.6	-	-	
pH (Lab)	pH Units	0.1	NGA	-	-	-	-	10	0	10	6.38	6.38	7.61	7.61	-	-	
Electrical Conductivity (Lab)	µS/cm	5	NGA	-	-	-	-	3	0	3	94.1	94.1	298	298	-	-	
Sodium Adsorption Ratio (SAR)	SAR	0.1	NGA	-	-	-	-	3	1	2	<0.10	0.12	0.49	0.49	-	-	
Total Organic Carbon (TOC)	mg/kg	1,000	NGA	6100	34,000	5,600	17,000	9	0	9	5600	5600	83900	83900	-	-	
Metals																	
Aluminium	mg/kg	50	NGA	15,000	12,400	15,200	18,900	19	0	19	4260	4260	30000	30000	-	-	
Antimony	mg/kg	0.1	25 ^a	<0.10	<0.10	<0.10	0	19	15	4	<0.10	0.14	0.19	0.19	0	0	
Arsenic	mg/kg	0.1	17 ^{b, e}	2	2	3	4	19	0	19	0.64	0.64	4.92	4.92	0	0	
Barium	mg/kg	0.5	NGA	18	96	28	51	19	0	19	7.34	7.34	96.4	96.4	-	-	
Beryllium	mg/kg	0.1	NGA	1	0	1	1	19	0	19	0.21	0.21	1.61	1.61	-	-	
Boron	mg/kg	5	NGA	<5.0	5	<5.0	<5.0	19	11	8	<5.0	5.3	13.4	13.4	-	-	
Cadmium	mg/kg	0.02	3.5 ^{b, e}	0	1	0	0	19	0	19	0.071	0.071	1.06	1.06	0	0	
Chromium (Total, III+VI)	mg/kg	0.5	90 ^{b, e}	9	16	15	20	19	0	19	4.35	4.35	26.8	26.8	0	0	
Cobalt	mg/kg	0.1	NGA	7	7	9	12	19	0	19	2.26	2.26	20	20	-	-	
Copper	mg/kg	0.5	197 ^{b, e}	18	432	12	16	19	0	19	5.1	5.1	432	432	1	0	
Iron	mg/kg	50	43,766 ^{c, f}	24,300	16,900	24,300	30,400	19	0	19	7920	7920	39400	39400	0	0	
Lead	mg/kg	0.5	91.3 ^{b, e}	4	11	6	11	19	0	19	3.86	3.86	116	116	1	0	
Manganese	mg/kg	1	1100 ^{c, f}	475	455	502	802	19	0	19	300	300	3270	3270	3	0	
Mercury	mg/kg	0.005	0.486 ^{b, e}	-	-	-	-	10	3	7	<0.0050	0.0058	0.0418	0.0418	0	0	
Molybdenum	mg/kg	0.1	NGA	0	0	1	1	19	0	19	0.19	0.19	2.88	2.88	-	-	
Nickel	mg/kg	0.5	75 ^{c, f}	11	9	10	19	19	0	19	3.28	3.28	29	29	0	0	
Calcium Dissolved	mg/L	0.5	NGA	-	-	-	-	3	0	3	1.5	1.5	12.1	12.1	-	-	
Selenium	mg/kg	0.2	2 ^{d, g}	<0.20	1	<0.20	0	19	8	11	<0.20	0.22	1.42	1.42	0	0	
Silver	mg/kg	0.1	0.5 ^{c, h}	<0.10	0	<0.10	<0.10	19	16	3	<0.10	0.11	0.17	0.17	0	0	
Strontium	mg/kg	0.5	NGA	20	19	21	23	19	0	19	12	12	76.9	76.9	-	-	
Sulphur	mg/kg	1,000	NGA	<1,000	<1,000	<1,000	<1,000	19	16	3	<1000	3300	7000	7000	-	-	
Thallium	mg/kg	0.05	NGA	0	0	0	0	19	5	14	<0.050	0.052	0.286	0.286	-	-	
Tin	mg/kg	2	NGA	<2.0	<2.0	<2.0	<2.0	19	19	0	<2.0	-	<2.0	-	-	-	
Uranium	mg/kg	0.05	NGA	1	4	1	3	19	0	19	0.729	0.729	16.4	16.4	-	-	
Vanadium	mg/kg	0.2	NGA	37	36	39	49	19	0	19	12.5	12.5	65.9	65.9	-	-	
Zinc	mg/kg	2	315 ^{b, e}	44	489	44	61	19	0	19	28.6	28.6	489	489	2	0	

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

^a Simpson S.L., Batley, G.B. and Chariton, A.A. 2013. Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines. CSIRO Land and Water Science Report 08/07. CSIRO Land and Water. Recommended SQG-high value.

^b CCME. Fact sheets. Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Freshwater sediment quality

^c BCMOECC. 2025. British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Table 2 Working Sediment Quality Guidelines.

^d Ambient Water Quality Guidelines for Selenium. Technical Report. Update. April, 2014. Water Protection and Sustainability Branch, Environmental Sustainability and Strategic Policy Division, British Columbia Ministry of Environment.

^e PEL guidelines used.

^f Upper quality guideline used.

^g No upper quality guidelines available. Alert concentration applied as guideline..

^h No upper quality guidelines available. Lower quality guideline applied.

Table E-6: Analytical data for BTEX and PHCs in sediment for the former Frenchvale mine site compared to ecological health-based sediment quality

Table E-6: Analytical data for BTEX and PHCs in sediment for the former Frenchvale mine site compared to ecological health-based sediment quality				Sample ID	SED7	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SedQG	Number of Non-Detects Above the SedQG
				Sample Type	Normal									
				Depth	0-0.15m									
				Date	17 Oct 2024									
	Unit	EQL	Ecological Health Sediment Quality Guideline (SoQG _e)											
BTEX														
Benzene	mg/kg	0.005	1.2 ^a	<0.0050	1	1	0	<0.0050	-	<0.0050	-	0	0	
Toluene	mg/kg	0.05	1.4 ^a	<0.050	1	1	0	<0.050	-	<0.050	-	0	0	
Ethylbenzene	mg/kg	0.015	1.2 ^a	<0.015	1	1	0	<0.015	-	<0.015	-	0	0	
Xylene (o)	mg/kg	0.03	NGA	<0.030	1	1	0	<0.030	-	<0.030	-	-	-	
Xylene (m & p)	mg/kg	0.03	NGA	<0.030	1	1	0	<0.030	-	<0.030	-	-	-	
Xylene Total	mg/kg	0.05	1.3 ^a	<0.050	1	1	0	<0.050	-	<0.050	-	0	0	
Petroleum Hydrocarbons (PHCs)														
VPH (C6-C10 - BTEX)	mg/kg	5	NGA	≤5.0	1	1	0	<5.0	-	<5.0	-	-	-	
EPH >C10-C16	mg/kg	5	NGA	≤5.0	1	1	0	<5.0	-	<5.0	-	-	-	
EPH >C16-C21	mg/kg	5	NGA	≤5.0	1	1	0	<5.0	-	<5.0	-	-	-	
EPH >C21-C32	mg/kg	5	NGA	9	1	0	1	9	8.7	9	8.7	-	-	
EPH >C34-C50	mg/kg	20	NGA	<20	1	1	0	<20	-	<20	-	-	-	
TEH >C10-C32	mg/kg	10	NGA	≤10	1	1	0	<10	-	<10	-	-	-	
Modified TPH (Tier 1)	mg/kg	10	15/25/43 ^{a,b}	≤10	1	1	0	<10	-	<10	-	-	-	
Reached Baseline at C32	-		NGA	Yes	1	0	0	-	-	Yes	-	-	-	
Hydrocarbon Resemblance	none		Gas/Fuel/Lube	LOF	1	0	0	-	-	LOF	-	-	-	

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

LOF = Lube Oil Fraction; RES = Residual PHC formation. Calculated value exceeds 30,000 mg/kg and solubility for PHC fraction.

^a ARBCA. 2023. Atlantic RBCA - Ecological Tier II Pathway-Specific Standards (PSS) for Sediment - Freshwater

^b Guidelines provided are for Modified TPH with resemblance of gas, fuel and lube, respectively.

Table E-7: Analytical data for PAHs in sediment for the former Frenchvale mine site compared to ecological health-based sediment quality guidelines.

Table E-7: Analytical data for PAHs in sediment for the former Frenchvale mine site compared to ecological health-based sediment quality guidelines.				Sample ID Sample Type Depth Date	SED3	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SedQG	Number of Non- Detects Above the SedQG
					Normal									
					0-0.15m									
					17 Oct 2024									
	Unit	EQL	Ecological Health Sediment Quality Guideline (SoQG _E)											
Polycyclic Aromatic Hydrocarbons (PAHs)														
1-Methylnaphthalene	mg/kg	0.01	0.201 ^{a,c,e}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
2-Methylnaphthalene	mg/kg	0.01	0.201 ^{a,e}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
1 & 2 Methylnaphthalene	mg/kg	0.015	NGA	<0.015	1	1	0	<0.015	-	<0.015	-	-	-	
Acenaphthene	mg/kg	0.005	0.0889 ^{a,e}	<0.0050	1	1	0	<0.0050	-	<0.0050	-	0	0	
Acenaphthylene	mg/kg	0.005	0.128 ^{a,e}	<0.0050	1	1	0	<0.0050	-	<0.0050	-	0	0	
Acridine	mg/kg	0.01	NGA	<0.010	1	1	0	<0.010	-	<0.010	-	-	-	
Anthracene	mg/kg	0.004	0.245 ^{a,e}	<0.0040	1	1	0	<0.0040	-	<0.0040	-	0	0	
Benz(a)anthracene	mg/kg	0.01	0.385 ^{a,e}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Benzo(a)pyrene	mg/kg	0.01	0.782 ^{a,e}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Benzo(b+j)fluoranthene	mg/kg	0.01	13.4 ^{b,d}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Benzo(b+j+k)fluoranthene	mg/kg	0.015	13.4 ^{b,d}	<0.015	1	1	0	<0.015	-	<0.015	-	0	0	
Benzo(g,h,i)perylene	mg/kg	0.01	0.32 ^b	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Benzo(k)fluoranthene	mg/kg	0.01	13.4 ^b	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Chrysene	mg/kg	0.01	0.862 ^{a,e}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Dibenz(a,h)anthracene	mg/kg	0.005	0.135 ^{a,e}	<0.0050	1	1	0	<0.0050	-	<0.0050	-	0	0	
Fluorene	mg/kg	0.01	0.144 ^{a,e}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Fluoranthene	mg/kg	0.01	2.355 ^{a,e}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	3.2 ^b	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Naphthalene	mg/kg	0.01	0.391 ^{a,e}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Perylene	mg/kg	0.01	NGA	<0.010	1	1	0	<0.010	-	<0.010	-	-	-	
Phenanthrene	mg/kg	0.01	0.515 ^{a,e}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Pyrene	mg/kg	0.01	0.875 ^{a,e}	<0.010	1	1	0	<0.010	-	<0.010	-	0	0	
Quinoline	mg/kg	0.01	NGA	<0.010	1	1	0	<0.010	-	<0.010	-	-	-	

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

^a CCME. Canadian sediment quality guidelines for the protection of aquatic life. PEL based guidelines for freshwater sediments.

^b BC MOECC. 2025. British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Table 2 Working Sediment Quality Guidelines. Upper SWQG.

^c The guideline for 2-methylnaphthalene was applied to 1-methylnaphthalene as no guideline was available.

^d Guideline for benzo[k]fluoranthene was applied to Benzo(b+j+k)fluoranthene and Benzo(b+j)fluoranthene

^e PEL guidelines used.



Table E-8: Analytical data for metals in surface water for the former Frenchvale mine site compared to ecological health-based surface water quality guidelines.

			Sample ID	SW1	SW3	SW4	SW5	SW6		SW7	SW8	SW9	SW10	SW11	SW12	SW13	SW14	SW15		SW16
			Sample Type	Normal	Normal	Normal	Normal	Normal	QA/QC 03	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	25 DUP F	Normal
			Date	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025
				Ecological Health Surface Water Quality Guideline (SWQG _s)																
	Unit	EQL																		
Calculated Parameters																				
Anions Total	meq/L	0.1	NGA	4.37	3.76	3.22	3.73	3.4	3.41	3.15	3.85	3.36	2.56	2.27	2.35	2.25	2.99	2.48	2.73	3.37
Cations Total	meq/L	0.1	NGA	4.54	3.8	3.26	3.91	3.54	3.47	3.25	4.42	3.5	2.67	2.28	2.35	2.22	3.06	2.73	2.7	3.47
Ionic Balance	%	0.01	NGA	104	101	101	105	104	102	103	115	104	104	100	98.7	102	110	98.9	103	103
Langelier Index (@ 20C)	N/A	0.01	NGA	0.867	0.26	0.197	0.223	0.24	0.389	-0.392	-0.034	0.061	-0.473	-0.429	-0.11	-0.286	0.353	0.006	-0.029	0.37
Langelier Index (@ 4C)	N/A	0.01	NGA	0.621	0.011	-0.051	-0.028	-0.009	0.142	-0.643	-0.285	-0.188	-0.724	-0.681	-0.362	-0.535	0.105	-0.243	-0.278	0.122
Saturation @ 4c	-	0.01	NGA	7.72	7.93	8.1	7.91	7.99	8	8.1	7.78	8.09	8.22	8.27	8.25	8.24	7.97	8.18	8.13	7.88
Saturation pH (@ 20C)	N/A	0.01	NGA	7.47	7.68	7.85	7.66	7.74	7.75	7.85	7.53	7.84	7.97	8.02	8	8	7.73	7.93	7.88	7.63
NA																				
Colour, Apparent	CU	2	NGA	3.6	6.6	3.4	8.1	4.1	5.7	4.6	73.8	<2.0	8	17.8	16.5	22.2	7.6	7.7	10.4	2.7
General Chemistry																				
Carbonate	mg/L	1	NGA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Alkalinity (total)	mg/L	1	NGA	167	127	109	126	119	120	106	157	111	89.3	90	91.6	91.7	134	90.1	103	153
Bicarbonate	mg/L	1	NGA	203	155	133	153	145	147	130	192	135	109	110	112	112	163	110	126	187
Hardness as CaCO3 (Measured)	mg/L	0.5	NGA	205	163	125	170	148	145	125	177	125	108	93.3	96	93.7	144	112	111	166
Ammonia as N	mg/L	0.005	NGA	0.0239	0.0089	0.0182	0.0061	0.0112	0.0079	0.0113	0.0233	0.0212	0.0124	0.0106	0.045	0.0066	0.0133	<0.0050	0.0075	<0.0050
Total Organic Carbon (TOC)	mg/L	0.5	NGA	1.98	2.37	1.74	2.75	1.46	1.98	1.5	9.11	1.28	2.86	3.07	2.72	3.92	1.54	1.23	1.08	<0.50
Ortho Phosphate as P (filtered)	mg/L	0.001	NGA	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Fluoride	mg/L	0.02	NGA	<0.020	0.025	0.045	0.026	0.039	0.037	0.041	0.053	0.053	0.026	0.05	0.048	0.044	0.032	0.051	0.05	0.034
Chloride	mg/L	0.5	NGA	22.6	30.1	26.2	29.1	25.4	25.4	26	19.8	29.9	18	11	11.7	9.49	6.24	14.6	14.6	6.15
Hydroxide	mg/L	1	NGA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrate (as N)	mg/L	0.02	NGA	0.586	<0.020	0.116	<0.020	0.092	0.092	0.126	<0.020	0.181	0.207	<0.020	<0.020	<0.020	<0.020	0.079	0.074	<0.020
Nitrite (as N)+C31	mg/L	0.01	NGA	<0.010	<0.010	<0.010	<0.010	0.012	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrite + Nitrate as N	mg/L	0.0224	NGA	0.586	<0.0224	0.116	<0.0224	0.104	0.103	0.126	<0.0224	0.181	0.207	<0.0224	<0.0224	<0.0224	<0.0224	0.079	0.074	<0.0224
pH (Lab)	pH Units	0.1	NGA	8.34	7.94	8.05	7.88	7.98	8.14	7.46	7.5	7.9	7.5	7.59	7.89	7.71	8.08	7.94	7.85	8
pH (field)			NGA	6.17	7.26	7.51	6.86	7.61	7.61	7.74	7.1	7.74	6.17	6.25	6.74	6.99	7.44	7.65	7.65	7.84
Electrical Conductivity (Lab)	µS/cm	1	NGA	419	374	324	379	336	338	317	373	333	256	216	222	210	274	263	259	310
Sulphate	mg/L	0.3	NGA	17.2	18.1	13.8	18.8	14	13.9	13.9	7.1	13.6	12.3	7.77	8.84	7.19	6.44	12.3	12.3	6.82
Total Dissolved Solids (TDS) - Measured	mg/L	20	NGA	240	224	180	229	192	195	166	209	188	148	128	132	96	144	142	139	163
Turbidity	NTU	0.1	NGA	<0.10	0.28	0.32	0.2	0.3	0.19	0.25	11.8	0.13	0.26	0.86	0.77	0.99	0.31	0.11	<0.10	<0.10
Metals																				
Aluminium	mg/L	0.003	0.005 ^a	0.0262	0.0102	0.0109	0.0165	0.0122	0.0085	0.0143	0.361	0.0117	0.0195	0.0734	0.029	0.0112	0.0366	0.008	0.0118	<0.0030
Antimony	mg/L	0.0001	0.009 ^b	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.0001	0.005 ^a	0.00011	0.00014	0.00013	0.00013	0.00013	0.00011	0.00013	0.00043	0.00026	<0.00010	0.00015	0.00015	0.00017	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.0001	1 ^c	0.0151	0.00811	0.00959	0.0108	0.00747	0.00719	0.00949	0.0194	0.015	0.00657	0.00783	0.00722	0.0102	0.0498	0.006	0.00597	0.0644
Beryllium	mg/L	0.00002	0.00015 ^d	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000025	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth	mg/L	0.00005	NGA	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.01	1.5 ^a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.000005	0.00009 ^a	0.0000071	<0.0000050	<0.0000050	<0.0000050	0.0000056	<0.0000050	<0.0000050	0.0000203	<0.0000050	0.0000161	<0.0000050	<0.0000050	<0.0000050	0.0000152	<0.0000050	0.000005	0.0000219
Chromium (Total, III+VI)	mg/L	0.0005	0.0089 ^a	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00064	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.0001	0.001 ^e	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	0.00013	<0.00010	0.00057	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.0005	0.002 ^a	0.00099	0.00084	<0.00050	0.00091	<0.00050	<0.00050	<0.00050	0.00229	<0.00050	0.00057	0.00095	0.00066	<0.00050	0.00054	0.00053	0.00056	0.00067
Iron	mg/L	0.01	0.3 ^a	0.025	0.056	0.132	0.036	0.296	0.262	0.115	7.22	0.014	0.013	0.546	0.221	0.331	0.041	<0.010	0.014	<0.010
Lead	mg/L	0.00005	0.001 ^a	<0.000050	<0.000050	<0.000050	0.000063	<0.000050	<0.000050	<0.000050	0.000975	<0.000050	0.00009	0.00014	0.00006	0.00064	<0.000050	<0.000050	<0.000050	<0.000050
Magnesium	mg/L	0.005	NGA	18.2	14.6	11.4	14.6	13.1	13	11.3	15.1	11	9.38	7.92	8.1	8.02	14.9	8.97	8.85	18
Manganese	mg/L	0.0001																		



Table E-8: Analytical data for metals in surface water for the former Frenchvale mine site compared to ecological health-based surface water quality guidelines.

			Ecological Health Surface Water Quality Guideline (SWQG _e)	Number of Samples	Number of Non-Detects	Number of Detects	Minimum Concentration	Minimum Detected Concentration	Maximum Concentration	Maximum Detected Concentration	Number of Exceedances Over the SWQG	Number of Non-Detects Above the SWQG
	Unit	EQL										
Calculated Parameters												
Anions Total	meq/L	0.1	NGA	17	0	17	2.25	2.25	4.37	4.37	-	-
Cations Total	meq/L	0.1	NGA	17	0	17	2.22	2.22	4.54	4.54	-	-
Ionic Balance	%	0.01	NGA	17	0	17	98.7	98.7	115	115	-	-
Langelier Index (@ 20C)	N/A	0.01	NGA	17	0	17	-0.473	-0.473	0.867	0.867	-	-
Langelier Index (@ 4C)	N/A	0.01	NGA	17	0	17	-0.724	-0.724	0.621	0.621	-	-
Saturation @ 4c	-	0.01	NGA	17	0	17	7.72	7.72	8.27	8.27	-	-
Saturation pH (@ 20C)	N/A	0.01	NGA	17	0	17	7.47	7.47	8.02	8.02	-	-
NA												
Colour, Apparent	CU	2	NGA	17	1	16	<2.0	2.7	73.8	73.8	-	-
General Chemistry												
Carbonate	mg/L	1	NGA	17	17	0	<1.0	-	<1.0	-	-	-
Alkalinity (total)	mg/L	1	NGA	17	0	17	89.3	89.3	167	167	-	-
Bicarbonate	mg/L	1	NGA	17	0	17	109	109	203	203	-	-
Hardness as CaCO3 (Measured)	mg/L	0.5	NGA	17	0	17	93.3	93.3	205	205	-	-
Ammonia as N	mg/L	0.005	NGA	17	2	15	<0.0050	0.0061	0.045	0.045	-	-
Total Organic Carbon (TOC)	mg/L	0.5	NGA	17	1	16	<0.50	1.08	9.11	9.11	-	-
Ortho Phosphate as P (filtered)	mg/L	0.001	NGA	17	16	1	<0.0010	0.0013	0.0013	0.0013	-	-
Fluoride	mg/L	0.02	NGA	17	1	16	<0.020	0.025	0.053	0.053	-	-
Chloride	mg/L	0.5	NGA	17	0	17	6.15	6.15	30.1	30.1	-	-
Hydroxide	mg/L	1	NGA	17	17	0	<1.0	-	<1.0	-	-	-
Nitrate (as N)	mg/L	0.02	NGA	17	8	9	<0.020	0.074	0.586	0.586	-	-
Nitrite (as N)+C31	mg/L	0.01	NGA	17	15	2	<0.010	0.011	0.012	0.012	-	-
Nitrite + Nitrate as N	mg/L	0.0224	NGA	17	8	9	<0.0224	0.074	0.586	0.586	-	-
pH (Lab)	pH Units	0.1	NGA	17	0	17	7.46	7.46	8.34	8.34	-	-
pH (field)			NGA	17	0	17	6.17	6.17	7.84	7.84	-	-
Electrical Conductivity (Lab)	µS/cm	1	NGA	17	0	17	210	210	419	419	-	-
Sulphate	mg/L	0.3	NGA	17	0	17	6.44	6.44	18.8	18.8	-	-
Total Dissolved Solids (TDS) - Measured	mg/L	20	NGA	17	0	17	96	96	240	240	-	-
Turbidity	NTU	0.1	NGA	17	3	14	<0.10	0.11	11.8	11.8	-	-
Metals												
Aluminium	mg/L	0.003	0.005 ^a	17	1	16	<0.0030	0.008	0.361	0.361	16	0
Antimony	mg/L	0.0001	0.009 ^b	17	17	0	<0.00010	-	<0.00010	-	0	0
Arsenic	mg/L	0.0001	0.005 ^a	17	5	12	<0.00010	0.00011	0.00043	0.00043	0	0
Barium	mg/L	0.0001	1 ^c	17	0	17	0.00597	0.00597	0.0644	0.0644	0	0
Beryllium	mg/L	0.00002	0.00015 ^d	17	16	1	<0.000020	0.000025	0.000025	0.000025	0	0
Bismuth	mg/L	0.00005	NGA	17	17	0	<0.000050	-	<0.000050	-	-	-
Boron	mg/L	0.01	1.5 ^a	17	17	0	<0.010	-	<0.010	-	0	0
Cadmium	mg/L	0.000005	0.00009 ^a	17	10	7	<0.0000050	0.000005	0.0000219	0.0000219	0	0
Chromium (Total, III+VI)	mg/L	0.0005	0.0089 ^a	17	16	1	<0.00050	0.00064	0.00064	0.00064	0	0
Cobalt	mg/L	0.0001	0.001 ^e	17	14	3	<0.00010	0.00013	0.00057	0.00057	0	0
Copper	mg/L	0.0005	0.002 ^a	17	6	11	<0.00050	0.00053	0.00229	0.00229	1	0
Iron	mg/L	0.01	0.3 ^a	17	2	15	<0.010	0.013	7.22	7.22	3	0
Lead	mg/L	0.00005	0.001 ^a	17	11	6	<0.000050	0.00006	0.000975	0.000975	0	0
Magnesium	mg/L	0.005	NGA	17	0	17	7.92	7.92	18.2	18.2	-	-
Manganese	mg/L	0.0001	0.43 ^a	17	1	16	<0.00010	0.00188	1.15	1.15	1	0
Mercury	mg/L	0.000005	0.000026 ^a	10	10	0	<0.0000050	-	<0.0000050	-	0	0
Molybdenum	mg/L	0.00005	0.073 ^a	17	0	17	0.000306	0.000306	0.000667	0.000667	0	0
Nickel	mg/L	0.0005	0.025 ^a	17	16	1	<0.00050	0.00054	0.00054	0.00054	0	0
Silica (SiO2)	mg/L	0.21	NGA	17	0	17	2.22	2.22	9.5	9.5	-	-
Calcium Dissolved	mg/L	0.1	NGA	10	0	10	27.8	27.8	52	52	-	-
Calcium, Total			NGA	7	0	7	24.3	24.3	36.6	36.6	-	-
Potassium	mg/L	0.05	NGA	17	0	17	0.534	0.534	1.22	1.22	-	-
Selenium	mg/L	0.00005	0.001 ^a	17	3	14	<0.000050	0.000052	0.000119	0.000119	0	0
Cesium	mg/L	0.00001	NGA	17	11	6	<0.000010	0.00001	0.000064	0.000064	-	-
Rubidium	mg/L	0.0002	NGA	17	0	17	0.00118	0.00118	0.00232	0.00232	-	-
Tellurium	mg/L	0.0002	NGA	17	17	0	<0.00020	-	<0.00020	-	-	-
Thorium	mg/L	0.0001	NGA	17	17	0	<0.00010	-	<0.00010	-	-	-
Tungsten	mg/L	0.0001	NGA	17	17	0	<0.00010	-	<0.00010	-	-	-
Lithium	mg/L	0.001	NGA	17	17	0	<0.0010	-	<0.0010	-	-	-
Silver	mg/L	0.00001	0.00025 ^a	17	17	0	<0.000010	-	<0.000010	-	0	0
Silicon	mg/L	0.1	NGA	17	0	17	1.04	1.04	4.44	4.44	-	-
Sodium	mg/L	0.05	NGA	17	0	17	3.43	3.43	22.7	22.7	-	-
Strontium	mg/L	0.0002	2.5 ^c	17	0	17	0.0268	0.0268	0.0876	0.0876	0	0
Sulphur as S	mg/L	0.5	NGA	17	0	17	2.22	2.22	6.99	6.99	-	-
Titanium	mg/L	0.0003	NGA	17	13	4	<0.00050	0.00069	0.00912	0.00912	-	-
Thallium	mg/L	0.00001	0.0008 ^a	17	17	0	<0.000010	-	<0.000010	-	0	0
Tin	mg/L	0.0001	NGA	17	17	0	<0.00010	-	<0.00010	-	-	-
Uranium	mg/L	0.00001	0.015 ^a	17	0	17	0.000956	0.000956	0.00356	0.00356	0	0
Vanadium	mg/L	0.0005	0.12 ^d	17	15	2	<0.00050	0.00051	0.0014	0.0014	0	0
Zinc	mg/L	0.003	0.007 ^a	17	13	4	<0.0030	0.0038	0.0068	0.0068	0	0
Zirconium	mg/L	0.0002	NGA	17	17	0	<0.00020	-	<0.00020	-	-	-
Phosphorus	mg/L	0.05	NGA	17	14	3	<0.050	0.05	0.151	0.151	-	-

Notes

Shaded cells indicate an exceedance over the guideline.

NGA = No Guideline Available

^a CCME Summary Table, Canadian Water Quality Guidelines for the Protection of Aquatic Life, Freshwater quality guidelines.

^b BC CSR, 2019, Schedule 3.2, Generic Numerical Water Standards Protection of freshwater aquatic life.

^c FEQG, 2020, Federal environmental quality guidelines - Strontium, Table 1, Federal freshwater quality guideline for strontium (dissolved).

^d FEQG, 2016, Federal Environmental Quality Guidelines - Vanadium, Table 1, Federal Water Quality Guidelines for Vanadium (total).

^e FEQG, 2017, Federal Environmental Quality Guidelines - Cobalt, Table 1, Federal Water Quality Guidelines for Cobalt (aquatic life, freshwater).

^f Michigan DEQ, 2008, Final chronic value.



Table E-9: Analytical data for select metals in surface water for the former Frenchvale mine site compared to CCME adjusted ecological health-based surface water quality guidelines.

	Sample ID	Sample Type	Date	SW1	SW3	SW4	SW5	SW6		SW7	SW8	SW9	SW10	SW11	SW12	SW13	SW14	SW15	
				Normal	Normal	Normal	Normal	Normal	QAQC 03	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	25 DUP F
				17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	17 Oct 2024	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025	03 Jun 2025
	Unit	EQL																	
General Chemistry																			
Hardness as CaCO3 (Measured)	mg/L	0.5		205	163	125	170	148	145	125	177	125	108	93.3	96	93.7	144	112	111
Total Organic Carbon (TOC)	mg/L	0.5		1.98	2.37	1.74	2.75	1.46	1.98	1.5	9.11	1.28	2.86	3.07	2.72	3.92	1.54	1.23	1.08
pH (field)				6.17	7.26	7.51	6.86	7.61	7.61	7.74	7.1	7.74	6.17	6.25	6.74	6.99	7.44	7.65	7.65
Metals																			
Aluminium ^a	mg/L			0.005															
Adjusted Aluminium Guideline (pH) ^b				0.005	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.005	0.005	0.005	0.1	0.1	0.1	0.1	0.1
Sample Concentration	mg/L	0.003		0.0262	0.0102	0.0109	0.0165	0.0122	0.0085	0.0143	0.361	0.0117	0.0195	0.0734	0.029	0.0112	0.0366	0.008	0.0118
Copper ^a	mg/L			0.002															
Adjusted Copper Guideline (hardness) ^c				-	-	-	-	-	-	-	0.00385	-	-	-	-	-	-	-	-
Sample Concentration	mg/L	0.0005		-	-	-	-	-	-	-	0.00229	-	-	-	-	-	-	-	-
Manganese ^a	mg/L			0.43															
Adjusted Manganese Guideline ^d				-	-	-	-	-	-	-	0.730	-	-	-	-	-	-	-	-
Sample Concentration	mg/L	0.0001		-	-	-	-	-	-	-	1.15	-	-	-	-	-	-	-	-

Notes

- Shaded cells indicate an exceedance over the guideline.
- “-” denotes the sample did not exceed the generic guideline and was not screened against the adjusted guideline values.
- a CCME guideline (not adjusted for site-specific data and equations provided by CCME).
- b Guideline = 0.005 mg/L if pH <6.5; 0.1 mg/L if pH ≥6.5 (CCREM, 1987).
- c Guideline = $0.2 \times e^{(0.8545(\ln(\text{hardness}))-1.465)}$; Guideline adjusted to mg/L (CCREM, 1987)
- d Adjusted guidelines for manganese were determined using the CWQG calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese. (CCME, 2019)