



BUILD NOVA SCOTIA

Supplemental Sampling Program and Human Health and Ecological Risk Assessment (Final)

Mill Village Former Mine Site, Medway River Road, Charleston, NS
PID No. 70169214



February 21, 2025

Nova Scotia Lands Inc.
45 Wabana Court
Sydney, Nova Scotia
B1P 0B9

Attention: Cory MacPhee, P.Eng.
Project Manager

***Supplemental Sampling and Human Health and Ecological Risk Assessment
Medway River Road, Charleston, NS
PID No. 70169214***

Dillon Consulting Limited (Dillon) is pleased to provide this summary of Supplemental Soil Sampling Program (SSSP) and Human Health and Ecological Risk Assessment (HHERA) conducted at the Mill Village Former mine site located near Medway Road in Charleston, Nova Scotia and identified by Parcel Identification Designation Number (PID) No. 70169214.

Should you have any questions, please contact us.

Sincerely,

DILLON CONSULTING LIMITED

A handwritten signature in blue ink that reads "Asia Reid".

Asia Reid, B.Sc.
Project Manager

DM:sk

Our file: 23-6446

137 Chain Lake Dr
Suite 100
Halifax, Nova Scotia
Canada
B3S 1B3
Telephone
902.450.4000
Fax
902.450.2008

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Acronyms, Abbreviations, Definitions

AEP	Alberta Environment and Parks
ALS Labs	ALS Environmental Analytical Laboratories
ASTM	American Society for Testing and Materials
APEC	Area of Potential Environmental Concern
ARBCA	Atlantic Risk-Based Corrective Action
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
BNS	Build Nova Scotia
CALA	Canadian Association for Laboratory Accreditation Inc.
CCME	Canadian Council of Ministers of the Environment
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
COPC	Contaminants of Potential Concern
ERA	Ecological Risk Assessment
EcoSSL	Ecological Soil Screening Levels
EC	Environment Canada
ECCC	Environment and Climate Change Canada
EQS	Environmental Quality Standards
ESA	Environmental Site Assessment
EPC	Exposure Point Concentration
FCSAP	Federal Contaminated Sites Action Plan
DQRACHEM	Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals
PQRA	Guidance on Human Health Preliminary Quantitative Risk Assessment
HC	Health Canada
HHERA	Human Health and Ecological Risk Assessment
ILCR	Incremental Lifetime Cancer Risk
LADD	Lifetime Average Daily Dose
LOE	Lines of Evidence
MECP	Ministry of the Environment, Conservation and Parks
NGA	No Guideline is Available
NAPL	Non-aqueous phase liquids
NS	Nova Scotia
NS CSRs	Nova Scotia Contaminated Sites Regulations
NSDNRR	Nova Scotia Department of Natural Resources and Renewables
NS PSS	Nova Scotia Pathway Specific Standards
PID	Parcel Identification Designation Number
PSS	Pathway Specific Standards
PHCs	Petroleum Hydrocarbons
PAHs	Polycyclic Aromatic Hydrocarbons
QA/QC	Quality Assurance/Quality Control
ROC	Receptor Of Concern
RPD	Relative percent difference
RDL	Reportable detection limit
RBCA	Risk Based Corrective Action

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SSTL	Site Specific Target Levels
SAR	Species at Risk
SSSP	Supplemental Soil Sampling Program
SPLP	Synthetic Precipitation Leaching Procedure
TCRLs	Target Cancer Risk Levels
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
UCL	Upper Confidence Limit
WOE	Weight Of Evidence

Executive Summary

Dillon Consulting Limited (Dillon) was commissioned by Build Nova Scotia to complete a Supplemental Sampling Program and Human Health and Ecological Risk Assessment (HHERA) of NSDNRR Crown lands at the Mill Village former mine site (herein referred to as the “site” or the “subject property”) located at near Charleston, Nova Scotia (NS).

The site was an active gold mine from the 1860s to 1950s. Dillon completed a Phase I ESA at the site in July 2023 and subsequently a Phase II ESA was completed, which consisted of collection of soil samples from the assessment area, collection of background soil samples outside of the assessment area, rock samples within the waste rock pile and installation of three monitoring wells with associated groundwater monitoring. The current program included supplemental soil sampling, a groundwater monitoring event and an HHERA.

Sample results were compared to the Nova Scotia Contaminated Sites Regulations (NS CSRs) Tier I Environmental Quality Standards (EQS), data were compared to available background values from the Environment Canada background soils database as well as site specific background threshold values calculated for the site (i.e., expected background values).

Soil samples from the assessment area exceeded the NS Tier I EQS for several metals. However, with the exception of arsenic and cobalt, the detected concentrations were below the expected background values, therefore, concentrations are interpreted to be related to, or influenced by, background conditions. The cobalt and arsenic impacts in soil have not been delineated to the northeast, as the current assessment was limited to the subject property only.

Dillon completed a HHERA for the site to refine the remedial approach and liability estimate as presented in Dillon’s Preliminary Remedial Option Technical Memo, submitted in December 2023.

Based on the findings of the SSSP and HHERA, Dillon offers the following conclusions:

- Arsenic concentrations in the assessment area have been delineated relative to the background value. Delineation has not been achieved to the north, beyond the DNRR property boundary;
- Concentrations of cobalt and manganese, in the groundwater sample collected from MW23-1, exceeded the applicable NS Tier 1 EQS for potable groundwater. This sample was collected from a background location, suggesting the concentrations are naturally occurring;
- Arsenic exceeded the applicable NS Tier 1 EQS in sample MW23-2. It is noted that this exceedance was not noted during the May 2024 monitoring event;
- An SSTL was calculated for a site visitor in direct contact with the on-site soil (dermal contact, ingestion and inhalation with soil and dust). The SSTL is greater than the EPC calculated for the site and therefore the arsenic concentrations identified at the site are not posing unacceptable risks to

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human receptors who may come into contact with the arsenic in surface soil. However, it is important to note that the extent of impacts has not been fully delineated (i.e., off-site); and

- Dillon utilized the soil, groundwater and SPLP results to empirically derive soil concentrations that could leach concentrations of arsenic into groundwater at concentrations above the drinking water criteria. The findings indicated that soil concentrations in excess of 349 mg/kg could potentially leach arsenic concentrations over the potable criteria. Given the conservative nature of SPLP, the linear curve with very little deviation from an ideal sorption curve and the very high correlation coefficient (greater than 0.9), this approach is highly conservative.

Based on the findings, risk management or remediation may be required if there is potential of installation of potable groundwater wells at the site. However, it is recommended to continue groundwater monitoring at the property on a seasonal basis for a minimum of 4 additional events, to assess trends and further assess if groundwater is impacted above drinking water guidelines and/or background levels.

1.0

Introduction

Dillon Consulting Limited (Dillon) was commissioned by Build Nova Scotia (BNS) to complete a supplemental sampling program (SSP) and a Human Health and Ecological Risk Assessment (HHERA) of the former Mill Village Mine (herein referred to as the “site” or the “subject property”) located on Medway River Road, Charleston, Nova Scotia (refer to **Figure 1**).

It should be noted that the assessment area is limited to the assumed extents of the former mine site that exist on Crown land PID No:70105796. The study boundary generally included areas of Potential Environmental Concern (APECs) identified in the Phase I Environmental Site Assessment (ESA) completed for the site (Dillon, 2023), shown on **Figure 2, Appendix A**. The HHERA is based on information and analytical data obtained from previously completed Phase I and II ESAs and the SSSP conducted as part of the current scope of work.

1.1

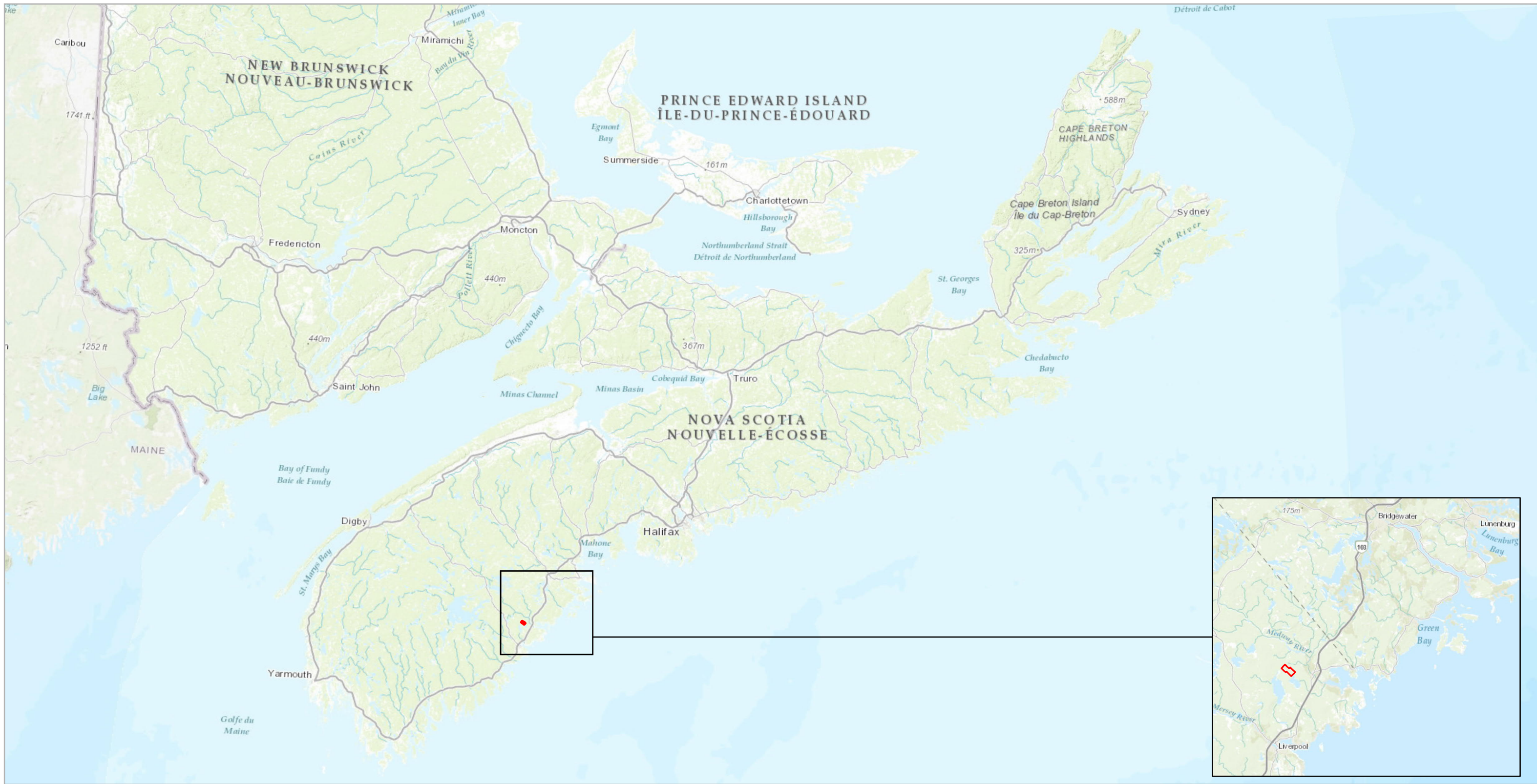
Objectives

The objective of the SSP and HHERA are to complete delineation of identified metals impacts in the surface soil at the site and to assess the potential for unacceptable risks to human and ecological receptors from the metals impacts in the soil and groundwater at the site.

2.0 Site Background

The Mill Village former mine site (i.e., the site) is located in Charleston, Nova Scotia (NS) near Medway River Road, though the site is only accessible via unnamed dirt roads that extend from Zwicker Road. The site is approximately 14 km Northeast of Liverpool in Queen's County. The former mine site occupied a portion of the property identified by PID No. 70169214, which is owned by Nova Scotia Department of Natural Resources and Renewables (NSDNRR).

Beginning in the 1860s, gold mineralization was found in the Mill Village Gold district and prospecting was conducted over the area identifying several prospects. The Thompson Vein was discovered on the subject property and two shafts were reported to have been sunk to target the gold mineralization. A stamp mill was built for ore processing but burnt down in the early 1900s. Additional mine shafts were constructed in the 1940s. Mining operations ceased in the early 1950s. During mining operations ore was reportedly processed at a stamp mill on the adjacent property to the north (PID No: 70105796).



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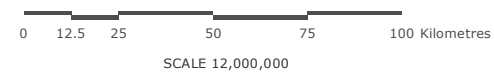
PROJECT LOCATION
 FIGURE 1



 Project Location



MAP DRAWING INFORMATION:
 DATA PROVIDED BY GeoNova, NSDNRR
 MAP CREATED BY: SCM
 MAP CHECKED BY: SPDR
 MAP PROJECTION: NAD 1983 UTM Zone 20N



PROJECT: 23-6446

Date: 2024-10-07



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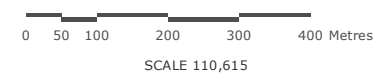
- Subject Parcel
- Assessment Area
- Adjacent Parcel

SUBJECT PARCEL
 FIGURE 2



MAP DRAWING INFORMATION:
 DATA PROVIDED BY GeoNova, NSDNRR

MAP CREATED BY: SCM
 MAP CHECKED BY: SPDR
 MAP PROJECTION: NAD 1983 UTM Zone 20N



PROJECT: 23-6446

Date: 2024-12-06

No further activity is reported to have occurred at the site until the 1980s when a series of mineral exploration programs were conducted in the area by private companies to target gold mineralization. Activities included drilling (early 1980s), boulder and soil sampling (late 1980s and 2000s) and geochemical surveys (early 2010s). In 2013, DNRR carried out site reclamation work, which involved backfilling mine openings (shafts) and grading the surrounding areas, as documented in the AMO dataset (2013-11-18) and site photographs. This excavation and grading have significantly altered the ground conditions from when the site was originally abandoned in the 1950s.

The site has no restrictions to public access; however, the site is located several kilometers from the nearest community is only accessible via irregularly maintained dirt roads. As such, Dillon believes it appropriate to consider the land use at this site to be commercial regarding guideline selection, however, it is considered conservative, as commercial guidelines assume presence on site for 5 days/week for 48 weeks/year. The site is currently vacant with no buildings present.

2.1 Physical Setting

2.1.1 Water Supply/Groundwater Usage

No potable wells are currently located on site. The neighbouring property to the north is privately owned and though currently there are no known buildings on site, in the future there could potentially be potable wells on the property.

During Phase II ESA activities, groundwater samples taken from the assessment area exceeded the NS Tier 1 EQS for cobalt, iron, arsenic and manganese at the background sampling location. These are listed on the NSECC Table 5 list of substances potentially considered as background occurrences, and are interpreted to be related to, or influenced by, background conditions.

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; and
- Keppie, J.D. (compiler) 2000: Geologic 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 consists of glacial till, which is part of the Stony Till Plain. The till is stony with a sandy matrix, derived from local quartzite. Till thicknesses ranges from three to 10 meters (m) in the local area, although on-site observations noted the till to be thinner with depths ranging from 1.68 to 5.28 m.

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The regional bedrock of the subject area consists of metamorphosed sedimentary rocks such as quartzite, greywacke and occasional layers of slate which are part of the Goldenville Formation.

The topography of the subject area is lightly undulating till plains. The western portion of the site is elevated and slopes to the east. Regional topography suggests the regional shallow groundwater flow direction is likely northeast.

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. For clarification purposes, soil stratigraphy has been grouped by area. Generally, the soil was a brown colored silt overlain by vegetation and tree roots. Visual signs of tailings were not observed. Soil observed can be considered coarse-grained.

During hand-auguring activities at the site, it was noted that the waste rock area consists of piles of boulder to cobble sized rocks inter-filled with dark brown and grey sand and silt. The assessment area immediately surrounding the waste rock pile consists of dark brown silty-sand soil with significant shallow root mass.

2.1.4 Climate

The site is situated within the maritime boreal climate zone and is characterized by variable weather, warm summers, cold winters, and moderate precipitation. Current climate conditions at the site can be characterized by examining the historical data. Climate data was taken from ClimateAtlas.ca using the historical period 1976-2005. All data is for the Bridgewater Regional Municipality which includes the Mill village site (ClimateAtlas.ca, 2024).

- Average annual temperature: 7.1 °C;
- Coldest month: February: -4.7 °C;
- Hottest month: July: 15.8 °C;
- Annual average precipitation: 1426 mm;
- Number of Frost Days (Days with coldest temperature below 0°C): 150.5 days;
- Number of Summer Days (Days above 25°C): 35 days; and
- Dry Days (Number of days without rain or snow): 202 days.

2.2 Regulatory Framework

2.2.1 Nova Scotia Contaminated Sites Regulations and Associated Ministerial Protocols

The Phase II ESA activities for the site were conducted in accordance with the NS CSRs and associated Ministerial Protocols. The assessment work was conducted in accordance with the Ministerial Protocol PRO-200 (Environmental Site Assessment for Limited Remediation). Specifically, the criteria used to

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assess impacts at the site were the NS Tier 1 Environmental Quality Standards (EQS) (October 2022) for soil and groundwater, at a property having commercial land-use, potable groundwater conditions and coarse-grained soils.

2.2.2 Atlantic Risk Based Corrective Action (RBCA) Ecological Screening Criteria

Soil concentrations were also compared to the Atlantic Risk-Based Corrective Action (RBCA) Ecological Tier 1 EQS for soil at an agricultural site, to identify potential risks to ecological receptors. Since the site is vacant, agricultural guidelines are considered appropriate for initial screening as they take soil contact and soil and food ingestion exposure pathways into account to protect ecological receptors (soil invertebrates, birds, mammals) at a population level.

Groundwater data were not compared against these criteria as the nearest receiving water body is >200m from the onsite wells and as such, is not expected to be impacted from potential contamination on the site.

2.2.3 Background Concentrations

Metals in soil concentrations were also evaluated against the Nova Scotia Maximum Concentration Background Levels, as specified in Environment Canada's (EC) Background Soil Database (March 2011). Additionally, comparisons were made to Site-Specific Background Threshold Values (BTVs), which were derived from measured metal concentrations in background samples collected in May 2024.

2.2.4 HHERA Regulatory Context

The HHERA was conducted in accordance with the Nova Scotia Contaminated Sites Regulations (NS CSRs) and associated Ministerial Protocols, where relevant. Provincial guidelines were applied where possible (i.e., the Nova Scotia Pathway Specific Standards [NS PSS] for human health and Atlantic Risk-Based Corrective Action [ARBCA] guidelines for ecological health). 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 5**).

2.3 Environmental Site Assessment History

A summary of the ESA activities completed at the site are summarized in the following sections.

2.3.1 Phase I ESA

Dillon completed a Phase I ESA at the site (Dillon, 2024a). It should be noted that the assessment area is limited to the assumed extents of the former mine site that exist on Crown land PID. The Phase I ESA indicated two APECs, as outlined in **Table 2-1**.

Table 2-1: Summary of APECs (Phase I ESA, Dillon,2024)

APEC No.	APEC	Contaminants of Potential Concern (CoPCs)	Media of Concern	Comments
1	Waste Rock/Dump	Metals, General Chemistry (groundwater only), Petroleum Hydrocarbons (PHCs), Polycyclic Aromatic Hydrocarbons (PAHs)	Soil, Groundwater	Suspected tailings area based on background review. Appears to be a waste rock pile, tailings not observed.
2	Former Mine Site	Metals, PAHs	Soil, Groundwater	Area surrounding waste rock pile

2.3.2 Phase II ESA

Dillon conducted a Phase II ESA at the site based on the findings of a Phase I ESA. The Phase I ESA identified two APECs: a suspected waste rock pile area and the surrounding areas impacted by historical mining activities. The objective of the Phase II ESA was to assess soil and groundwater quality in these areas, compare the findings to NS Tier I EQS, and establish site-specific BTVs to differentiate contamination from natural conditions.

Soil analysis revealed that concentrations of aluminum, arsenic, beryllium, cobalt, iron, manganese, selenium, and vanadium exceeded NS Tier I EQS. Most exceedances, except for arsenic and cobalt, were attributed to natural background concentrations of glacial till and the underlying quartzite bedrock. Arsenic exceeded BTVs in seven of 30 samples, necessitating further delineation, while cobalt exceedance was limited to one location within the waste rock pile. Petroleum hydrocarbons (PHCs) and PAHs were either not detected above laboratory reportable detection limits or were below applicable guidelines, and no energetics were identified. Groundwater sampling, which included general chemistry, metals, PHCs, and PAHs, identified exceedances of cobalt, iron, and manganese relative to NS Tier I EQS in samples from background locations, indicating naturally occurring concentrations. PHCs and PAHs were below detection limits in all groundwater samples.

To establish site-specific background levels, Dillon conducted a statistical analysis of background soil samples, ensuring the calculated BTVs accurately represent local environmental conditions. The higher of Environment Canada's background data or calculated BTVs was used for comparison.

Dillon recommended supplemental soil sampling to delineate arsenic impacts and further assess contamination to the northeast. An HHERA was advised to refine remedial strategies, and confirmatory groundwater sampling under low-flow conditions was also recommended to verify results. While some contaminant concentrations exceeded guidelines, many are attributed to natural background conditions, and further assessments will ensure appropriate management of potential impacts and guide remediation efforts.

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3.0 Supplemental Sampling Program (Sept 2024)

3.1 Scope and Methodology

3.1.1 General

Dillon completed an SSP at the site to delineate the extent of metals impacts in the soil at the site, to further assess groundwater conditions and to obtain additional analytical data required for the HHERA. Dillon selected sample locations prior to site activities and used the Field Maps application published by Esri to navigate to the selected locations. Coordinates were georeferenced using UTM Zone 20N, NAD 83. For the current scope of work, sample locations were confined to the subject property PID. Site photographs are presented in **Appendix A**.

Soil and groundwater samples were submitted to ALS Environmental Analytical Laboratories (ALS Labs) for required analysis. ALS Labs is accredited to ISO/IEC 17025 for soil and groundwater analyses by the Canadian Association for Laboratory Accreditation Inc. (CALA). For each of the analytical methods used, ALS applied internal QA/QC programs including laboratory duplicates, surrogate recoveries, reference materials, spiked method blanks, and matrix spikes to govern sample analysis and analytical data quality assurance. The appropriate laboratory analytical methods were used to meet the data quality objectives and achieve the method / reportable detection limits suitable for the current investigation.

3.1.2 Shallow Surface Soil Sampling

Shallow surface soil sampling was completed in September 2024 and consisted of collection of a total of 12 surface soil samples, including two lab duplicates, at the locations shown in **Figure 3**. Samples were visually inspected as they were collected.

Of note, visual signs of tailings were not observed during sample collection. Shallow surface soil samples were collected using hand tools (i.e., spade, hand-auger). Samples were collected directly from these tools and placed immediately in laboratory supplied containers and then placed in coolers containing ice pending delivery to ALS Labs. Hand tools used for soil sample collection were decontaminated between each sample location using a phosphate free detergent and rinsed with distilled water. Soil samples were submitted to ALS Environmental Analytical Laboratories (ALS Labs) in Dartmouth, Nova Scotia for analysis of arsenic and metals leachate.

3.1.3 Groundwater Monitoring and Sampling

Groundwater monitoring and sampling was completed September 23, 2024. Prior to purging the well, the depth to groundwater was measured from an established reference point (top of PVC casing) using an oil-water interface probe. Low flow sampling was used to minimize sample turbidity. Sample turbidity has the potential to bias the dissolved phase analytical results, as targeted substances present within or

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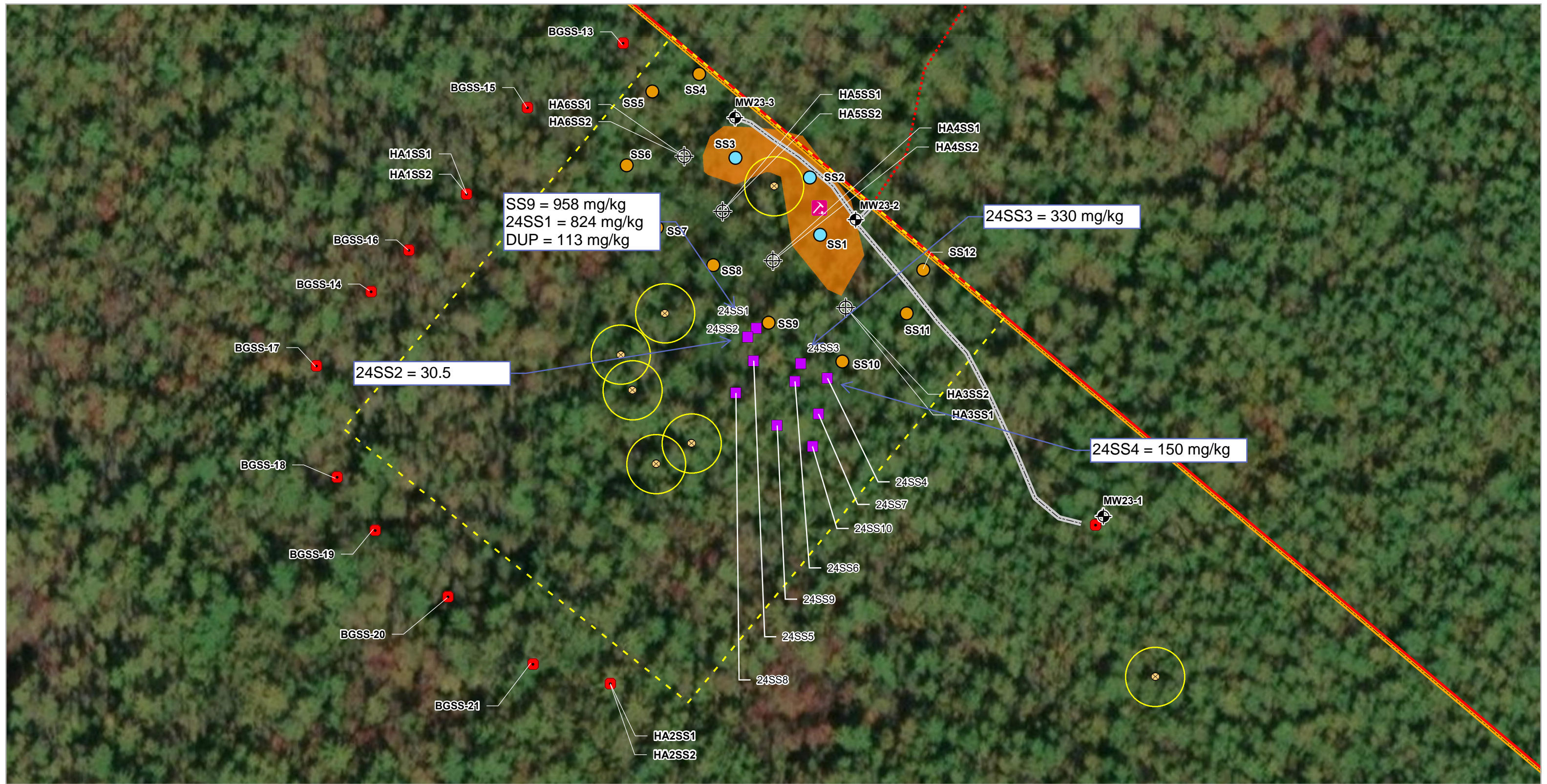
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sorbed to soil particles may be released during sample preparation/analysis, resulting in an artificially high measurement.

A battery powered peristaltic pump set at a low pumping rate (e.g., 0.1 L/min) to minimize drawdown was utilized to purge and sample the monitoring wells. Monitoring wells were purged according to Dillon Standard Environmental Field Procedures and industry standards for low-flow groundwater sampling. Groundwater field parameters were measured using a multimeter calibrated according to the manufacture's published instructions and a flow-through cell. Field parameters recorded from the instrument included pH, conductivity, dissolved oxygen, oxidation-reduction potential, turbidity, and temperature. Groundwater field parameters and drawdown were monitored and recorded typically every three to five minutes. Once the monitored parameters had stabilized such that successive measurements were within 10%, a groundwater sample was collected.

The collected groundwater samples were directly placed into laboratory supplied containers. Metals and mercury samples were field filtered and preserved. The sample containers were filled, labeled, and stored in a sample cooler containing ice pending delivery to ALS Labs in Dartmouth, NS for general chemistry, dissolved metals (including mercury), PHC and/or PAH analysis, depending on the sample location. Monitoring well locations are presented on **Figure 3**.



SS9 = 958 mg/kg
 24SS1 = 824 mg/kg
 DUP = 113 mg/kg

24SS3 = 330 mg/kg

24SS2 = 30.5

24SS4 = 150 mg/kg

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SAMPLE LOCATIONS
 FIGURE 3



- Soil Sample Locations (Dillon September 2024)
- Monitoring Well
- Background Sample
- Soil/Tailings Sample
- Proposed Access Road
- - - Access Route
- Rock Sample
- Hand Auger Sample
- Step-out Surficial Soil Sample
- Mine Openings Buffer (10m)
- Assessment Area
- Mine Opening
- Subject Parcel
- Tailings Area

MAP DRAWING INFORMATION:
 DATA PROVIDED BY GeoNova, NSDNRR
 MAP CREATED BY: SCM
 MAP CHECKED BY: AVR
 MAP PROJECTION: NAD 1983 UTM Zone 20N



3.1.4 Quality Assurance and Quality Control

Quality Assurance/Quality Control (QA/QC) protocols were established and followed throughout the program. This included the collection of duplicate samples. As discussed in sections above, non-dedicated equipment, such as the hand-auger and water level meter, were decontaminated between sampling locations. Methods used during the field work followed Dillon's Standard Environmental Field Procedures which are based on industry standards and described in the respective sections above.

Four blind field duplicate soil samples and one duplicate groundwater sample were collected during the assessment. Additionally, ALS Labs analyzed select laboratory duplicate samples as part of their internal QA program. The results of this testing were used to evaluate the reliability of the sampling.

Sample containers were labelled with sample/location ID, project name and number, company name (Dillon), and time and date of collection. Soil samples were collected and placed directly into laboratory supplied glass sample containers. Groundwater samples were collected in laboratory supplied containers prepared with appropriate preservatives for the intended analysis. Once collected, samples were immediately placed in coolers containing ice to maintain a temperature of less than 10°C. Where insufficient sample volume was available, the volume available was provided to the laboratory in an appropriate container and the lab was able to conduct the analyses with limited sample volume. To minimize the potential for cross contamination, new nitrile gloves were used to collect each sample, and non-dedicated sampling equipment was decontaminated between each sampling location.

To evaluate the precision associated with sampling and analytical methods, the samples and their duplicates were used to calculate the relative percent difference (RPD). The RPD is defined as the absolute value of the variation between a sample's analytical concentration and its duplicate, when compared to the average concentration of the original and the duplicate in detected samples. The RPD is calculated using the following equation:

$$= \frac{|V_1 - V_2|}{\frac{(V_1 + V_2)}{2}} \times 100$$

RPD is used to assess the validity of the field and laboratory analytical procedures for parameters analyzed that are greater than 5 times the reportable detection limit (RDL) in both the parent and duplicate sample. Dillon set a screening-level RPD acceptance criterion of less than 60% for acceptability in soil and 40% for acceptability in groundwater. In cases where the measured concentration of a parameter is less than 5 times the RDL, the absolute difference of the two measured concentration of the sample and its duplicate must be less than 2 times the RDL for acceptability. As noted above, field duplicates were collected during each sampling program, with RPDs calculated for each duplicate.

3.2 Supplemental Sampling Program Results

3.2.1 Soil Quality

Soil analytical results are presented in **Tables B-1** to **Table B-3** of **Appendix B** and are summarized in the sections below. Laboratory Certificates of Analysis are provided in **Appendix C**.

3.2.2 Soil Stratigraphy

As noted previously, soil stratigraphy varies across the site. While visual signs of tailings were not observed, a more detailed examination of shallow soil samples collected at a depth of 6 inches reveals a range of soil types. The soils are primarily light brown to medium brown, with some areas exhibiting grey or black coloration, particularly in organic-rich zones. The predominant texture is silty sand, with varying amounts of sand and silt-sized particles. All samples were dry and had no significant odour.

Specific observations include light brown to medium brown silty sand in samples 24SS1, 24SS2, 24SS4, 24SS7, and 24SS10. Samples 24SS3, 24SS5, 24SS6, and 24SS9 exhibited a light brown to orange color and a silty sand texture, with noticeable amounts of pebbles and organic matter. Sample 24SS8 displayed a distinct black and grey coloration and a silty sand texture with organic content.

Overall, the soils at the site can be classified as coarse-grained, with variations in color, texture, and organic content observed across different sampling locations. It is important to note that the soils can be heterogeneous even within a two-foot radius, indicating significant variability in both colour and texture.

3.2.3 Arsenic in Soil

A total of 12 soil samples, including two field duplicates, were collected from the assessment area during the SSP. Seven samples, including one field duplicate, were submitted for arsenic analysis. After receiving the first round of results, three samples, including the field duplicate, were submitted for re-analysis. **Table B-1, Appendix B**, presents a summary arsenic concentration analysis conducted at the site. Sample results are compared to the NS Tier I EQS, the Atlantic RBCA – Ecological Tier 1 EQS, and background values.

Arsenic exceedances for 2024 samples within the assessment area are summarized below:

- Arsenic concentrations (ranging from 30.5 mg/kg to 876 mg/kg) exceeded the applicable NS Tier 1 EQS (10 mg/kg), and the Atlantic RBCA Ecological Tier 1 EQS for soil - Agricultural value (17.1 mg/kg) in 9 out of 10 soil samples; however, only three samples exceeded the background value (281 mg/kg). Step-out samples 24SS5 (AA) and 24SS6, with arsenic concentrations of 62.4 mg/kg and 214 mg/kg, respectively, delineated the region characterized by arsenic levels exceeding the background value.

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In summary, arsenic concentrations in the assessment area have been delineated relative to the background value. Delineation has not been achieved to the north, beyond the DNRR property boundary.

3.2.4 Arsenic Leachate

A total of 10 soil samples were collected from the assessment area for Synthetic Precipitation Leaching Procedure (SPLP) arsenic leachate analysis. Upon receiving arsenic in soil results (see Section 3.2.3), three samples were strategically chosen and submitted for SPLP arsenic leachate analysis. **Table B-2, Appendix B**, presents leachate analysis of the three soil samples compared to arsenic concentrations of 10 surface soil samples (September 2024), three composite borehole samples (December 2023), and three groundwater samples (September 2024). Sample results are compared to the NS Tier I EQS for reference. This analysis was completed to assess potential concerns with potable groundwater at the site and are discussed further in the human health risk assessment (HHRA).

3.3 Groundwater Quality

Groundwater analytical results are presented in **Table B-3 of Appendix B** and are summarized in the sections below. Laboratory Certificates of Analysis are provided in **Appendix C**.

3.3.1 Groundwater Depths

Groundwater was encountered during the September 23, 2024, sampling event at depths ranging from 2.06 meters below top of casing (mbtoc) (i.e., in MW23-2) to 5.23 mbtoc (i.e., in MW23-1; **Table 3-1**). Non-aqueous phase liquids (NAPL) were not measured or observed in on-site monitoring wells during the groundwater monitoring event. Based on the orientation of the monitoring wells, groundwater flow directions were not calculated. The inferred groundwater flow direction is to the northeast.

Table 3-1: Groundwater Depths

Monitoring Well ID	Depth to Groundwater (mbtoc)
MW23-1	5.23
MW23-2	2.06
MW23-3	2.67

Notes:

1. mbtoc – meters below top of casing
2. Water levels were collected on September 23, 2024.

3.3.2 General Chemistry

A total of four groundwater samples, including a field duplicate, were submitted for General Chemistry analysis. The findings of the current sampling event, as well as those of May 2024, are tabulated in

Table B-3, Appendix B. Where detected, general Chemistry parameters were at concentrations below the applicable NS Tier 1 EQS.

3.3.3 Metals

Four groundwater samples, including a field duplicate, were submitted for dissolved metals analysis, including mercury. The results are presented in **Table B-3, Appendix B.** In one of the analyzed samples (MW23-1), concentrations of cobalt (0.0047 mg/L), and manganese (0.127 mg/L) exceeded the applicable NS Tier 1 EQS (0.0038 mg/L, and 0.12 mg/L, respectively). This sample was collected from a background location, suggesting the concentrations are naturally occurring. In another analyzed sample (MW23-2), concentrations of arsenic (0.0175 mg/L) exceeded the applicable NS Tier 1 EQS (0.01 mg/L).

3.3.4 Petroleum Hydrocarbons

A total of three groundwater samples, including a field duplicate, were submitted for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), and modified Total Petroleum Hydrocarbons (TPH). The results are presented in **Table B-3, Appendix B.** Concentrations of BTEX and modified TPH were below the laboratory detection limits for all samples.

3.3.5 Polycyclic Aromatic Hydrocarbons

A total of four groundwater samples, including a field duplicate, were submitted for analysis of PAHs. The results are presented in **Table B-3, Appendix B.** PAH concentrations were below the laboratory detection limits for all samples.

3.4 Quality Assurance and Quality Control

A program to ensure quality assurance and control (QA/QC) was implemented throughout the Supplemental Sampling Program. The QA/QC program consisted of a number of 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 precision of the data for the samples collected was evaluated by calculating the RPD between the original samples and its duplicate when the samples had concentrations greater than 5x the laboratory

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RDL. Where concentrations are within 5 x the RDL, RPDs cannot be calculated. In this case, a duplicate is considered acceptable if the difference between the duplicate sample concentration is less than 2 x the RDL.

In order to assess the precision and accuracy of the laboratory results, the RPD was calculated for each parameter (only arsenic for soil), where RPDs below 60% and 40% are deemed to be acceptable in soil and groundwater, respectively. RPD values were not calculated for parameters that had concentrations that were less than the laboratory limit of detection. Calculated RPD values are presented in **Table B-4**, **Table B-5**, and **Table B-6** (see **Appendix B**) for soil and groundwater. A summary of RPD results, where calculated, is presented below:

- RPDs for arsenic in soil exceeded the 60% threshold. Due to significant soil non-heterogeneity in the sampling area, sample 24SS1 was re-analyzed as 24SS1-A. The RPD between 24SS1 and 24SS1-A was below 60% and was deemed acceptable. It is noted that these samples were all collected at the location of SS9, collected during the Phase II ESA. Given the concerns with heterogeneity of the soil, the highest detected concentration at this location is carried forward into the HHERA; and
- RPDs for groundwater were below 40% for all parameters, where they could be calculated. For zinc, RPDs could not be calculated, and the difference between the parent and duplicate sample was 0.0021 mg/L which slightly exceeded 2 x the RDL (0.0020 mg/L). The zinc concentrations were well below the applicable guideline and therefore the data is considered acceptable.

4.0 Data Availability and QA/QC

4.1 Background Data

Metals in soil concentrations were evaluated against the Nova Scotia Maximum Concentration Background Levels, as specified in Environment Canada's (EC) Background Soil Database (March 2011). Additionally, comparisons were made to Site-Specific Background Threshold Values (BTVs), which were derived from measured metal concentrations in background samples collected in May 2024.

A total of 23 samples were included in BTV calculations for arsenic and a total of 13 samples were included in the BTV calculations for other metals. To determine site-specific background levels for metals in soil that exceed the Nova Scotia Tier 1 EQS, the following statistical procedure was conducted using ProUCL Version 5.1, a statistical software for environmental applications published by the United States Environmental Protection Agency (USEPA).

1. Data Evaluation for Distribution Type and Frequency of Detection: The background soil dataset, including new samples collected in May 2024, was first evaluated to identify the distribution type. This involved determining whether the data followed a normal, log-normal, gamma, or nonparametric distribution. The frequency of detection for each metal was also assessed;
2. Outlier Detection: Potential outliers were identified visually using Q-Q plots for individual parameters. If necessary, histograms were generated to further investigate the distribution of the data. Parameters of interest were evaluated as a whole using Q-Q plots and histograms. Rosner's Outlier Test was applied to confirm the presence of any significant outliers; and
3. Generation of BTVs: Using the cleaned dataset, BTVs were calculated at a 95% confidence level. This step ensured that the statistical analysis aligns with the methodology employed by Environment Canada in establishing their background soils database.

BTVs were specifically calculated for metals that exceeded the Nova Scotia Tier 1 EQS as identified in the Phase II ESA report, issued on 25 March 2024. The derived BTVs serve as the proposed comparison criteria to statistically determine if the analytical results from media samples collected at areas of environmental concern exceed the background concentrations. This approach ensures that the site-specific background levels are robust and representative of the local environmental conditions.

4.2 Site Data

The data selected for the HHERA were compiled from the Phase II ESA field program (Dillon, 2024b) completed in 2023 and 2024 and the current SSP. A total of 49 shallow soil samples, plus six field duplicates, were analyzed for metals and six groundwater samples, plus two field duplicates, were collected for metals, general chemistry, BTEX/TPH, and PAHs. The results are presented in **Table B-1**, **Table B-2**, **Table B-3**, **Table B-7**, and **Table B-8 (Appendix B)**.

A program to ensure QA/QC was implemented throughout the Phase II ESA and current program. The QA/QC program consisted of a number of elements:

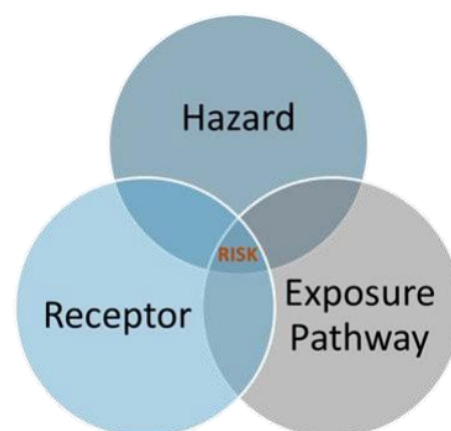
- Collection of samples using protocols consistent with Dillon Standard Environmental Field Procedures and/or industry standards;
- Use of dedicated sampling equipment and/or adherence to established equipment cleaning protocols, where applicable;
- Use of laboratory supplied containers;
- Collection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

Review of the laboratory certificates of analysis on their internal quality assurance/quality control (QA/QC) metrics (i.e., method blanks, certified reference materials, spiked blanks, and matrix spikes) indicates no significant data quality issues that would affect the use of the site soil data and HHERA.

5.0

Human Health Risk Assessment Framework

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 Human Health Risk Assessment (HHRA) for the Mill Village 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 is described in this section and its associated subsections.

The HHRA for Mill Village was conducted in accordance with the following regulatory guidance documents, where applicable:

- NS CSRs and associated Ministerial Protocols, where relevant. Provincial guidelines were applied where possible (i.e., the Nova Scotia Pathway Specific Standards [NS PSS] for human health and Atlantic Risk-Based Corrective Action [ARBCA] guidelines for ecological health);
- Federal Contaminated Site Risk Assessment in Canada. Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA). Version 3.0. March 2021. Health Canada Contaminated Sites Division, Safe Environments Directorate (Health Canada, 2021a);
- Federal Contaminated Site Risk Assessment in Canada. Toxicological Reference Values (TRVs). Version 3.0. March 2021. Health Canada Contaminated Sites Division, Safe Environments Directorate (Health Canada, 2021b);
- 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, 2021c);
- Federal Contaminated Site Risk Assessment in Canada. Part V. Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals (DQRACHEM). September 2012. Prepared by: Health Canada Contaminated Sites Division, Safe Environments Directorate (Health Canada, 2010);

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- 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).

Where appropriate or necessary, the HHRA also considered guidance and procedures developed and endorsed by other regulatory agencies such as the US EPA (Environmental Protection Agency), in the absence of federal or provincial benchmarks.

An HHRA typically consists of five main steps or phases, as outlined below, and represented in Error! Reference source not found..

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 TRV (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 to the receptors selected based on the 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.

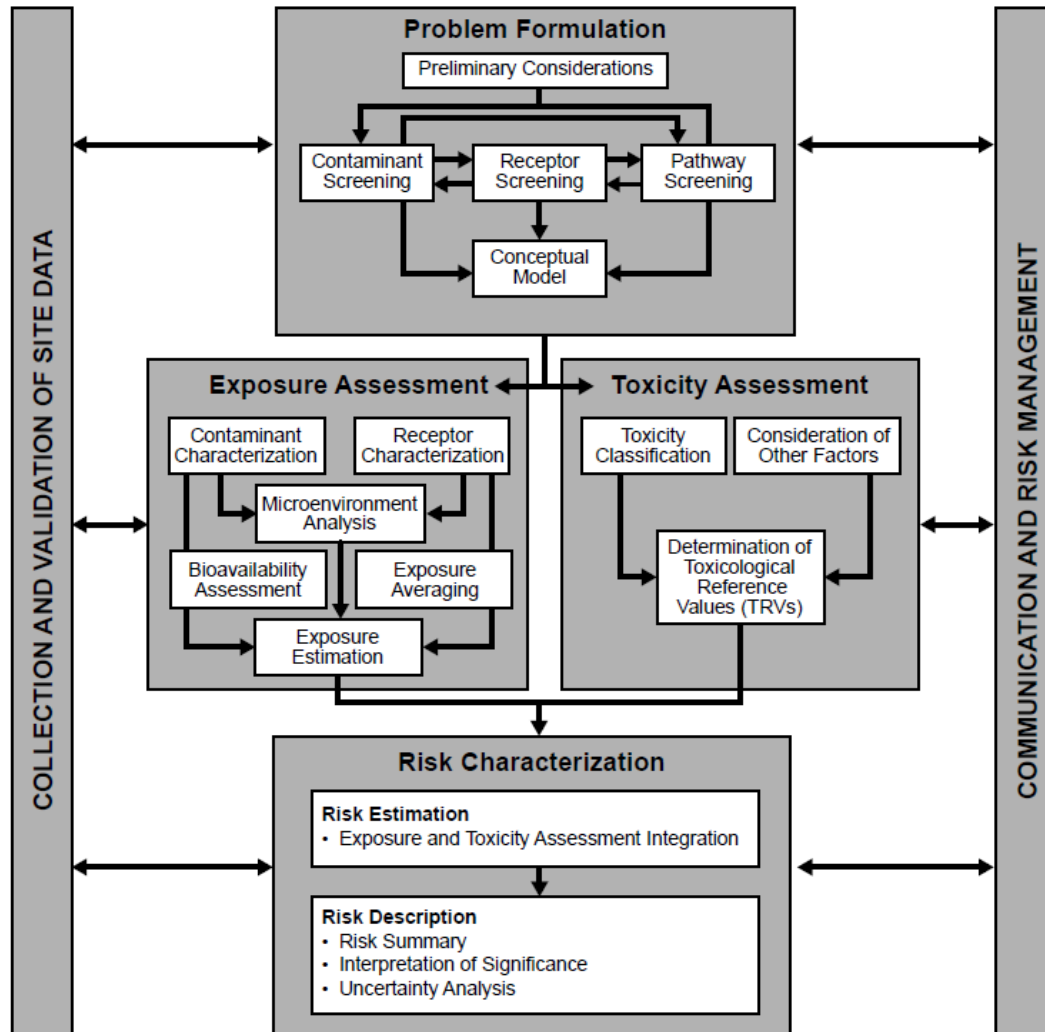


Figure 4: Human Health Risk Assessment Framework (from Health Canada, 2010)

5.1 HHRA 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

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- Development of a conceptual site model (CSM).

5.1.1 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 Area was previously provided in **Section 2.0**.

5.1.2 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 toxicological reference values (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 (which is the case for a few of the COPCs in the HHRA), it is necessary that HHRA 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

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of hypothetical receptor called a “lifetime” or “composite” receptor may be evaluated when potential carcinogenic risks require consideration in a HHRA. The assessment of lifetime receptors in HHRAs involves combining (using a weighted average approach) estimated daily exposures for each relevant life stage, to calculate a Lifetime Average Daily Dose (LADD), which is then used to estimate incremental lifetime cancer risk (ILCR). However, the appropriateness or reasonableness of assessing a lifetime receptor is directly related to the exposure scenarios under evaluation and the likelihood that a person may be exposed to carcinogenic COPCs in site media for their entire lifespan, under the same set of exposure conditions for the same assumed exposure frequencies and durations, from infancy to death. For many contaminated site exposure scenarios, this would be highly unrealistic, but there may be certain exposure scenarios (such as residential scenarios) where assessment of a lifetime receptor is appropriate (albeit highly conservative).

The site is owned by the province of Nova Scotia and has no restrictions to public access; however, the site is located several kilometers from the nearest community is only accessible via irregularly maintained dirt roads. The site is currently vacant with no buildings present. No potable wells are currently located on site. The neighbouring property to the north is privately owned and though currently there are no known buildings on site, in the future there could potentially be potable wells on the property. Current potential human receptors for this site include hikers who may come in contact with metals in surface soil (i.e., inadvertent contact).

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

- **Site Visitor (all ages)** –The most likely human receptor for the site are site visitors (all ages) using the land for recreational purposes (walking, hiking) and so will only be screened against surface level soil concentrations. Relevant soil data (surface soils) for this receptor were screened in the Problem Formulation and will be incorporated into the future risk assessment.

Key parameters and assumptions for the receptors evaluated in the HHRA are described in **Table 5-1**.

Table 5-1: Key Parameters and Assumptions for the Receptors Selected for Mill Village

Parameter	Value	Reference
Age Group Duration (years)	Infant: 0 to <6 months (0.5) Toddler: 6 months to <5 years (4.5) Child: 5 years to <12 years (7) Teen: 12 years to <20 years (8) Adult: ≥20 years (60)	Health Canada, 2021a

Parameter	Value	Reference
Body Weight (kg)	Infant: 8.2 Toddler: 16.5 Child: 32.9 Teen: 59.7 Adult: 70.7	Health Canada, 2021a
Soil Ingestion (mg/day)	Infant: 20 Toddler: 80 Child: 20 Teen: 20 Adult: 20	Health Canada, 2021a
Outdoor dust level from soil ($\mu\text{g}/\text{m}^3$)	0.76	Health Canada, 2021a
Inhalation Rate (m^3/day)	Infant: 2.2 Toddler: 8.3 Child: 14.5 Teen: 15.6 Adult: 16.6	Health Canada, 2021a
Hand Surface area (m^2)	Infant: 0.032 Toddler: 0.043 Child: 0.059 Teen: 0.08 Adult: 0.089	Health Canada, 2021a
Skin surface area (upper and lower arms) (m^2)	Infant: 0.055 Toddler: 0.089 Child: 0.148 Teen: 0.223 Adult: 0.25	Health Canada, 2021a
Skin surface area (upper and lower legs) (m^2)	Infant: 0.091 Toddler: 0.169 Child: 0.307 Teen: 0.497 Adult: 0.572	Health Canada, 2021a
Hand soil adherence factor ($\text{kg}/\text{cm}^2\text{-event}$)	1×10^{-7}	Health Canada, 2021a
Surfaces other than hands soil adherence factor ($\text{kg}/\text{cm}^2\text{-day}$)	1×10^{-8}	Health Canada, 2021a
Outdoor dust level from soil ($\mu\text{g}/\text{m}^3$) ^a	250	Health Canada, 2021a

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Parameter	Value	Reference
Time spent on site	Site visitor: 2 hours/day, 5 days/week, for 48 weeks/year. For oral/dermal pathways, exposures are considered event driven, and as such, the hour/day term does not apply in the risk modelling.	Assumed

5.1.3 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 encounters 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 contacts 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 the outcome of pathways, receptors, and COPCs at a site, and states how a human exposure to contaminants take place. The most likely exposure scenarios are selected based on the information previously presented in relation to site characterization, COPC identification and exposure pathway selection, and land use.

In general, inhalation occurs on a continuous 24-hour per day basis regardless of whether a person is on-site or off-site. Therefore, the inhalation exposure experienced by people on-site is a function of both the time spent on-site in a given day and the number of days spent on-site in a given year. Exposures of this nature are considered *time driven*. Alternatively, exposures such as incidental ingestion or dermal contact with impacted soil (typically grouped together by the term 'direct contact') can only occur while a person is present on-site. In the practice of HHRA, it is commonly assumed that whether someone spends 1 minute or 24 hours at a site, their entire daily 'dose' of contaminant is obtained from the site. These types of exposures are considered to be *event-driven* and are a function of only the days spent on site in a given year. Unlike inhalation exposures, they do not take into account the time spent on site in a given day.

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Given the site's current and reasonably foreseeable future land use, the most likely and relevant human exposure pathways/routes for each land use are presented in **Table 5-2**. A number of other potential exposure pathways for human receptors were considered, but were ultimately excluded, as briefly summarized in **Table 5-2**, below. Table 5-2 does not include pathways with respect to surface water and sediment as there are no surface water bodies on the site. 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 5-2: Summary of Selected and Excluded Pathways in the HHRA

Pathway	Land Use	Selected or excluded?	Rationale
Ingestion of Soil Dust, Inhalation of Soil/ Dust, Dermal Contact with Outdoor Soils/Dusts	Commercial	Selected	COPCs have been identified in soils on site. People may be exposed to COPC in surface soils via incidental ingestion, inhalation/ ingestion of soil dusts, and dermal contact with soils while on site.
Groundwater Ingestion (as drinking water)	All	Selected	No potable wells are currently located on site. The neighbouring property to the north is privately owned. In the future there could potentially be potable wells. COPCs have been identified in soil and groundwater that may impact potable groundwater. Although the use of groundwater as drinking water is unlikely, this pathway was conservatively selected.
Indoor Vapour Inhalation	All	Excluded	No on-site buildings. Based on the Phase II ESA completed at the site, the only identified COPCs were metals, which are not volatile.
Ingestion of Garden Produce/Country Food Vegetation	All	Excluded	The site several kilometers from the nearest community is only accessible via irregularly maintained dirt roads. Unexpected to be used for farmland/gardens
Dermal Contact with Groundwater	All	Excluded	There are no known potable water wells, however, potential for future potable water use. Assessment of groundwater ingestion pathway will be protective of this pathway
Outdoor Vapour Inhalation	Not applicable	Excluded	The only identified COPCs were metals, which are not volatile.
Ingestion of livestock animals	Not applicable	Excluded	The site does not provide appropriate habitat for raising livestock and this is not expected to change in the future.

Notes:

Blue shading indicated site-related pathways selected.

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Based on the exposure pathway screening provided in **Table 5-1**, the most likely human exposure pathways/routes relevant for the Site for site related exposures are:

- Ingestion of outdoor soils/dusts;
- Dermal contact with outdoor soils/dusts;
- Inhalation of outdoor soils/dusts; and
- Ingestion of /Dermal Contact with groundwater as potable drinking water.

Dillon utilized the soil, groundwater and SPLP results to empirically derive soil concentrations that could leach concentrations of arsenic into groundwater at concentrations above the drinking water criteria. This is discussed further in **Section 5.4.2**.

Based on the information previously presented in relation to site characterization, COPC identification and exposure pathway selection, and assuming that the parkland, residential and commercial land use will be applicable in the future, the following exposure scenarios were selected for each land use. The assumed exposure scenario durations were conservatively selected to provide flexibility in the HHRA results. The exposure scenarios and time on site assumptions evaluated in the study area were:

- **Site Visitor Scenario:** This scenario assumes that a site visitor (all ages) would periodically visit the Site for recreational activities, hiking, etc. It was conservatively assumed that outdoor site visitors would be present for 5 days a week, 2 hours per day onsite for 48 weeks a year; and
- **Potable Groundwater:** This scenario was completed assuming the groundwater at the site is used for potable purposes, and was assessed utilizing soil, groundwater and soil leaching data, in comparison to drinking water guidelines.

These exposure scenarios are considered to be realistic, yet conservative for the site based on reasonably anticipated future land use and likely overestimates the time spent on the site by any one individual receptor. The exposure scenarios assume that current COPC site concentrations also represent future site soil and groundwater COPC concentrations.

5.1.4

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.

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This step of the HHRA identifies chemicals that have the potential to pose a risk to human health. As per Health Canada (2021a) 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 stepwise process, as follows:

1. Comparison of site soil chemistry data maxima to regulatory human health-based soil quality benchmarks 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, frequency of exceedance of site soil chemistry data over human health-based soil quality benchmarks, and/or degree of guideline exceedance; 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 the general chemistry and physical properties of soil and/or groundwater (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 parameters were not considered further in the HHRA.

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 risks exist; it is simply an indicator that further assessment is required. Guidelines are intentionally derived by regulatory agencies to be conservative and protective.

5.1.4.1 COPCs in Site Soil (Direct Contact)

Direct soil contact was assumed to be an open exposure pathway for areas having a future parkland, residential, or commercial land use. Separate COPC soil screenings were completed for each land use

area, such that soil data collected within areas identified as having a future parkland land use were screened against residential/parkland guidelines; areas identified as having a future residential land use were also screened against residential/parkland guidelines; and areas identified as having a future commercial land use were screened against commercial guidelines. Results of the direct contact soil screening by land use are presented in the following sections.

COPC screening was conducted using only surface soils on site. The comparison of maximum measured concentrations of chemicals in site surface soil to the selected SQG_{HH} are presented in **Table 5-3**.

Table 5-3: Human Health Screening for COPCs at Surface Depth, Direct Contact Pathway

Chemical	Maximum Measured Concentration (mg/kg)	Background Maximum Concentration (mg/kg)	Human Health Screening Level (mg/kg)		Exceeds Guideline and Background? (Y/N) ^c
Aluminium	31400	59000	15400	^a	N
Arsenic	958	281 ^b	31	^a	Y
Antimony	0.78	2	7.5		N
Barium	57.8	540	10000	^a	N
Beryllium	1.09	1.6	110	^a	N
Cadmium	0.535	2.6	49	^a	N
Chromium (Total)	53.9	21	630	^a	N
Cobalt	49.3	30.6	22	^a	Y
Copper	30.8	29	4000	^a	N
Iron	37400	52000	11000	^a	Y
Lead	67.5	160	260	^a	N
Manganese	404	6,530	360	^a	N
Mercury	0.0971	0.56	24	^a	N
Molybdenum	4.64	2.6	110	^a	N
Nickel	55.4	16	310	^a	N
Selenium	1.95	3.1	125	^a	N
Uranium	1.7	3.9	33	^a	N
Vanadium	40.7	115	39	^a	N
Zinc	72.2	340	16000	^a	N

Notes:

^a Nova Scotia Tier II Pathway Specific Standards (PSS) for Soil – Commercial Land Use

^b Site Specific Background Threshold Values

^c If guideline and the maximum background concentration was exceeded, but the samples were generally within the range of background, the chemical was not carried forward as an initial COPC.

Bold values indicate exceedance over the guideline and background.

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. A check was conducted to confirm that chemicals that were not detected in any of the soil samples had detection limits that were greater than applicable benchmarks. Based on the screening of maximum chemical

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concentrations to human health-based guidelines and to background concentrations, the arsenic and cobalt were carried forward as initial COPCs and discussed further below. Chemicals without guidelines were also carried forward as initial COPCs.

Further Examination of Initial COPCs

Cobalt was exceeded in only 1 of 11 samples collected from the site (SS3). This sample was collected from the waste pile area. The degree of exceedance of the maximum soil concentration over guidelines were as follows: cobalt 2.2-fold (49.3 mg/kg versus guideline of 22 mg/kg). Surrounding samples had low cobalt concentrations (i.e., concentrations ranging from 0.78 – 12.5 mg/kg, with highest concentrations confined to the waste rock pile area), indicating the exceedance of cadmium is in a small area only. The extent of cobalt exceedances has been delineated. Since cobalt had a low degree and frequency of guideline exceedance, the impacts are confined to the waste rock pile and have been delineated, adverse effects to human health are not expected from the identified cobalt exceedance. Cobalt is not carried forward for further assessment in the HHRA.

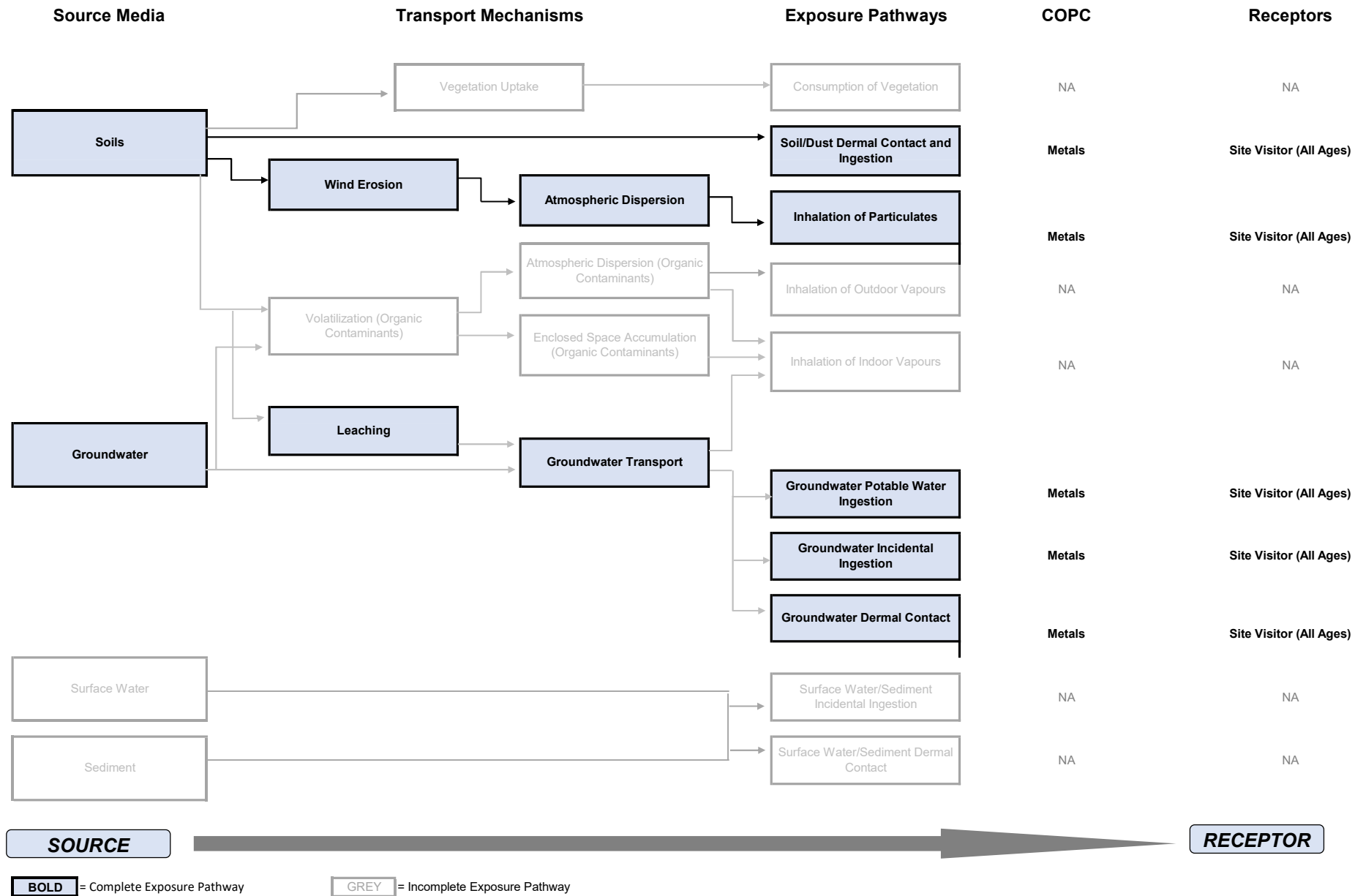
5.1.4.2 COPCs in Groundwater

The results of the groundwater monitoring programs completed at the site are summarized in **Table C-3**, Appendix C. Analytical results were compared to the NS EQS for commercial sites with potable groundwater. Groundwater sample MW23-1 had concentrations of cobalt, iron and/or manganese exceeded the applicable NS Tier 1 EQS during both monitoring events; however, these samples were collected from a background location, suggesting the concentrations are naturally occurring. During the September 2024 monitoring event, groundwater sample MW23-2 contained an arsenic concentration exceeding the applicable NS Tier 1 EQS. This is discussed further in **Section 5.4.2**.

5.1.5 Conceptual Site Model for Human Receptors

A CSM provides a description of relevant exposure pathways for the COPCs that have the potential to contribute to human health risks for the selected receptors.

Figure 5 CSM for Human Health Risk Assessment



5.2 Exposure Assessment

The exposure assessment of an HHRA involves estimation of exposure of hypothetical human receptors to each of the COPCs. Exposure assessment involves the estimation of the amount of chemical received by individuals per unit time (i.e., the quantity of chemical and the rate at which that quantity is received). The exposure assessment evaluates and integrates available data for the chemicals, human receptors, and exposure pathways that were selected during the problem formulation step of the HHRA. The rate of exposure to chemicals, from the various environmental media being evaluated at a given site, is usually expressed as a dose, or the amount of chemical taken in per body weight per unit time (e.g., μg chemical/kg body weight/day). The degree of human exposure to chemicals at a given site depends on the interactions of a number of parameters, including:

- The concentrations of chemicals in various site environmental media (e.g., air, water, soil, or foods) as determined by the quantities of chemicals entering the site's environmental media from various sources, their fate and persistence in these media, and the normal ambient, or background concentrations that may exist independent of a specific source;
- The various exposure pathways and routes for the transfer of the chemicals from the different environmental media to humans (e.g., inhalation of indoor and outdoor air, soil particles, and dusts; ingestion of food items, water, soils/dusts; skin penetration of various chemicals from water or soil/dust contact);
- The physiological, behavioural and lifestyle characteristics of human receptors that determine the actual exposures received through interactions with the various exposure pathways (e.g., respiration rate, water intake rate, food intake rate, soils/dusts intake rate, time spent at various activities and in different locations); and
- The various physical, chemical, and biological factors that determine the ability of people to take chemicals into their bodies from the exposure pathways and media (e.g., bioavailability of the chemicals within soil/dust, foods, water, and air).

5.2.1 Exposure Point Concentrations

To evaluate exposure of human receptors to the COPCs in study area soil, it was necessary to first estimate the representative concentration of each COPC in soil, for each assessed exposure scenario.

Where data are sufficient in terms of sample size, Health Canada (2021a) recommends use of the 95% upper confidence limit of the arithmetic mean (UCLM95) to assess exposure (i.e., the UCLM95 is applied as the exposure point concentration (EPC)). The UCLM95 is the most common statistic used to represent EPCs in HHRAs. Most regulatory agencies recognize that the best approximation of the exposure point concentration (EPC), often referred to as the "true mean", or "the concentration most likely to be contacted over time", is the 95% upper confidence limit (UCL) of the arithmetic mean. Accurate and statistically robust estimates of the UCLM95 are important in a HHRA. To derive the UCLM95 values, the US-EPA computer program, ProUCL™ Version 5.2 was used. The US-EPA recommends the use of ProUCL when calculating EPCs for use in HHRAs of contaminated sites. ProUCL determines the most appropriate

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UCLM95 value for a dataset, given its distribution and characteristics. A number of statistically valid methods to calculate a UCLM95 can be run simultaneously, with the program recommending the most appropriate or statistically robust value(s) to consider for selection (while the software recommends a UCLM95 value, it is ultimately up to the user of the software to select the most suitable values). However, according to its user guidance, ProUCL can only determine robust and reliable UCLM95 values if the sample size is at least 10.

In calculating the UCLM95 COPC concentrations in soil, the following tasks/conditions were conducted/applied, which tend to bias UCLM95-based EPCs high:

- For Study Area soil samples with corresponding laboratory or field duplicates, the higher concentration out of the original and duplicate samples was retained;
- For soil samples collected from the same sample location but at different depths, the higher of the sample results from all depths was retained;
- For any Study Area soil samples with analytical results for COPCs that were below the laboratory reported detection limit (i.e., <RDL), the <RDL values were assumed to equal the highest achieved RDL for that COPC in the analyzed soil samples;
- Prior to calculating UCLM95-based EPCs, Dillon reviewed the laboratory certificates of analysis, as well as the accompanying laboratory quality assurance reports for the Study Area soil chemistry data. This review focused on laboratory performance with respect to the RDLs that were achieved, % surrogate recoveries, lab and field duplicate results and relative percent difference or absolute difference (when lab duplicates are compared to original sample results), matrix spikes, method blanks, and spiked blanks. No analytical issues were identified that would affect the use of these data in a HHRA. Thus, the Study Area soil chemistry data were considered to be of adequate quality for use in a HHRA and appropriate for the purposes of EPC calculation;
- As the measured COPC concentrations in Study Area soil samples represent potential concentrations that human receptors could come into contact with, no attempt was made to conduct statistical outlier tests to remove extreme values (high or low) from the soil chemistry datasets. Thus, the EPC calculations for the COPCs included the presence of potential extreme values; and
- As the options for a UCLM95 generated by ProUCL 5.2 can vary considerably (as a function of the underlying assumptions in the statistical models, and the soil data distribution type), some degree of professional judgement is typically necessary when selecting the most appropriate UCLM95 value for use as the EPC in a HHRA. This is not necessarily the value recommended by the software. Key considerations often include the sample size, data distribution type, goodness-of-fit test outcomes, the significance level associated with the UCLM95 calculation methods (i.e., ProUCL-recommended values are not always at the 95% significance level), any warnings generated by the ProUCL 5.2 software, and the magnitude of the calculated UCLM95 options. In some cases, statistics other than a UCLM95 may be selected as the EPC. The reasons why a UCLM95 may be excluded as an EPC relate mainly to the data distribution type, goodness-of-fit test outcomes, sample size, and number of detectable concentrations in a dataset. Most often, when an

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alternative EPC statistic (such as the 90th percentile) is chosen over a UCLM95 value, it is because the sample size was smaller than what the ProUCL software and associated guidance recommends for calculating UCLM95 values (i.e., $N < 10$), and the majority of samples in the dataset were below RDLs. In such cases, ProUCL often cannot determine reliable UCLs. Thus, in such cases, "reasonable maximum" alternatives to UCLM95 values, such as upper percentiles, are utilized (e.g., 90th percentile is commonly used in both human and ecological risk assessments to represent EPCs of contaminants of concern in site media). Health Canada HHRA guidance (HC, 2021a) recognizes this as well, and notes that statistics which represent reasonable maximum exposure may include the UCLM95, 90th percentile, or other reasonable statistics, and that the specific value used to estimate exposure for each medium will depend on the available data.

The calculated EPC for Arsenic was 287.3, based on the 95% Adjusted Gamma UCL. The output is provided in **Appendix D**.

EPCs were not calculated for groundwater.

5.3 Toxicity (Hazard) Assessment

The toxicity (or hazard assessment) determines an exposure limit or toxicological reference value (i.e., concentration of a chemical not expected to be associated with adverse health effects) for each of the COPCs.

Toxicity is the potential for a chemical agent to produce any type of damage, permanent or temporary, to the structure or function of any part of an organism. The toxicity of a chemical depends on the amount that is taken into the organism (referred to as the "dose") and the duration of exposure (i.e., the length of time the person or other organism is exposed to the chemical). For every chemical, there is a specific dose and duration of exposure necessary to produce a toxic effect in an organism (this is referred to as the "dose-response relationship" of a chemical). In the toxicity assessment step of a HHRA, information relating to the dose-response relationship of each COPC is evaluated (usually from laboratory animal studies and epidemiological studies of human exposure in the workplace) to determine the maximum dose to which humans can be continuously exposed that would be associated with no or very low probability of adverse health effects. These toxicity estimates are called toxicity or toxicological reference values (TRVs) (also referred to as exposure limits, the terms are analogous) and indicate an exposure that will not likely result in adverse human health effects.

The toxicity assessment discussed herein, is for direct contact with soil only. Potable groundwater assessment is discussed in **Section 5.4.2**.

5.3.1 Toxicity Reference Values

TRVs are typically derived by regulatory agencies based on detailed reviews of toxicological, epidemiological, other scientific information, professional judgment, and technical oversight by a

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number of experienced scientists with expertise in the toxicological sciences. They are often derived to be protective of the most sensitive endpoints in individuals (e.g., organ damage, neurological effects, cancer, or reproductive effects), and large safety or uncertainty factors (i.e., 100-fold or greater) are commonly used in their estimation. These factors are often applied to exposure levels from studies where no adverse effects were observed (i.e., the NOAEL). Thus, exceedance of a TRV does not necessarily mean that adverse effects will occur; rather, it means that the safety factor beyond the no-effect exposure is somewhat reduced. Usually, exposure rates that are less than TRVs are not likely to be associated with adverse health effects, and are therefore, less likely to be of concern. As the frequency or magnitude of exposures exceeding a TRV increase, the probability of adverse health effects occurring in a human individual or population also increases. However, it should not be categorically concluded that all exposures below the TRV will be “acceptable” (unlikely to result in adverse health effects), and that all exposures above the TRV are “unacceptable” (likely to result in adverse health effects).

There are two main types of dose-response relationships that have been established for chemical agents:

- **Threshold Response Chemicals:** For these substances, there is a dose-response threshold below which no adverse effects would be expected to occur. This relationship is generally true for all chemicals that do not cause cancer; and
- **Non-Threshold Response Chemicals:** For these types of chemicals, it is assumed there is no dose-response threshold. This means that any exposure greater than zero is assumed to cause some type of response, or damage. This relationship is typically used/assumed for carcinogens (although, some carcinogenic substances do have a well-defined threshold below which cancer does not appear to be a response to exposure). In theory, any exposure to a non-threshold substance has the potential to cause damage. As such, it is necessary to define an “acceptable” degree of risk associated with these types of exposures. This “acceptable” degree of risk is usually defined as a target cancer risk level of one-in-one hundred thousand to one-in-one million. Essentially, these numbers correspond to the dose rate that may cause an increased cancer risk in one person out of one hundred thousand people, or one person out of one million people. The acceptable or target level of carcinogenic risk is a policy rather than a scientific decision, and is set by regulatory agencies, as opposed to risk assessors. TRVs derived for non-threshold chemicals that are believed to be potential carcinogens are typically expressed as cancer slope factors or cancer potency factors [e.g., $(\mu\text{g}/\text{kg body weight}/\text{day})^{-1}$], or unit risk values for environmental media [e.g., $(\mu\text{g}/\text{m}^3)^{-1}$]. However, TRVs for carcinogens may also be expressed as risk-specific media concentrations or doses that are associated with a particular level of acceptable cancer risk.

Health Canada (2021a) states that for the assessment of risks posed by chemicals and substances found at federal contaminated sites in Canada, Health Canada TRVs should be employed, when available, for the characterization of potential health risks.

5.3.1.1 Toxicological Reference Values

TRVs for the identified COPCs are summarized in **Table 5-4**. These TRVs are routinely used in HHRAs conducted within North America and elsewhere and are protective of chronic exposure conditions.

A number of regulatory agencies, including Health Canada (2021a), and the US-EPA (numerous guidance documents prepared within the Superfund Program) provide guidance for considering relative bioavailability between the dermal and oral exposure routes using dermal relative absorption factors (RAFs) and oral TRVs.

Table 5-4: Summary of TRVs Used in the HHRA

COPC	Exposure Route	TRV	Health Endpoint(s)	Regulatory Agency Source
Arsenic	Oral (cancer)	1.8 (mg/kg _{BW} -day) ¹	Cancer (bladder, lung, liver)	HC, 2021b
	Inhalation (cancer)	6.4 (mg/m ³) ⁻¹	Cancer (lung)	HC, 2021b

5.3.1.2 Bioavailability and Bioaccessibility

The response of the human body to chemical exposure depends on the quantity of the chemicals that actually enter the target organs, tissues and cells. In many cases, only a fraction of the chemicals ingested, or inhaled, or in contact with the skin, are actually absorbed into the body.

Bioavailability refers to the extent and rate to which a chemical can be absorbed into the systemic circulation of an organism, and potentially produce an adverse effect (Hrudey, 1996; Kelly et al., 2002). For HHRA, it is important to distinguish between two types of bioavailability:

- absolute bioavailability; and
- relative bioavailability.

Absolute bioavailability refers to the fraction or percentage of a compound which is ingested, inhaled, or applied on the skin surface that is actually absorbed and reaches the systemic circulation (Hrudey, 1996). Absolute bioavailability is often defined as the ratio of an absorbed dose to an administered dose. In studies investigating absolute bioavailability, the absorbed dose is typically determined by measuring the concentration of the compound in blood over time or by measuring the mass of the compound in excreta (e.g., urine, feces, or exhaled air). The absorbed (or internal) dose is useful for characterizing risk if the TRVs describing the dose-response relationship (i.e., RfD, TDI etc.) are based on the absorbed dose. However, most TRVs are based on a delivered or administered dose rather than an absorbed dose; thus, in HHRA, it is usually not necessary to determine the absolute bioavailability of a contaminant (Schoof, 2003).

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RBA is defined as a measure of the differences in extent of absorption between two or more forms of the same chemical (e.g., lead sulphide versus lead acetate), different exposure vehicles (e.g., food, soil, and/or water), or different doses (Schoof, 2003; Kelly et al., 2002). Relative bioavailability is particularly important for HHRAs. This is because matrix effects in some environmental media can substantially decrease the bioavailability of a soil- or sediment-bound chemical (for example), relative to the soluble forms and dosing media that are generally used in the toxicology studies upon which TRVs are derived from (i.e., food, water). Thus, RBA is calculated as the ratio of the absorbed fraction from the exposure medium in the risk assessment (e.g., soil) to the absorbed fraction from the dosing medium used in the critical toxicity study. When RBA is expressed in this manner, it is commonly termed a RAF. Incorporating RAFs into HHRAs can greatly refine estimates of the external (i.e., administered) dose that is available for absorption (Schoof, 2003; US-EPA, 2007a; HERAG, 2007). It is important to recognize that while absolute bioavailability can never exceed 100%, RBA can exceed this value (US-EPA, 2007a).

Table 5-5: Summary of Oral, Dermal and Inhalation RAFs Used in the HHRA

COPC			
Arsenic	Oral (soil)^A	Dermal	Inhalation
	1	0.03 ^C	1

Notes:

A – Assumed, unless otherwise noted.

B – Health Canada, 2021b.

5.4 Risk Characterization

Risk characterization is the final step in a HHRA. It integrates the exposure and hazard (toxicity) assessments to estimate the likelihood of potential human health risk to the selected receptors based on the 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 hazard (toxicity) assessment.

Risk characterization differs depending upon whether the chemical is a threshold substance (i.e., there is a level of chemical exposure below which effects are not expected to occur); or a non-threshold substance (i.e., there is the potential for human health risk at any level of exposure). Only Arsenic was carried forward in the HHRA, which is a non-threshold chemical.

5.4.1 Non-Threshold Chemicals

For chemicals with TRVs based on non-threshold dose response relationships (such as carcinogens), risk characterization typically involves determining an ILCR level that would be expected given the predicted exposures. The ILCR is calculated by multiplying the predicted exposure by the slope factor (or unit risk value) for the COPC in question. The ILCR is defined as the predicted risk of an individual in a population

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of a given size developing cancer over a lifetime, and is expressed as the prediction that one extra person per “n” people, exposed at the assessed rate daily over a lifetime, would develop cancer, where the magnitude of “n” reflects the risks to that population – the larger “n” is, the smaller the risk (e.g., if the ILCR is 1 person per 10, the predicted risks of any individual developing cancer would be higher than if the ILCR is 1 per 1,000). Calculated ILCRs are then compared to target cancer risk levels (TCRLs) to evaluate the significance of the ILCR. For federal contaminated sites in Canada, the TCRL is one-in-one hundred thousand (i.e., 1×10^{-5} , or one additional cancer case per hundred thousand people).

The following equation provides the method by which the ILCR is calculated:

$$\text{ILCR} = \text{Estimated Exposure } (\mu\text{g/kg body weight/day}) \times \text{CSF } ([\mu\text{g/kg body weight/day}]^{-1})$$

Where:

ILCR = Incremental Lifetime Cancer Risk
 CSF = Cancer Slope Factor

The resulting estimated cancer risk (i.e., the ILCR) can then be compared to the TCRL (i.e., 1 in 100,000) to determine if estimated COPC exposures pose a potentially unacceptable human health risk.

The risk characterization of carcinogens is based on 100% of the TCRL of 1 in 100,000 (i.e., there is no apportioning of cancer risks), as ILCR values are considered to be independent of background exposure sources; Health Canada, 2021a).

ILCR values less than 1 in 100,000 suggest that adverse health effects would not be expected to occur in relation to the exposure scenarios that were evaluated. However, ILCR values greater than 1 in 100,000 do not necessarily indicate a potential cancer risk exists under these scenarios. Rather, when ILCRs exceed the target cancer risk level, assumptions, parameters, and data used in the HHRA are typically re-examined prior to making final conclusions regarding the likelihood of adverse health effects occurring.

The results of the risk characterization for the HHRA are provided in **Section 5.4.2**.

5.4.1.1

Site Specific Target Levels (SSTL)

When risk characterization results of HHRA indicate potentially unacceptable risks for human receptors, site-specific target levels (SSTL) for site media are typically generated and provide the maximum allowable concentration of a COPC in site media, based on the assessed exposure scenarios, which will not pose a risk to human receptors. SSTLs are often used to guide remediation or risk management activities, if/as warranted.

SSTLs for site media are typically only developed if a COPC in a given site medium is considered to pose a potential human health risk, via the assessed exposure pathway(s) that involve that medium.

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It is common that a site can have a number of soil sample locations exceed a calculated soil SSTL and not pose a potential human health risk. This is because HHRAs focus on upper estimates of central tendency for EPCs of COPCs. What matters most is whether or not the EPCs for site soil COPC data will be below a SSTL following risk management or remedial measures.

5.4.2 Risk Characterization Results

5.4.2.1 Dermal Contact/Ingestion of Soil/Dust

The calculated ILCR for arsenic in the assessment area is 2.21×10^{-4} which exceeds the target of 1×10^{-5} , indicating the potential for unacceptable risks from exposure to arsenic in the surface soil in the assessment area. It is noted that the calculated ILCR does not take background concentrations into account. Based on the findings, an SSTL was calculated for the site.

A SSTL of 294 mg/kg was calculated for the site. The SSTL is greater than the EPC calculated for the site (287.3 mg/kg) and therefore the arsenic concentrations identified at the site are not posing unacceptable risks to human receptors who may come into contact with the arsenic in surface soil. However, it is important to note that the extent of impacts has not been fully delineated (i.e., off-site).

It is also noted that the EPC calculated for the site (287.3 mg/kg) is only slightly above the site specific BTV (281 mg/kg), indicating that on average, concentrations at the site are generally similar to background conditions.

The ILCR and SSTL calculations are provided in **Appendix E**.

5.4.2.2 Potable Groundwater

Dillon utilized the soil, groundwater and SPLP results to empirically derive soil concentrations that could leach concentrations of arsenic into groundwater at concentrations above the drinking water criteria. The soil concentrations of arsenic from the monitoring wells were plotted against the groundwater concentration from the same well and the soil concentration of arsenic was also plotted against its corresponding SPLP concentrations. The correlation plot resulting from this were used to empirically fit (trend analysis) using excel to generate a soil leaching curve. This resulted in a strong, linear correlation (0.99869 correlation coefficient) indicating that soil concentrations in excess of 349 mg/kg could potentially leach arsenic concentrations over the potable criteria. This methodology is the same approach used to evaluate soil sorption and soil leaching to groundwater criteria. Given the conservative nature of SPLP, the linear curve with very little deviation from an ideal sorption curve and the very high correlation coefficient (greater than 0.9), this approach should conservatively set the limits for potable well exclusion. Should additional data be obtained from soil and groundwater/SPLP for the site or adjacent impacted areas, the empirical curve should be updated, however it will provide an adequate screening tool for this site should no further data be obtained.

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As previously discussed, the arsenic concentration in a groundwater sample collected from MW23-2 exceeded the applicable Tier I EQS for a potable site. This could potentially be attributed to background conditions, or it could be from the areas of elevated arsenic concentrations at the site. It is recommended to complete on-going seasonal monitoring of this monitoring well to assess potential trends.

The findings of the assessment are provided in **Appendix F**.

6.0 Ecological Risk Assessment

An Ecological Risk Assessment (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 ERA Problem Formulation component, as well as other components of an ERA for the Former Mill Site should it be completed in the future, are described in this section and its associated subsections.

6.1 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, 2012a) 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.” The site management goal for this ERA Problem Formulation was to determine whether or not soils at the Mill Village Site warrant risk management for the protection of ecological receptors that may occur on or utilize the properties. The assessment goal for an ERA relates to the management goal. In the current ERA Problem Formulation, the 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 (i.e., soil) at the site. The scope of the Problem Formulation is also limited by the chemistry data that are currently available for the on-site media. The Problem Formulation does not evaluate or consider potential exposures and risks to ecological receptors that may occur on adjacent properties other than the site, nor does it consider the adjacent freshwater water bodies that could potentially be influenced by the current and historical activities at the site. Although the current scope of this study is limited to the Problem Formulation component of the ERA for soils only, the framework and associated methodologies for each step of a full ERA is provided below for context in the event that the Problem Formulation is incorporated into a full risk assessment in the future.

6.2 ERA Steps

The 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 ecological risk assessment frameworks, methodologies and guidance published and endorsed by Environment Canada (e.g., CCME, 2020; the FCSAP ERA Guidance Document [2012a], and the US EPA [i.e., U.S. EPA, 1998]). Where necessary, consideration was also given to ERA guidance from other agencies and jurisdictions in Canada and internationally.

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ERAs can involve various levels of detail, complexity, and level of effort. The initial ERA framework developed by Environment Canada (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 Environment Canada for use on federally contaminated sites (i.e., CCME, 2020; FCSAP, 2012a) does not categorize ERAs according to scope or level of detail/effort (e.g., screening-level versus detailed quantitative). Rather, this recent ERA guidance suggests that the level of detail and effort for an ERA is dependent on many factors and is often site- and assessment-specific. This guidance also 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 6**.

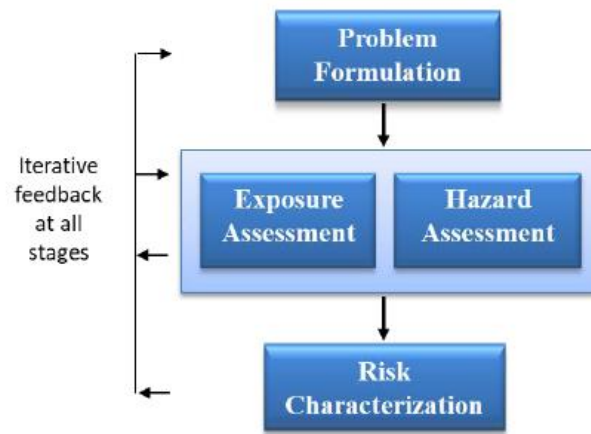


Figure 6: Ecological Risk Assessment Steps (from CCME, 2020; FCSAP, 2012a)

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

6.2.1 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. The outcomes of the problem formulation step form the basis of the approach taken in the ERA. These outcomes can also help identify key data gaps that may limit aspects of the ERA, and/or lead to developing 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/or site-related chemicals.

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;
- Identify assessment and measurement endpoints;
- Develop lines of evidence (LOE);
- Identify exposure pathways;
- Identify COCs; and
- Develop a CSM for the ERA.

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Additional details of some of the steps of the problem formulation are provided in the following sections.

6.2.1.1 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 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 site 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 site;
- 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); for example, species that are highly omnivorous are rarely selected as receptors in an ERA as it is much more difficult (due to high variability and uncertainty) to estimate the exposure such species may incur from food items, relative to species that are primarily in one feeding guild, such as herbivore, granivore, insectivore / invertivore, or carnivore;
- 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;
- 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;

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- 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 on the site (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 level 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 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.

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6.2.1.2

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 (1990) 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.”

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.

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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.

6.2.1.3 Exposure Pathway Identification

If there are no possible exposure pathways that link ROC to COC 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 (means by which an ecological receptor comes into contact with a chemical in an environmental medium) and exposure routes (the means by which a chemical enters the body from the environmental medium) for each of the selected/identified ROCs.

6.2.1.4 Identification of COPCs

The goal of COC selection is to identify those chemicals measured in site/property media that may pose a potential risk to ecological health.

It is common practice in ERAs to limit the number of chemicals evaluated to those that represent the greatest potential concern to ecological receptors 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 that 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.

In the context of an ERA, the COC selection process is designed such that if no health risks are predicted for the chemicals evaluated, then no health risks would be expected for any of the chemicals not included in the initial evaluation (e.g., those that are present at lower concentrations in site media, those that have a lower toxic potency, those that are emitted/released at lower rates, etc.). If a large degree of risk is predicted for those chemicals initially evaluated, then additional chemicals (from the list that was not evaluated) can be added back into the ERA for evaluation, if deemed necessary. Thus, the COC selection process is iterative, and is designed to reasonably ensure that no contaminants of potential concern are overlooked.

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6.2.1.5 Conceptual Site Model for Ecological Receptors

The ERA CSM for ecological receptors provides a simplified representation of potential exposure pathways and routes that link the identified COCs in site environmental media to the ecological receptors of interest.

6.2.2 Exposure Assessment

The exposure assessment step of an ERA involves estimating the amount (quantity) of chemicals that are received by ecological receptors.

Exposure can be calculated using quantitative approaches (e.g., where exposures for a specific receptor are estimated using models and a variety of receptor input parameters), or can be assessed qualitatively (e.g., where exposures are assumed to equal measured concentrations in environmental media). The latter method likely overestimates potential exposure as it ignores an organisms' natural barriers to chemical uptake (i.e., bioavailability considerations), and biochemical transformation processes that may occur within cells, tissues, and organs, which may reduce the actual dose that reaches a target site within an organism.

The degree of exposure of ecological receptors to chemicals in the environment depends on the interactions of a number of parameters, including:

- The concentration of chemicals in various environmental media (e.g., water, soil, food) as determined by the quantities of chemicals entering the environment from various sources, their persistence in these media, and the normal ambient, or background concentrations that exist independent of a specific source;
- The various exposure pathways for the transfer of the chemicals from the different environmental media to ecological receptors (e.g., inhalation of soil particles and dusts; ingestion of food items, water, soils/dusts);
- The physiological and behavioural characteristics of ecological receptors that determine the actual exposures through interactions with the various pathways (e.g., rates of respiration, water intake, food intake, soils/dusts intake, energy utilization); and
- The various physical, chemical, and biological factors that determine the ability of the ecological receptors to take the chemicals into their bodies from the exposure pathways (e.g., bioavailability of the chemicals from soil/dust particles, foods, water, and air).

6.2.3 Effects Assessment

The effects assessment (also commonly referred to as the hazard or toxicity assessment) step of ERA evaluates the potential for chemical exposure to elicit an adverse effect, or a toxic response, in the ROCs. The toxicity of a chemical depends on the amount taken into an organism or its tissues and the duration of the exposure (i.e., the length of time the receptor is exposed to the chemical). Analogous to the HHRA and humans, for every chemical, there is an exposure level or dose, and a duration of

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exposure, which is necessary to produce a toxic effect in the ROCs (this is referred to as the exposure–response or dose-response relationship). TRVs can be expressed in different ways depending on the COC (and its properties), and the receptor or receptor group. Many TRVs are expressed as a dose (e.g., mg/kg body weight/day) and are commonly used to evaluate risks to mammalian and avian receptors via ingestion-based exposure pathways (and occasionally dermal and inhalation-based pathways).

It is important to recognize that when/if ecological TRVs are exceeded by estimated exposures, it does not necessarily imply that there is a risk of adverse ecological effects. Rather, it suggests that further evaluation or consideration of additional lines of evidence may be warranted before reaching final conclusions on the potential for ecological risk.

6.2.4 Risk Characterization

In an ERA, the risk characterization step is the process by which the probability of adverse ecological effects (based on the information obtained from the exposure and effects assessments for each LOE), is integrated and interpreted in the context of the overall potential for ecological risk (FCSAP, 2012a). The risk characterization step also serves to translate the complex scientific information that comprises the previous steps of the ERA process into a format that is useful, unambiguous, and understandable for risk managers. Another key element of risk characterization in an ERA is to acknowledge, evaluate, and/or discuss the major strengths, limitations, conservative assumptions, and uncertainties arising from the information used to estimate exposure and potential risk to the ROCs (FCSAP, 2012a; CCME, 1996).

The risk characterization of ROCs in the ERA utilized a simple qualitative weight of evidence (WOE) approach. FCSAP (2012a) defines a WOE approach as “any process used to aggregate information from different lines of scientific evidence to render a conclusion regarding the probability and magnitude of harm.” This definition encompasses a wide range of potential techniques and practices, ranging from those that are qualitative, and/or based on professional judgment, to those that involve complex quantitative and/or statistical methods. The type of WOE approach used generally reflects the scale/scope, the level of effort, and the numbers and types of LOE considered in the ERA. Irrespective of how the WOE approach is conducted, key principles are transparency, clarity, consistency, and reasonableness (FCSAP, 2012a).

6.3 ERA Findings

6.3.1 Site Habitat Characterization

Site characterization information specifically relevant for the ERA are provided below, while additional aspects of the site’s history and site characterization have been previously presented in **Section 2.0** of this report. Photos of the site and the surrounding ecological habitat can be found in **Appendix A**. The

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site is almost completely forested with a clearing between MW23-3 and MW23-2, around the former mine shaft (see **Figure 3** – Sample locations).

The site and surrounding land may provide habitat for resident and transitory wildlife and limited native fauna (Dillon, 2024b).

6.3.2 Regulatory Context

With respect to the regulatory context for the ERA, the site is located on land owned by the NSDNRR, and as the NS PSS for commercial soils were preferentially applied. The PSS are benchmarks developed by source agencies and departments outside of Nova Scotia such as the CCME, AEP and MECP. 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.

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.

6.3.3 Selection of Site Boundaries and Reference Areas

The spatial boundary for the current ERA is the northern, southern, and western property boundary and the study area boundary along the southeastern portion of the property (i.e., approximately 46 ha; see **Figure 2, Appendix A**). Sample locations are presented on **Figure 3 (Appendix A)**. Site photographs are presented in **Appendix A**.

6.3.4 Species at Risk (SAR) Assessment

A Species at Risk (SAR) assessment was not completed under the current scope; however, NSDNRR provided some information on potential SAR which was considered herein.

The common nighthawk (*Chordeiles minor*), listed as Special Concern under Schedule 1, is known to inhabit the area in the vicinity of the site (Government of Canada, 2021) and areas within and adjacent to the site have been identified by NSDNRR as potential nighthawk nesting habitat. Common Nighthawks are known to nest in open and vegetation-free habitats between early June and late July and lay their eggs on the ground (Government of Canada, 2021; Maritime Breeding Atlas, 2022). Some examples of nesting habitat are dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, and marshes (Government of Canada, 2021). During the 2022 field program, accommodations were made by Dillon to avoid the nesting period of the common nighthawk in Region C3 (all of Cape Breton) that ends in late August.

Although portions of the site comprise potential habitat for the common nighthawk, this species feeds on flying insects so their exposure to site contamination would be expected to be limited given the

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available habitat, food resources, and typical home range of this species (up to 259 ha; Ng, 2009). However, there is uncertainty associated with other potential SAR species on or near the site; therefore, a SAR assessment is recommended to support a future risk assessment for the site.

6.3.5 Identification of Receptors of Concern

The selection of ROC considers site characteristics in addition to the size. While the total area of the property is approximately 78 ha, the study boundary is approximately 2.5 ha. The study boundary is shown on **Figure 2**. Given that soil contamination on the site has not been fully delineated, there is some uncertainty in how far the contamination extends into areas that may have suitable habitat for ecological receptors. As such, receptors were conservatively selected assuming there is suitable habitat in the vicinity of the contamination. These receptors can be refined once the site is further delineated.

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

- Previous environmental reports (e.g., Dillon 2024 as well as historical reports);
- 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., 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 for the ERA Problem Formulation, along with rationale for their inclusion/exclusion are provided in **Table 6-1**. 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. Since there is no aquatic habitat on the site, aquatic receptors groups are not included in **Table 6-1**.

Surrogate receptor species are also provided in **Table 6-1**, 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 6-1: Ecological Receptors Selected for or Excluded from Evaluation in the ERA

Receptor Groups	Include/ Exclude	Surrogate Species (if included)	Rationale for Inclusion/Exclusion
Terrestrial Vegetation	Include	Not applicable; assessed at the community level	Terrestrial vegetation has been observed on the site. 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 (i.e., 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>)	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 large relative to the home and foraging range sizes of small mammal herbivores, such that the entire home/ foraging ranges could occur within the study area boundaries. Small herbivorous mammals could be exposed to COPCs via consumption of vegetation and incidental soil ingestion. As such, this receptor group was selected as a ROC. The meadow vole was selected as the surrogate species as it occurs in Nova Scotia and would have relatively high exposures due to its small home range.
Insectivorous / Invertevorous Small Mammals	Include	Masked shrew (<i>Sorex cinereus</i>)	Insectivorous/invertevorous small mammals have a high potential to be exposed to COCs 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, such that entire home/foraging ranges could occur within the assessment boundaries. While much of the habitat that makes up the APECs and immediate surrounding areas would not be considered suitable there are areas that would be suitable habitat for insectivorous small mammals and the site would provide food resources for some of these receptors.

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Receptor Groups	Include/ Exclude	Surrogate Species (if included)	Rationale for Inclusion/Exclusion
			Insectivorous and invertivores small mammals such as the masked shrew are found in Nova Scotia (NatureServe, 2023). As such, this receptor group was included as a ROC.
Herbivorous Birds	Include	Ruffed Grouse (Bonasa umbellus)	While herbivorous birds tend to have moderately large home/foraging ranges, the size of the site encompasses the home/foraging range sizes, 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. The ruffed grouse was selected as a surrogate given that it occurs in Nova Scotia (NatureServe, 2023).
Insectivorous/ Invertevorous Birds	Include	American Robin (Turdis migratorius)	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 American robin was selected as a surrogate for this receptor group as it has been reported to occur across Nova Scotia (Natural Resources and Renewables, 2023; online).
Carnivorous Small Mammals	Include	Ermine (Mustela erminea)	Carnivorous small mammals, such as red fox and ermines, could occur on site and be potentially exposed to COCs 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. The site is within the size range as the home and foraging range sizes of most small bird insectivores/invertevores. The extent of contamination has not been fully delineated. As such, the areas of impact could extend further into areas with more suitable habitat and more plentiful food resources. As such, carnivorous small mammals were conservatively assumed to occur/forage on the site,

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Receptor Groups	Include/ Exclude	Surrogate Species (if included)	Rationale for Inclusion/Exclusion
			<p>where they could be exposed to COPCs via the consumption of small mammals and soil (incidentally) and were selected as receptors. The ermine was selected as a surrogate species for this receptor group as it has been reported to occur in Nova Scotia (Natural Resources and Renewables, 2023; online).</p>
Soil Microorganisms		Exclude	<p>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 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 understanding of microbial community structure and function in soils is limited. Given these considerations, soil microorganisms were excluded as ROCs.</p>
Herbivorous Large Mammals		Exclude	<p>Herbivorous large mammals such as deer and moose could occur within the site but would not be anticipated to occur within the study boundary to any large degree due to the limited habitat and food resources within the APECs. Given the large home range of large herbivorous mammals 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, the evaluation of these pathways for small mammal herbivores adequately captures potential worst case COPC exposures for large mammals.</p>



Receptor Groups	Include/ Exclude	Surrogate Species (if included)	Rationale for Inclusion/Exclusion
Carnivorous Large Mammals		Exclude	While large carnivorous mammals occur in Nova Scotia, and possibly within the vicinity of the site, the amount of time they would spend within the study boundary would be expected to be limited. Large carnivorous mammals have large home ranges: for example, the coyote (home range reported to be approximately 2000 ha in Nova Scotia) and the bobcat (home range 100 ha to 10,000 ha) (NatureServe Explorer, 2023). While these species could be exposed to site chemicals via ingestion of prey from the site, given the limited food resources within 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 very limited. As such, carnivorous large mammals were excluded as ROCs.
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/ inverteverous small mammals (and birds). However, the exposure potential to COPCs in site media and biota is very limited given the lack of habitat and food resources within the study boundary, in addition to the very large home/foraging range sizes which are considerably larger than the site. As such, carnivorous birds were excluded as ROCs.
Species at Risk (or other rare, threatened, or endangered species)		Exclude	As discussed in previously, a SAR assessment was not conducted for the site under the current scope of work. Although the likely home ranges of potential mammal and bird SAR species and the expected diets of those species, potential chemical exposures to SAR on the site are expected to be low. As such, SAR were excluded as ROC in the current assessment.

Note:
Receptors to be refined once contamination on the site is delineated.



6.3.5.1 Further Considerations Regarding Potential ROCs

Further considerations regarding potential ROCs for the site are briefly described and discussed in the following subsections.

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 site has a total area of roughly approximately 46 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 and surrounding APECs) as much of the study boundary is covered with rock and has limited soil, and there is limited vegetation in the central areas of the site although trees and shrubs are noted intermittently and around the site boundary. In addition, in some areas of the site there is the presence of extremely wet ground wherein mostly aquatic plants (such as cattails) grow.

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

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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, many areas of the site likely associated with the most contamination (i.e., within and immediately surrounding APECs) provide little to no suitable habitat for ROC due to the presence of waste rock piles and/or exposed rock, no vegetation. Thus, it can be concluded that the site offers 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).

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

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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 is vegetated areas of the site which was assumed to be the area of the entire site of approximately 2.5 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 6-2**). For all receptor species, the smallest identified HR_s value was taken from the FCSAP ERA guidance documentation (i.e., FCSAP, 2012b) or other resources if no FCSAP value was available. The A_s value used was approximately 46 ha which is the entire area within the study boundary.

Table 6-2: Estimated N_s Values for Selected Ecological Receptors

Receptor	A_s	HR_s	N_s
Meadow vole	2.5	0.348 ha	7.18
Masked shrew		0.6 ha	4.17
Ruffed grouse		1 ha	2.5
Ermine		1 ha	2.5
Snowshoe hare		1.6 ha	1.56
White-tailed deer		30 ha	0.083
Black bear		300 ha	0.0083

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. As such, the home range of 0.348 ha (FCSAP, 2012b) was used.

¹Home range from NatureServe Explorer (<https://explorer.natureserve.org/>)

While there is no set N_s value that represents the presence of a population for each receptor, the N_s values in **Table 6-2** suggest that a few individuals to potentially populations of receptors with smaller home ranges may occur on site. The N_s scores were calculated based on the study area, and not the entire site, which is approximately 46 ha. 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 Site, these N_s values would be considered conservative given the limited habitat/food resources on the site. As such, it would be unrealistic to assume that ROC presence and foraging occurs extensively on the site, but not on the

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various adjacent areas that have equally suitable (or better) habitat conditions and food availability. For example, the site consists of areas with little to no terrestrial vegetation (e.g., rocks piles and tailings ponds) whereas adjacent areas to the site are mostly forested with more preferable vegetation for the ROC selected herein.

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. The calculated Ns scores support that the use of the site by mammalian and avian receptors could potentially include populations. However, the Ns 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 study boundary is covered with rock and has limited soil, and limited vegetation and other food resources, it is unlikely that populations could be supported within the study boundary. While it is unlikely that populations can be supported within the study boundary, given the site has not yet been fully delineated, better habitat exists outside the study boundary, the selected receptors were conservatively carried forward further in the problem formulation.

6.3.5.2 Summary of ROC Selection

Based on the ROC selection procedure and related considerations described in the preceding sections, the receptors/receptor groups in **Table 6-3** were identified as ROCs that warranted further evaluation in the ERA Problem Formulation.

Table 6-3: 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	American Robin	Assessed at the population level
Carnivorous small mammals	Ermine	Assessed at the population level

Notes:

NA = not applicable

6.3.6 Selection of Assessment and Measurement Endpoints and Lines of Evidence

Specific assessment and measurement endpoints and LOE were identified for the ROC that were selected for evaluation in the ERA Problem Formulation, presented in **Table 6-4**:

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Table 6-4: 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	<p>Concentrations of chemicals in site soil and reference areas.</p> <p>Vegetation health-based soil quality benchmarks.</p> <p>Qualitative site survey of vegetation types and apparent health and similarity to surrounding sites.</p>	<p>Outcomes of the comparison of site soil chemical concentrations to vegetation health-based soil quality benchmarks and reference areas.</p> <p>Comparison of vegetation on site to vegetation present in the surrounding area.</p> <p>Outcomes of visual vegetation observations.</p>
Soil invertebrates	Survival and reproduction of soil invertebrate communities	<p>Concentrations of chemicals in site soil and reference areas.</p> <p>Soil invertebrate health-based soil quality benchmarks.</p>	<p>Outcomes of the comparison of site soil chemical concentrations to soil invertebrate health-based soil quality benchmarks and reference areas.</p>
Herbivorous small mammals (surrogate: meadow vole)	Survival, growth, reproduction, and abundance of populations	<p>Concentrations of chemicals in site soils and reference areas.</p> <p>Mammalian health-based soil quality benchmarks.</p> <p>Modeled exposure and risk estimates for COCs in food items and soil.</p> <p>Applicable mammalian TRVs.</p> <p>Spatial size and habitat quality/preference considerations for the site.</p>	<p>Outcomes of the comparison of site soil chemical concentrations to mammalian health-based soil quality benchmarks.</p> <p>Comparisons between estimated COC exposures and TRVs (i.e., ecological hazard quotients).</p> <p>Comparison of site spatial size to ASTM spatial criteria for ERA; comparison of receptor habitat preferences to site habitat conditions and habitat quality.</p>

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Receptor of Concern (ROC)	Assessment Endpoint	Measurement Endpoints	Lines of Evidence (LOE)
		Ns values estimated for the site.	Interpretation of Ns values with respect to likelihood for populations or individuals to utilize or occur on the site.
Insectivorous/ invertevorous small mammals (surrogate: masked shrew)	Survival, growth, reproduction, and abundance of populations	<p>Concentrations of chemicals in site soils and reference areas.</p> <p>Mammalian health-based soil quality benchmarks.</p> <p>Modeled exposure and risk estimates for COCs in food items and soil.</p> <p>Applicable mammalian TRVs.</p> <p>Spatial size and habitat quality/preference considerations for the site.</p> <p>Ns values estimated for the site.</p>	<p>Outcomes of the comparison of site soil chemical concentrations to mammalian health-based soil quality benchmarks.</p> <p>Comparisons between estimated COC exposures and TRVs (i.e., ecological hazard quotients).</p> <p>Comparison of site spatial size to ASTM spatial criteria for ERA; comparison of receptor habitat preferences to site habitat conditions and habitat quality.</p> <p>Interpretation of Ns values with respect to likelihood for populations or individuals to utilize or occur on the site.</p>

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Receptor of Concern (ROC)	Assessment Endpoint	Measurement Endpoints	Lines of Evidence (LOE)
Herbivorous birds (surrogate: ruffed grouse)	Survival, growth, reproduction, and abundance of populations	<p>Concentrations of chemicals in site soils and reference areas.</p> <p>Avian health-based soil quality benchmarks.</p> <p>Modeled exposure and risk estimates for COCs in food items and soil.</p> <p>Applicable avian toxicity TRVs.</p> <p>Spatial size and habitat quality/preference considerations for the site.</p> <p>Ns values estimated for the site.</p>	<p>Outcomes of the comparison of site soil chemical concentrations to avian health-based soil quality benchmarks.</p> <p>Comparisons between estimated COC exposures and TRVs (i.e., ecological hazard quotients).</p> <p>Comparison of site spatial size to ASTM spatial criteria for ERA; comparison of receptor habitat preferences to site habitat conditions and habitat quality.</p> <p>Interpretation of Ns values with respect to likelihood for populations or individuals to utilize or occur on the site.</p>
Insectivorous/ invertevorous birds (surrogate: American robin)	Survival, growth, reproduction, and abundance of populations	<p>Concentrations of chemicals in site soils and reference areas.</p> <p>Avian health-based soil quality benchmarks.</p> <p>Modeled exposure and risk estimates for COCs in food items and soil.</p> <p>Applicable avian TRVs.</p> <p>Spatial size and habitat quality/preference considerations for the site.</p> <p>Ns values estimated for the site.</p>	<p>Outcomes of the comparison of site soil chemical concentrations to avian health-based soil quality benchmarks.</p> <p>Comparisons between estimated COC exposures and TRVs (i.e., ecological hazard quotients).</p> <p>Comparison of site spatial size to ASTM spatial criteria for ERA; comparison of receptor habitat preferences to site habitat conditions and habitat quality.</p> <p>Interpretation of Ns values with respect to likelihood for populations or individuals to utilize or occur on the site.</p>

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Receptor of Concern (ROC)	Assessment Endpoint	Measurement Endpoints	Lines of Evidence (LOE)
Carnivorous small mammals (surrogate: ermine)	Survival, growth, reproduction, and abundance of populations	Concentrations of chemicals in site soils and reference areas. 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. Ns 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., 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 Ns values with respect to likelihood for populations or individuals to utilize or occur on the site.

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.

* Receptor not evaluated in the current problem formulation as it was outside the scope of the assessment.

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 focuses on potential health effects as a result of direct chemical exposures.

6.3.7 Exposure Pathway Identification

For the ROCs 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 6-5**.

Table 6-5: Summary of Exposure Pathways and Routes Selected for the ROCs

Receptor Group	Surrogate	Exposure Pathway and Route
Terrestrial vegetation	NA	Direct contact with soils Root uptake
Soil invertebrates	NA	Direct soil ingestion Direct contact with dermal coverings or integument
Herbivorous small mammals	Meadow vole	Soil ingestion Vegetation ingestion
Insectivorous or invertevorous small mammals	Masked shrew	Soil ingestion Ingestion of soil invertebrates
Herbivorous birds	Ruffed grouse	Soil ingestion Vegetation ingestion
Insectivorous or invertivores birds	American robin	Soil ingestion Ingestion of soil invertebrates
Carnivorous small mammals	Ermine	Soil ingestion Ingestion of prey

Notes:

* Receptor not evaluated in the current problem formulation as it was outside the scope of the assessment. Exposures pathways included for future reference.

NA = not applicable.

6.3.7.1 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

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- 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.

6.3.7.2 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, SABCS, 2008; U.S. EPA, 2003). This is considered to be the case in the current ERA Problem Formulation as well, given that the ROC 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 Problem Formulation, it was assumed that herbivorous small mammalian ROC 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;
- The main exposure pathways and routes evaluated for insectivorous/invertevorous small mammals and birds were soil ingestion and ingestion of soil invertebrates; and
- The main exposure pathways and routes evaluated for carnivorous mammals were soil ingestion and ingestion of prey.

With respect to the assessment and measurement endpoints and LOEs noted in **Table 6-5** and the exposure pathways and routes selected for the ROC, there were some inherent conservative assumptions within the ERA Problem Formulation 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 highly unrealistic and conservative, particularly given the limited habitat and food resources on the site.

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In summary, the following exposure pathways and routes were assessed for the selected ROCs.

- Terrestrial vegetation: direct contact with soils; root uptake;
- Soil invertebrates: direct contact with dermal coverings or integument; direct soil ingestion;
- Herbivorous small mammals (meadow vole): soil ingestion, vegetation ingestion;
- Insectivorous or invertevorous small mammals (masked shrew): soil ingestion and ingestion of soil invertebrates;
- Herbivorous birds (ruffed grouse): soil ingestion, vegetation ingestion;
- Insectivorous or invertevorous birds (American robin): soil ingestion, ingestion of invertebrates; and
- Carnivorous small mammals (ermine): soil ingestion, ingestion of prey.

6.3.8 Identification of COPCs

Similar to the COC identification process for the HHRA, the identification of COCs for the ERA Problem Formulation also involved a sequential process, as follows. Details regarding the COC identification process for the Problem Formulation (including the soil quality data and statistics, benchmarks that were used, COC screening table and screening outcomes) are provided in the following sections. For the current Problem Formulation, COCs were only screened in site soils. Other relevant media should be screened for COCs as part of the ERA.

- Comparison of the maximum measured concentrations of contaminants in site soil to applicable regulatory ecological health-based benchmarks and available background data;
- Chemicals with a maximum concentration that exceeded the applicable ecological health-based benchmark and were above background concentrations, were identified as initial COPCs;
- 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); and
- 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); and
 - Speciation of chemicals in site media.
- Final COCs are selected considering all other above, where relevant.

Soils would be the predominant source of exposures to terrestrial vegetation, soil invertebrates, herbivorous small mammals, and birds, insectivorous/invertevorous small mammals and birds, and

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carnivorous mammals. For freshwater aquatic life, groundwater, surface water and sediments would be the predominant exposures sources. Given the current Problem Formulation focussed on contaminants in surface soils only, groundwater, surface water and sediments were not screened for COCs.

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

- Substances that were non-detectable (below RDLs) in site soils were excluded from further consideration unless the RDL was above the applicable benchmark value;
- All site soil data were considered, including field duplicate samples;
- Soil concentrations of analytes were assumed to be accessible for ecological receptor exposure regardless of location;
- The more conservative of coarse or fine-grained soil benchmarks were used based on the particle size analysis;
- Chemicals having a maximum concentration which exceeded the applicable ecological benchmark value and available background data were retained for further assessment as 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 soil quality benchmarks were carried forward for further discussion.

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.

It should also be recognized that 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).

The specific human health-based soil quality benchmarks that were considered in the COC identification process are presented below. As the study area is located on land owned by Nova Scotia land, NS CSR guidelines apply and the NS PSS for commercial soils were preferentially used. The PSS were developed by source agencies and departments outside of Nova Scotia such as the CCME, AEP and MECP. 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.

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The benchmarks and background data that were applied in the screening are provided in the sections below and in **Appendix B**. Soil analytical data can be found in the screening tables therein, and laboratory certifications of analysis can be found in **Appendix C**.

6.3.9 Determining Usability of Data

FCSAP (2012) states that all data in the top 1.5 m of soil should be considered relevant for screening COPCs for an ERA. However, soil depths greater than 0.3 m bgs are generally considered not to be available for direct contact or ingestion from ecological receptors (Anderson et al., 2010; Suter et al., 2000; Suter, 2007). Given some of the soils were wet and on ground that was marsh-like, it was assumed soil exposures could occur at deeper depths. 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 3**. Site photographs are presented in **Appendix A**. All soil data used in the current assessment are presented in **Appendix B**.

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

With respect to the regulatory context for the ERA Problem Formulation, the site is located on land owned by the NSDNRR, and as such the NS CSR guidelines apply. Atlantic RBCA has released Tier I EQS and Tier II PSS for use in the Atlantic Provinces. While the ecological health-based PSS for commercial soils were not found on the NS CSR website, these values have been adopted by the province. The PSS were developed by source agencies and departments outside of Nova Scotia such as the CCME, AEP and MECP. 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 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 COC identification purposes.

It is important to recognize that generic screening levels (such as the ecological health-based soil quality benchmarks noted above) are typically derived to be intentionally conservative and protective. Exceedances of these screening levels do not imply there is a risk of adverse ecological effects; rather, it suggests that further evaluation of those chemicals may be warranted. 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) (ICMM, 2007). Increased metal/metalloid tolerance has been documented for many

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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).

6.3.10.1 Results of Ecological Health-Based Soil Screening

Site soil screening results are provided in **Table 6-6** and discussed in the following sections. 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. For completeness, the RDL for parameters with concentrations < the RDL were cross-referenced with the appropriate ecological-health based guideline, and all RDLs were below the applicable guideline; therefore, none of the non-detected parameters would screen on in the ERA Problem Formulation.

Table 6-6: Ecological Screening (Soil COPC Identification) for the Mill Village Site

Chemical	Ecological Soil Quality Benchmark (mg/kg)	Maximum Background Concentration (mg/kg)	Maximum Measured Concentration (mg/kg)	Exceeds Guideline and Background? (Y/N)
Aluminium	NGA	59000	31400	N
Arsenic	26	281 a	958	Y
Antimony	78	2	0.78	N
Barium	2000	540	57.8	N
Beryllium	8	1.6	1.09	N
Cadmium	1.9	2.6	0.535	N
Chromium (Total, III+VI)	87	21	53.9	N
Cobalt	180	30.6	49.3	N
Copper	91	29	30.8	N
Iron	NGA	26800	37400	N
Lead	32	160	67.5	N
Manganese	NGA	6530	404	N
Mercury	20	0.56	0.0971	N
Molybdenum	40	2.6	4.64	N
Nickel	89	16	55.4	N
Selenium	2.9	3.1	1.95	N
Uranium	33	3.9	1.7	N
Vanadium	18	115	40.7	N
Zinc	340	340	72.2	N

Notes:

Guidelines were taken from Atlantic RBCA Ecological Tier II Pathway-Specific Standards for Soil - Commercial Land Use.

a Based on site-specific BTV, NGA indicates no guideline is available.

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The following chemicals were carried forward for further evaluation, based on comparison of maximum concentrations to ecological benchmarks, and background concentrations.

Initial COPCs

- Arsenic

The maximum arsenic concentration detected on the site exceeds both the Ecological Tier II PSS for soil contact, which would be protective of plants/invertebrates (26 mg/kg), and for soil and food ingestion which would be protective of birds/mammals (330 mg/kg).

As discussed in the HHRA, an EPC of 287.3 mg/kg was calculated for the study area, which slightly exceeds the calculated BTV of 281 mg/kg. Since the calculated EPC is below the Tier II PSS for soil and food ingestion, unacceptable risks to birds/mammals associated with arsenic identified in the study area, are not expected.

For vegetation and soil invertebrates, the maximum concentrations exceeded the applicable guidelines for arsenic in several samples, and the concentrations exceed the background concentration at 7 locations. The EPC for the study area was consistent with the calculated BTV (only slightly exceeded), it is not anticipated that the arsenic concentrations identified in the study area would an increased unacceptable risk (above background levels) to plants and soil invertebrates, on a population level.

Based on the COPC identification steps and considerations described above, further ERA is not required at this time.

6.3.11 Conceptual Site Model for Ecological Receptors

The ERA conceptual site model (CSM) for site soils is presented on **Figure 7**. The CSM for ecological receptors provides a simplified representation of potential exposure pathways and routes that link the identified COCs in site environmental media to the ecological receptors of interest. Based on the COPC screening, COPCs were carried forward for terrestrial vegetation and soil invertebrates. This CSM is based on site soil exposures only. A CSM for exposures from other site media can be included when an ERA is conducted. Based on the above discussion, further assessment is not required.

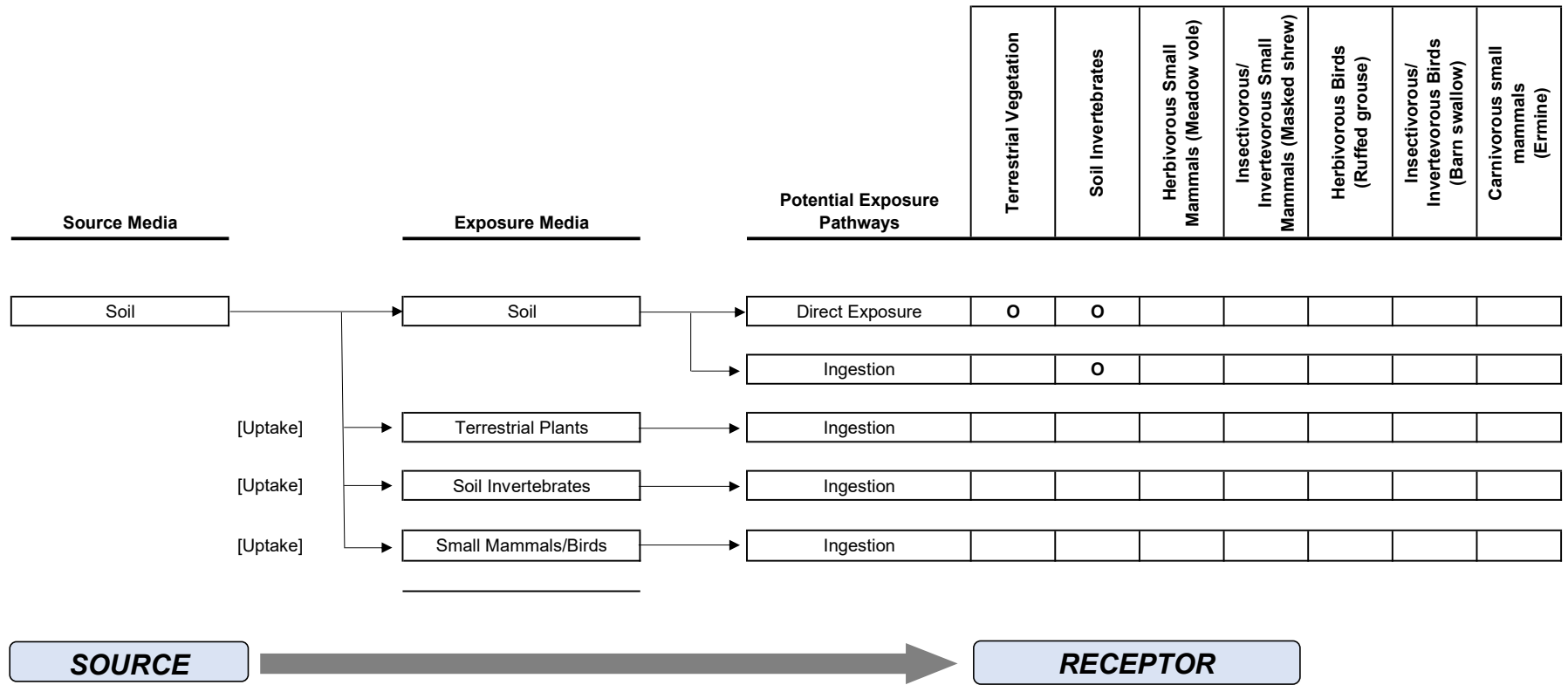
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Figure 7 CSM For Ecological Risk Assessment



Note:

- 1) X - Indicates a potentially complete exposure pathway for quantitative analysis.
- 1) O - Indicates an interaction that will be evaluated qualitatively.

Conclusions and Recommendations

Based on the findings of the SSP and HHERA, Dillon offers the following conclusions:

- Arsenic concentrations in the assessment area have been delineated relative to the background value. Delineation has not been achieved to the north, beyond the DNRR property boundary;
- Concentrations of cobalt and manganese, in the groundwater sample collected from MW23-1, exceeded the applicable NS Tier 1 EQS for potable groundwater. This sample was collected from a background location, suggesting the concentrations are naturally occurring;
- Arsenic exceeded the applicable NS Tier 1 EQS in sample MW23-2. It is noted that this exceedance was not noted during the May 2024 monitoring event;
- An SSTL was calculated for a site visitor in direct contact with the on-site soil (dermal contact, ingestion and inhalation with soil and dust). The SSTL is greater than the EPC calculated for the site and therefore the arsenic concentrations identified at the site are not posing unacceptable risks to human receptors who may come into contact with the arsenic in surface soil. However, it is important to note that the extent of impacts has not been fully delineated (i.e., off-site); and
- Dillon utilized the soil, groundwater and SPLP results to empirically derive soil concentrations that could leach concentrations of arsenic into groundwater at concentrations above the drinking water criteria. The findings indicated that soil concentrations in excess of 349 mg/kg could potentially leach arsenic concentrations over the potable criteria. Given the conservative nature of SPLP, the linear curve with very little deviation from an ideal sorption curve and the very high correlation coefficient (greater than 0.9), this approach is highly conservative.

Based on these findings, risk management or remediation may be required if there is potential for the installation of potable groundwater wells at the site. It is recommended to complete two additional rounds of groundwater monitoring (spring and fall) at the property, as well as conduct additional research into naturally occurring arsenic concentrations in gold regions in the province. This additional information will allow us to confirm the persistence of the exceedances and gain a better understanding of naturally occurring groundwater conditions. This additional data will also inform a re-evaluation of remedial options to determine the most appropriate and cost-effective strategy, if any is deemed necessary.

8.0

Limitations and Closure

This report was prepared exclusively for the purposes, project and site location(s) outlined in the report. The report is based on information provided to or obtained by Dillon Consulting Limited (Dillon) as indicated in the report and applies solely to site conditions existing at the time of the site investigation(s). 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(s). 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(s), and that the levels of contamination or hazardous materials may vary across the site(s). 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 our client Build Nova Scotia. The material in the report reflects Dillon's judgment in light of the information available to Dillon at the time of preparation. Any use which a third party (i.e., a party other than our Client or our Client's lending institution) 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

Asia Reid, B.Sc.
Project Manager

Susan Barfoot, P.Eng.
Site Professional

Appendix A

Photos

Appendix A – Photo Log



Figure 1: Soil Sample SS-1; Note presence of rocks and root mass.



Figure 2: Soil Sample SS-2; Note presence of rocks.



Figure 3: Soil Sample SS-5; Note presence of root mass.



Figure 4: Soil Sample SS-11; note shallow depth of refusal.

Appendix B

Analytical Results

Table B-1: Arsenic Concentrations in Soil

Mill Village Former Mine Site
Dillon Project Number: 23-6446

					Arsenic mg/kg
RDL					0.1
Background ^A					281
NS Tier I EQS ^B					10
Atlantic RBCA - Ecological Tier 1 EQS ^C					17.1
Location/Sample ID	Sample Type	Depth	Date		
HA3	HA3 SS1	Soil immediately adjacent to waste rock	Surface	10 Nov 2023	393
	HA3 SS2	Soil immediately adjacent to waste rock		10 Nov 2023	391
HA4	HA4 SS1	Soil immediately adjacent to waste rock	Surface	10 Nov 2023	97.1
	HA4 SS2	Soil immediately adjacent to waste rock		10 Nov 2023	122
HA5	HA5 SS1	Soil immediately adjacent to waste rock	Surface	10 Nov 2023	154
	HA5 SS2	Soil immediately adjacent to waste rock		10 Nov 2023	170
HA6	HA6 SS1	Soil immediately adjacent to waste rock	Surface	10 Nov 2023	147
	HA6 SS2	Soil immediately adjacent to waste rock		10 Nov 2023	182
SS1	DUP 1	Field Duplicate of SS1	Surface	09 Nov 2023	48.8
	SS1	Soil within the waste rock pile	Surface	09 Nov 2023	56.8
SS2	SS2	Soil within the waste rock pile	Surface	09 Nov 2023	181
SS3	SS3	Soil within the waste rock pile	Surface	09 Nov 2023	373
SS4	DUP 2	Field Duplicate of SS4	Surface	09 Nov 2023	132
	SS4	Deliniation step-out samples	Surface	09 Nov 2023	87.5
SS5	SS5	Deliniation step-out samples	Surface	09 Nov 2023	99
SS6	SS6	Deliniation step-out samples	Surface	09 Nov 2023	114
SS7	SS7	Deliniation step-out samples	Surface	09 Nov 2023	96
SS8	SS8	Deliniation step-out samples	Surface	09 Nov 2023	180
SS9	SS9	Deliniation step-out samples	Surface	09 Nov 2023	958
	24SS1	Deliniation step-out samples		23 Sep 2024	824
	24SS1-A ^D	Deliniation step-out samples		23 Sep 2024	876
	DUPA	Field Duplicate of 24SS1	Surface	23 Sep 2024	113
	DUPA-A ^D	Field Duplicate of 24SS1		23 Sep 2024	177
SS10	SS10	Deliniation step-out samples	Surface	09 Nov 2023	370
SS11	DUP 3	Field Duplicate of SS11	Surface	09 Nov 2023	151
	SS11	Deliniation step-out samples	Surface	09 Nov 2023	105
SS12	SS12	Deliniation step-out samples	Surface	09 Nov 2023	58.6
24SS2	24SS2	Deliniation step-out samples	Surface	23 Sep 2024	30.5
24SS3	24SS3	Deliniation step-out samples	Surface	23 Sep 2024	330
24SS4	24SS4	Deliniation step-out samples	Surface	23 Sep 2024	150
24SS5	24SS5	Deliniation step-out samples	Surface	23 Sep 2024	1.85
	24SS5 (AA) ^E	Deliniation step-out samples	Surface	23 Sep 2024	62.4
24SS6	24SS6	Deliniation step-out samples	Surface	23 Sep 2024	214
MW23-2	MW23-2	Composite soil sample from borehole	0-3.7 mbgs	13 Dec 2023	371
MW23-3	MW23-3	Composite soil sample from borehole	0-6.1 mbgs	13 Dec 2023	333

Notes:

A - The higher value was selected from the Background Soil range provided by the Review of Environment Canada's Background Soil Database (2004-2009), Version No.1, March 2011, and the calculated Site-Specific Background Threshold Values.

B - Nova Scotia Tier I EQS for Soil - Commercial Land Use, Potable Site Conditions, Coarse Grain Size

C - Atlantic RBCA Ecological Tier I EQS for Soil - Agricultural Land Use, Potable Site Conditions, Coarse Grain Size

D - Sample submitted for re-analysis due to a difference in arsenic concentration between the original sample and its duplicate

E - Sample submitted for re-analysis due to an unexpectedly low arsenic concentration

100 Bold values indicate the concentrations exceed the Background Value

100 Highlighted values indicate the concentrations exceed the NS Tier I EQS

100 Italic values indicate the concentrations exceed the Atlantic RBCA Tier 1 EQS

Table B-2: SPLP Analysis of Arsenic Concentrations in Soil

Mill Village Former Mine Site
 Dillon Project Number: 23-6446

					Leachate Analysis		Metals	
					pH (Final)	pH (Initial)	Arsenic	Arsenic
					pH Units	pH Units	mg/L	mg/kg
EQL					0.01	0.01	0.001	0.1
NS Tier I EQS Soil ^A					-	-	-	10
NS Tier I EQS Water ^B					-	-	0.01	-
Location Code	Field ID	Sample Type	Matrix Type	Date				
24SS2	24SS2	Normal	Soil	23 Sep 2024	-	-	-	30.5
24SS3	24SS3	Normal	Soil	23 Sep 2024	5.01	5.07	<0.00100	330
24SS4	24SS4	Normal	Soil	23 Sep 2024	5.03	4.88	<0.00100	150
24SS5	24SS5	Normal	Soil	23 Sep 2024	-	-	-	1.85
	24SS5 (AA)	Normal	Soil	23 Sep 2024	-	-	-	62.4
24SS6	24SS6	Normal	Soil	23 Sep 2024	-	-	-	214
SS9	24SS1	Normal	Soil	23 Sep 2024	5.01	5.22	0.12	824
	24SS1-A	Normal	Soil	23 Sep 2024	-	-	-	876
	DUPA	Field_D	Soil	23 Sep 2024	-	-	-	113
	DUPA-A	Field_D	Soil	23 Sep 2024	-	-	-	177
MW23-1	BH1 Composite	Normal	Soil	14 Dec 2023	-	-	-	104
	MW23-1	Normal	Water	23 Sep 2024	-	-	0.00132	-
MW23-2	BH2 Composite (Limited S	Normal	Soil	13 Dec 2023	-	-	-	371
	MW23-2	Normal	Water	23 Sep 2024	-	-	0.0175	-
MW23-3	BH3 SS2 (Limited Sample)	Normal	Soil	13 Dec 2023	-	-	-	333
	MW23-3	Normal	Water	23 Sep 2024	-	-	0.00409	-

Notes:

A - Nova Scotia Environment, September 2021, NS Tier I EQS Soil Commercial Potable Coarse

B - Nova Scotia Environment, September 2021, NS Tier I EQS Com/Ind Potable Coarse

100 Highlighted values indicate the concentrations exceed the NS Tier 1 EQS

Table B-3: Groundwater Analytical Results
Mill Village Former Mine Site
Dillon Project Number: 23-6446

Location Code Field ID Sample Type Date	Unit	EQL	NS Tier 1 EQS ^A	MW23-1		MW23-2			MW23-3		
				MW23-1		DUP A	MW23-2		DUP A	MW23-3	
				Normal	Field_D	Field_D	Normal	Field_D	Normal	Field_D	
				14 May 2024	23 Sep 2024	14 May 2024	14 May 2024	23 Sep 2024	23 Sep 2024	14 May 2024	23 Sep 2024
Calculated Parameters											
Anions Total (filtered)	meq/L	0.1	-	0.29	0.45	0.84	0.82	0.98	0.55	0.49	0.55
Cations Total (filtered)	meq/L	0.1	-	0.31	0.42	0.75	0.74	0.88	0.56	0.47	0.56
Ionic Balance (filtered)	%	0.01	-	107	93.3	89.3	90.2	89.8	102	95.9	102
Langelier Index (@ 20C)	N/A	0.01	-	-4.26	-3.62	-2.08	-2.1	-2.04	-3.24	-3.11	-3.24
Langelier Index (@ 4C)	N/A	0.01	-	-4.51	-3.87	-2.34	-2.35	-2.29	-3.49	-3.36	-3.49
Saturation @ 4c	0.01	-	-	10.7	10.1	9.09	9.09	8.93	9.61	9.77	9.61
Saturation pH (@ 20C)	N/A	0.01	-	10.4	9.82	8.83	8.84	8.68	9.36	9.47	9.36
General Chemistry											
Calcium Dissolved (filtered)	mg/L	0.05	-	1.07	2.61	9.58	9.6	11.8	5.82	4.67	5.8
Carbonate	mg/L	1	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity (total)	mg/L	1	-	6.6	11.5	30.9	30.2	36.6	15.1	14.1	15.1
Bicarbonate	mg/L	1	-	8	14	37.6	36.9	44.6	18.5	17.2	18.4
Ammonia as N	mg/L	0.005	-	<0.0050	<0.0050	0.0072	<0.0050	<0.0050	0.0186	0.0059	0.0059
Total Organic Carbon (TOC)	mg/L	0.5	-	10.4	0.95	0.81	0.74	0.72	<0.50	0.67	<0.50
Ortho Phosphate as P (filtered)	mg/L	0.001	-	<0.0010	0.0021	<0.0010	<0.0010	0.0012	0.0014	0.0013	0.0013
Phosphorus (filtered)	mg/L	0.05	-	<0.050	<0.500	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoride	mg/L	0.02	-	<0.020	0.027	0.025	0.025	0.041	<0.020	<0.020	<0.020
Chloride (filtered)	mg/L	0.5	250	4.24	6.11	5.33	5.3	5.9	6.22	5.49	6.22
Hydroxide	mg/L	1	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nitrate (as N)	mg/L	0.02	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrite (as N)	mg/L	0.01	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrite + Nitrate as N	mg/L	0.0224	-	<0.0224	<0.0224	<0.0224	<0.0224	<0.0224	<0.0224	<0.0224	<0.0224
pH (Lab)	pH Units	0.1	-	6.17	6.2	6.75	6.74	6.64	6.12	6.36	6.12
Electrical Conductivity (Lab)	µS/cm	1	-	36	50.6	87.8	87	99.9	64.7	56.9	64.4
Sulphate (filtered)	mg/L	0.3	-	1.66	2.08	3.2	3.23	4.05	3.58	2.64	3.6
Total Dissolved Solids (TDS) - Measured	mg/L	10	-	20	38	44	43	55	39	28	38
Turbidity	NTU	0.1	-	3.37	1.04	10.3	10.5	6.57	25.8	21.4	29.3
Metals											
Aluminum (filtered)	mg/L	0.001	0.1	0.0098	<0.0100	0.003	0.0027	0.0015	0.0041	0.0074	0.0043
Antimony (filtered)	mg/L	0.0001	0.006	<0.00010	<0.00100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (filtered)	mg/L	0.0001	0.01	0.0002	0.00132	0.00682	0.00721	0.0175	0.00411	0.00233	0.00409
Barium (filtered)	mg/L	0.0001	1	0.00999	0.00222	0.00395	0.00416	0.00368	0.00515	0.00499	0.00521
Beryllium (filtered)	mg/L	0.00002	0.004	0.000026	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	0.000028	<0.000200
Bismuth (filtered)	mg/L	0.00005	-	<0.0000500	<0.0000500	<0.0000500	<0.0000500	<0.0000500	<0.0000500	<0.0000500	<0.0000500
Boron (filtered)	mg/L	0.01	5	<0.010	<0.100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (filtered)	mg/L	0.00005	0.005	0.0000179	<0.0000500	0.0000095	0.0000113	0.0000089	0.0000169	0.0000198	0.0000205
Chromium (Total, III+VI) (filtered)	mg/L	0.0005	0.05	<0.00050	<0.00500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (filtered)	mg/L	0.0001	0.0038	0.00906	0.0047	0.00097	0.00083	0.00021	0.00105	0.00127	0.00104
Copper (filtered)	mg/L	0.0002	2	0.109	0.0101	0.00114	0.00148	0.00142	0.00229	0.00354	0.00332
Iron (filtered)	mg/L	0.01	0.3	1.26	<0.100	0.128	0.092	<0.100	<0.100	0.015	<0.100
Lead (filtered)	mg/L	0.0005	0.005	<0.000500	<0.00500	<0.000500	<0.000500	<0.000500	<0.000500	<0.000500	<0.000500
Magnesium (filtered)	mg/L	0.005	1	0.598	0.72	0.882	0.894	1.04	0.726	0.656	0.728
Manganese (filtered)	mg/L	0.0001	0.12	0.245	0.127	0.0471	0.0411	0.00534	0.00595	0.0416	0.0578
Mercury (filtered)	mg/L	0.000005	0.001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (filtered)	mg/L	0.00005	0.07	0.000095	<0.0000500	0.000133	0.000195	0.000184	0.000212	0.000233	0.000219
Nickel (filtered)	mg/L	0.0005	0.1	0.033	0.00756	0.00082	0.00084	0.00094	0.00321	0.0035	0.00319
Silica (SiO2) (filtered)	mg/L	0.11	-	6.24	12.3	7.89	7.61	9.09	8.53	6.4	8.6
Potassium (filtered)	mg/L	0.05	-	0.771	0.679	0.678	0.676	0.859	0.822	0.533	0.807
Selenium (filtered)	mg/L	0.00005	0.05	<0.0000500	<0.000500	0.000109	0.00011	0.000092	0.000068	0.000065	0.000062
Cesium (filtered)	mg/L	0.00001	-	0.000016	<0.000100	0.000057	0.000058	0.000097	0.000013	<0.000010	0.000013
Tellurium (filtered)	mg/L	0.00002	-	<0.000020	<0.000200	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Thorium (filtered)	mg/L	0.0001	-	<0.00010	<0.00100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tungsten (filtered)	mg/L	0.0001	-	0.0195	0.197	0.00251	0.00311	0.0028	0.00372	0.00371	0.00367
Lithium (filtered)	mg/L	0.0001	-	<0.00010	<0.00100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.001
Silver (filtered)	mg/L	0.00001	-	0.000058	<0.000100	<0.000010	<0.000010	<0.000010	0.000048	0.000028	0.000041
Silicon (filtered)	mg/L	0.05	-	2.92	5.75	3.69	3.56	4.25	3.99	2.99	4.02
Sodium (filtered)	mg/L	0.05	200	3.05	4.81	3.93	3.9	4.24	4.21	3.83	4.23
Strontium (filtered)	mg/L	0.0002	2.4	0.0148	0.0259	0.038	0.0386	0.0452	0.0257	0.0234	0.0253
Sulphur as S (filtered)	mg/L	0.5	-	<0.50	<5.00	1.02	1.02	1.26	0.82	0.82	1.23
Titanium (filtered)	mg/L	0.0003	-	<0.00030	<0.00300	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Thallium (filtered)	mg/L	0.00001	0.002	0.000013	<0.000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (filtered)	mg/L	0.0001	2.4	<0.00010	<0.00100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (filtered)	mg/L	0.00001	0.02	<0.000010	<0.000100	0.0000105	0.0000106	0.000015	0.000067	0.00008	0.000064
Vanadium (filtered)	mg/L	0.0005	0.0062	<0.00050	<0.00500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (filtered)	mg/L	0.001	5	0.0152	<0.0100	0.0025	0.003	0.0026	0.0022	0.0036	0.0043
Zirconium (filtered)	mg/L	0.0002	-	<0.00020	<0.00200	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
BTEX											
Benzene	mg/L	0.0005	0.005	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	0.0005	0.024	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	0.0005	0.0016	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	0.0003	-	<0.00030	-	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Xylene (m & p)	mg/L	0.0004	-	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene Total	mg/L	0.0005	0.02	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Petroleum Hydrocarbons (PHCs)											
>C10-C16 fraction of mTPH	%	1	-	<1	-	<1	<1	<1	<1	<1	<1
>C16-C21 fraction of mTPH	%	1	-	<1	-	<1	<1	<1	<1	<1	<1
>C21-C32 frac	%	1	-	<1	-	<1	<1	<1	<1	<1	<1
C6-C10 fraction of mTPH	%	1	-	<1	-	<1	<1	<1	<1	<1	<1
VPH (C6-C10 - BTEX)	mg/L	0.025	-	<0.025	-	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
EPH >C10-C16	mg/L	0.05	-	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.125	<0.125
EPH >C16-C21	mg/L	0.05	-	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.125	<0.125
EPH >C21-C32	mg/L	0.05	-	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Modified TPH (Tier 1)	mg/L	0.09	3.2	<0.090	-	<0.090	<0.184	<0.150	<0.090	<0.184	<0.184
Reached Baseline at C32	-	-	-	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes
Hydrocarbon Resemblance	none	-	-	N/A	-	N/A	N/A	N/A	N/A	N/A	N/A
Polycyclic Aromatic Hydrocarbons (PAHs)											
1-Methylnaphthalene	mg/L	0.00001	0.012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
2-methylnaphthalene	mg/L	0.00001	0.012	<0.000010	<0.000010	<0.000010	<0				

Table B-4: Quality Control for Groundwater
 Mill Village Former Mine Site
 Dillon Project Number: 23-6446

Location Code	MW23-3		MW23-3		MW23-3		MW23-3		MW23-3		MW23-3	
	Sample Type	Date	Normal	Field Duplicate	5 x the RDL	Absolute Difference b/w Parent and Duplicate	2 x the RDL	Relative Percent Difference	QC Result			
			23 Sep 2024	23 Sep 2024								
	Unit	RDL										
General Chemistry												
Calcium Dissolved	mg/L	0.05	5.8	5.82	0.25	Both Samples >5x RDL	Not Calculated	0%	Acceptable			
Carbonate	mg/L	1	<1.0	<1.0	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Alkalinity (total)	mg/L	1	15.1	15.1	5	Both Samples >5x RDL	Not Calculated	0%	Acceptable			
Bicarbonate	mg/L	1	18.4	18.5	5	Both Samples >5x RDL	Not Calculated	1%	Acceptable			
Ammonia as N	mg/L	0.005	0.0059	<0.0050	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Total Organic Carbon (TOC)	mg/L	0.5	<0.50	<0.50	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Ortho Phosphate as P	mg/L	0.001	0.0013	0.0014	0.005	0.0001	0.002	Not Calculated	Acceptable			
Phosphorus	mg/L	0.05	<0.050	<0.050	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Fluoride	mg/L	0.02	<0.020	<0.020	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Chloride	mg/L	0.5	6.22	6.22	2.5	Both Samples >5x RDL	Not Calculated	0%	Acceptable			
Hydroxide	mg/L	1	<1.0	<1.0	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Nitrate (as N)	mg/L	0.02	<0.020	<0.020	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Nitrite (as N)	mg/L	0.01	<0.010	<0.010	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Nitrite + Nitrate as N	mg/L	0.0224	<0.0224	<0.0224	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
pH (Lab)	pH Units	0.1	6.12	6.12	0.5	Both Samples >5x RDL	Not Calculated	0%	Acceptable			
Electrical Conductivity (Lab)	µS/cm	1	64.4	64.7	5	Both Samples >5x RDL	Not Calculated	0%	Acceptable			
Sulphate	mg/L	0.3	3.6	3.58	1.5	Both Samples >5x RDL	Not Calculated	1%	Acceptable			
Total Dissolved Solids (TDS) - Measured	mg/L	10	38	39	50	1	20	Not Calculated	Acceptable			
Turbidity	NTU	0.1	29.3	25.8	0.5	Both Samples >5x RDL	Not Calculated	13%	Acceptable			
Metals												
Aluminium	mg/L	0.001	0.0043	0.0041	0.005	0.0002	0.002	Not Calculated	Acceptable			
Antimony	mg/L	0.0001	<0.00010	<0.00010	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Arsenic	mg/L	0.0001	0.00409	0.00411	0.0005	Both Samples >5x RDL	Not Calculated	0%	Acceptable			
Barium	mg/L	0.0001	0.00521	0.00515	0.0005	Both Samples >5x RDL	Not Calculated	1%	Acceptable			
Beryllium	mg/L	0.00002	<0.000020	<0.000020	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Bismuth	mg/L	0.00005	<0.000050	<0.000050	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Boron	mg/L	0.01	<0.010	<0.010	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Cadmium	mg/L	0.00001	0.0000205	0.0000169	0.000025	0.0000036	0.00001	Not Calculated	Acceptable			
Chromium (Total, III+VI)	mg/L	0.0005	<0.00050	<0.00050	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Cobalt	mg/L	0.0001	0.00104	0.00105	0.0005	Both Samples >5x RDL	Not Calculated	1%	Acceptable			
Copper	mg/L	0.0002	0.00332	0.00229	0.001	Both Samples >5x RDL	Not Calculated	37%	Acceptable			
Iron	mg/L	0.01	<0.010	<0.010	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Lead	mg/L	0.00005	<0.000050	<0.000050	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Magnesium	mg/L	0.005	0.728	0.726	0.025	Both Samples >5x RDL	Not Calculated	0%	Acceptable			
Manganese	mg/L	0.0001	0.0578	0.0595	0.0005	Both Samples >5x RDL	Not Calculated	3%	Acceptable			
Mercury	mg/L	0.00001	<0.0000050	<0.0000050	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Molybdenum	mg/L	0.00005	0.000219	0.000212	0.00025	7E-06	0.0001	Not Calculated	Acceptable			
Nickel	mg/L	0.0005	0.00319	0.00321	0.0025	Both Samples >5x RDL	Not Calculated	1%	Acceptable			
Silica (SiO2)	mg/L	0.11	8.6	8.53	0.55	Both Samples >5x RDL	Not Calculated	1%	Acceptable			
Potassium	mg/L	0.05	0.807	0.822	0.25	Both Samples >5x RDL	Not Calculated	2%	Acceptable			
Selenium	mg/L	0.00005	0.000062	0.000068	0.00025	0.000006	0.0001	Not Calculated	Acceptable			
Cesium	mg/L	0.00001	0.000013	0.000013	0.00005	0	0.00002	Not Calculated	Acceptable			
Tellurium	mg/L	0.0002	<0.00020	<0.00020	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Thorium	mg/L	0.0001	<0.00010	<0.00010	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Tungsten	mg/L	0.0001	0.00367	0.00372	0.0005	Both Samples >5x RDL	Not Calculated	1%	Acceptable			
Lithium	mg/L	0.001	0.001	<0.0010	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Silver	mg/L	0.00001	0.000041	0.000048	0.00005	0.000007	0.00002	Not Calculated	Acceptable			
Silicon	mg/L	0.05	4.02	3.99	0.25	Both Samples >5x RDL	Not Calculated	1%	Acceptable			
Sodium	mg/L	0.05	4.23	4.21	0.25	Both Samples >5x RDL	Not Calculated	0%	Acceptable			
Strontium	mg/L	0.0002	0.0253	0.0257	0.001	Both Samples >5x RDL	Not Calculated	2%	Acceptable			
Sulphur as S	mg/L	0.5	1.23	1.26	2.5	0.03	1	Not Calculated	Acceptable			
Titanium	mg/L	0.0003	<0.00030	<0.00030	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Thallium	mg/L	0.00001	<0.000010	<0.000010	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Tin	mg/L	0.0001	<0.00010	<0.00010	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Uranium	mg/L	0.00001	0.000064	0.000067	0.00005	Both Samples >5x RDL	Not Calculated	5%	Acceptable			
Vanadium	mg/L	0.0005	<0.00050	<0.00050	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			
Zinc	mg/L	0.001	0.0043	0.0022	0.005	0.0021	0.002	Not Calculated	Unacceptable			
Zirconium	mg/L	0.0002	<0.00020	<0.00020	Not Calculated	Not Calculated	Not Calculated	Not Calculated	Not Calculated			

Comments:
 Where either parent and field duplicate sample concentrations are less than 5X the RDL, then the absolute difference in values is shown. The difference is acceptable if it is less than 2X the RDL.

Relative percent difference (RPD) is only considered where parent and duplicate sample concentrations are both greater than 5X the RDL. The RPD is considered acceptable if it is within the industry accepted ranges for metals in soil (as detailed in the report).
 $RPD = \frac{(\text{parent result} - \text{duplicate result})}{(\text{parent result} + \text{duplicate result})/2} * 100$
 QC calculations and results have been evaluated in accordance of the Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment (CCME, 2016).
 BOLD value indicates the value which the acceptance criteria is based on (i.e. absolute difference or RPD).

Table B-5: Quality Control for Arsenic in Soil
 Mill Village Former Mine Site
 Dillon Project Number: 23-6446

			24551	DUPA	24551	24551	24551	24551	24551
			Normal	Field Duplicate	5 x the RDL	Absolute Difference b/w Parent and Duplicate	2 x the RDL	Relative Percent Difference	QC Result
			23 Sep 2024	23 Sep 2024					
	Unit	RDL							
Metals									
Arsenic	mg/kg	0.1	824	113	0.5	Both Samples >5x RDL	Not Calculated	152%	Unacceptable

Comments:

Where either parent and field duplicate sample concentrations are less than 5X the RDL, then the absolute difference in values is shown. The difference is acceptable if it is less than 2X the RDL.

Relative percent difference (RPD) is only considered where parent and duplicate sample concentrations are both greater than 5X the RDL. The RPD is considered acceptable if it is within the industry accepted ranges for metals in soil (as detailed in the report).

$RPD = ((\text{parent result} - \text{duplicate result}) / (\text{parent result} + \text{duplicate result} / 2)) * 100$

QC calculations and results have been evaluated in accordance of the Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment (CCME, 2016).

BOLD value indicates the value which the acceptance criteria is based on (i.e. absolute difference or RPD).

Table B-6: Quality Control for Arsenic in Soil
 Mill Village Former Mine Site
 Dillon Project Number: 23-6446

			24551	24551-A	24551	24551	24551	24551	
			Normal	Normal	5 x the RDL	Absolute Difference b/w Parent and Duplicate	2 x the RDL	Relative Percent Difference	QC Result
			23 Sep 2024	23 Sep 2024					
	Unit	RDL							
Metals									
Arsenic	mg/kg	0.1	824	876	0.5	Both Samples >5x RDL	Not Calculated	6%	Acceptable

Comments:

Where either parent and field duplicate sample concentrations are less than 5X the RDL, then the absolute difference in values is shown. The difference is acceptable if it is less than 2X the RDL.

Relative percent difference (RPD) is only considered where parent and duplicate sample concentrations are both greater than 5X the RDL. The RPD is considered acceptable if it is within the industry accepted ranges for metals in soil (as detailed in the report).

$$RPD = ((\text{parent result} - \text{duplicate result}) / (\text{parent result} + \text{duplicate result} / 2)) * 100$$

QC calculations and results have been evaluated in accordance of the Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment (CCME, 2016).

BOLD value indicates the value which the acceptance criteria is based on (i.e. absolute difference or RPD).

Table B-7: Metal concentrations in background soil samples
 Mill Village Former Mine Site
 Dillon Project Number: 23-6446

	Metals																									
	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium (Total, III+VI)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Sulphur as S	Thallium	Tin	Uranium	Vanadium	Zinc	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	50	0.1	0.1	0.5	0.1	5	0.02	0.5	0.1	0.5	50	0.5	1	0.005	0.1	0.5	0.2	0.1	0.5	1,000	0.05	2	0.05	0.2	2	

Location Code	Field ID	Depth	Date	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium (Total, III+VI)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Sulphur as S	Thallium	Tin	Uranium	Vanadium	Zinc
BGSS-13	BGSS-13 0-1	0 - 1	13 May 2024	23,400	0.14	136	19.5	0.26	<5.0	0.045	18.5	1.43	5.6	25,900	11	125	0.0669	0.32	6.54	0.88	0.2	2.29	<1,000	0.123	<2.0	0.445	35.4	17.4
BGSS-14	BGSS-14 0-1	0 - 1	13 May 2024	14,100	0.17	101	14.6	0.12	<5.0	0.024	13.3	0.91	4.18	23,700	8.83	91.8	0.0347	0.28	3.93	0.58	<0.10	2.15	<1,000	0.15	<2.0	0.265	35.3	12.7
BGSS-15	BGSS-15 0-1	0 - 1	14 May 2024	30,600	0.18	223	25.9	0.35	<5.0	0.047	24.3	2.63	10.4	26,800	12.8	170	0.0971	0.35	9.5	1.31	0.21	4.1	<1,000	0.137	<2.0	0.555	25.1	33.4
	BGSS-15 1-2	1 - 2	14 May 2024	-	-	230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BGSS-16	BGSS-16 0-1	0 - 1	14 May 2024	31,400	0.12	263	25.1	0.34	<5.0	0.05	26	3.32	9.46	25,500	13.7	177	0.094	0.39	10.6	1.95	0.22	4.64	<1,000	0.104	<2.0	0.687	29	24.7
	BGSS-16 1-2	1 - 2	14 May 2024	-	-	225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BGSS-17	BGSS-17 0-1	0 - 1	14 May 2024	16,700	0.17	145	17.9	0.21	<5.0	0.033	14.7	2.15	6.98	18,500	11.2	133	0.0551	0.34	8.43	0.63	<0.10	3.18	<1,000	0.117	<2.0	0.392	25.2	18.4
	BGSS-17 1-2	1 - 2	14 May 2024	-	-	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BGSS-18	BGSS-18 0-1	0 - 1	14 May 2024	19,600	0.15	60	24.1	0.22	<5.0	0.049	17.5	1.82	7.72	21,200	9.84	117	0.0646	0.29	6.67	0.67	<0.10	2.02	<1,000	0.137	<2.0	0.444	36.8	15.7
	BGSS-18 1-2	1 - 2	14 May 2024	-	-	61.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BGSS-19	BGSS-19 0-1	0 - 1	14 May 2024	1,130	0.21	1.89	47.7	<0.10	<5.0	0.535	2.27	0.29	8.14	579	18.1	16.6	0.11	0.18	3.26	0.72	<0.10	42.9	<1,000	0.05	<2.0	0.093	3.51	17.4
	BGSS-19 1-2	1 - 2	14 May 2024	-	-	1.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BGSS-20	BGSS-20 0-1	0 - 1	14 May 2024	4,640	0.14	63.9	12.5	<0.10	<5.0	0.044	4.83	0.34	2.28	6,540	11.3	43.3	0.0401	0.18	1.55	0.22	<0.10	2.42	<1,000	0.072	<2.0	0.179	14.1	6.1
	BGSS-20 1-2	1 - 2	14 May 2024	-	-	116	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BGSS-21	BGSS-21 0-1	0 - 1	14 May 2024	18,500	0.21	189	21.1	0.23	<5.0	0.056	17.8	2.32	7.21	24,000	12.5	158	0.0487	0.32	8.45	0.75	0.14	4.28	<1,000	0.124	<2.0	0.396	28.9	22.4
	BGSS-21 1-2	1 - 2	14 May 2024	-	-	197	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DUP A	0-1	14 May 2024	17,200	0.2	164	22.3	0.24	<5.0	0.096	16.4	2.14	7.31	21,600	13.4	138	0.0655	0.31	7.92	0.76	0.16	4.14	<1,000	0.117	<2.0	0.394	24.4	20.5
BGSS-22	BGSS-22 0-1	0 - 1	14 May 2024	6,910	0.21	156	16.7	<0.10	<5.0	0.052	7.21	0.65	2.16	11,200	11.8	89.8	0.0407	0.28	2.11	0.45	0.15	4.2	<1,000	0.104	<2.0	0.213	20.1	8.3
	BGSS-22 1-2	1 - 2	14 May 2024	-	-	281	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA1	HA1 SS1	0-1	09 Nov 2023	17,000	0.16	145	18.2	0.21	<5.0	0.048	18.9	2.73	8.07	19,800	11.4	178	0.0605	0.35	9.3	1.04	0.11	6.22	<1,000	0.086	<2.0	0.419	22.8	22
	HA1 SS2	1-2	09 Nov 2023	-	-	165	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA2	HA2 SS1	0-1	10 Nov 2023	3,500	<0.10	4.24	30.7	0.43	<5.0	0.169	3.76	0.78	13.5	1,680	14.2	12.6	0.0474	0.14	5.8	0.49	0.11	6.57	<1,000	0.058	<2.0	0.346	3.32	3.7
	HA2 SS2	1-2	10 Nov 2023	-	-	5.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW23-1	BH1 Composite	-	14 Dec 2023	14,100	0.14	104	32.4	0.38	<5.0	0.032	23.5	8.13	22.2	21,400	8.9	315	0.02	0.59	21.8	0.26	<0.10	4.63	<1,000	0.114	<2.0	0.647	21.9	44.1

Table B-8: Metal Concentrations in Soil
 Mill Village Former Mine Site
 Dillon Project Number: 23-6446

				Metals																									
				Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium (Total, III+VI)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Sulphur as S	Thallium	Tin	Uranium	Vanadium	Zinc	
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RDL				50	0.1	0.1	0.5	0.1	5	0.02	0.5	0.1	0.5	50	0.5	1	0.005	0.1	0.5	0.2	0.1	0.5	1,000	0.05	2	0.05	0.2	2	
Background ^A				59,000	2	281	194	1.8	1.18	1.1	143	30.6	140	52,000	112	6,530	0.23	3.5	187	3.1	0.6	86	-	2.5	15.2	4.8	115	270	
NS Tier I EQS ^B				15,400	7.5	10	350	1	4,300	1	630	22	250	11,000	120	360	24	15	70	1	77	9,400	-	1	9,400	30	39	200	
Atlantic RBCA - Ecological Tier 1 EQS ^C				-	20	17.1	400	5	120	3.8	64	20	63	-	70		12	4	45	1	20		-	1	5	33	18	200	
Location Code	Sample Type	Depth	Date																										
HA3 SS1	Soil immediately adjacent to waste rock	Surface	10 Nov 2023	24,800	0.2	393	24.4	0.79	<5.0	0.133	25.6	2.92	8.06	36,100	11.8	119	0.101	0.92	7.96	1.56	0.13	6.34	<1,000	0.091	<2.0	0.585	40.7	30.9	
HA4 SS1	Soil immediately adjacent to waste rock	Surface	10 Nov 2023	24,900	0.15	97.1	23.6	0.34	<5.0	0.045	20.4	2.56	7.07	23,800	11.1	112	0.102	0.37	7.8	1.34	0.17	2.72	<1,000	0.109	<2.0	0.402	31.1	48.2	
HA5 SS1	Soil immediately adjacent to waste rock	Surface	10 Nov 2023	21,600	0.15	154	24.6	0.36	<5.0	0.052	21.2	3.34	10.2	24,800	10.6	181	0.162	0.34	11.6	0.97	0.16	3.7	<1,000	0.124	<2.0	0.407	25.9	41.8	
HA6 SS1	Soil immediately adjacent to waste rock	Surface	10 Nov 2023	20,800	0.16	147	17.7	0.26	<5.0	0.049	18	1.79	5.48	25,400	12.1	101	0.077	0.4	6.01	1.14	0.14	2.8	<1,000	0.106	<2.0	0.358	28.7	27	
SS1	Field Duplicate of SS1	Surface	09 Nov 2023	9,150	<0.10	48.8	19.6	0.15	<5.0	0.064	6.74	1.77	5.2	9,270	7.5	54.9	0.0504	0.2	3.85	0.48	<0.10	7.85	<1,000	0.074	<2.0	0.272	12.7	17	
	Assessing soil within waste rock pile	Surface	09 Nov 2023	6,460	0.13	56.8	20.9	0.11	<5.0	0.08	5.79	1.52	4.65	9,980	9.58	49.1	0.0491	0.23	3.22	0.44	0.1	7.79	<1,000	0.087	<2.0	0.252	16.5	14.5	
SS2	Assessing soil within waste rock pile	Surface	09 Nov 2023	14,900	0.29	181	24	0.46	<5.0	0.05	22.3	8.97	24.6	25,100	22.3	360	0.113	0.26	22.9	0.31	<0.10	5.64	<1,000	0.131	<2.0	0.73	24.3	56.8	
SS3	Assessing soil within waste rock pile	Surface	09 Nov 2023	18,400	0.78	373	73.3	1.09	<5.0	0.13	29.8	49.3	99.5	37,400	67.5	719	0.132	0.24	55.4	<0.20	0.22	18.2	<1,000	0.257	<2.0	1.7	32.7	121	
SS4	Delimitation step-out sample	Surface	09 Nov 2023	18,800	0.17	132	23.1	0.19	<5.0	0.057	17.1	1.36	5.45	24,900	9.73	102	0.0599	0.45	5.1	0.76	0.16	3.2	<1,000	0.162	<2.0	0.317	30.9	19.6	
SS11	Delimitation step-out sample	Surface	09 Nov 2023	13,400	0.12	151	25.9	0.27	<5.0	0.039	18.4	2.65	5.71	26,700	10.6	156	0.0631	0.4	9.76	0.42	<0.10	5.46	<1,000	0.118	<2.0	0.388	32.7	26.2	
MW23-2	Composite soil sample from borehole	0-3.7 mbgs	13 Dec 2023	22,200	0.26	371	47.4	0.62	<5.0	0.039	31.6	11.8	30.8	31,300	11.6	404	0.0392	1.13	27.8	0.61	0.1	6.57	<1,000	0.205	<2.0	1.11	33.6	68.6	
MW23-3	Composite soil sample from borehole	0-6.1 mbgs	13 Dec 2023	23,400	0.22	333	57.8	0.44	<5.0	0.043	53.9	12.5	24.8	33,200	13.8	404	0.0232	4.64	28	0.56	<0.10	5.14	<1,000	0.19	<2.0	0.736	32.2	72.2	

Notes:
 A - The higher value was selected from the Background Soil range provided by the Review of Environment Canada's Background Soil Database (2004-2009), Version No.1, March 2011, and the calculated Site-Specific Background Threshold Values.
 B - Nova Scotia Tier I EQS for Soil - Commercial Land Use, Potable Site Conditions, Coarse Grain Size
 C - Atlantic RBCA Ecological Tier I EQS for Soil - Agricultural Land Use, Potable Site Conditions, Coarse Grain Size

100 Bold values indicate the concentrations exceed the Background Value
 100 Highlighted values indicate the concentrations exceed the NS Tier I EQS
 100 Italic values indicate the concentrations exceed the Atlantic RBCA Tier 1 EQS
 mbgs - meters below ground surface

Appendix C

Lab COAs



CERTIFICATE OF ANALYSIS

Work Order	: HA2402324	Laboratory	: ALS Environmental - Waterloo
Client	: Dillon Consulting Limited	Account Manager	: Andrew Martin
Contact	: Asia Reid	Address	: 60 Northland Road, Unit 1
Address	: 137 Chain Lake Drive Halifax Nova Scotia Canada B3S 1B3		: Waterloo ON Canada N2V 2B8
Telephone	: 902.450.5015 ext. 5045	Telephone	: +1 519 886 6910
Project	: 236446	Date Samples Received	: 25-Sep-2024 16:05
PO	: ----	Date Analysis Commenced	: 26-Sep-2024
C-O-C number	: ----	Issue Date	: 03-Oct-2024 10:17
Sampler	: ----		
Site	: Build NS (Mill Village)		
Quote number	: HA23-DICL100-11 - Build NS (Mill Village)		
No. of samples received	: 16		
No. of samples analysed	: 16		

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>
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Metals, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Inorganics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Metals, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Dartmouth, Nova Scotia
Jon Fisher	Production Manager, Environmental	Administration, Dartmouth, Nova Scotia
Sarah Birch	VOC Section Supervisor	VOC, 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/L	milligrams per litre
-	no units
none	none
pH units	pH units
µS/cm	microsiemens per centimetre
NTU	nephelometric turbidity units
CU	colour units (1 cu = 1 mg/l pt)
µg/L	micrograms per litre
meq/L	milliequivalents per litre
%	percent
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.

Sample Comments

Sample	Client Id	Comment
HA2402324-002	MW23-2	N/A: Resemblance Not Applicable (mTPH < LOR)
HA2402324-002	MW23-2	RRR: Surrogate recovery is outside ALS DQO. Detection limits for affected compounds have been raised accordingly.



HA2402324-003	MW23-3	N/A: Resemblance Not Applicable (mTPH < LOR)
HA2402324-003	MW23-3	RRR: Surrogate recovery is outside ALS DQO. Detection limits for affected compounds have been raised accordingly.
HA2402324-004	DUP A	N/A: Resemblance Not Applicable (mTPH < LOR)
HA2402324-004	DUP A	RRR: Detection limit raised due to high analyte recovery in the method blank.

Qualifiers

<u>Qualifier</u>	<u>Description</u>
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
RRR	Refer to report comments for issues regarding this analysis.
SUR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.
VOCHS	VOC analysis was conducted for a water sample that contained > 5% headspace. Results may be biased low.



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

				Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
				Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, bicarbonate (as HCO ₃)	71-52-3	E290/WT	1.0	mg/L	14.0	44.6	18.4	18.5	----
Alkalinity, carbonate (as CO ₃)	3812-32-6	E290/WT	1.0	mg/L	<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	----
Alkalinity, total (as CaCO ₃)	----	E290/WT	1.0	mg/L	11.5	36.6	15.1	15.1	----
Colour, apparent	----	E330/WT	2.0	CU	12.1	47.0	231	196	----
Conductivity	----	E100/WT	1.0	µS/cm	50.6	99.9	64.4	64.7	----
Langelier index (@ 20°C)	----	EC105/WT	0.010	-	-3.62	-2.04	-3.24	-3.24	----
Langelier index (@ 4°C)	----	EC105/WT	0.010	-	-3.87	-2.29	-3.49	-3.49	----
pH	----	E108/WT	0.10	pH units	6.20	6.64	6.12	6.12	----
pH, saturation (@ 20°C)	----	EC105/WT	0.010	pH units	9.82	8.68	9.36	9.36	----
pH, saturation (@ 4°C)	----	EC105/WT	0.010	pH units	10.1	8.93	9.61	9.61	----
Solids, total dissolved [TDS]	----	E162/HA	10	mg/L	38	55	38	39	----
Turbidity	----	E121/WT	0.10	NTU	1.04	6.57	29.3	25.8	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L	<0.0050	<0.0050	0.0059	<0.0050	----
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L	6.11	5.90	6.22	6.22	----
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L	0.027	0.041	<0.020	<0.020	----
Nitrate (as N)	14797-55-8	E235.NO ₃ /WT	0.020	mg/L	<0.020	<0.020	<0.020	<0.020	----
Nitrate + Nitrite (as N)	----	EC235.N+N/W T	0.0032	mg/L	<0.0224	<0.0224	<0.0224	<0.0224	----
Nitrite (as N)	14797-65-0	E235.NO ₂ /WT	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L	0.0021	0.0012	0.0013	0.0014	----



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Anions and Nutrients										
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L	2.08	4.05	3.60	3.58	----	
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	---	E355-L/WT	0.50	mg/L	0.95	0.72	<0.50	<0.50	----	
Ion Balance										
Anion sum	---	EC101/WT	0.10	meq/L	0.45	0.98	0.55	0.55	----	
Cation sum	---	EC101/WT	0.10	meq/L	0.42	0.88	0.56	0.56	----	
Ion balance (cations/anions)	---	EC101/WT	0.010	%	93.3	89.8	102	102	----	
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/WT	0.0010	mg/L	<0.0100 ^{DLHC}	0.0015	0.0043	0.0041	----	
Antimony, dissolved	7440-36-0	E421/WT	0.00010	mg/L	<0.00100 ^{DLHC}	<0.00010	<0.00010	<0.00010	----	
Arsenic, dissolved	7440-38-2	E421/WT	0.00010	mg/L	0.00132 ^{DLHC}	0.0175	0.00409	0.00411	----	
Barium, dissolved	7440-39-3	E421/WT	0.00010	mg/L	0.00222 ^{DLHC}	0.00368	0.00521	0.00515	----	
Beryllium, dissolved	7440-41-7	E421/WT	0.000020	mg/L	<0.000200 ^{DLHC}	<0.000020	<0.000020	<0.000020	----	
Bismuth, dissolved	7440-69-9	E421/WT	0.000050	mg/L	<0.000500 ^{DLHC}	<0.000050	<0.000050	<0.000050	----	
Boron, dissolved	7440-42-8	E421/WT	0.010	mg/L	<0.100 ^{DLHC}	<0.010	<0.010	<0.010	----	
Cadmium, dissolved	7440-43-9	E421/WT	0.0000050	mg/L	<0.0000500 ^{DLHC}	0.0000089	0.0000205	0.0000169	----	
Calcium, dissolved	7440-70-2	E421/WT	0.050	mg/L	2.61 ^{DLHC}	11.8	5.80	5.82	----	
Cesium, dissolved	7440-46-2	E421/WT	0.000010	mg/L	<0.000100 ^{DLHC}	0.000097	0.000013	0.000013	----	
Chromium, dissolved	7440-47-3	E421/WT	0.00050	mg/L	<0.00500 ^{DLHC}	<0.00050	<0.00050	<0.00050	----	
Cobalt, dissolved	7440-48-4	E421/WT	0.00010	mg/L	0.00470 ^{DLHC}	0.00021	0.00104	0.00105	----	
Copper, dissolved	7440-50-8	E421/WT	0.00020	mg/L	0.0101 ^{DLHC}	0.00142	0.00332	0.00229	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Dissolved Metals										
Iron, dissolved	7439-89-6	E421/WT	0.010	mg/L	<0.100 ^{DLHC}	<0.010	<0.010	<0.010	<0.010	----
Lead, dissolved	7439-92-1	E421/WT	0.000050	mg/L	<0.000500 ^{DLHC}	<0.000050	<0.000050	<0.000050	<0.000050	----
Lithium, dissolved	7439-93-2	E421/WT	0.0010	mg/L	<0.0100 ^{DLHC}	<0.0010	0.0010	<0.0010	<0.0010	----
Magnesium, dissolved	7439-95-4	E421/WT	0.0050	mg/L	0.720 ^{DLHC}	1.04	0.728	0.726	0.726	----
Manganese, dissolved	7439-96-5	E421/WT	0.00010	mg/L	0.127 ^{DLHC}	0.00534	0.0578	0.0595	0.0595	----
Mercury, dissolved	7439-97-6	E509/WT	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
Molybdenum, dissolved	7439-98-7	E421/WT	0.000050	mg/L	<0.000500 ^{DLHC}	0.000184	0.000219	0.000212	0.000212	----
Nickel, dissolved	7440-02-0	E421/WT	0.00050	mg/L	0.00756 ^{DLHC}	0.00094	0.00319	0.00321	0.00321	----
Phosphorus, dissolved	7723-14-0	E421/WT	0.050	mg/L	<0.500 ^{DLHC}	<0.050	<0.050	<0.050	<0.050	----
Potassium, dissolved	7440-09-7	E421/WT	0.050	mg/L	0.679 ^{DLHC}	0.859	0.807	0.822	0.822	----
Rubidium, dissolved	7440-17-7	E421/WT	0.00020	mg/L	<0.00200 ^{DLHC}	0.00139	0.00140	0.00152	0.00152	----
Selenium, dissolved	7782-49-2	E421/WT	0.000050	mg/L	<0.000500 ^{DLHC}	0.000092	0.000062	0.000068	0.000068	----
Silicon (as SiO ₂), dissolved	7440-21-3	EC421.SiO ₂ /WT	0.15	mg/L	12.3	9.09	8.60	8.53	8.53	----
Silicon, dissolved	7440-21-3	E421/WT	0.050	mg/L	5.75 ^{DLHC}	4.25	4.02	3.99	3.99	----
Silver, dissolved	7440-22-4	E421/WT	0.000010	mg/L	<0.000100 ^{DLHC}	<0.000010	0.000041	0.000048	0.000048	----
Sodium, dissolved	7440-23-5	E421/WT	0.050	mg/L	4.81 ^{DLHC}	4.24	4.23	4.21	4.21	----
Strontium, dissolved	7440-24-6	E421/WT	0.00020	mg/L	0.0259 ^{DLHC}	0.0452	0.0253	0.0257	0.0257	----
Sulfur, dissolved	7704-34-9	E421/WT	0.50	mg/L	<5.00 ^{DLHC}	1.26	1.23	1.26	1.26	----
Tellurium, dissolved	13494-80-9	E421/WT	0.00020	mg/L	<0.00200 ^{DLHC}	<0.00020	<0.00020	<0.00020	<0.00020	----
Thallium, dissolved	7440-28-0	E421/WT	0.000010	mg/L	<0.000100 ^{DLHC}	<0.000010	<0.000010	<0.000010	<0.000010	----
Thorium, dissolved	7440-29-1	E421/WT	0.00010	mg/L	<0.00100 ^{DLHC}	<0.00010	<0.00010	<0.00010	<0.00010	----



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Dissolved Metals										
Tin, dissolved	7440-31-5	E421/WT	0.00010	mg/L	<0.00100 ^{DLHC}	<0.00010	<0.00010	<0.00010	----	
Titanium, dissolved	7440-32-6	E421/WT	0.00030	mg/L	<0.00300 ^{DLHC}	<0.00030	<0.00030	<0.00030	----	
Tungsten, dissolved	7440-33-7	E421/WT	0.00010	mg/L	0.197 ^{DLHC}	0.00280	0.00367	0.00372	----	
Uranium, dissolved	7440-61-1	E421/WT	0.000010	mg/L	<0.000100 ^{DLHC}	0.000150	0.000064	0.000067	----	
Vanadium, dissolved	7440-62-2	E421/WT	0.00050	mg/L	<0.00500 ^{DLHC}	<0.00050	<0.00050	<0.00050	----	
Zinc, dissolved	7440-66-6	E421/WT	0.0010	mg/L	<0.0100 ^{DLHC}	0.0026	0.0043	0.0022	----	
Zirconium, dissolved	7440-67-7	E421/WT	0.00020	mg/L	<0.00200 ^{DLHC}	<0.00020	<0.00020	<0.00020	----	
Dissolved mercury filtration location	----	EP509/WT	-	-	Field	Field	Field	Field	----	
Dissolved metals filtration location	----	EP421/WT	-	-	Field	Field	Field	Field	----	
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	----	
>C16-C21 fraction of mTPH	n/a	EC581D/WT	1	%	----	<1	<1	<1	----	
>C21-C32 fraction of mTPH	n/a	EC581D/WT	1	%	----	<1	<1	<1	----	
Hydrocarbons										
Benzene	71-43-2	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050 ^{VOCH_S}	----	
Toluene	108-88-3	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050 ^{VOCH_S}	----	
Ethylbenzene	100-41-4	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050 ^{VOCH_S}	----	
Xylenes, total	1330-20-7	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050	----	
Xylene, o-	95-47-6	E611A/WT	0.00030	mg/L	----	<0.00030	<0.00030	<0.00030 ^{VOCH_S}	----	
Xylene, m+p-	179601-23-1	E611A/WT	0.00040	mg/L	----	<0.00040	<0.00040	<0.00040 ^{VOCH_S}	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Hydrocarbons										
VPH C6-C10	n/a	E581.VPH/WT	0.025	mg/L	----	<0.025	<0.025	<0.025 ^{VOCH_s}	----	
VPH C6-C10 (less BTEX)	n/a	EC580C/WT	0.025	mg/L	----	<0.025	<0.025	<0.025	----	
EPH >C10-C16	n/a	E601F/WT	0.050	mg/L	----	<0.100 ^{RRR}	<0.125 ^{RRR}	<0.050	----	
EPH >C16-C21	n/a	E601F/WT	0.050	mg/L	----	<0.100 ^{RRR}	<0.125 ^{RRR}	<0.050	----	
EPH >C21-C32	n/a	E601F/WT	0.050	mg/L	----	<0.050	<0.050	<0.050	----	
EPH >C34-C50	n/a	E601F/WT	0.10	mg/L	----	<0.10	<0.10	<0.10	----	
hydrocarbon resemblance	n/a	E601F/WT	-	none	----	N/A	N/A	N/A	----	
mTPH (Tier I)	n/a	EC581D/WT	0.090	mg/L	----	<0.150	<0.184	<0.090	----	
return to baseline at C32	n/a	E601F/WT	-	-	----	Yes	Yes	Yes	----	
TEH >C10-C32	n/a	E601F/WT	0.100	mg/L	----	<0.150 ^{RRR}	<0.184 ^{RRR}	<0.100	----	
Hydrocarbons Surrogates										
dotriacontane, n- (EPH)	n/a	E601F/WT	1.0	%	----	67.0	61.4	71.7	----	
isobutylbenzene (EPH)	538-93-2	E601F/WT	1.0	%	----	47.9 ^{RRR}	35.8 ^{RRR}	54.2 ^{SUR-ND}	----	
isobutylbenzene (VPH)	538-93-2	E581.VPH/WT	1.0	%	----	97.9	105	96.5	----	
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/WT	1.0	%	----	102	106	102	----	
Difluorobenzene, 1,4-	540-36-3	E611A/WT	1.0	%	----	94.9	94.0	94.5	----	
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Acenaphthylene	208-96-8	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Acridine	260-94-6	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Polycyclic Aromatic Hydrocarbons										
Anthracene	120-12-7	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Benz(a)anthracene	56-55-3	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Benzo(a)pyrene	50-32-8	E641A-L/WT	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	----	
Benzo(b+j)fluoranthene	n/a	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Benzo(b+j+k)fluoranthene	n/a	E641A-L/WT	0.015	µg/L	<0.015	<0.015	<0.015	<0.015	----	
Benzo(g,h,i)perylene	191-24-2	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Benzo(k)fluoranthene	207-08-9	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Chrysene	218-01-9	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Dibenz(a,h)anthracene	53-70-3	E641A-L/WT	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	----	
Fluoranthene	206-44-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Fluorene	86-73-7	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Methylnaphthalene, 1-	90-12-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Methylnaphthalene, 1+2-	----	E641A-L/WT	0.015	µg/L	<0.015	<0.015	<0.015	<0.015	----	
Methylnaphthalene, 2-	91-57-6	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Naphthalene	91-20-3	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Perylene	198-55-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Phenanthrene	85-01-8	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Pyrene	129-00-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Quinoline	91-22-5	E641A-L/WT	0.010	µg/L	<0.010	<0.020 ^{DLM}	<0.010	<0.033 ^{RRR}	----	
B(a)P total potency equivalents [B(a)P TPE]	----	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit						
					HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004		----
					Result	Result	Result	Result		----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A-L/WT	0.1	%	97.5	98.0	106	98.8		----
Naphthalene-d8	1146-65-2	E641A-L/WT	0.1	%	85.7	83.2	90.8	119		----
Phenanthrene-d10	1517-22-2	E641A-L/WT	0.1	%	106	106	113	123		----

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

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	24SS1	24SS2	24SS3	24SS4	24SS5
					Client sampling date / time	23-Sep-2024 10:21	23-Sep-2024 11:24	23-Sep-2024 14:41	23-Sep-2024 13:28	23-Sep-2024 11:55
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit						
					HA2402324-005	HA2402324-006	HA2402324-007	HA2402324-008	HA2402324-009	
					Result	Result	Result	Result	Result	
Sample Data										
Dummy analyte	----	HOLD/HA	-	-	----	----	----	----		NR
Metals										
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	824	30.5	330	150		----

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

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	24SS6	24SS7	24SS8	24SS9	24SS10
					Client sampling date / time	23-Sep-2024 14:12	23-Sep-2024 13:39	23-Sep-2024 12:28	23-Sep-2024 14:00	23-Sep-2024 13:48
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit						
					HA2402324-010	HA2402324-011	HA2402324-012	HA2402324-013	HA2402324-014	
					Result	Result	Result	Result	Result	
Sample Data										
Dummy analyte	----	HOLD/HA	-	-	NR	NR	NR	NR		NR

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



Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

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

					Client sample ID		DUPA	DUPB	----	----	----
					Client sampling date / time		23-Sep-2024 10:21	23-Sep-2024 13:48	----	----	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-015	HA2402324-016	----	----	----	----	----
					Result	Result	----	----	----	----	----
Sample Data											
Dummy analyte	----	HOLD/HA	-	-	----	NR	----	----	----	----	----
Metals											
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	113	----	----	----	----	----	----

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

Please refer to the Accreditation section for an explanation of analyte accreditations.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : HA2402324</p> <p>Client : Dillon Consulting Limited</p> <p>Contact : Asia Reid</p> <p>Address : 137 Chain Lake Drive Halifax NS Canada B3S 1B3</p> <p>Telephone : 902.450.5015 ext. 5045</p> <p>Project : 236446</p> <p>PO : ----</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : Build NS (Mill Village)</p> <p>Quote number : HA23-DICL100-11 - Build NS (Mill Village)</p> <p>No. of samples received : 16</p> <p>No. of samples analysed : 16</p>	<p>Page : 1 of 21</p> <p>Laboratory : ALS Environmental - Halifax</p> <p>Account Manager : Andrew Martin</p> <p>Address : 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2</p> <p>Telephone : +1 902 707 4888</p> <p>Date Samples Received : 25-Sep-2024 16:05</p> <p>Issue Date : 03-Oct-2024 10:17</p>
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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 Laboratory Control Sample (LCS) outliers occur
- 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.
- Test sample Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

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	Anonymous	Anonymous	Arsenic	7440-38-2	E440	44.8 % 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.

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Polycyclic Aromatic Hydrocarbons	QC-MRG3-1680705 001	----	Quinoline	91-22-5	E641A-L	0.034 ^B µg/L	0.01 µg/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.

Regular Sample Surrogates

Sub-Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Result	Limits	Comment
Samples Submitted							
Hydrocarbons Surrogates	HA2402324-002	MW23-2	isobutylbenzene (EPH)	538-93-2	47.9 %	60.0-140 %	Recovery less than lower data quality objective
Hydrocarbons Surrogates	HA2402324-003	MW23-3	isobutylbenzene (EPH)	538-93-2	35.8 %	60.0-140 %	Recovery less than lower data quality objective
Hydrocarbons Surrogates	HA2402324-004	DUP A	isobutylbenzene (EPH)	538-93-2	54.2 %	60.0-140 %	Recovery less than lower data quality objective



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 : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 24SS1	E440	23-Sep-2024	01-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 24SS2	E440	23-Sep-2024	01-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 24SS3	E440	23-Sep-2024	02-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 24SS4	E440	23-Sep-2024	02-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap DUPA	E440	23-Sep-2024	02-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS10	HOLD	23-Sep-2024	---	---	---		03-Oct-2024	---	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS5	HOLD	23-Sep-2024	---	---	---		03-Oct-2024	---	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	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS6	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS7	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS8	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS9	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap DUPB	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	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) DUP A	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW23-1	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW23-2	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 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) MW23-3	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE DUP A	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW23-1	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW23-2	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW23-3	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE DUP A	E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✔	26-Sep-2024	3 days	3 days	✔
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE MW23-1	E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✔	26-Sep-2024	3 days	3 days	✔
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE MW23-2	E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✔	26-Sep-2024	3 days	3 days	✔
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE MW23-3	E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✔	26-Sep-2024	3 days	3 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 DUP A	E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW23-1	E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW23-2	E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW23-3	E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE DUP A	E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	* EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE MW23-1	E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	* EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE MW23-2	E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	* EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE MW23-3	E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	* EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE DUP A	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 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 MW23-1	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC											
HDPE MW23-2	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC											
HDPE MW23-3	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Sulfate in Water by IC											
HDPE DUP A	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE MW23-1	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE MW23-2	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE MW23-3	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) DUP A	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) MW23-1	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-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	
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW23-2	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW23-3	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) DUP A	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW23-1	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW23-2	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW23-3	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓
Hydrocarbons : EPH in Water by GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) DUP A	E601F	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	01-Oct-2024	40 days	5 days	✓
Hydrocarbons : EPH in Water by GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-2	E601F	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	01-Oct-2024	40 days	5 days	✓
Hydrocarbons : EPH in Water by GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-3	E601F	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	01-Oct-2024	40 days	5 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	
Hydrocarbons : VPH by Headspace GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) DUP A	E581.VPH	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 days	✓
Hydrocarbons : VPH by Headspace GC-FID (RBCA)										
Glass vial (sodium bisulfate) MW23-2	E581.VPH	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 days	✓
Hydrocarbons : VPH by Headspace GC-FID (RBCA)										
Glass vial (sodium bisulfate) MW23-3	E581.VPH	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) DUP A	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW23-3	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW23-1	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	28-Sep-2024	28 days	5 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW23-2	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	28-Sep-2024	28 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE DUP A	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW23-1	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 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 MW23-2	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE MW23-3	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓	
Physical Tests : Colour (Apparent) by Spectrometer											
HDPE MW23-1	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	96 hrs	* EHTR	
Physical Tests : Colour (Apparent) by Spectrometer											
HDPE DUP A	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	97 hrs	* EHTR	
Physical Tests : Colour (Apparent) by Spectrometer											
HDPE MW23-2	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	97 hrs	* EHTR	
Physical Tests : Colour (Apparent) by Spectrometer											
HDPE MW23-3	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	97 hrs	* EHTR	
Physical Tests : Conductivity in Water											
HDPE DUP A	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE MW23-1	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE MW23-2	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 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 MW23-3	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 days	✓	
Physical Tests : pH by Meter											
HDPE MW23-1	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	72 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE MW23-2	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	73 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE DUP A	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	75 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE MW23-3	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	75 hrs	* EHTR-FM	
Physical Tests : TDS by Gravimetry											
HDPE DUP A	E162	23-Sep-2024	---	---	---		30-Sep-2024	7 days	7 days	✓	
Physical Tests : TDS by Gravimetry											
HDPE MW23-1	E162	23-Sep-2024	---	---	---		30-Sep-2024	7 days	7 days	✓	
Physical Tests : TDS by Gravimetry											
HDPE MW23-2	E162	23-Sep-2024	---	---	---		30-Sep-2024	7 days	7 days	✓	
Physical Tests : TDS by Gravimetry											
HDPE MW23-3	E162	23-Sep-2024	---	---	---		30-Sep-2024	7 days	7 days	✓	



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

<i>Analyte Group : Analytical Method</i>		<i>Method</i>	<i>Sampling Date</i>	<i>Extraction / Preparation</i>				<i>Analysis</i>			
<i>Container / Client Sample ID(s)</i>				<i>Preparation Date</i>	<i>Holding Times</i>		<i>Eval</i>	<i>Analysis Date</i>	<i>Holding Times</i>		<i>Eval</i>
					<i>Rec</i>	<i>Actual</i>			<i>Rec</i>	<i>Actual</i>	
Physical Tests : Turbidity by Nephelometry											
HDPE DUP A		E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Physical Tests : Turbidity by Nephelometry											
HDPE MW23-1		E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Physical Tests : Turbidity by Nephelometry											
HDPE MW23-2		E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Physical Tests : Turbidity by Nephelometry											
HDPE MW23-3		E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)											
Amber glass/Teflon lined cap (sodium bisulfate) MW23-1		E641A-L	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	30-Sep-2024	40 days	3 days	✔
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)											
Amber glass/Teflon lined cap (sodium bisulfate) MW23-2		E641A-L	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	30-Sep-2024	40 days	3 days	✔
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)											
Amber glass/Teflon lined cap (sodium bisulfate) MW23-3		E641A-L	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	30-Sep-2024	40 days	3 days	✔
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)											
Amber glass/Teflon lined cap (sodium bisulfate) DUP A		E641A-L	23-Sep-2024	30-Sep-2024	14 days	7 days	✔	01-Oct-2024	40 days	1 days	✔
Volatile Organic Compounds : BTEX by Headspace GC-MS											
Amber glass/Teflon lined cap (sodium bisulfate) DUP A		E611A	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	27-Sep-2024	14 days	4 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	
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW23-2	E611A	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW23-3	E611A	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 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	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Metals in Soil/Solid by CRC ICPMS	E440	1676573	2	8	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Metals in Soil/Solid by CRC ICPMS	E440	1676573	4	8	50.0	10.0	✓
Method Blanks (MB)							
Metals in Soil/Solid by CRC ICPMS	E440	1676573	2	8	25.0	5.0	✓

Matrix: **Water**

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)							
Alkalinity Species by Titration	E290	1673965	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	1677011	1	20	5.0	5.0	✓
Conductivity in Water	E100	1673964	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✓
pH by Meter	E108	1673963	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	1680696	1	19	5.2	5.2	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✓
Turbidity by Nephelometry	E121	1673870	1	20	5.0	5.0	✓
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1673965	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	1677011	1	20	5.0	5.0	✓
Conductivity in Water	E100	1673964	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✓



Matrix: **Water** 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 Control Samples (LCS) - Continued							
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✔
EPH in Water by GC-FID (RBCA)	E601F	1673907	1	7	14.2	5.0	✔
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✔
PAHs in Water by Hexane LVI GC-MS (Low Level)	E641A-L	1676593	2	4	50.0	5.0	✔
pH by Meter	E108	1673963	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1680696	1	19	5.2	5.2	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✔
Turbidity by Nephelometry	E121	1673870	1	20	5.0	5.0	✔
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1673965	1	20	5.0	5.0	✔
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✔
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1677011	1	20	5.0	5.0	✔
Conductivity in Water	E100	1673964	1	20	5.0	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✔
EPH in Water by GC-FID (RBCA)	E601F	1673907	1	7	14.2	5.0	✔
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✔
PAHs in Water by Hexane LVI GC-MS (Low Level)	E641A-L	1676593	2	4	50.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1680696	1	19	5.2	5.2	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✔
Turbidity by Nephelometry	E121	1673870	1	20	5.0	5.0	✔
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✔
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✔



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

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
Matrix Spikes (MS) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✔
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✔
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	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
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.
Sample Hold Fee for Soil/Solid	HOLD ALS Environmental - Halifax	Soil/Solid		Fee for storing sample to meet sample integrity requirements and holding times.
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 - Waterloo	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.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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 inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. 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.
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Waterloo	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury in Water by CVAAS	E509 ALS Environmental - Waterloo	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
VPH by Headspace GC-FID (RBCA)	E581.VPH ALS Environmental - Waterloo	Water	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 Water by GC-FID (RBCA)	E601F ALS Environmental - Waterloo	Water	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	Water	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 Water by Hexane LVI GC-MS (Low Level)	E641A-L ALS Environmental - Waterloo	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Waterloo	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. 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-D)	EC105 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. If available, Field pH measurements are recommended for best accuracy (test code EC104).
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).
Dissolved Silicon as Silica (Calculation)	EC421.SiO2 ALS Environmental - Waterloo	Water	N/A	Dissolved Silicon (as SiO ₂) is a calculated parameter. Dissolved Silicon (as SiO ₂ mg/L) = 2.139 x Dissolved Silicon (mg/L).



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VPH C6-C10 (less BTEX) [RBCA]	EC580C ALS Environmental - Waterloo	Water	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	Water	Atlantic RBCA Version 3.1	Modified TPH (PIRI), Tier I is the sum of PIRI Fraction (C6 - C10 - BTEX) + (>C10 - C16) + (>C16 - C21) + (>C21 - C32).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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
Dissolved Metals Water Filtration	EP421 ALS Environmental - Waterloo	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO ₃ .
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Waterloo	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Waterloo	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into a GC-MS-FID.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.
PHCs Hexane Extraction (RBCA)	EP601F ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

<p>Work Order : HA2402324</p> <p>Client : Dillon Consulting Limited</p> <p>Contact : Asia Reid</p> <p>Address : 137 Chain Lake Drive Halifax NS Canada B3S 1B3</p> <p>Telephone : 902.450.5015 ext. 5045</p> <p>Project : 236446</p> <p>PO : ----</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : Build NS (Mill Village)</p> <p>Quote number : HA23-DICL100-11 - Build NS (Mill Village)</p> <p>No. of samples received : 16</p> <p>No. of samples analysed : 16</p>	<p>Page : 1 of 18</p> <p>Laboratory : ALS Environmental - Halifax</p> <p>Account Manager : Andrew Martin</p> <p>Address : 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2</p> <p>Telephone : +1 902 707 4888</p> <p>Date Samples Received : 25-Sep-2024 16:05</p> <p>Date Analysis Commenced : 26-Sep-2024</p> <p>Issue Date : 03-Oct-2024 10:16</p>
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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>
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Jeremy Gingras	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Waterloo Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Halifax Administration, Dartmouth, Nova Scotia
Jon Fisher	Production Manager, Environmental	Halifax Inorganics, Dartmouth, Nova Scotia
Jon Fisher	Production Manager, Environmental	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Waterloo Metals, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo VOC, 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: 1676573)											
HA2402306-001	Anonymous	Arsenic	7440-38-2	E440	0.10	mg/kg	7.68	12.1	44.8%	30%	DUP-H
Metals (QC Lot: 1677133)											
HA2402324-007	24SS3	Arsenic	7440-38-2	E440	0.10	mg/kg	330	312	5.46%	30%	----

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: 1673870)											
HA2402293-003	Anonymous	Turbidity	----	E121	0.10	NTU	1.69	1.77	4.63%	15%	----
Physical Tests (QC Lot: 1673963)											
HA2402324-002	MW23-2	pH	----	E108	0.10	pH units	6.64	6.63	0.151%	4%	----
Physical Tests (QC Lot: 1673964)											
HA2402324-002	MW23-2	Conductivity	----	E100	1.0	µS/cm	99.9	101	0.798%	10%	----
Physical Tests (QC Lot: 1673965)											
HA2402324-002	MW23-2	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	36.6	37.1	1.47%	20%	----
Physical Tests (QC Lot: 1677011)											
HA2402049-001	Anonymous	Colour, apparent	----	E330	20.0	CU	1200	1230	2.41%	20%	----
Physical Tests (QC Lot: 1680696)											
HA2402323-001	Anonymous	Solids, total dissolved [TDS]	----	E162	10	mg/L	17	21	4	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1673958)											
HA2402324-001	MW23-1	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.027	0.025	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1673959)											
HA2402324-001	MW23-1	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: 1673960)											
HA2402324-001	MW23-1	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: 1673961)											
HA2402324-001	MW23-1	Chloride	16887-00-6	E235.Cl	0.50	mg/L	6.11	5.87	3.98%	20%	----
Anions and Nutrients (QC Lot: 1673962)											
HA2402324-001	MW23-1	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.08	1.83	0.25	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1673966)											
HA2402324-001	MW23-1	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0021	0.0019	0.0002	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
Anions and Nutrients (QC Lot: 1675226)											
HA2402293-005	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1675369)											
HA2402324-003	MW23-3	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0059	0.0061	0.0002	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1675224)											
HA2402293-004	Anonymous	Carbon, total organic [TOC]	----	E355-L	2.50	mg/L	22.7	22.2	0.48	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1675370)											
HA2402324-004	DUP A	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	0.70	0.20	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1673995)											
HA2402324-001	MW23-1	Aluminum, dissolved	7429-90-5	E421	0.0100	mg/L	<0.0100	0.0158	0.0058	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00100	mg/L	0.00132	0.00130	0.00002	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00100	mg/L	0.00222	0.00224	0.00002	Diff <2x LOR	----
		Beryllium, dissolved	7440-41-7	E421	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.500	mg/L	2.61	2.56	0.053	Diff <2x LOR	----
		Cesium, dissolved	7440-46-2	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00100	mg/L	0.00470	0.00478	0.00008	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00200	mg/L	0.0101	0.0107	0.00058	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0500	mg/L	0.720	0.730	1.24%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00100	mg/L	0.127	0.126	0.723%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00500	mg/L	0.00756	0.00739	0.00017	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.500	mg/L	0.679	0.654	0.025	Diff <2x LOR	----
		Rubidium, dissolved	7440-17-7	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.500	mg/L	5.75	5.83	1.38%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000100	mg/L	<0.000100	<0.000100	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
Dissolved Metals (QC Lot: 1673995) - continued											
HA2402324-001	MW23-1	Sodium, dissolved	7440-23-5	E421	0.500	mg/L	4.81	4.82	0.010	Diff <2x LOR	----
		Strontium, dissolved	7440-24-6	E421	0.00200	mg/L	0.0259	0.0262	0.946%	20%	----
		Sulfur, dissolved	7704-34-9	E421	5.00	mg/L	<5.00	<5.00	0	Diff <2x LOR	----
		Tellurium, dissolved	13494-80-9	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00300	mg/L	<0.00300	<0.00300	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00100	mg/L	0.197	0.200	1.46%	20%	----
		Uranium, dissolved	7440-61-1	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1676636)											
HA2402324-001	MW23-1	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1677839)											
HA2402307-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.00040 mg/L	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.00030 mg/L	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1677838)											
HA2402307-001	Anonymous	VPH C6-C10	n/a	E581.VPH	25	µg/L	<0.025 mg/L	<25	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: 1676573)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	---
Metals (QCLot: 1677133)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	---

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1673870)						
Turbidity	---	E121	0.1	NTU	<0.10	---
Physical Tests (QCLot: 1673964)						
Conductivity	---	E100	1	µS/cm	1.1	---
Physical Tests (QCLot: 1673965)						
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	1.5	---
Physical Tests (QCLot: 1677011)						
Colour, apparent	---	E330	2	CU	<2.0	---
Physical Tests (QCLot: 1680696)						
Solids, total dissolved [TDS]	---	E162	10	mg/L	<10	---
Anions and Nutrients (QCLot: 1673958)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
Anions and Nutrients (QCLot: 1673959)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	---
Anions and Nutrients (QCLot: 1673960)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	---
Anions and Nutrients (QCLot: 1673961)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	---
Anions and Nutrients (QCLot: 1673962)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
Anions and Nutrients (QCLot: 1673966)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	---
Anions and Nutrients (QCLot: 1675226)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	---
Anions and Nutrients (QCLot: 1675369)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1675224)						
Carbon, total organic [TOC]	---	E355-L	0.5	mg/L	<0.50	---
Organic / Inorganic Carbon (QCLot: 1675370)						
Carbon, total organic [TOC]	---	E355-L	0.5	mg/L	<0.50	---
Dissolved Metals (QCLot: 1673995)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	---
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	---
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	---
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	---
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	---
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	---
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	---
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	---
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	---
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	---
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	---
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	---
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	---
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	---
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	---
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	---
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	---
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	---
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	---
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	---
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	---
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	---
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	---
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	---
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	---
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	---
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	---
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	---
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	---
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	---
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1673995) - continued						
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1676636)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Volatile Organic Compounds (QCLot: 1677839)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1673907)						
EPH >C10-C16	n/a	E601F	50	µg/L	<50	----
EPH >C16-C21	n/a	E601F	50	µg/L	<50	----
EPH >C21-C32	n/a	E601F	50	µg/L	<50	----
EPH >C34-C50	n/a	E601F	100	µg/L	<100	----
Hydrocarbons (QCLot: 1677838)						
VPH C6-C10	n/a	E581.VPH	25	µg/L	<25	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593)						
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A-L	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	<0.0050	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593) - continued						
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	<0.010	----
Perylene	198-55-0	E641A-L	0.01	µg/L	<0.010	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	<0.010	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	<0.010	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705)						
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A-L	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	<0.010	----
Perylene	198-55-0	E641A-L	0.01	µg/L	<0.010	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	<0.010	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	# 0.034	B



Qualifiers

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



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: 1676573)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Metals (QCLot: 1677133)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	107	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
Physical Tests (QCLot: 1673870)									
Turbidity	----	E121	0.1	NTU	200 NTU	96.0	85.0	115	----
Physical Tests (QCLot: 1673963)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 1673964)									
Conductivity	----	E100	1	µS/cm	1410 µS/cm	104	90.0	110	----
Physical Tests (QCLot: 1673965)									
Alkalinity, total (as CaCO ₃)	----	E290	1	mg/L	150 mg/L	101	85.0	115	----
Physical Tests (QCLot: 1677011)									
Colour, apparent	----	E330	2	CU	25 CU	99.7	70.0	130	----
Physical Tests (QCLot: 1680696)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	88.3	85.0	115	----
Anions and Nutrients (QCLot: 1673958)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	108	90.0	110	----
Anions and Nutrients (QCLot: 1673959)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	99.6	90.0	110	----
Anions and Nutrients (QCLot: 1673960)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 1673961)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 1673962)									
Sulfate (as SO ₄)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1673966)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	98.8	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
Anions and Nutrients (QCLot: 1675226)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.7	85.0	115	----
Anions and Nutrients (QCLot: 1675369)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	96.0	85.0	115	----
Organic / Inorganic Carbon (QCLot: 1675224)									
Carbon, total organic [TOC]	---	E355-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1675370)									
Carbon, total organic [TOC]	---	E355-L	0.5	mg/L	8.57 mg/L	102	80.0	120	----
Dissolved Metals (QCLot: 1673995)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	0.1 mg/L	93.2	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	0.05 mg/L	100.0	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	0.05 mg/L	101	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.012 mg/L	104	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.005 mg/L	98.6	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	0.05 mg/L	96.2	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	0.05 mg/L	97.6	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.005 mg/L	98.7	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	2.5 mg/L	97.6	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.002 mg/L	102	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.012 mg/L	93.7	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.012 mg/L	93.5	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.012 mg/L	92.5	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	0.05 mg/L	93.8	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.025 mg/L	97.6	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.012 mg/L	95.6	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	2.5 mg/L	98.0	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.012 mg/L	95.1	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.012 mg/L	98.3	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.025 mg/L	92.3	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	0.5 mg/L	98.5	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	2.5 mg/L	96.1	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.005 mg/L	97.7	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	0.05 mg/L	97.7	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	0.5 mg/L	103	60.0	140	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.005 mg/L	93.6	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
Dissolved Metals (QCLot: 1673995) - continued									
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	2.5 mg/L	94.4	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.012 mg/L	99.0	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	2.5 mg/L	101	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.005 mg/L	96.2	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	0.05 mg/L	97.6	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.005 mg/L	97.0	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.025 mg/L	101	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.012 mg/L	94.4	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.005 mg/L	103	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0 mg/L	101	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.025 mg/L	96.4	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.025 mg/L	93.7	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.005 mg/L	98.0	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	90.6	80.0	120	----
Volatile Organic Compounds (QCLot: 1677839)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	98.9	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	93.3	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	94.1	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	94.7	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	95.5	70.0	130	----
Hydrocarbons (QCLot: 1673907)									
EPH >C10-C16	n/a	E601F	50	µg/L	3620 µg/L	83.9	70.0	130	----
EPH >C16-C21	n/a	E601F	50	µg/L	3100 µg/L	92.4	70.0	130	----
EPH >C21-C32	n/a	E601F	50	µg/L	2800 µg/L	88.0	70.0	130	----
EPH >C34-C50	n/a	E601F	100	µg/L	3720 µg/L	87.4	70.0	130	----
Hydrocarbons (QCLot: 1677838)									
VPH C6-C10	n/a	E581.VPH	25	µg/L	2000 µg/L	95.6	80.0	120	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593)									
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	0.526 µg/L	100	50.0	140	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	0.526 µg/L	95.6	50.0	140	----
Acridine	260-94-6	E641A-L	0.01	µg/L	0.526 µg/L	99.8	50.0	140	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	0.526 µg/L	95.9	50.0	140	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	0.526 µg/L	116	50.0	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
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593) - continued									
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	0.526 µg/L	101	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	0.526 µg/L	110	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	0.526 µg/L	104	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	0.526 µg/L	108	50.0	140	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	0.526 µg/L	116	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	0.526 µg/L	115	50.0	140	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	0.526 µg/L	118	50.0	140	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	0.526 µg/L	108	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	0.526 µg/L	115	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	0.526 µg/L	97.6	50.0	140	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	0.526 µg/L	97.7	50.0	140	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	0.526 µg/L	86.5	50.0	140	----
Perylene	198-55-0	E641A-L	0.01	µg/L	0.526 µg/L	105	50.0	140	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	0.526 µg/L	112	50.0	140	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	0.526 µg/L	109	50.0	140	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	0.526 µg/L	108	50.0	140	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705)									
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	0.526 µg/L	115	50.0	140	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	0.526 µg/L	110	50.0	140	----
Acridine	260-94-6	E641A-L	0.01	µg/L	0.526 µg/L	88.2	50.0	140	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	0.526 µg/L	111	50.0	140	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	0.526 µg/L	106	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	0.526 µg/L	113	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	0.526 µg/L	113	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	0.526 µg/L	132	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	0.526 µg/L	116	50.0	140	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	0.526 µg/L	112	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	0.526 µg/L	116	50.0	140	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	0.526 µg/L	127	50.0	140	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	0.526 µg/L	117	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	0.526 µg/L	134	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	0.526 µg/L	112	50.0	140	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	0.526 µg/L	117	50.0	140	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	0.526 µg/L	114	50.0	140	----
Perylene	198-55-0	E641A-L	0.01	µg/L	0.526 µg/L	122	50.0	140	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	0.526 µg/L	126	50.0	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
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705) - continued									
Pyrene	129-00-0	E641A-L	0.01	µg/L	0.526 µg/L	126	50.0	140	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	0.526 µg/L	117	50.0	140	----



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: **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: 1673958)										
HA2402324-001	MW23-1	Fluoride	16984-48-8	E235.F	0.984 mg/L	1 mg/L	98.4	75.0	125	----
Anions and Nutrients (QCLot: 1673959)										
HA2402324-001	MW23-1	Nitrate (as N)	14797-55-8	E235.NO3	2.45 mg/L	2.5 mg/L	98.0	75.0	125	----
Anions and Nutrients (QCLot: 1673960)										
HA2402324-001	MW23-1	Nitrite (as N)	14797-65-0	E235.NO2	0.493 mg/L	0.5 mg/L	98.6	75.0	125	----
Anions and Nutrients (QCLot: 1673961)										
HA2402324-001	MW23-1	Chloride	16887-00-6	E235.Cl	97.8 mg/L	100 mg/L	97.8	75.0	125	----
Anions and Nutrients (QCLot: 1673962)										
HA2402324-001	MW23-1	Sulfate (as SO4)	14808-79-8	E235.SO4	99.5 mg/L	100 mg/L	99.5	75.0	125	----
Anions and Nutrients (QCLot: 1673966)										
HA2402324-001	MW23-1	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0203 mg/L	0.02 mg/L	104	70.0	130	----
Anions and Nutrients (QCLot: 1675226)										
HA2402293-005	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.102 mg/L	0.1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1675369)										
HA2402324-003	MW23-3	Ammonia, total (as N)	7664-41-7	E298	0.101 mg/L	0.1 mg/L	101	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1675224)										
HA2402293-004	Anonymous	Carbon, total organic [TOC]	----	E355-L	ND mg/L	----	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1675370)										
HA2402324-004	DUP A	Carbon, total organic [TOC]	----	E355-L	5.65 mg/L	5 mg/L	113	70.0	130	----
Dissolved Metals (QCLot: 1673995)										
HA2402324-002	MW23-2	Aluminum, dissolved	7429-90-5	E421	0.0932 mg/L	0.1 mg/L	93.2	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0517 mg/L	0.05 mg/L	103	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0540 mg/L	0.05 mg/L	108	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0130 mg/L	0.012 mg/L	104	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.00522 mg/L	0.005 mg/L	104	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0467 mg/L	0.05 mg/L	93.4	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.050 mg/L	0.05 mg/L	100	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00528 mg/L	0.005 mg/L	106	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00260 mg/L	0.002 mg/L	104	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0120 mg/L	0.012 mg/L	95.7	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0118 mg/L	0.012 mg/L	94.4	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0117 mg/L	0.012 mg/L	94.0	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
Dissolved Metals (QCLot: 1673995) - continued										
HA2402324-002	MW23-2	Iron, dissolved	7439-89-6	E421	0.047 mg/L	0.05 mg/L	93.6	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0253 mg/L	0.025 mg/L	101	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0125 mg/L	0.012 mg/L	99.9	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	2.43 mg/L	2.5 mg/L	97.2	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0118 mg/L	0.012 mg/L	94.3	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0126 mg/L	0.012 mg/L	101	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0233 mg/L	0.025 mg/L	93.2	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	0.545 mg/L	0.5 mg/L	109	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	2.39 mg/L	2.5 mg/L	95.6	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.00500 mg/L	0.005 mg/L	100	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0573 mg/L	0.05 mg/L	115	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	ND mg/L	----	ND	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00482 mg/L	0.005 mg/L	96.3	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	2.64 mg/L	2.5 mg/L	106	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.00536 mg/L	0.005 mg/L	107	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.0504 mg/L	0.05 mg/L	101	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.00488 mg/L	0.005 mg/L	97.5	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0257 mg/L	0.025 mg/L	103	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0120 mg/L	0.012 mg/L	96.1	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.00518 mg/L	0.005 mg/L	104	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.000258 mg/L	0 mg/L	103	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0248 mg/L	0.025 mg/L	99.2	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.0261 mg/L	0.025 mg/L	104	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.00496 mg/L	0.005 mg/L	99.2	70.0	130	----
Dissolved Metals (QCLot: 1676636)										
HA2402324-002	MW23-2	Mercury, dissolved	7439-97-6	E509	0.0000840 mg/L	0 mg/L	84.0	70.0	130	----
Volatile Organic Compounds (QCLot: 1677839)										
HA2402307-001	Anonymous	Benzene	71-43-2	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Ethylbenzene	100-41-4	E611A	92.2 µg/L	100 µg/L	92.2	60.0	140	----
		Toluene	108-88-3	E611A	93.0 µg/L	100 µg/L	93.0	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	189 µg/L	200 µg/L	94.5	60.0	140	----
		Xylene, o-	95-47-6	E611A	95.6 µg/L	100 µg/L	95.6	60.0	140	----
Hydrocarbons (QCLot: 1677838)										
HA2402307-001	Anonymous	VPH C6-C10	n/a	E581.VPH	2480 µg/L	2000 µg/L	124	60.0	140	----



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:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 1676573)									
QC-1676573-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	97.2	70.0	130	----
Metals (QCLot: 1677133)									
QC-1677133-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	106	70.0	130	----



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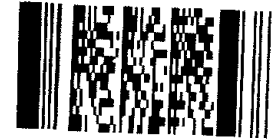
Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

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Canada Toll Free: 1 800 668 9878

Environmental Division
Halifax
Work Order Reference
HA2402324



Telephone : +1 902 707 4888

Report To, Reports / Recipients, Turnaround Time (TAT) Requested, Invoice To, Invoice Recipients, Project Information, Oil and Gas Required Fields (client use)

ALS Lab Work Order # (ALS use only): HA2402324, ALS Contact: Andrew Martin, Sampler:

Table with columns: ALS Sample # (ALS use only), Sample Identification and/or Coordinates, Date, Time, Sample Type, NUMBER OF CONTAINERS, and various chemical analysis parameters.

Drinking Water (DW) Samples (client use), Notes / Specify Limits for result evaluation by selecting from drop-down below, SAMPLE RECEIPT DETAILS (ALS use only)

SHIPMENT RELEASE (client use), INITIAL SHIPMENT RECEPTION (ALS use only), FINAL SHIPMENT RECEPTION (ALS use only)

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.

GC-849 / MM-142 / OR-803 / N-251 / DW-086 / SOL-419 / 418 / 420



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COC Number: 22 -

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Page of

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 Limited	Select Report Format:	<input checked="" type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)	<input type="checkbox"/> Routine [R] if received by 3pm M-F - no surcharges apply		<input type="checkbox"/> 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum		<input type="checkbox"/> 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum				<input type="checkbox"/> 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum		<input type="checkbox"/> 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum		<input type="checkbox"/> Same day [E2] if received by 10am M-S - 200% rush surcharge.																
Contact:	Asia Reid	Merge QC/QCI Reports with COA	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	Compare Results to Criteria on Report - provide details below if box checked		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:				For all tests with rush TATs requested, please contact your AM to confirm availability.																				
Phone:	902.450.5015 ext. 5045	Select Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX	Email 1 or Fax AReid@dillon.ca		Analysis Request						NUMBER OF CONTAINERS			SAMPLES ON HOLD			EXTENDED STORAGE REQUIRED			SUSPECTED HAZARD (see notes)											
Company address below will appear on the final report		Street: 137 Chain Lake Drive Suite 100		Email 2		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below																										
City/Province:	Halifax / Nova Scotia	Email 3		Invoice Recipients		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						BTEX/TPH (RBCA) in Water			PAHs (RBCA) in Water			Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)		
Postal Code:	B3S 1B3	Select Invoice Distribution:		Select Invoice Distribution:		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)								
Invoice To	Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Email 1 or Fax AReid@dillon.ca		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)								
Company:		Email 2 payables@dillon.ca		Project Information		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)								
Contact:		Oil and Gas Required Fields (client use)		ALS Client Code / QUOTE #: DICL100 / HA23-DICL100-11		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)								
Job / Project #: Build NS - Mill Village		Major/Minor Code:		Routing Code:		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)								
PO / AFE:		Requisitioner:		ALS Lab Work Order # (ALS use only):		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)								
LSD:		Location:		ALS Contact: Andrew Martin		Sampler:		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)						
ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)							
	24559			23/09/24	14:00	Soil	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)							
	245910			↓	13:48	↓	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)							
	DUPA			↓	10:21	↓	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)							
	DUPB			↓	13:48	↓	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below						Gen. Chem. w/ diss. Metals + Hg:			Alk. Anions, NH3, EC, TOC, Color, Turb.			pH, TDS, Metals, Mercury, Hardness			Bulk Metals in Soil (As)			mSCLP Metals in Soil (As)							
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? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO						Cooling Method: <input type="checkbox"/> NONE <input checked="" type="checkbox"/> ICE <input type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input type="checkbox"/> COOLING INITIATED																										
Are samples for human consumption/ use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO						Cooler Custody Seals Intact: YES N/A Sample Custody Seals Intact: YES N/A																										
						INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C																							
		11.8			13			17.8																								
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:	Time:	Received by:	Date:	Time:																					
			Shone	24 Sept 2024	12:41	Cm	Sept 25/24	9:00																								

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	: HA2402324	Laboratory	: ALS Environmental - Waterloo
Amendment	: 1	Account Manager	: Andrew Martin
Client	: Dillon Consulting Limited	Address	: 60 Northland Road, Unit 1
Contact	: Asia Reid		: Waterloo ON Canada N2V 2B8
Address	: 137 Chain Lake Drive	Telephone	: +1 519 886 6910
	: Halifax Nova Scotia Canada B3S 1B3	Date Samples Received	: 25-Sep-2024 16:05
Telephone	: 902.450.5015 ext. 5045	Date Analysis Commenced	: 26-Sep-2024
Project	: 236446	Issue Date	: 21-Oct-2024 12:53
PO	: ----		
C-O-C number	: ----		
Sampler	: ----		
Site	: Build NS (Mill Village)		
Quote number	: HA23-DICL100-11 - Build NS (Mill Village)		
No. of samples received	: 18		
No. of samples analysed	: 18		

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>
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Metals, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Inorganics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Metals, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Dartmouth, Nova Scotia
Jon Fisher	Production Manager, Environmental	Administration, Dartmouth, Nova Scotia
Nik Perkio	Senior Analyst	Metals, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	VOC, 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).

<i>Unit</i>	<i>Description</i>
mg/L	milligrams per litre
none	none
-	no units
pH units	pH units
CU	colour units (1 cu = 1 mg/l pt)
NTU	nephelometric turbidity units
µS/cm	microsiemens per centimetre
µg/L	micrograms per litre
meq/L	milliequivalents per litre
%	percent
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.

Workorder Comments

Amendment (08/10/2024): This report has been amended and re-released to allow the reporting of additional analytical data.



Sample Comments

Sample	Client Id	Comment
HA2402324-002	MW23-2	N/A: Resemblance Not Applicable (mTPH < LOR)
HA2402324-002	MW23-2	RRR: Surrogate recovery is outside ALS DQO. Detection limits for affected compounds have been raised accordingly.
HA2402324-003	MW23-3	N/A: Resemblance Not Applicable (mTPH < LOR)
HA2402324-003	MW23-3	RRR: Surrogate recovery is outside ALS DQO. Detection limits for affected compounds have been raised accordingly.
HA2402324-004	DUP A	N/A: Resemblance Not Applicable (mTPH < LOR)
HA2402324-004	DUP A	RRR: Detection limit raised due to high analyte recovery in the method blank.

Qualifiers

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
RRR	Refer to report comments for issues regarding this analysis.
SUR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.
VOCHS	VOC analysis was conducted for a water sample that contained > 5% headspace. Results may be biased low.



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Physical Tests										
Alkalinity, bicarbonate (as HCO ₃)	71-52-3	E290/WT	1.0	mg/L	14.0	44.6	18.4	18.5	----	
Alkalinity, carbonate (as CO ₃)	3812-32-6	E290/WT	1.0	mg/L	<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	----	
Alkalinity, total (as CaCO ₃)	----	E290/WT	1.0	mg/L	11.5	36.6	15.1	15.1	----	
Colour, apparent	----	E330/WT	2.0	CU	12.1	47.0	231	196	----	
Conductivity	----	E100/WT	1.0	µS/cm	50.6	99.9	64.4	64.7	----	
Langelier index (@ 20°C)	----	EC105/WT	0.010	-	-3.62	-2.04	-3.24	-3.24	----	
Langelier index (@ 4°C)	----	EC105/WT	0.010	-	-3.87	-2.29	-3.49	-3.49	----	
pH	----	E108/WT	0.10	pH units	6.20	6.64	6.12	6.12	----	
pH, saturation (@ 20°C)	----	EC105/WT	0.010	pH units	9.82	8.68	9.36	9.36	----	
pH, saturation (@ 4°C)	----	EC105/WT	0.010	pH units	10.1	8.93	9.61	9.61	----	
Solids, total dissolved [TDS]	----	E162/HA	10	mg/L	38	55	38	39	----	
Turbidity	----	E121/WT	0.10	NTU	1.04	6.57	29.3	25.8	----	
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L	<0.0050	<0.0050	0.0059	<0.0050	----	
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L	6.11	5.90	6.22	6.22	----	
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L	0.027	0.041	<0.020	<0.020	----	
Nitrate (as N)	14797-55-8	E235.NO3/WT	0.020	mg/L	<0.020	<0.020	<0.020	<0.020	----	
Nitrate + Nitrite (as N)	----	EC235.N+N/W T	0.0032	mg/L	<0.0224	<0.0224	<0.0224	<0.0224	----	
Nitrite (as N)	14797-65-0	E235.NO2/WT	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	----	
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L	0.0021	0.0012	0.0013	0.0014	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Anions and Nutrients										
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L	2.08	4.05	3.60	3.58	----	
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	---	E355-L/WT	0.50	mg/L	0.95	0.72	<0.50	<0.50	----	
Ion Balance										
Anion sum	---	EC101/WT	0.10	meq/L	0.45	0.98	0.55	0.55	----	
Cation sum	---	EC101/WT	0.10	meq/L	0.42	0.88	0.56	0.56	----	
Ion balance (cations/anions)	---	EC101/WT	0.010	%	93.3	89.8	102	102	----	
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/WT	0.0010	mg/L	<0.0100 ^{DLHC}	0.0015	0.0043	0.0041	----	
Antimony, dissolved	7440-36-0	E421/WT	0.00010	mg/L	<0.00100 ^{DLHC}	<0.00010	<0.00010	<0.00010	----	
Arsenic, dissolved	7440-38-2	E421/WT	0.00010	mg/L	0.00132 ^{DLHC}	0.0175	0.00409	0.00411	----	
Barium, dissolved	7440-39-3	E421/WT	0.00010	mg/L	0.00222 ^{DLHC}	0.00368	0.00521	0.00515	----	
Beryllium, dissolved	7440-41-7	E421/WT	0.000020	mg/L	<0.000200 ^{DLHC}	<0.000020	<0.000020	<0.000020	----	
Bismuth, dissolved	7440-69-9	E421/WT	0.000050	mg/L	<0.000500 ^{DLHC}	<0.000050	<0.000050	<0.000050	----	
Boron, dissolved	7440-42-8	E421/WT	0.010	mg/L	<0.100 ^{DLHC}	<0.010	<0.010	<0.010	----	
Cadmium, dissolved	7440-43-9	E421/WT	0.0000050	mg/L	<0.0000500 ^{DLHC}	0.0000089	0.0000205	0.0000169	----	
Calcium, dissolved	7440-70-2	E421/WT	0.050	mg/L	2.61 ^{DLHC}	11.8	5.80	5.82	----	
Cesium, dissolved	7440-46-2	E421/WT	0.000010	mg/L	<0.000100 ^{DLHC}	0.000097	0.000013	0.000013	----	
Chromium, dissolved	7440-47-3	E421/WT	0.00050	mg/L	<0.00500 ^{DLHC}	<0.00050	<0.00050	<0.00050	----	
Cobalt, dissolved	7440-48-4	E421/WT	0.00010	mg/L	0.00470 ^{DLHC}	0.00021	0.00104	0.00105	----	
Copper, dissolved	7440-50-8	E421/WT	0.00020	mg/L	0.0101 ^{DLHC}	0.00142	0.00332	0.00229	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Dissolved Metals										
Iron, dissolved	7439-89-6	E421/WT	0.010	mg/L	<0.100 DLHC	<0.010	<0.010	<0.010	<0.010	----
Lead, dissolved	7439-92-1	E421/WT	0.000050	mg/L	<0.000500 DLHC	<0.000050	<0.000050	<0.000050	<0.000050	----
Lithium, dissolved	7439-93-2	E421/WT	0.0010	mg/L	<0.0100 DLHC	<0.0010	0.0010	<0.0010	<0.0010	----
Magnesium, dissolved	7439-95-4	E421/WT	0.0050	mg/L	0.720 DLHC	1.04	0.728	0.726	0.726	----
Manganese, dissolved	7439-96-5	E421/WT	0.00010	mg/L	0.127 DLHC	0.00534	0.0578	0.0595	0.0595	----
Mercury, dissolved	7439-97-6	E509/WT	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
Molybdenum, dissolved	7439-98-7	E421/WT	0.000050	mg/L	<0.000500 DLHC	0.000184	0.000219	0.000212	0.000212	----
Nickel, dissolved	7440-02-0	E421/WT	0.00050	mg/L	0.00756 DLHC	0.00094	0.00319	0.00321	0.00321	----
Phosphorus, dissolved	7723-14-0	E421/WT	0.050	mg/L	<0.500 DLHC	<0.050	<0.050	<0.050	<0.050	----
Potassium, dissolved	7440-09-7	E421/WT	0.050	mg/L	0.679 DLHC	0.859	0.807	0.822	0.822	----
Rubidium, dissolved	7440-17-7	E421/WT	0.00020	mg/L	<0.00200 DLHC	0.00139	0.00140	0.00152	0.00152	----
Selenium, dissolved	7782-49-2	E421/WT	0.000050	mg/L	<0.000500 DLHC	0.000092	0.000062	0.000068	0.000068	----
Silicon (as SiO ₂), dissolved	7440-21-3	EC421.SiO ₂ /WT	0.15	mg/L	12.3	9.09	8.60	8.53	8.53	----
Silicon, dissolved	7440-21-3	E421/WT	0.050	mg/L	5.75 DLHC	4.25	4.02	3.99	3.99	----
Silver, dissolved	7440-22-4	E421/WT	0.000010	mg/L	<0.000100 DLHC	<0.000010	0.000041	0.000048	0.000048	----
Sodium, dissolved	7440-23-5	E421/WT	0.050	mg/L	4.81 DLHC	4.24	4.23	4.21	4.21	----
Strontium, dissolved	7440-24-6	E421/WT	0.00020	mg/L	0.0259 DLHC	0.0452	0.0253	0.0257	0.0257	----
Sulfur, dissolved	7704-34-9	E421/WT	0.50	mg/L	<5.00 DLHC	1.26	1.23	1.26	1.26	----
Tellurium, dissolved	13494-80-9	E421/WT	0.00020	mg/L	<0.00200 DLHC	<0.00020	<0.00020	<0.00020	<0.00020	----
Thallium, dissolved	7440-28-0	E421/WT	0.000010	mg/L	<0.000100 DLHC	<0.000010	<0.000010	<0.000010	<0.000010	----
Thorium, dissolved	7440-29-1	E421/WT	0.00010	mg/L	<0.00100 DLHC	<0.00010	<0.00010	<0.00010	<0.00010	----



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Dissolved Metals										
Tin, dissolved	7440-31-5	E421/WT	0.00010	mg/L	<0.00100 DLHC	<0.00010	<0.00010	<0.00010	<0.00010	----
Titanium, dissolved	7440-32-6	E421/WT	0.00030	mg/L	<0.00300 DLHC	<0.00030	<0.00030	<0.00030	<0.00030	----
Tungsten, dissolved	7440-33-7	E421/WT	0.00010	mg/L	0.197 DLHC	0.00280	0.00367	0.00372	0.00372	----
Uranium, dissolved	7440-61-1	E421/WT	0.000010	mg/L	<0.000100 DLHC	0.000150	0.000064	0.000067	0.000067	----
Vanadium, dissolved	7440-62-2	E421/WT	0.00050	mg/L	<0.00500 DLHC	<0.00050	<0.00050	<0.00050	<0.00050	----
Zinc, dissolved	7440-66-6	E421/WT	0.0010	mg/L	<0.0100 DLHC	0.0026	0.0043	0.0022	0.0022	----
Zirconium, dissolved	7440-67-7	E421/WT	0.00020	mg/L	<0.00200 DLHC	<0.00020	<0.00020	<0.00020	<0.00020	----
Dissolved mercury filtration location	----	EP509/WT	-	-	Field	Field	Field	Field	Field	----
Dissolved metals filtration location	----	EP421/WT	-	-	Field	Field	Field	Field	Field	----
Hydrocarbon Distribution of RBCA mTPH (Tier I) Fractions										
C6-C10 fraction of mTPH	n/a	EC581D/WT	1	%	----	<1	<1	<1	<1	----
>C10-C16 fraction of mTPH	n/a	EC581D/WT	1	%	----	<1	<1	<1	<1	----
>C16-C21 fraction of mTPH	n/a	EC581D/WT	1	%	----	<1	<1	<1	<1	----
>C21-C32 fraction of mTPH	n/a	EC581D/WT	1	%	----	<1	<1	<1	<1	----
Hydrocarbons										
Benzene	71-43-2	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050	<0.00050 VOCH _S	----
Toluene	108-88-3	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050	<0.00050 VOCH _S	----
Ethylbenzene	100-41-4	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050	<0.00050 VOCH _S	----
Xylenes, total	1330-20-7	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050	<0.00050	----
Xylene, o-	95-47-6	E611A/WT	0.00030	mg/L	----	<0.00030	<0.00030	<0.00030	<0.00030 VOCH _S	----
Xylene, m+p-	179601-23-1	E611A/WT	0.00040	mg/L	----	<0.00040	<0.00040	<0.00040	<0.00040 VOCH _S	----



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Hydrocarbons										
VPH C6-C10	n/a	E581.VPH/WT	0.025	mg/L	----	<0.025	<0.025	<0.025 ^{VOCH_S}	----	
VPH C6-C10 (less BTEX)	n/a	EC580C/WT	0.025	mg/L	----	<0.025	<0.025	<0.025	----	
EPH >C10-C16	n/a	E601F/WT	0.050	mg/L	----	<0.100 ^{RRR}	<0.125 ^{RRR}	<0.050	----	
EPH >C16-C21	n/a	E601F/WT	0.050	mg/L	----	<0.100 ^{RRR}	<0.125 ^{RRR}	<0.050	----	
EPH >C21-C32	n/a	E601F/WT	0.050	mg/L	----	<0.050	<0.050	<0.050	----	
EPH >C34-C50	n/a	E601F/WT	0.10	mg/L	----	<0.10	<0.10	<0.10	----	
hydrocarbon resemblance	n/a	E601F/WT	-	none	----	N/A	N/A	N/A	----	
mTPH (Tier I)	n/a	EC581D/WT	0.090	mg/L	----	<0.150	<0.184	<0.090	----	
return to baseline at C32	n/a	E601F/WT	-	-	----	Yes	Yes	Yes	----	
TEH >C10-C32	n/a	E601F/WT	0.100	mg/L	----	<0.150 ^{RRR}	<0.184 ^{RRR}	<0.100	----	
Hydrocarbons Surrogates										
dotriacontane, n- (EPH)	n/a	E601F/WT	1.0	%	----	67.0	61.4	71.7	----	
isobutylbenzene (EPH)	538-93-2	E601F/WT	1.0	%	----	47.9 ^{RRR}	35.8 ^{RRR}	54.2 ^{SUR-ND}	----	
isobutylbenzene (VPH)	538-93-2	E581.VPH/WT	1.0	%	----	97.9	105	96.5	----	
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/WT	1.0	%	----	102	106	102	----	
Difluorobenzene, 1,4-	540-36-3	E611A/WT	1.0	%	----	94.9	94.0	94.5	----	
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Acenaphthylene	208-96-8	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Acridine	260-94-6	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Polycyclic Aromatic Hydrocarbons										
Anthracene	120-12-7	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Benz(a)anthracene	56-55-3	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Benzo(a)pyrene	50-32-8	E641A-L/WT	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Benzo(b+j+k)fluoranthene	n/a	E641A-L/WT	0.015	µg/L	<0.015	<0.015	<0.015	<0.015	<0.015	----
Benzo(g,h,i)perylene	191-24-2	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Chrysene	218-01-9	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A-L/WT	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	----
Fluoranthene	206-44-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Fluorene	86-73-7	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Methylnaphthalene, 1+2-	----	E641A-L/WT	0.015	µg/L	<0.015	<0.015	<0.015	<0.015	<0.015	----
Methylnaphthalene, 2-	91-57-6	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Naphthalene	91-20-3	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Perylene	198-55-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Phenanthrene	85-01-8	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Pyrene	129-00-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----
Quinoline	91-22-5	E641A-L/WT	0.010	µg/L	<0.010	<0.020 ^{DLM}	<0.010	<0.033 ^{RRR}	<0.033 ^{RRR}	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID				
					MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time				
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
					HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----
					Result	Result	Result	Result	----
Polycyclic Aromatic Hydrocarbons Surrogates									
Chrysene-d12	1719-03-5	E641A-L/WT	0.1	%	97.5	98.0	106	98.8	----
Naphthalene-d8	1146-65-2	E641A-L/WT	0.1	%	85.7	83.2	90.8	119	----
Phenanthrene-d10	1517-22-2	E641A-L/WT	0.1	%	106	106	113	123	----

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

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID				
					24SS1	24SS2	24SS3	24SS4	24SS5
					Client sampling date / time				
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	23-Sep-2024 10:21	23-Sep-2024 11:24	23-Sep-2024 14:41	23-Sep-2024 13:28	23-Sep-2024 11:55
					HA2402324-005	HA2402324-006	HA2402324-007	HA2402324-008	HA2402324-009
					Result	Result	Result	Result	Result
Sample Data									
Dummy analyte	----	HOLD/HA	-	-	----	----	----	----	NR
Metals									
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	824	30.5	330	150	1.85

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

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	24SS6	24SS7	24SS8	24SS9	24SS10
					Client sampling date / time	23-Sep-2024 14:12	23-Sep-2024 13:39	23-Sep-2024 12:28	23-Sep-2024 14:00	23-Sep-2024 13:48
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-010	HA2402324-011	HA2402324-012	HA2402324-013	HA2402324-014	
					Result	Result	Result	Result	Result	
Sample Data										
Dummy analyte	----	HOLD/HA	-	-	NR	NR	NR	NR	NR	
Metals										
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	214	----	----	----	----	

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

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	DUPA	DUPB	24SS1-A	DUPA-A	----
					Client sampling date / time	23-Sep-2024 10:21	23-Sep-2024 13:48	23-Sep-2024 10:21	23-Sep-2024 10:21	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-015	HA2402324-016	HA2402324-017	HA2402324-018	----	
					Result	Result	Result	Result	----	
Sample Data										
Dummy analyte	----	HOLD/HA	-	-	----	NR	----	----	----	
Metals										
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	113	----	876	177	----	

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

Please refer to the Accreditation section for an explanation of analyte accreditations.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : HA2402324</p> <p>Amendment : 1</p> <p>Client : Dillon Consulting Limited</p> <p>Contact : Asia Reid</p> <p>Address : 137 Chain Lake Drive Halifax NS Canada B3S 1B3</p> <p>Telephone : 902.450.5015 ext. 5045</p> <p>Project : 236446</p> <p>PO : ----</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : Build NS (Mill Village)</p> <p>Quote number : HA23-DICL100-11 - Build NS (Mill Village)</p> <p>No. of samples received : 18</p> <p>No. of samples analysed : 18</p>	<p>Page : 1 of 21</p> <p>Laboratory : ALS Environmental - Halifax</p> <p>Account Manager : Andrew Martin</p> <p>Address : 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2</p> <p>Telephone : +1 902 707 4888</p> <p>Date Samples Received : 25-Sep-2024 16:05</p> <p>Issue Date : 21-Oct-2024 12:53</p>
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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 Laboratory Control Sample (LCS) outliers occur
- 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.
- Test sample Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

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	Anonymous	Anonymous	Arsenic	7440-38-2	E440	44.8 % 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.

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Polycyclic Aromatic Hydrocarbons	QC-MRG3-1680705 001	----	Quinoline	91-22-5	E641A-L	0.034 ^B µg/L	0.01 µg/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.

Regular Sample Surrogates

Sub-Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Result	Limits	Comment
Samples Submitted							
Hydrocarbons Surrogates	HA2402324-002	MW23-2	isobutylbenzene (EPH)	538-93-2	47.9 %	60.0-140 %	Recovery less than lower data quality objective
Hydrocarbons Surrogates	HA2402324-003	MW23-3	isobutylbenzene (EPH)	538-93-2	35.8 %	60.0-140 %	Recovery less than lower data quality objective
Hydrocarbons Surrogates	HA2402324-004	DUP A	isobutylbenzene (EPH)	538-93-2	54.2 %	60.0-140 %	Recovery less than lower data quality objective



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 : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS1-A	E440	23-Sep-2024	16-Oct-2024	180 days	23 days	✔	16-Oct-2024	180 days	23 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS5	E440	23-Sep-2024	16-Oct-2024	180 days	23 days	✔	16-Oct-2024	180 days	23 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS6	E440	23-Sep-2024	16-Oct-2024	180 days	23 days	✔	16-Oct-2024	180 days	23 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap DUPA-A	E440	23-Sep-2024	17-Oct-2024	180 days	25 days	✔	18-Oct-2024	180 days	25 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS1	E440	23-Sep-2024	01-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS2	E440	23-Sep-2024	01-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS3	E440	23-Sep-2024	02-Oct-2024	180 days	9 days	✔	02-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 24SS4	E440	23-Sep-2024	02-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap DUPA	E440	23-Sep-2024	02-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS10	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS5	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS6	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS7	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS8	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap 24SS9	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days	
Sample Data : Sample Hold Fee for Soil/Solid										
Glass soil jar/Teflon lined cap DUPB	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	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) DUP A	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW23-1	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW23-2	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW23-3	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE DUP A	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW23-1	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW23-2	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW23-3	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE DUP A	E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✔	26-Sep-2024	3 days	3 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 : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)											
HDPE MW23-1		E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	26-Sep-2024	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)											
HDPE MW23-2		E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	26-Sep-2024	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)											
HDPE MW23-3		E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	26-Sep-2024	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC											
HDPE DUP A		E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC											
HDPE MW23-1		E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC											
HDPE MW23-2		E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC											
HDPE MW23-3		E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC											
HDPE DUP A		E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	* EHT
Anions and Nutrients : Nitrate in Water by IC											
HDPE MW23-1		E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 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 : Nitrate in Water by IC											
HDPE MW23-2	E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrate in Water by IC											
HDPE MW23-3	E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC											
HDPE DUP A	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC											
HDPE MW23-1	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC											
HDPE MW23-2	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC											
HDPE MW23-3	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Sulfate in Water by IC											
HDPE DUP A	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE MW23-1	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE MW23-2	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 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 MW23-3	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) DUP A	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW23-1	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW23-2	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW23-3	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) DUP A	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW23-1	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW23-2	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW23-3	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 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	
Hydrocarbons : EPH in Water by GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) DUP A	E601F	23-Sep-2024	26-Sep-2024	14 days	3 days	✔	01-Oct-2024	40 days	5 days	✔
Hydrocarbons : EPH in Water by GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-2	E601F	23-Sep-2024	26-Sep-2024	14 days	3 days	✔	01-Oct-2024	40 days	5 days	✔
Hydrocarbons : EPH in Water by GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-3	E601F	23-Sep-2024	26-Sep-2024	14 days	3 days	✔	01-Oct-2024	40 days	5 days	✔
Hydrocarbons : VPH by Headspace GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) DUP A	E581.VPH	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	27-Sep-2024	14 days	4 days	✔
Hydrocarbons : VPH by Headspace GC-FID (RBCA)										
Glass vial (sodium bisulfate) MW23-2	E581.VPH	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	27-Sep-2024	14 days	4 days	✔
Hydrocarbons : VPH by Headspace GC-FID (RBCA)										
Glass vial (sodium bisulfate) MW23-3	E581.VPH	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	27-Sep-2024	14 days	4 days	✔
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) DUP A	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW23-3	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW23-1	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	28-Sep-2024	28 days	5 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	
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW23-2	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	28-Sep-2024	28 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE DUP A	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW23-1	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW23-2	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW23-3	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE MW23-1	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	96 hrs	* EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE DUP A	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	97 hrs	* EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE MW23-2	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	97 hrs	* EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE MW23-3	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	97 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 : Conductivity in Water											
HDPE DUP A	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE MW23-1	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE MW23-2	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE MW23-3	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 days	✓	
Physical Tests : pH by Meter											
HDPE MW23-1	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	72 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE MW23-2	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	73 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE DUP A	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	75 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE MW23-3	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	75 hrs	* EHTR-FM	
Physical Tests : TDS by Gravimetry											
HDPE DUP A	E162	23-Sep-2024	----	----	----		30-Sep-2024	7 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	
Physical Tests : TDS by Gravimetry										
HDPE MW23-1	E162	23-Sep-2024	----	----	----		30-Sep-2024	7 days	7 days	✔
Physical Tests : TDS by Gravimetry										
HDPE MW23-2	E162	23-Sep-2024	----	----	----		30-Sep-2024	7 days	7 days	✔
Physical Tests : TDS by Gravimetry										
HDPE MW23-3	E162	23-Sep-2024	----	----	----		30-Sep-2024	7 days	7 days	✔
Physical Tests : Turbidity by Nephelometry										
HDPE DUP A	E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Physical Tests : Turbidity by Nephelometry										
HDPE MW23-1	E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Physical Tests : Turbidity by Nephelometry										
HDPE MW23-2	E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Physical Tests : Turbidity by Nephelometry										
HDPE MW23-3	E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-1	E641A-L	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	30-Sep-2024	40 days	3 days	✔
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-2	E641A-L	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	30-Sep-2024	40 days	3 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	
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-3	E641A-L	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	30-Sep-2024	40 days	3 days	✔
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)										
Amber glass/Teflon lined cap (sodium bisulfate) DUP A	E641A-L	23-Sep-2024	30-Sep-2024	14 days	7 days	✔	01-Oct-2024	40 days	1 days	✔
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP A	E611A	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	27-Sep-2024	14 days	4 days	✔
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW23-2	E611A	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	27-Sep-2024	14 days	4 days	✔
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW23-3	E611A	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	27-Sep-2024	14 days	4 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	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Metals in Soil/Solid by CRC ICPMS	E440	1676573	4	14	28.5	5.0	✓
Laboratory Control Samples (LCS)							
Metals in Soil/Solid by CRC ICPMS	E440	1676573	8	14	57.1	10.0	✓
Method Blanks (MB)							
Metals in Soil/Solid by CRC ICPMS	E440	1676573	4	14	28.5	5.0	✓

Matrix: **Water**

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)							
Alkalinity Species by Titration	E290	1673965	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	1677011	1	20	5.0	5.0	✓
Conductivity in Water	E100	1673964	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✓
pH by Meter	E108	1673963	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	1680696	1	19	5.2	5.2	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✓
Turbidity by Nephelometry	E121	1673870	1	20	5.0	5.0	✓
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1673965	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	1677011	1	20	5.0	5.0	✓
Conductivity in Water	E100	1673964	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✓



Matrix: **Water**

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 Control Samples (LCS) - Continued							
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✔
EPH in Water by GC-FID (RBCA)	E601F	1673907	1	7	14.2	5.0	✔
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✔
PAHs in Water by Hexane LVI GC-MS (Low Level)	E641A-L	1676593	2	4	50.0	5.0	✔
pH by Meter	E108	1673963	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1680696	1	19	5.2	5.2	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✔
Turbidity by Nephelometry	E121	1673870	1	20	5.0	5.0	✔
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1673965	1	20	5.0	5.0	✔
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✔
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1677011	1	20	5.0	5.0	✔
Conductivity in Water	E100	1673964	1	20	5.0	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✔
EPH in Water by GC-FID (RBCA)	E601F	1673907	1	7	14.2	5.0	✔
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✔
PAHs in Water by Hexane LVI GC-MS (Low Level)	E641A-L	1676593	2	4	50.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1680696	1	19	5.2	5.2	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✔
Turbidity by Nephelometry	E121	1673870	1	20	5.0	5.0	✔
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✔
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✔



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

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
Matrix Spikes (MS) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✔
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✔
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	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
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.
Sample Hold Fee for Soil/Solid	HOLD ALS Environmental - Halifax	Soil/Solid		Fee for storing sample to meet sample integrity requirements and holding times.
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 - Waterloo	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.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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 inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. 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.
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Waterloo	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury in Water by CVAAS	E509 ALS Environmental - Waterloo	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
VPH by Headspace GC-FID (RBCA)	E581.VPH ALS Environmental - Waterloo	Water	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 Water by GC-FID (RBCA)	E601F ALS Environmental - Waterloo	Water	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	Water	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 Water by Hexane LVI GC-MS (Low Level)	E641A-L ALS Environmental - Waterloo	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Waterloo	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. 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-D)	EC105 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. If available, Field pH measurements are recommended for best accuracy (test code EC104).
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).
Dissolved Silicon as Silica (Calculation)	EC421.SiO2 ALS Environmental - Waterloo	Water	N/A	Dissolved Silicon (as SiO ₂) is a calculated parameter. Dissolved Silicon (as SiO ₂ mg/L) = 2.139 x Dissolved Silicon (mg/L).



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VPH C6-C10 (less BTEX) [RBCA]	EC580C ALS Environmental - Waterloo	Water	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	Water	Atlantic RBCA Version 3.1	Modified TPH (PIRI), Tier I is the sum of PIRI Fraction (C6 - C10 - BTEX) + (>C10 - C16) + (>C16 - C21) + (>C21 - C32).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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
Dissolved Metals Water Filtration	EP421 ALS Environmental - Waterloo	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO ₃ .
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Waterloo	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Waterloo	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into a GC-MS-FID.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.
PHCs Hexane Extraction (RBCA)	EP601F ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: HA2402324	Page	: 1 of 18
Amendment	: 1		
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Asia Reid	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	: 902.450.5015 ext. 5045	Telephone	: +1 902 707 4888
Project	: 236446	Date Samples Received	: 25-Sep-2024 16:05
PO	: ----	Date Analysis Commenced	: 26-Sep-2024
C-O-C number	: ----	Issue Date	: 21-Oct-2024 12:53
Sampler	: ----		
Site	: Build NS (Mill Village)		
Quote number	: HA23-DICL100-11 - Build NS (Mill Village)		
No. of samples received	: 18		
No. of samples analysed	: 18		

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>
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Jeremy Gingras	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Waterloo Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Halifax Administration, Dartmouth, Nova Scotia
Jon Fisher	Production Manager, Environmental	Halifax Inorganics, Dartmouth, Nova Scotia
Jon Fisher	Production Manager, Environmental	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Waterloo Metals, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Metals, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo VOC, 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
Metals (QC Lot: 1676573)											
HA2402306-001	Anonymous	Arsenic	7440-38-2	E440	0.10	mg/kg	7.68	12.1	44.8%	30%	DUP-H
Metals (QC Lot: 1677133)											
HA2402324-007	24SS3	Arsenic	7440-38-2	E440	0.10	mg/kg	330	312	5.46%	30%	----
Metals (QC Lot: 1708168)											
HA2402324-009	24SS5	Arsenic	7440-38-2	E440	0.10	mg/kg	1.85	1.63	12.9%	30%	----
Metals (QC Lot: 1713228)											
HA2402324-018	DUPA-A	Arsenic	7440-38-2	E440	0.10	mg/kg	177	161	9.54%	30%	----

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: 1673870)											
HA2402293-003	Anonymous	Turbidity	----	E121	0.10	NTU	1.69	1.77	4.63%	15%	----
Physical Tests (QC Lot: 1673963)											
HA2402324-002	MW23-2	pH	----	E108	0.10	pH units	6.64	6.63	0.151%	4%	----
Physical Tests (QC Lot: 1673964)											
HA2402324-002	MW23-2	Conductivity	----	E100	1.0	µS/cm	99.9	101	0.798%	10%	----
Physical Tests (QC Lot: 1673965)											
HA2402324-002	MW23-2	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	36.6	37.1	1.47%	20%	----
Physical Tests (QC Lot: 1677011)											
HA2402049-001	Anonymous	Colour, apparent	----	E330	20.0	CU	1200	1230	2.41%	20%	----
Physical Tests (QC Lot: 1680696)											
HA2402323-001	Anonymous	Solids, total dissolved [TDS]	----	E162	10	mg/L	17	21	4	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1673958)											
HA2402324-001	MW23-1	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.027	0.025	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1673959)											
HA2402324-001	MW23-1	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: 1673960)											
HA2402324-001	MW23-1	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: 1673961)											
HA2402324-001	MW23-1	Chloride	16887-00-6	E235.Cl	0.50	mg/L	6.11	5.87	3.98%	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
Anions and Nutrients (QC Lot: 1673962)											
HA2402324-001	MW23-1	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.08	1.83	0.25	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1673966)											
HA2402324-001	MW23-1	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0021	0.0019	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1675226)											
HA2402293-005	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1675369)											
HA2402324-003	MW23-3	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0059	0.0061	0.0002	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1675224)											
HA2402293-004	Anonymous	Carbon, total organic [TOC]	----	E355-L	2.50	mg/L	22.7	22.2	0.48	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1675370)											
HA2402324-004	DUP A	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	0.70	0.20	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1673995)											
HA2402324-001	MW23-1	Aluminum, dissolved	7429-90-5	E421	0.0100	mg/L	<0.0100	0.0158	0.0058	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00100	mg/L	0.00132	0.00130	0.00002	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00100	mg/L	0.00222	0.00224	0.00002	Diff <2x LOR	----
		Beryllium, dissolved	7440-41-7	E421	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.500	mg/L	2.61	2.56	0.053	Diff <2x LOR	----
		Cesium, dissolved	7440-46-2	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00100	mg/L	0.00470	0.00478	0.00008	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00200	mg/L	0.0101	0.0107	0.00058	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0500	mg/L	0.720	0.730	1.24%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00100	mg/L	0.127	0.126	0.723%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00500	mg/L	0.00756	0.00739	0.00017	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.500	mg/L	0.679	0.654	0.025	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
Dissolved Metals (QC Lot: 1673995) - continued											
HA2402324-001	MW23-1	Rubidium, dissolved	7440-17-7	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.500	mg/L	5.75	5.83	1.38%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.500	mg/L	4.81	4.82	0.010	Diff <2x LOR	----
		Strontium, dissolved	7440-24-6	E421	0.00200	mg/L	0.0259	0.0262	0.946%	20%	----
		Sulfur, dissolved	7704-34-9	E421	5.00	mg/L	<5.00	<5.00	0	Diff <2x LOR	----
		Tellurium, dissolved	13494-80-9	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00300	mg/L	<0.00300	<0.00300	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00100	mg/L	0.197	0.200	1.46%	20%	----
		Uranium, dissolved	7440-61-1	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
Zinc, dissolved	7440-66-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----		
Zirconium, dissolved	7440-67-7	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----		
Dissolved Metals (QC Lot: 1676636)											
HA2402324-001	MW23-1	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1677839)											
HA2402307-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.00040 mg/L	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.00030 mg/L	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1677838)											
HA2402307-001	Anonymous	VPH C6-C10	n/a	E581.VPH	25	µg/L	<0.025 mg/L	<25	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: 1676573)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Metals (QCLot: 1677133)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Metals (QCLot: 1708168)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Metals (QCLot: 1713228)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1673870)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 1673964)						
Conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 1673965)						
Alkalinity, total (as CaCO ₃)	----	E290	1	mg/L	1.5	----
Physical Tests (QCLot: 1677011)						
Colour, apparent	----	E330	2	CU	<2.0	----
Physical Tests (QCLot: 1680696)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 1673958)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1673959)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1673960)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 1673961)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1673962)						
Sulfate (as SO ₄)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1673966)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 1675226)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1675369)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 1675224)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1675370)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1673995)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1673995) - continued						
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1676636)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Volatile Organic Compounds (QCLot: 1677839)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1673907)						
EPH >C10-C16	n/a	E601F	50	µg/L	<50	----
EPH >C16-C21	n/a	E601F	50	µg/L	<50	----
EPH >C21-C32	n/a	E601F	50	µg/L	<50	----
EPH >C34-C50	n/a	E601F	100	µg/L	<100	----
Hydrocarbons (QCLot: 1677838)						
VPH C6-C10	n/a	E581.VPH	25	µg/L	<25	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593)						
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A-L	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	<0.010	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593) - continued						
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	<0.010	----
Perylene	198-55-0	E641A-L	0.01	µg/L	<0.010	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	<0.010	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	<0.010	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705)						
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A-L	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	<0.010	----
Perylene	198-55-0	E641A-L	0.01	µg/L	<0.010	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	<0.010	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	<0.010	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705) - continued						
Quinoline	91-22-5	E641A-L	0.01	µg/L	# 0.034	B

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
Metals (QCLot: 1676573)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Metals (QCLot: 1677133)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	----
Metals (QCLot: 1708168)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Metals (QCLot: 1713228)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	110	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
Physical Tests (QCLot: 1673870)									
Turbidity	----	E121	0.1	NTU	200 NTU	96.0	85.0	115	----
Physical Tests (QCLot: 1673963)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 1673964)									
Conductivity	----	E100	1	µS/cm	1410 µS/cm	104	90.0	110	----
Physical Tests (QCLot: 1673965)									
Alkalinity, total (as CaCO ₃)	----	E290	1	mg/L	150 mg/L	101	85.0	115	----
Physical Tests (QCLot: 1677011)									
Colour, apparent	----	E330	2	CU	25 CU	99.7	70.0	130	----
Physical Tests (QCLot: 1680696)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	88.3	85.0	115	----
Anions and Nutrients (QCLot: 1673958)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	108	90.0	110	----
Anions and Nutrients (QCLot: 1673959)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	99.6	90.0	110	----
Anions and Nutrients (QCLot: 1673960)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 1673961)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.2	90.0	110	----



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: 1673962)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1673966)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	98.8	80.0	120	----
Anions and Nutrients (QCLot: 1675226)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.7	85.0	115	----
Anions and Nutrients (QCLot: 1675369)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	96.0	85.0	115	----
Organic / Inorganic Carbon (QCLot: 1675224)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1675370)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	102	80.0	120	----
Dissolved Metals (QCLot: 1673995)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	0.1 mg/L	93.2	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	0.05 mg/L	100.0	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	0.05 mg/L	101	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.012 mg/L	104	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.005 mg/L	98.6	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	0.05 mg/L	96.2	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	0.05 mg/L	97.6	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.005 mg/L	98.7	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	2.5 mg/L	97.6	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.002 mg/L	102	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.012 mg/L	93.7	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.012 mg/L	93.5	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.012 mg/L	92.5	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	0.05 mg/L	93.8	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.025 mg/L	97.6	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.012 mg/L	95.6	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	2.5 mg/L	98.0	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.012 mg/L	95.1	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.012 mg/L	98.3	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.025 mg/L	92.3	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	0.5 mg/L	98.5	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	2.5 mg/L	96.1	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
Dissolved Metals (QCLot: 1673995) - continued									
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.005 mg/L	97.7	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	0.05 mg/L	97.7	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	0.5 mg/L	103	60.0	140	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.005 mg/L	93.6	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	2.5 mg/L	94.4	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.012 mg/L	99.0	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	2.5 mg/L	101	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.005 mg/L	96.2	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	0.05 mg/L	97.6	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.005 mg/L	97.0	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.025 mg/L	101	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.012 mg/L	94.4	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.005 mg/L	103	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0 mg/L	101	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.025 mg/L	96.4	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.025 mg/L	93.7	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.005 mg/L	98.0	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	90.6	80.0	120	----
Volatile Organic Compounds (QCLot: 1677839)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	98.9	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	93.3	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	94.1	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	94.7	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	95.5	70.0	130	----
Hydrocarbons (QCLot: 1673907)									
EPH >C10-C16	n/a	E601F	50	µg/L	3620 µg/L	83.9	70.0	130	----
EPH >C16-C21	n/a	E601F	50	µg/L	3100 µg/L	92.4	70.0	130	----
EPH >C21-C32	n/a	E601F	50	µg/L	2800 µg/L	88.0	70.0	130	----
EPH >C34-C50	n/a	E601F	100	µg/L	3720 µg/L	87.4	70.0	130	----
Hydrocarbons (QCLot: 1677838)									
VPH C6-C10	n/a	E581.VPH	25	µg/L	2000 µg/L	95.6	80.0	120	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593)									
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	0.526 µg/L	100	50.0	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
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593) - continued									
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	0.526 µg/L	95.6	50.0	140	----
Acridine	260-94-6	E641A-L	0.01	µg/L	0.526 µg/L	99.8	50.0	140	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	0.526 µg/L	95.9	50.0	140	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	0.526 µg/L	116	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	0.526 µg/L	101	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	0.526 µg/L	110	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	0.526 µg/L	104	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	0.526 µg/L	108	50.0	140	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	0.526 µg/L	116	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	0.526 µg/L	115	50.0	140	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	0.526 µg/L	118	50.0	140	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	0.526 µg/L	108	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	0.526 µg/L	115	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	0.526 µg/L	97.6	50.0	140	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	0.526 µg/L	97.7	50.0	140	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	0.526 µg/L	86.5	50.0	140	----
Perylene	198-55-0	E641A-L	0.01	µg/L	0.526 µg/L	105	50.0	140	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	0.526 µg/L	112	50.0	140	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	0.526 µg/L	109	50.0	140	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	0.526 µg/L	108	50.0	140	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705)									
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	0.526 µg/L	115	50.0	140	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	0.526 µg/L	110	50.0	140	----
Acridine	260-94-6	E641A-L	0.01	µg/L	0.526 µg/L	88.2	50.0	140	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	0.526 µg/L	111	50.0	140	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	0.526 µg/L	106	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	0.526 µg/L	113	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	0.526 µg/L	113	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	0.526 µg/L	132	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	0.526 µg/L	116	50.0	140	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	0.526 µg/L	112	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	0.526 µg/L	116	50.0	140	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	0.526 µg/L	127	50.0	140	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	0.526 µg/L	117	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	0.526 µg/L	134	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	0.526 µg/L	112	50.0	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
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705) - continued									
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	0.526 µg/L	117	50.0	140	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	0.526 µg/L	114	50.0	140	----
Perylene	198-55-0	E641A-L	0.01	µg/L	0.526 µg/L	122	50.0	140	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	0.526 µg/L	126	50.0	140	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	0.526 µg/L	126	50.0	140	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	0.526 µg/L	117	50.0	140	----



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: **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: 1673958)										
HA2402324-001	MW23-1	Fluoride	16984-48-8	E235.F	0.984 mg/L	1 mg/L	98.4	75.0	125	----
Anions and Nutrients (QCLot: 1673959)										
HA2402324-001	MW23-1	Nitrate (as N)	14797-55-8	E235.NO3	2.45 mg/L	2.5 mg/L	98.0	75.0	125	----
Anions and Nutrients (QCLot: 1673960)										
HA2402324-001	MW23-1	Nitrite (as N)	14797-65-0	E235.NO2	0.493 mg/L	0.5 mg/L	98.6	75.0	125	----
Anions and Nutrients (QCLot: 1673961)										
HA2402324-001	MW23-1	Chloride	16887-00-6	E235.Cl	97.8 mg/L	100 mg/L	97.8	75.0	125	----
Anions and Nutrients (QCLot: 1673962)										
HA2402324-001	MW23-1	Sulfate (as SO4)	14808-79-8	E235.SO4	99.5 mg/L	100 mg/L	99.5	75.0	125	----
Anions and Nutrients (QCLot: 1673966)										
HA2402324-001	MW23-1	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0203 mg/L	0.02 mg/L	104	70.0	130	----
Anions and Nutrients (QCLot: 1675226)										
HA2402293-005	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.102 mg/L	0.1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1675369)										
HA2402324-003	MW23-3	Ammonia, total (as N)	7664-41-7	E298	0.101 mg/L	0.1 mg/L	101	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1675224)										
HA2402293-004	Anonymous	Carbon, total organic [TOC]	----	E355-L	ND mg/L	----	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1675370)										
HA2402324-004	DUP A	Carbon, total organic [TOC]	----	E355-L	5.65 mg/L	5 mg/L	113	70.0	130	----
Dissolved Metals (QCLot: 1673995)										
HA2402324-002	MW23-2	Aluminum, dissolved	7429-90-5	E421	0.0932 mg/L	0.1 mg/L	93.2	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0517 mg/L	0.05 mg/L	103	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0540 mg/L	0.05 mg/L	108	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0130 mg/L	0.012 mg/L	104	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.00522 mg/L	0.005 mg/L	104	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0467 mg/L	0.05 mg/L	93.4	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.050 mg/L	0.05 mg/L	100	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00528 mg/L	0.005 mg/L	106	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00260 mg/L	0.002 mg/L	104	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0120 mg/L	0.012 mg/L	95.7	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0118 mg/L	0.012 mg/L	94.4	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0117 mg/L	0.012 mg/L	94.0	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
Dissolved Metals (QCLot: 1673995) - continued										
HA2402324-002	MW23-2	Iron, dissolved	7439-89-6	E421	0.047 mg/L	0.05 mg/L	93.6	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0253 mg/L	0.025 mg/L	101	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0125 mg/L	0.012 mg/L	99.9	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	2.43 mg/L	2.5 mg/L	97.2	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0118 mg/L	0.012 mg/L	94.3	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0126 mg/L	0.012 mg/L	101	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0233 mg/L	0.025 mg/L	93.2	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	0.545 mg/L	0.5 mg/L	109	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	2.39 mg/L	2.5 mg/L	95.6	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.00500 mg/L	0.005 mg/L	100	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0573 mg/L	0.05 mg/L	115	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	ND mg/L	----	ND	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00482 mg/L	0.005 mg/L	96.3	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	2.64 mg/L	2.5 mg/L	106	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.00536 mg/L	0.005 mg/L	107	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.0504 mg/L	0.05 mg/L	101	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.00488 mg/L	0.005 mg/L	97.5	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0257 mg/L	0.025 mg/L	103	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0120 mg/L	0.012 mg/L	96.1	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.00518 mg/L	0.005 mg/L	104	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.000258 mg/L	0 mg/L	103	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0248 mg/L	0.025 mg/L	99.2	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.0261 mg/L	0.025 mg/L	104	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.00496 mg/L	0.005 mg/L	99.2	70.0	130	----
Dissolved Metals (QCLot: 1676636)										
HA2402324-002	MW23-2	Mercury, dissolved	7439-97-6	E509	0.0000840 mg/L	0 mg/L	84.0	70.0	130	----
Volatile Organic Compounds (QCLot: 1677839)										
HA2402307-001	Anonymous	Benzene	71-43-2	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Ethylbenzene	100-41-4	E611A	92.2 µg/L	100 µg/L	92.2	60.0	140	----
		Toluene	108-88-3	E611A	93.0 µg/L	100 µg/L	93.0	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	189 µg/L	200 µg/L	94.5	60.0	140	----
		Xylene, o-	95-47-6	E611A	95.6 µg/L	100 µg/L	95.6	60.0	140	----
Hydrocarbons (QCLot: 1677838)										
HA2402307-001	Anonymous	VPH C6-C10	n/a	E581.VPH	2480 µg/L	2000 µg/L	124	60.0	140	----



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:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 1676573)									
QC-1676573-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	97.2	70.0	130	----
Metals (QCLot: 1677133)									
QC-1677133-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	106	70.0	130	----
Metals (QCLot: 1708168)									
QC-1708168-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	92.2	70.0	130	----
Metals (QCLot: 1713228)									
QC-1713228-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	102	70.0	130	----



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Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

Canada Toll Free: 1 800 668 9878

Environmental Division
Halifax
Work Order Reference
HA2402324



Telephone : +1 902 707 4888

Report To: Dillon Consulting Limited
Reports / Recipients: Select Report Format: PDF, EXCEL, EDD (DIGITAL)
Turnaround Time (TAT) Requested: Routine [R] if received by 3pm M-F - no surcharges apply

Project Information: ALS Client Code / QUOTE #: DICL100 / HA23-DICL100-11
Job / Project #: Build NS - Mill Village 236446
ALS Lab Work Order #: HA2402324
ALS Contact: Andrew Martin

Table with columns: ALS Sample #, Sample Identification and/or Coordinates, Date, Time, Sample Type, and various analytical parameters (BTEX/TPH, PAHs, etc.).

Drinking Water (DW) Samples (client use)
Notes / Specify Limits for result evaluation by selecting from drop-down below
Cooling Method: NONE, ICE, ICE PACKS, FROZEN, COOLING INITIATED

SHIPMENT RELEASE (client use)
INITIAL SHIPMENT RECEPTION (ALS use only)
FINAL SHIPMENT RECEPTION (ALS use only)

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.

GC-849 / MM-142 / OR-803 / N-251 / MW-086 / SOL-419 / 418 / 420



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Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Canada Toll Free: 1 800 668 9878

Page of

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 Limited	Select Report Format:	<input checked="" type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)	<input type="checkbox"/> Routine [R] if received by 3pm M-F - no surcharges apply <input type="checkbox"/> 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum <input type="checkbox"/> 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum <input type="checkbox"/> 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum <input type="checkbox"/> 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum <input type="checkbox"/> Same day [E2] if received by 10am M-S - 200% rush surcharge.											
Contact:	Asia Reid	Merge QC/QCI Reports with COA	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> N/A	Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.											
Phone:	902.450.5015 ext. 5045	Compare Results to Criteria on Report - provide details below if box checked			Date and Time Required for all E&P TATs:										
Company address below will appear on the final report		Select Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX	Invoice Recipients				For all tests with rush TATs requested, please contact your AM to confirm availability.							
Street:	137 Chain Lake Drive Suite 100	Email 1 or Fax	AReid@dillon.ca	Select Invoice Distribution:				Analysis Request							
City/Province:	Halifax / Nova Scotia	Email 2		<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX				Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below							
Postal Code:	B3S 1B3	Email 3		Email 1 or Fax				AReid@dillon.ca							
Invoice To	Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			Email 2				NUMBER OF CONTAINERS							
	Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			Email 2				BTEX/TPH (RBCA) in Water							
Company:				payables@dillon.ca				PAHs (RBCA) in Water							
Contact:								Gen. Chem. w/ diss. Metals + Hg:							
Project Information		Oil and Gas Required Fields (client use)				pH, TDS, Metals, Mercury, Hardness				Bulk Metals in Soil (As)					
ALS Client Code / QUOTE #:	DICL100 / HA23-DICL100-11	AFE/Cost Center:	PO#	Major/Minor Code:				mSPLP Metals in Soil (As)				SAMPLES ON HOLD			
Job / Project #:	Build NS - Mill Village	Routing Code:		Requisitioner:								EXTENDED STORAGE REQUIRED			
PO / AFE:		Location:								SUSPECTED HAZARD (see notes)					
LSD:															
ALS Lab Work Order # (ALS use only):		ALS Contact:	Andrew Martin	Sampler:											
ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type											
	24559	23/09/24	14:00	Soil											
	245910	↓	13:48	↓											
	DUPA	↓	10:21	↓											
	DUPB	↓	13:48	↓											
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? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO						Cooling Method: <input type="checkbox"/> NONE <input checked="" type="checkbox"/> ICE <input type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input type="checkbox"/> COOLING INITIATED									
Are samples for human consumption/ use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO						Cooler Custody Seals Intact: YES <input type="checkbox"/> N/A <input type="checkbox"/> Sample Custody Seals Intact: YES <input type="checkbox"/> N/A <input type="checkbox"/>									
						INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C						
						11.8 13			17.8						
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:	Time:	Received by:	Date:	Time:				
			Shone	24 Sept 2024	12:41	Cm	Sept 25/24	9:00							

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	: HA2402324	Laboratory	: ALS Environmental - Waterloo
Amendment	: 2	Account Manager	: Andrew Martin
Client	: Dillon Consulting Limited	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Contact	: Asia Reid	Telephone	: +1 519 886 6910
Address	: 137 Chain Lake Drive Halifax Nova Scotia Canada B3S 1B3	Date Samples Received	: 25-Sep-2024 16:05
Telephone	: 902.450.5015 ext. 5045	Date Analysis Commenced	: 26-Sep-2024
Project	: 236446	Issue Date	: 06-Nov-2024 10:50
PO	: ----		
C-O-C number	: ----		
Sampler	: ----		
Site	: Build NS (Mill Village)		
Quote number	: HA23-DICL100-11 - Build NS (Mill Village)		
No. of samples received	: 19		
No. of samples analysed	: 19		

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>
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Metals, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Inorganics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Metals, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Dartmouth, Nova Scotia
Jon Fisher	Production Manager, Environmental	Administration, Dartmouth, Nova Scotia
Nik Perkio	Senior Analyst	Metals, Waterloo, Ontario
Robert Braun	Soils Team Supervisor	Inorganics, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	VOC, 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).

<i>Unit</i>	<i>Description</i>
mg/L	milligrams per litre
none	none
-	no units
pH units	pH units
µS/cm	microsiemens per centimetre
NTU	nephelometric turbidity units
CU	colour units (1 cu = 1 mg/l pt)
µg/L	micrograms per litre
meq/L	milliequivalents per litre
%	percent
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.



Workorder Comments

Amendment (08/10/2024): This report has been amended and re-released to allow the reporting of additional analytical data.

Amendment (24/10/2024): This report has been amended and re-released to allow the reporting of additional analytical data.

Amendment (28/10/2024): This report has been amended and re-released to allow the reporting of additional analytical data.

Sample Comments

Sample	Client Id	Comment
HA2402324-002	MW23-2	N/A: Resemblance Not Applicable (mTPH < LOR)
HA2402324-002	MW23-2	RRR: Surrogate recovery is outside ALS DQO. Detection limits for affected compounds have been raised accordingly.
HA2402324-003	MW23-3	N/A: Resemblance Not Applicable (mTPH < LOR)
HA2402324-003	MW23-3	RRR: Surrogate recovery is outside ALS DQO. Detection limits for affected compounds have been raised accordingly.
HA2402324-004	DUP A	N/A: Resemblance Not Applicable (mTPH < LOR)
HA2402324-004	DUP A	RRR: Detection limit raised due to high analyte recovery in the method blank.

Qualifiers

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
RRA	Heterogeneity was observed in test sample and in lab results. Reported result is the average of two or more analyses.
RRR	Refer to report comments for issues regarding this analysis.
SUR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.
VOCHS	VOC analysis was conducted for a water sample that contained > 5% headspace. Results may be biased low.



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Physical Tests										
Alkalinity, bicarbonate (as HCO3)	71-52-3	E290/WT	1.0	mg/L	14.0	44.6	18.4	18.5	----	
Alkalinity, carbonate (as CO3)	3812-32-6	E290/WT	1.0	mg/L	<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	----	
Alkalinity, total (as CaCO3)	----	E290/WT	1.0	mg/L	11.5	36.6	15.1	15.1	----	
Colour, apparent	----	E330/WT	2.0	CU	12.1	47.0	231	196	----	
Conductivity	----	E100/WT	1.0	µS/cm	50.6	99.9	64.4	64.7	----	
Langelier index (@ 20°C)	----	EC105/WT	0.010	-	-3.62	-2.04	-3.24	-3.24	----	
Langelier index (@ 4°C)	----	EC105/WT	0.010	-	-3.87	-2.29	-3.49	-3.49	----	
pH	----	E108/WT	0.10	pH units	6.20	6.64	6.12	6.12	----	
pH, saturation (@ 20°C)	----	EC105/WT	0.010	pH units	9.82	8.68	9.36	9.36	----	
pH, saturation (@ 4°C)	----	EC105/WT	0.010	pH units	10.1	8.93	9.61	9.61	----	
Solids, total dissolved [TDS]	----	E162/HA	10	mg/L	38	55	38	39	----	
Turbidity	----	E121/WT	0.10	NTU	1.04	6.57	29.3	25.8	----	
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L	<0.0050	<0.0050	0.0059	<0.0050	----	
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L	6.11	5.90	6.22	6.22	----	
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L	0.027	0.041	<0.020	<0.020	----	
Nitrate (as N)	14797-55-8	E235.NO3/WT	0.020	mg/L	<0.020	<0.020	<0.020	<0.020	----	
Nitrate + Nitrite (as N)	----	EC235.N+N/W T	0.0032	mg/L	<0.0224	<0.0224	<0.0224	<0.0224	----	
Nitrite (as N)	14797-65-0	E235.NO2/WT	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	----	
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L	0.0021	0.0012	0.0013	0.0014	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Anions and Nutrients										
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L	2.08	4.05	3.60	3.58	----	
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	---	E355-L/WT	0.50	mg/L	0.95	0.72	<0.50	<0.50	----	
Ion Balance										
Anion sum	---	EC101/WT	0.10	meq/L	0.45	0.98	0.55	0.55	----	
Cation sum	---	EC101/WT	0.10	meq/L	0.42	0.88	0.56	0.56	----	
Ion balance (cations/anions)	---	EC101/WT	0.010	%	93.3	89.8	102	102	----	
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/WT	0.0010	mg/L	<0.0100 ^{DLHC}	0.0015	0.0043	0.0041	----	
Antimony, dissolved	7440-36-0	E421/WT	0.00010	mg/L	<0.00100 ^{DLHC}	<0.00010	<0.00010	<0.00010	----	
Arsenic, dissolved	7440-38-2	E421/WT	0.00010	mg/L	0.00132 ^{DLHC}	0.0175	0.00409	0.00411	----	
Barium, dissolved	7440-39-3	E421/WT	0.00010	mg/L	0.00222 ^{DLHC}	0.00368	0.00521	0.00515	----	
Beryllium, dissolved	7440-41-7	E421/WT	0.000020	mg/L	<0.000200 ^{DLHC}	<0.000020	<0.000020	<0.000020	----	
Bismuth, dissolved	7440-69-9	E421/WT	0.000050	mg/L	<0.000500 ^{DLHC}	<0.000050	<0.000050	<0.000050	----	
Boron, dissolved	7440-42-8	E421/WT	0.010	mg/L	<0.100 ^{DLHC}	<0.010	<0.010	<0.010	----	
Cadmium, dissolved	7440-43-9	E421/WT	0.0000050	mg/L	<0.0000500 ^{DLHC}	0.0000089	0.0000205	0.0000169	----	
Calcium, dissolved	7440-70-2	E421/WT	0.050	mg/L	2.61 ^{DLHC}	11.8	5.80	5.82	----	
Cesium, dissolved	7440-46-2	E421/WT	0.000010	mg/L	<0.000100 ^{DLHC}	0.000097	0.000013	0.000013	----	
Chromium, dissolved	7440-47-3	E421/WT	0.00050	mg/L	<0.00500 ^{DLHC}	<0.00050	<0.00050	<0.00050	----	
Cobalt, dissolved	7440-48-4	E421/WT	0.00010	mg/L	0.00470 ^{DLHC}	0.00021	0.00104	0.00105	----	
Copper, dissolved	7440-50-8	E421/WT	0.00020	mg/L	0.0101 ^{DLHC}	0.00142	0.00332	0.00229	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Dissolved Metals										
Iron, dissolved	7439-89-6	E421/WT	0.010	mg/L	<0.100 DLHC	<0.010	<0.010	<0.010	<0.010	----
Lead, dissolved	7439-92-1	E421/WT	0.000050	mg/L	<0.000500 DLHC	<0.000050	<0.000050	<0.000050	<0.000050	----
Lithium, dissolved	7439-93-2	E421/WT	0.0010	mg/L	<0.0100 DLHC	<0.0010	0.0010	<0.0010	<0.0010	----
Magnesium, dissolved	7439-95-4	E421/WT	0.0050	mg/L	0.720 DLHC	1.04	0.728	0.726	0.726	----
Manganese, dissolved	7439-96-5	E421/WT	0.00010	mg/L	0.127 DLHC	0.00534	0.0578	0.0595	0.0595	----
Mercury, dissolved	7439-97-6	E509/WT	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
Molybdenum, dissolved	7439-98-7	E421/WT	0.000050	mg/L	<0.000500 DLHC	0.000184	0.000219	0.000212	0.000212	----
Nickel, dissolved	7440-02-0	E421/WT	0.00050	mg/L	0.00756 DLHC	0.00094	0.00319	0.00321	0.00321	----
Phosphorus, dissolved	7723-14-0	E421/WT	0.050	mg/L	<0.500 DLHC	<0.050	<0.050	<0.050	<0.050	----
Potassium, dissolved	7440-09-7	E421/WT	0.050	mg/L	0.679 DLHC	0.859	0.807	0.822	0.822	----
Rubidium, dissolved	7440-17-7	E421/WT	0.00020	mg/L	<0.00200 DLHC	0.00139	0.00140	0.00152	0.00152	----
Selenium, dissolved	7782-49-2	E421/WT	0.000050	mg/L	<0.000500 DLHC	0.000092	0.000062	0.000068	0.000068	----
Silicon (as SiO ₂), dissolved	7440-21-3	EC421.SiO ₂ /WT	0.15	mg/L	12.3	9.09	8.60	8.53	8.53	----
Silicon, dissolved	7440-21-3	E421/WT	0.050	mg/L	5.75 DLHC	4.25	4.02	3.99	3.99	----
Silver, dissolved	7440-22-4	E421/WT	0.000010	mg/L	<0.000100 DLHC	<0.000010	0.000041	0.000048	0.000048	----
Sodium, dissolved	7440-23-5	E421/WT	0.050	mg/L	4.81 DLHC	4.24	4.23	4.21	4.21	----
Strontium, dissolved	7440-24-6	E421/WT	0.00020	mg/L	0.0259 DLHC	0.0452	0.0253	0.0257	0.0257	----
Sulfur, dissolved	7704-34-9	E421/WT	0.50	mg/L	<5.00 DLHC	1.26	1.23	1.26	1.26	----
Tellurium, dissolved	13494-80-9	E421/WT	0.00020	mg/L	<0.00200 DLHC	<0.00020	<0.00020	<0.00020	<0.00020	----
Thallium, dissolved	7440-28-0	E421/WT	0.000010	mg/L	<0.000100 DLHC	<0.000010	<0.000010	<0.000010	<0.000010	----
Thorium, dissolved	7440-29-1	E421/WT	0.00010	mg/L	<0.00100 DLHC	<0.00010	<0.00010	<0.00010	<0.00010	----



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Dissolved Metals										
Tin, dissolved	7440-31-5	E421/WT	0.00010	mg/L	<0.00100 DLHC	<0.00010	<0.00010	<0.00010	<0.00010	----
Titanium, dissolved	7440-32-6	E421/WT	0.00030	mg/L	<0.00300 DLHC	<0.00030	<0.00030	<0.00030	<0.00030	----
Tungsten, dissolved	7440-33-7	E421/WT	0.00010	mg/L	0.197 DLHC	0.00280	0.00367	0.00372	0.00372	----
Uranium, dissolved	7440-61-1	E421/WT	0.000010	mg/L	<0.000100 DLHC	0.000150	0.000064	0.000067	0.000067	----
Vanadium, dissolved	7440-62-2	E421/WT	0.00050	mg/L	<0.00500 DLHC	<0.00050	<0.00050	<0.00050	<0.00050	----
Zinc, dissolved	7440-66-6	E421/WT	0.0010	mg/L	<0.0100 DLHC	0.0026	0.0043	0.0022	0.0022	----
Zirconium, dissolved	7440-67-7	E421/WT	0.00020	mg/L	<0.00200 DLHC	<0.00020	<0.00020	<0.00020	<0.00020	----
Dissolved mercury filtration location	----	EP509/WT	-	-	Field	Field	Field	Field	Field	----
Dissolved metals filtration location	----	EP421/WT	-	-	Field	Field	Field	Field	Field	----
Hydrocarbon Distribution of RBCA mTPH (Tier I) Fractions										
C6-C10 fraction of mTPH	n/a	EC581D/WT	1	%	----	<1	<1	<1	<1	----
>C10-C16 fraction of mTPH	n/a	EC581D/WT	1	%	----	<1	<1	<1	<1	----
>C16-C21 fraction of mTPH	n/a	EC581D/WT	1	%	----	<1	<1	<1	<1	----
>C21-C32 fraction of mTPH	n/a	EC581D/WT	1	%	----	<1	<1	<1	<1	----
Hydrocarbons										
Benzene	71-43-2	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050	<0.00050 VOCH _S	----
Toluene	108-88-3	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050	<0.00050 VOCH _S	----
Ethylbenzene	100-41-4	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050	<0.00050 VOCH _S	----
Xylenes, total	1330-20-7	E611A/WT	0.00050	mg/L	----	<0.00050	<0.00050	<0.00050	<0.00050	----
Xylene, o-	95-47-6	E611A/WT	0.00030	mg/L	----	<0.00030	<0.00030	<0.00030	<0.00030 VOCH _S	----
Xylene, m+p-	179601-23-1	E611A/WT	0.00040	mg/L	----	<0.00040	<0.00040	<0.00040	<0.00040 VOCH _S	----



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Hydrocarbons										
VPH C6-C10	n/a	E581.VPH/WT	0.025	mg/L	----	<0.025	<0.025	<0.025 ^{VOCH_S}	----	
VPH C6-C10 (less BTEX)	n/a	EC580C/WT	0.025	mg/L	----	<0.025	<0.025	<0.025	----	
EPH >C10-C16	n/a	E601F/WT	0.050	mg/L	----	<0.100 ^{RRR}	<0.125 ^{RRR}	<0.050	----	
EPH >C16-C21	n/a	E601F/WT	0.050	mg/L	----	<0.100 ^{RRR}	<0.125 ^{RRR}	<0.050	----	
EPH >C21-C32	n/a	E601F/WT	0.050	mg/L	----	<0.050	<0.050	<0.050	----	
EPH >C34-C50	n/a	E601F/WT	0.10	mg/L	----	<0.10	<0.10	<0.10	----	
hydrocarbon resemblance	n/a	E601F/WT	-	none	----	N/A	N/A	N/A	----	
mTPH (Tier I)	n/a	EC581D/WT	0.090	mg/L	----	<0.150	<0.184	<0.090	----	
return to baseline at C32	n/a	E601F/WT	-	-	----	Yes	Yes	Yes	----	
TEH >C10-C32	n/a	E601F/WT	0.100	mg/L	----	<0.150 ^{RRR}	<0.184 ^{RRR}	<0.100	----	
Hydrocarbons Surrogates										
dotriacontane, n- (EPH)	n/a	E601F/WT	1.0	%	----	67.0	61.4	71.7	----	
isobutylbenzene (EPH)	538-93-2	E601F/WT	1.0	%	----	47.9 ^{RRR}	35.8 ^{RRR}	54.2 ^{SUR-ND}	----	
isobutylbenzene (VPH)	538-93-2	E581.VPH/WT	1.0	%	----	97.9	105	96.5	----	
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/WT	1.0	%	----	102	106	102	----	
Difluorobenzene, 1,4-	540-36-3	E611A/WT	1.0	%	----	94.9	94.0	94.5	----	
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Acenaphthylene	208-96-8	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Acridine	260-94-6	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time	23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----	
					Result	Result	Result	Result	----	
Polycyclic Aromatic Hydrocarbons										
Anthracene	120-12-7	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Benz(a)anthracene	56-55-3	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Benzo(a)pyrene	50-32-8	E641A-L/WT	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	----	
Benzo(b+j)fluoranthene	n/a	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Benzo(b+j+k)fluoranthene	n/a	E641A-L/WT	0.015	µg/L	<0.015	<0.015	<0.015	<0.015	----	
Benzo(g,h,i)perylene	191-24-2	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Benzo(k)fluoranthene	207-08-9	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Chrysene	218-01-9	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Dibenz(a,h)anthracene	53-70-3	E641A-L/WT	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	----	
Fluoranthene	206-44-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Fluorene	86-73-7	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Methylnaphthalene, 1-	90-12-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Methylnaphthalene, 1+2-	----	E641A-L/WT	0.015	µg/L	<0.015	<0.015	<0.015	<0.015	----	
Methylnaphthalene, 2-	91-57-6	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Naphthalene	91-20-3	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Perylene	198-55-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Phenanthrene	85-01-8	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Pyrene	129-00-0	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	
Quinoline	91-22-5	E641A-L/WT	0.010	µg/L	<0.010	<0.020 ^{DLM}	<0.010	<0.033 ^{RRR}	----	
B(a)P total potency equivalents [B(a)P TPE]	----	E641A-L/WT	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID				
					MW23-1	MW23-2	MW23-3	DUP A	----
					Client sampling date / time				
					23-Sep-2024 12:20	23-Sep-2024 11:35	23-Sep-2024 10:50	23-Sep-2024 10:50	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-001	HA2402324-002	HA2402324-003	HA2402324-004	----
					Result	Result	Result	Result	----
Polycyclic Aromatic Hydrocarbons Surrogates									
Chrysene-d12	1719-03-5	E641A-L/WT	0.1	%	97.5	98.0	106	98.8	----
Naphthalene-d8	1146-65-2	E641A-L/WT	0.1	%	85.7	83.2	90.8	119	----
Phenanthrene-d10	1517-22-2	E641A-L/WT	0.1	%	106	106	113	123	----

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

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

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

					Client sample ID				
					24SS1	24SS2	24SS3	24SS4	24SS5
					Client sampling date / time				
					23-Sep-2024 10:21	23-Sep-2024 11:24	23-Sep-2024 14:41	23-Sep-2024 13:28	23-Sep-2024 11:55
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-005	HA2402324-006	HA2402324-007	HA2402324-008	HA2402324-009
					Result	Result	Result	Result	Result
Sample Data									
Dummy analyte	----	HOLD/HA	-	-	----	----	----	----	NR
Metals									
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	824	30.5	330	150	1.85
SPLP Metals									
Arsenic, leachable	7440-38-2	E445/WT	0.00010	mg/L	0.120	----	<0.00100	<0.00100	----
pH, SPLP extraction fluid initial	----	EPP445/WT	0.010	pH units	5.22	----	5.07	4.88	----
pH, SPLP final	----	EPP445/WT	0.010	pH units	5.01	----	5.01	5.03	----

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

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	24SS6	24SS7	24SS8	24SS9	24SS10
					Client sampling date / time	23-Sep-2024 14:12	23-Sep-2024 13:39	23-Sep-2024 12:28	23-Sep-2024 14:00	23-Sep-2024 13:48
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-010	HA2402324-011	HA2402324-012	HA2402324-013	HA2402324-014	
					Result	Result	Result	Result	Result	
Sample Data										
Dummy analyte	----	HOLD/HA	-	-	NR	NR	NR	NR	NR	
Metals										
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	214	----	----	----	----	

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

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	DUPA	DUPB	24SS1-A	DUPA-A	24SS5 (AA)
					Client sampling date / time	23-Sep-2024 10:21	23-Sep-2024 13:48	23-Sep-2024 10:21	23-Sep-2024 10:21	23-Sep-2024 11:55
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	HA2402324-015	HA2402324-016	HA2402324-017	HA2402324-018	HA2402324-019	
					Result	Result	Result	Result	Result	
Sample Data										
Dummy analyte	----	HOLD/HA	-	-	----	NR	----	----	----	
Metals										
Arsenic	7440-38-2	E440/WT	0.10	mg/kg	113	----	876	177	62.4 ^{RRA}	

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

Please refer to the Accreditation section for an explanation of analyte accreditations.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : HA2402324</p> <p>Amendment : 2</p> <p>Client : Dillon Consulting Limited</p> <p>Contact : Asia Reid</p> <p>Address : 137 Chain Lake Drive Halifax NS Canada B3S 1B3</p> <p>Telephone : 902.450.5015 ext. 5045</p> <p>Project : 236446</p> <p>PO : ----</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : Build NS (Mill Village)</p> <p>Quote number : HA23-DICL100-11 - Build NS (Mill Village)</p> <p>No. of samples received : 19</p> <p>No. of samples analysed : 19</p>	<p>Page : 1 of 23</p> <p>Laboratory : ALS Environmental - Halifax</p> <p>Account Manager : Andrew Martin</p> <p>Address : 13-100 Wright Ave Dartmouth, Nova Scotia Canada B3B 1L2</p> <p>Telephone : +1 902 707 4888</p> <p>Date Samples Received : 25-Sep-2024 16:05</p> <p>Issue Date : 06-Nov-2024 10:51</p>
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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 Laboratory Control Sample (LCS) outliers occur
- 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.
- Test sample Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

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	Anonymous	Anonymous	Arsenic	7440-38-2	E440	44.8 % 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.

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Polycyclic Aromatic Hydrocarbons	QC-MRG3-1680705 001	----	Quinoline	91-22-5	E641A-L	0.034 ^B µg/L	0.01 µg/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.

Regular Sample Surrogates

Sub-Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Result	Limits	Comment
Samples Submitted							
Hydrocarbons Surrogates	HA2402324-002	MW23-2	isobutylbenzene (EPH)	538-93-2	47.9 %	60.0-140 %	Recovery less than lower data quality objective
Hydrocarbons Surrogates	HA2402324-003	MW23-3	isobutylbenzene (EPH)	538-93-2	35.8 %	60.0-140 %	Recovery less than lower data quality objective
Hydrocarbons Surrogates	HA2402324-004	DUP A	isobutylbenzene (EPH)	538-93-2	54.2 %	60.0-140 %	Recovery less than lower data quality objective



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 : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS1-A	E440	23-Sep-2024	16-Oct-2024	180 days	23 days	✔	16-Oct-2024	180 days	23 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS5	E440	23-Sep-2024	16-Oct-2024	180 days	23 days	✔	16-Oct-2024	180 days	23 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS6	E440	23-Sep-2024	16-Oct-2024	180 days	23 days	✔	16-Oct-2024	180 days	23 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap DUPA-A	E440	23-Sep-2024	17-Oct-2024	180 days	25 days	✔	18-Oct-2024	180 days	25 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS5 (AA)	E440	23-Sep-2024	30-Oct-2024	180 days	37 days	✔	30-Oct-2024	180 days	37 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS1	E440	23-Sep-2024	01-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS2	E440	23-Sep-2024	01-Oct-2024	180 days	9 days	✔	02-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 24SS3	E440	23-Sep-2024	02-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap 24SS4	E440	23-Sep-2024	02-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap DUPA	E440	23-Sep-2024	02-Oct-2024	180 days	9 days	✔	02-Oct-2024	180 days	9 days	✔	
Sample Data : Sample Hold Fee for Soil/Solid											
Glass soil jar/Teflon lined cap 24SS10	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days		
Sample Data : Sample Hold Fee for Soil/Solid											
Glass soil jar/Teflon lined cap 24SS5	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days		
Sample Data : Sample Hold Fee for Soil/Solid											
Glass soil jar/Teflon lined cap 24SS6	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days		
Sample Data : Sample Hold Fee for Soil/Solid											
Glass soil jar/Teflon lined cap 24SS7	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days		
Sample Data : Sample Hold Fee for Soil/Solid											
Glass soil jar/Teflon lined cap 24SS8	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days		
Sample Data : Sample Hold Fee for Soil/Solid											
Glass soil jar/Teflon lined cap 24SS9	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	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		
Sample Data : Sample Hold Fee for Soil/Solid											
Glass soil jar/Teflon lined cap DUPB	HOLD	23-Sep-2024	----	----	----		03-Oct-2024	----	10 days		
SPLP Metals : Metals by CRC ICPMS (SPLP)											
HDPE - total (lab preserved) 24SS1	E445	30-Oct-2024	31-Oct-2024	217 days	38 days	✓	31-Oct-2024	217 days	38 days	✓	
SPLP Metals : Metals by CRC ICPMS (SPLP)											
HDPE - total (lab preserved) 24SS3	E445	30-Oct-2024	31-Oct-2024	217 days	38 days	✓	31-Oct-2024	217 days	38 days	✓	
SPLP Metals : Metals by CRC ICPMS (SPLP)											
HDPE - total (lab preserved) 24SS4	E445	30-Oct-2024	31-Oct-2024	217 days	38 days	✓	31-Oct-2024	217 days	38 days	✓	
SPLP Metals : SPLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) 24SS1	EPP445	23-Sep-2024	30-Oct-2024	----	----		----	14 days	37 days	* EHT	
SPLP Metals : SPLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) 24SS3	EPP445	23-Sep-2024	30-Oct-2024	----	----		----	14 days	37 days	* EHT	
SPLP Metals : SPLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) 24SS4	EPP445	23-Sep-2024	30-Oct-2024	----	----		----	14 days	37 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 : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) DUP A	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 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) MW23-1	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW23-2	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW23-3	E298	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE DUP A	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW23-1	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW23-2	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW23-3	E235.Cl	23-Sep-2024	26-Sep-2024	28 days	3 days	✔	27-Sep-2024	28 days	4 days	✔
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE DUP A	E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✔	26-Sep-2024	3 days	3 days	✔
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE MW23-1	E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✔	26-Sep-2024	3 days	3 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 : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)											
HDPE MW23-2	E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	26-Sep-2024	3 days	3 days	✓	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)											
HDPE MW23-3	E378-U	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	26-Sep-2024	3 days	3 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE DUP A	E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE MW23-1	E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE MW23-2	E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE MW23-3	E235.F	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Nitrate in Water by IC											
HDPE DUP A	E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	* EHT	
Anions and Nutrients : Nitrate in Water by IC											
HDPE MW23-1	E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	* EHT	
Anions and Nutrients : Nitrate in Water by IC											
HDPE MW23-2	E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 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 : Nitrate in Water by IC											
HDPE MW23-3	E235.NO3	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC											
HDPE DUP A	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC											
HDPE MW23-1	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC											
HDPE MW23-2	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC											
HDPE MW23-3	E235.NO2	23-Sep-2024	26-Sep-2024	3 days	3 days	✓	27-Sep-2024	3 days	4 days	*	EHT
Anions and Nutrients : Sulfate in Water by IC											
HDPE DUP A	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE MW23-1	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE MW23-2	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE MW23-3	E235.SO4	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 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		
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) DUP A	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) MW23-1	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) MW23-2	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) MW23-3	E509	23-Sep-2024	27-Sep-2024	28 days	4 days	✓	30-Sep-2024	28 days	7 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) DUP A	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) MW23-1	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) MW23-2	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) MW23-3	E421	23-Sep-2024	26-Sep-2024	180 days	3 days	✓	26-Sep-2024	180 days	3 days	✓	
Hydrocarbons : EPH in Water by GC-FID (RBCA)											
Amber glass/Teflon lined cap (sodium bisulfate) DUP A	E601F	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	01-Oct-2024	40 days	5 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	
Hydrocarbons : EPH in Water by GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-2	E601F	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	01-Oct-2024	40 days	5 days	✓
Hydrocarbons : EPH in Water by GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-3	E601F	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	01-Oct-2024	40 days	5 days	✓
Hydrocarbons : VPH by Headspace GC-FID (RBCA)										
Amber glass/Teflon lined cap (sodium bisulfate) DUP A	E581.VPH	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 days	✓
Hydrocarbons : VPH by Headspace GC-FID (RBCA)										
Glass vial (sodium bisulfate) MW23-2	E581.VPH	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 days	✓
Hydrocarbons : VPH by Headspace GC-FID (RBCA)										
Glass vial (sodium bisulfate) MW23-3	E581.VPH	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) DUP A	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW23-3	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	27-Sep-2024	28 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW23-1	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	28-Sep-2024	28 days	5 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW23-2	E355-L	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	28-Sep-2024	28 days	5 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 DUP A	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW23-1	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW23-2	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW23-3	E290	23-Sep-2024	26-Sep-2024	14 days	3 days	✓	26-Sep-2024	14 days	3 days	✓
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE MW23-1	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	96 hrs	* EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE DUP A	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	97 hrs	* EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE MW23-2	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	97 hrs	* EHTR
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE MW23-3	E330	23-Sep-2024	----	----	----		27-Sep-2024	48 hrs	97 hrs	* EHTR
Physical Tests : Conductivity in Water										
HDPE DUP A	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 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 MW23-1	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE MW23-2	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE MW23-3	E100	23-Sep-2024	26-Sep-2024	28 days	3 days	✓	26-Sep-2024	28 days	3 days	✓	
Physical Tests : pH by Meter											
HDPE MW23-1	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	72 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE MW23-2	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	73 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE DUP A	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	75 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE MW23-3	E108	23-Sep-2024	26-Sep-2024	0.25 hrs	74 hrs	* EHTR-FM	26-Sep-2024	0.25 hrs	75 hrs	* EHTR-FM	
Physical Tests : TDS by Gravimetry											
HDPE DUP A	E162	23-Sep-2024	----	----	----		30-Sep-2024	7 days	7 days	✓	
Physical Tests : TDS by Gravimetry											
HDPE MW23-1	E162	23-Sep-2024	----	----	----		30-Sep-2024	7 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	
Physical Tests : TDS by Gravimetry										
HDPE MW23-2	E162	23-Sep-2024	----	----	----		30-Sep-2024	7 days	7 days	✔
Physical Tests : TDS by Gravimetry										
HDPE MW23-3	E162	23-Sep-2024	----	----	----		30-Sep-2024	7 days	7 days	✔
Physical Tests : Turbidity by Nephelometry										
HDPE DUP A	E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Physical Tests : Turbidity by Nephelometry										
HDPE MW23-1	E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Physical Tests : Turbidity by Nephelometry										
HDPE MW23-2	E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Physical Tests : Turbidity by Nephelometry										
HDPE MW23-3	E121	23-Sep-2024	----	----	----		26-Sep-2024	3 days	3 days	✔
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-1	E641A-L	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	30-Sep-2024	40 days	3 days	✔
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-2	E641A-L	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	30-Sep-2024	40 days	3 days	✔
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)										
Amber glass/Teflon lined cap (sodium bisulfate) MW23-3	E641A-L	23-Sep-2024	27-Sep-2024	14 days	4 days	✔	30-Sep-2024	40 days	3 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	
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS (Low Level)										
Amber glass/Teflon lined cap (sodium bisulfate) DUP A	E641A-L	23-Sep-2024	30-Sep-2024	14 days	7 days	✓	01-Oct-2024	40 days	1 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP A	E611A	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW23-2	E611A	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW23-3	E611A	23-Sep-2024	27-Sep-2024	14 days	4 days	✓	27-Sep-2024	14 days	4 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	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Metals by CRC ICPMS (SPLP)	E445	1742383	1	14	7.1	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1676573	4	15	26.6	5.0	✔
Laboratory Control Samples (LCS)							
Metals by CRC ICPMS (SPLP)	E445	1742383	1	14	7.1	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1676573	8	15	53.3	10.0	✔
Method Blanks (MB)							
Metals by CRC ICPMS (SPLP)	E445	1742383	1	14	7.1	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1676573	4	15	26.6	5.0	✔
Matrix Spikes (MS)							
Metals by CRC ICPMS (SPLP)	E445	1742383	1	14	7.1	5.0	✔

Matrix: **Water**

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)							
Alkalinity Species by Titration	E290	1673965	1	20	5.0	5.0	✔
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✔
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1677011	1	20	5.0	5.0	✔
Conductivity in Water	E100	1673964	1	20	5.0	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✔
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✔
pH by Meter	E108	1673963	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1680696	1	19	5.2	5.2	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✔
Turbidity by Nephelometry	E121	1673870	1	20	5.0	5.0	✔
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1673965	1	20	5.0	5.0	✔
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✔



Matrix: **Water** 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 Control Samples (LCS) - Continued							
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✔
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1677011	1	20	5.0	5.0	✔
Conductivity in Water	E100	1673964	1	20	5.0	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✔
EPH in Water by GC-FID (RBCA)	E601F	1673907	1	7	14.2	5.0	✔
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✔
PAHs in Water by Hexane LVI GC-MS (Low Level)	E641A-L	1676593	2	4	50.0	5.0	✔
pH by Meter	E108	1673963	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1680696	1	19	5.2	5.2	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✔
Turbidity by Nephelometry	E121	1673870	1	20	5.0	5.0	✔
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1673965	1	20	5.0	5.0	✔
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✔
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1677011	1	20	5.0	5.0	✔
Conductivity in Water	E100	1673964	1	20	5.0	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✔
EPH in Water by GC-FID (RBCA)	E601F	1673907	1	7	14.2	5.0	✔
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✔
PAHs in Water by Hexane LVI GC-MS (Low Level)	E641A-L	1676593	2	4	50.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1680696	1	19	5.2	5.2	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✔
Turbidity by Nephelometry	E121	1673870	1	20	5.0	5.0	✔
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	5.0	✔
Matrix Spikes (MS)							



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

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
Matrix Spikes (MS) - Continued							
Ammonia by Fluorescence	E298	1675226	2	40	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1677839	1	12	8.3	5.0	✔
Chloride in Water by IC	E235.Cl	1673961	1	20	5.0	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1676636	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1673995	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1673966	1	14	7.1	5.0	✔
Fluoride in Water by IC	E235.F	1673958	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1673959	1	20	5.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1673960	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1673962	1	20	5.0	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1675224	2	36	5.5	5.0	✔
VPH by Headspace GC-FID (RBCA)	E581.VPH	1677838	1	12	8.3	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
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Waterloo	Soil/Solid	EPA 6020B (mod)	<p>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.</p> <p>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.</p> <p>Analysis is by Collision/Reaction Cell ICPMS.</p>
Metals by CRC ICPMS (SPLP)	E445 ALS Environmental - Waterloo	Soil/Solid	EPA 1312/6020B (mod)	<p>The sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using water adjusted to pH 5.0 or pH 4.20 (depending of the sampling location relative to the Mississippi river). The extract is filtered through a 0.6 to 0.8 micron glass fibre filter, then analyzed by Collision/Reaction Cell ICPMS.</p>
Sample Hold Fee for Soil/Solid	HOLD ALS Environmental - Halifax	Soil/Solid		<p>Fee for storing sample to meet sample integrity requirements and holding times.</p>
Conductivity in Water	E100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	<p>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.</p>
pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	<p>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.</p>
Turbidity by Nephelometry	E121 ALS Environmental - Waterloo	Water	APHA 2130 B (mod)	<p>Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.</p>
TDS by Gravimetry	E162 ALS Environmental - Halifax	Water	APHA 2540 C (mod)	<p>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.</p>
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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 inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. 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.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Waterloo	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 ALS Environmental - Waterloo	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
VPH by Headspace GC-FID (RBCA)	E581.VPH ALS Environmental - Waterloo	Water	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 Water by GC-FID (RBCA)	E601F ALS Environmental - Waterloo	Water	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	Water	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 Water by Hexane LVI GC-MS (Low Level)	E641A-L ALS Environmental - Waterloo	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Waterloo	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. 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-D)	EC105 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. If available, Field pH measurements are recommended for best accuracy (test code EC104).
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
Dissolved Silicon as Silica (Calculation)	EC421.SiO2 ALS Environmental - Waterloo	Water	N/A	Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).
VPH C6-C10 (less BTEX) [RBCA]	EC580C ALS Environmental - Waterloo	Water	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	Water	Atlantic RBCA Version 3.1	Modified TPH (PIRI), Tier I is the sum of PIRI Fraction (C6 - C10 - BTEX) + (>C10 - C16) + (>C16 - C21) + (>C21 - C32).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
SPLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP445 ALS Environmental - Waterloo	Soil/Solid	EPA 1312	Preparation of a Synthetic Precipitation Leaching Procedure (SPLP) leachate. In summary, a measured portion of fresh subsample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using water adjusted to pH 5.0 or pH 4.20 (depending on the sampling location relative to the Mississippi river) by adding drops of a 60/40 weight % mixture of sulfuric and nitric acids. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter then bottled and prepared for analytical 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
Dissolved Metals Water Filtration	EP421 ALS Environmental - Waterloo	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Waterloo	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Waterloo	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into a GC-MS-FID.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.
PHCs Hexane Extraction (RBCA)	EP601F ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: HA2402324	Page	: 1 of 19
Amendment	: 2		
Client	: Dillon Consulting Limited	Laboratory	: ALS Environmental - Halifax
Contact	: Asia Reid	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	: 902.450.5015 ext. 5045	Telephone	: +1 902 707 4888
Project	: 236446	Date Samples Received	: 25-Sep-2024 16:05
PO	: ----	Date Analysis Commenced	: 26-Sep-2024
C-O-C number	: ----	Issue Date	: 06-Nov-2024 10:51
Sampler	: ----		
Site	: Build NS (Mill Village)		
Quote number	: HA23-DICL100-11 - Build NS (Mill Village)		
No. of samples received	: 19		
No. of samples analysed	: 19		

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>
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Jeremy Gingras	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Waterloo Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Halifax Administration, Dartmouth, Nova Scotia
Jon Fisher	Production Manager, Environmental	Halifax Inorganics, Dartmouth, Nova Scotia
Jon Fisher	Production Manager, Environmental	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Waterloo Metals, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Metals, Waterloo, Ontario
Robert Braun	Soils Team Supervisor	Waterloo Inorganics, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo VOC, 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
Metals (QC Lot: 1676573)											
HA2402306-001	Anonymous	Arsenic	7440-38-2	E440	0.10	mg/kg	7.68	12.1	44.8%	30%	DUP-H
Metals (QC Lot: 1677133)											
HA2402324-007	24SS3	Arsenic	7440-38-2	E440	0.10	mg/kg	330	312	5.46%	30%	----
Metals (QC Lot: 1708168)											
HA2402324-009	24SS5	Arsenic	7440-38-2	E440	0.10	mg/kg	1.85	1.63	12.9%	30%	----
Metals (QC Lot: 1713228)											
HA2402324-018	DUPA-A	Arsenic	7440-38-2	E440	0.10	mg/kg	177	161	9.54%	30%	----
SPLP Metals (QC Lot: 1742383)											
HA2402687-011	Anonymous	Arsenic, leachable	7440-38-2	E445	0.00100	mg/L	<1.00 µg/L	0.00110	0.00010	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: 1673870)											
HA2402293-003	Anonymous	Turbidity	----	E121	0.10	NTU	1.69	1.77	4.63%	15%	----
Physical Tests (QC Lot: 1673963)											
HA2402324-002	MW23-2	pH	----	E108	0.10	pH units	6.64	6.63	0.151%	4%	----
Physical Tests (QC Lot: 1673964)											
HA2402324-002	MW23-2	Conductivity	----	E100	1.0	µS/cm	99.9	101	0.798%	10%	----
Physical Tests (QC Lot: 1673965)											
HA2402324-002	MW23-2	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	36.6	37.1	1.47%	20%	----
Physical Tests (QC Lot: 1677011)											
HA2402049-001	Anonymous	Colour, apparent	----	E330	20.0	CU	1200	1230	2.41%	20%	----
Physical Tests (QC Lot: 1680696)											
HA2402323-001	Anonymous	Solids, total dissolved [TDS]	----	E162	10	mg/L	17	21	4	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1673958)											
HA2402324-001	MW23-1	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.027	0.025	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1673959)											
HA2402324-001	MW23-1	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: 1673960)											
HA2402324-001	MW23-1	Nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<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
Anions and Nutrients (QC Lot: 1673961)											
HA2402324-001	MW23-1	Chloride	16887-00-6	E235.Cl	0.50	mg/L	6.11	5.87	3.98%	20%	----
Anions and Nutrients (QC Lot: 1673962)											
HA2402324-001	MW23-1	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.08	1.83	0.25	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1673966)											
HA2402324-001	MW23-1	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0021	0.0019	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1675226)											
HA2402293-005	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1675369)											
HA2402324-003	MW23-3	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0059	0.0061	0.0002	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1675224)											
HA2402293-004	Anonymous	Carbon, total organic [TOC]	----	E355-L	2.50	mg/L	22.7	22.2	0.48	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1675370)											
HA2402324-004	DUP A	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	0.70	0.20	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1673995)											
HA2402324-001	MW23-1	Aluminum, dissolved	7429-90-5	E421	0.0100	mg/L	<0.0100	0.0158	0.0058	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00100	mg/L	0.00132	0.00130	0.00002	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00100	mg/L	0.00222	0.00224	0.00002	Diff <2x LOR	----
		Beryllium, dissolved	7440-41-7	E421	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.500	mg/L	2.61	2.56	0.053	Diff <2x LOR	----
		Cesium, dissolved	7440-46-2	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00100	mg/L	0.00470	0.00478	0.00008	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00200	mg/L	0.0101	0.0107	0.00058	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0500	mg/L	0.720	0.730	1.24%	20%	----
Manganese, dissolved	7439-96-5	E421	0.00100	mg/L	0.127	0.126	0.723%	20%	----		
Molybdenum, dissolved	7439-98-7	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----		
Nickel, dissolved	7440-02-0	E421	0.00500	mg/L	0.00756	0.00739	0.00017	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
Dissolved Metals (QC Lot: 1673995) - continued											
HA2402324-001	MW23-1	Phosphorus, dissolved	7723-14-0	E421	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.500	mg/L	0.679	0.654	0.025	Diff <2x LOR	----
		Rubidium, dissolved	7440-17-7	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.500	mg/L	5.75	5.83	1.38%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.500	mg/L	4.81	4.82	0.010	Diff <2x LOR	----
		Strontium, dissolved	7440-24-6	E421	0.00200	mg/L	0.0259	0.0262	0.946%	20%	----
		Sulfur, dissolved	7704-34-9	E421	5.00	mg/L	<5.00	<5.00	0	Diff <2x LOR	----
		Tellurium, dissolved	13494-80-9	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00300	mg/L	<0.00300	<0.00300	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00100	mg/L	0.197	0.200	1.46%	20%	----
		Uranium, dissolved	7440-61-1	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
Vanadium, dissolved	7440-62-2	E421	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----		
Zinc, dissolved	7440-66-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----		
Zirconium, dissolved	7440-67-7	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----		
Dissolved Metals (QC Lot: 1676636)											
HA2402324-001	MW23-1	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1677839)											
HA2402307-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.00040 mg/L	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.00030 mg/L	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1677838)											
HA2402307-001	Anonymous	VPH C6-C10	n/a	E581.VPH	25	µg/L	<0.025 mg/L	<25	0	Diff <2x LOR	----



Qualifiers

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



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: 1676573)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Metals (QCLot: 1677133)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Metals (QCLot: 1708168)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Metals (QCLot: 1713228)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
SPLP Metals (QCLot: 1742383)						
Arsenic, leachable	7440-38-2	E445	0.0001	mg/L	<0.00100	----

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1673870)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 1673964)						
Conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 1673965)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.5	----
Physical Tests (QCLot: 1677011)						
Colour, apparent	----	E330	2	CU	<2.0	----
Physical Tests (QCLot: 1680696)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 1673958)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1673959)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1673960)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 1673961)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1673962)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 1673966)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1675226)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1675369)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 1675224)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1675370)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1673995)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1673995) - continued						
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1676636)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Volatile Organic Compounds (QCLot: 1677839)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1673907)						
EPH >C10-C16	n/a	E601F	50	µg/L	<50	----
EPH >C16-C21	n/a	E601F	50	µg/L	<50	----
EPH >C21-C32	n/a	E601F	50	µg/L	<50	----
EPH >C34-C50	n/a	E601F	100	µg/L	<100	----
Hydrocarbons (QCLot: 1677838)						
VPH C6-C10	n/a	E581.VPH	25	µg/L	<25	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593)						
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A-L	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	<0.010	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593) - continued						
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	<0.010	----
Perylene	198-55-0	E641A-L	0.01	µg/L	<0.010	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	<0.010	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	<0.010	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705)						
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A-L	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	<0.010	----
Perylene	198-55-0	E641A-L	0.01	µg/L	<0.010	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705) - continued						
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	<0.010	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	# 0.034	B

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
Metals (QCLot: 1676573)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Metals (QCLot: 1677133)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	----
Metals (QCLot: 1708168)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Metals (QCLot: 1713228)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	----
SPLP Metals (QCLot: 1742383)									
Arsenic, leachable	7440-38-2	E445	0.0001	mg/L	0.05 mg/L	105	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
Physical Tests (QCLot: 1673870)									
Turbidity	----	E121	0.1	NTU	200 NTU	96.0	85.0	115	----
Physical Tests (QCLot: 1673963)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 1673964)									
Conductivity	----	E100	1	µS/cm	1410 µS/cm	104	90.0	110	----
Physical Tests (QCLot: 1673965)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	150 mg/L	101	85.0	115	----
Physical Tests (QCLot: 1677011)									
Colour, apparent	----	E330	2	CU	25 CU	99.7	70.0	130	----
Physical Tests (QCLot: 1680696)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	88.3	85.0	115	----
Anions and Nutrients (QCLot: 1673958)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	108	90.0	110	----
Anions and Nutrients (QCLot: 1673959)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	99.6	90.0	110	----
Anions and Nutrients (QCLot: 1673960)									



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: 1673960) - continued									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 1673961)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 1673962)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1673966)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	98.8	80.0	120	----
Anions and Nutrients (QCLot: 1675226)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.7	85.0	115	----
Anions and Nutrients (QCLot: 1675369)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	96.0	85.0	115	----
Organic / Inorganic Carbon (QCLot: 1675224)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1675370)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	102	80.0	120	----
Dissolved Metals (QCLot: 1673995)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	0.1 mg/L	93.2	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	0.05 mg/L	100.0	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	0.05 mg/L	101	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.012 mg/L	104	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.005 mg/L	98.6	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	0.05 mg/L	96.2	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	0.05 mg/L	97.6	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.005 mg/L	98.7	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	2.5 mg/L	97.6	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.002 mg/L	102	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.012 mg/L	93.7	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.012 mg/L	93.5	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.012 mg/L	92.5	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	0.05 mg/L	93.8	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.025 mg/L	97.6	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.012 mg/L	95.6	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	2.5 mg/L	98.0	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.012 mg/L	95.1	80.0	120	----



Sub-Matrix: Water

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Target Concentration	LCS	Low	High	
Dissolved Metals (QCLot: 1673995) - continued									
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.012 mg/L	98.3	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.025 mg/L	92.3	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	0.5 mg/L	98.5	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	2.5 mg/L	96.1	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.005 mg/L	97.7	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	0.05 mg/L	97.7	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	0.5 mg/L	103	60.0	140	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.005 mg/L	93.6	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	2.5 mg/L	94.4	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.012 mg/L	99.0	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	2.5 mg/L	101	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.005 mg/L	96.2	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	0.05 mg/L	97.6	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.005 mg/L	97.0	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.025 mg/L	101	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.012 mg/L	94.4	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.005 mg/L	103	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0 mg/L	101	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.025 mg/L	96.4	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.025 mg/L	93.7	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.005 mg/L	98.0	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	90.6	80.0	120	----
Volatile Organic Compounds (QCLot: 1677839)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	98.9	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	93.3	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	94.1	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	94.7	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	95.5	70.0	130	----
Hydrocarbons (QCLot: 1673907)									
EPH >C10-C16	n/a	E601F	50	µg/L	3620 µg/L	83.9	70.0	130	----
EPH >C16-C21	n/a	E601F	50	µg/L	3100 µg/L	92.4	70.0	130	----
EPH >C21-C32	n/a	E601F	50	µg/L	2800 µg/L	88.0	70.0	130	----
EPH >C34-C50	n/a	E601F	100	µg/L	3720 µg/L	87.4	70.0	130	----
Hydrocarbons (QCLot: 1677838)									



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 1677838) - continued									
VPH C6-C10	n/a	E581.VPH	25	µg/L	2000 µg/L	95.6	80.0	120	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1676593)									
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	0.526 µg/L	100	50.0	140	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	0.526 µg/L	95.6	50.0	140	----
Acridine	260-94-6	E641A-L	0.01	µg/L	0.526 µg/L	99.8	50.0	140	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	0.526 µg/L	95.9	50.0	140	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	0.526 µg/L	116	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	0.526 µg/L	101	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	0.526 µg/L	110	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	0.526 µg/L	104	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	0.526 µg/L	108	50.0	140	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	0.526 µg/L	116	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	0.526 µg/L	115	50.0	140	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	0.526 µg/L	118	50.0	140	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	0.526 µg/L	108	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	0.526 µg/L	115	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	0.526 µg/L	97.6	50.0	140	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	0.526 µg/L	97.7	50.0	140	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	0.526 µg/L	86.5	50.0	140	----
Perylene	198-55-0	E641A-L	0.01	µg/L	0.526 µg/L	105	50.0	140	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	0.526 µg/L	112	50.0	140	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	0.526 µg/L	109	50.0	140	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	0.526 µg/L	108	50.0	140	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705)									
Acenaphthene	83-32-9	E641A-L	0.01	µg/L	0.526 µg/L	115	50.0	140	----
Acenaphthylene	208-96-8	E641A-L	0.01	µg/L	0.526 µg/L	110	50.0	140	----
Acridine	260-94-6	E641A-L	0.01	µg/L	0.526 µg/L	88.2	50.0	140	----
Anthracene	120-12-7	E641A-L	0.01	µg/L	0.526 µg/L	111	50.0	140	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	0.526 µg/L	106	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	0.526 µg/L	113	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	0.526 µg/L	113	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	0.526 µg/L	132	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	0.526 µg/L	116	50.0	140	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	0.526 µg/L	112	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	0.526 µg/L	116	50.0	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
Polycyclic Aromatic Hydrocarbons (QCLot: 1680705) - continued									
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	0.526 µg/L	127	50.0	140	----
Fluorene	86-73-7	E641A-L	0.01	µg/L	0.526 µg/L	117	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	0.526 µg/L	134	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A-L	0.01	µg/L	0.526 µg/L	112	50.0	140	----
Methylnaphthalene, 2-	91-57-6	E641A-L	0.01	µg/L	0.526 µg/L	117	50.0	140	----
Naphthalene	91-20-3	E641A-L	0.01	µg/L	0.526 µg/L	114	50.0	140	----
Perylene	198-55-0	E641A-L	0.01	µg/L	0.526 µg/L	122	50.0	140	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	0.526 µg/L	126	50.0	140	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	0.526 µg/L	126	50.0	140	----
Quinoline	91-22-5	E641A-L	0.01	µg/L	0.526 µg/L	117	50.0	140	----



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**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
SPLP Metals (QCLot: 1742383)										
HA2402687-011	Anonymous	Arsenic, leachable	7440-38-2	E445	5.23 mg/L	5 mg/L	105	50.0	140	----

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: 1673958)										
HA2402324-001	MW23-1	Fluoride	16984-48-8	E235.F	0.984 mg/L	1 mg/L	98.4	75.0	125	----
Anions and Nutrients (QCLot: 1673959)										
HA2402324-001	MW23-1	Nitrate (as N)	14797-55-8	E235.NO3	2.45 mg/L	2.5 mg/L	98.0	75.0	125	----
Anions and Nutrients (QCLot: 1673960)										
HA2402324-001	MW23-1	Nitrite (as N)	14797-65-0	E235.NO2	0.493 mg/L	0.5 mg/L	98.6	75.0	125	----
Anions and Nutrients (QCLot: 1673961)										
HA2402324-001	MW23-1	Chloride	16887-00-6	E235.Cl	97.8 mg/L	100 mg/L	97.8	75.0	125	----
Anions and Nutrients (QCLot: 1673962)										
HA2402324-001	MW23-1	Sulfate (as SO4)	14808-79-8	E235.SO4	99.5 mg/L	100 mg/L	99.5	75.0	125	----
Anions and Nutrients (QCLot: 1673966)										
HA2402324-001	MW23-1	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0203 mg/L	0.02 mg/L	104	70.0	130	----
Anions and Nutrients (QCLot: 1675226)										
HA2402293-005	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.102 mg/L	0.1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1675369)										
HA2402324-003	MW23-3	Ammonia, total (as N)	7664-41-7	E298	0.101 mg/L	0.1 mg/L	101	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1675224)										
HA2402293-004	Anonymous	Carbon, total organic [TOC]	----	E355-L	ND mg/L	----	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1675370)										
HA2402324-004	DUP A	Carbon, total organic [TOC]	----	E355-L	5.65 mg/L	5 mg/L	113	70.0	130	----
Dissolved Metals (QCLot: 1673995)										
HA2402324-002	MW23-2	Aluminum, dissolved	7429-90-5	E421	0.0932 mg/L	0.1 mg/L	93.2	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0517 mg/L	0.05 mg/L	103	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0540 mg/L	0.05 mg/L	108	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0130 mg/L	0.012 mg/L	104	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.00522 mg/L	0.005 mg/L	104	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0467 mg/L	0.05 mg/L	93.4	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.050 mg/L	0.05 mg/L	100	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
Dissolved Metals (QCLot: 1673995) - continued										
HA2402324-002	MW23-2	Cadmium, dissolved	7440-43-9	E421	0.00528 mg/L	0.005 mg/L	106	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00260 mg/L	0.002 mg/L	104	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0120 mg/L	0.012 mg/L	95.7	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0118 mg/L	0.012 mg/L	94.4	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0117 mg/L	0.012 mg/L	94.0	70.0	130	----
		Iron, dissolved	7439-89-6	E421	0.047 mg/L	0.05 mg/L	93.6	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0253 mg/L	0.025 mg/L	101	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0125 mg/L	0.012 mg/L	99.9	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	2.43 mg/L	2.5 mg/L	97.2	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0118 mg/L	0.012 mg/L	94.3	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0126 mg/L	0.012 mg/L	101	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0233 mg/L	0.025 mg/L	93.2	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	0.545 mg/L	0.5 mg/L	109	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	2.39 mg/L	2.5 mg/L	95.6	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.00500 mg/L	0.005 mg/L	100	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0573 mg/L	0.05 mg/L	115	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	ND mg/L	----	ND	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00482 mg/L	0.005 mg/L	96.3	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	2.64 mg/L	2.5 mg/L	106	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.00536 mg/L	0.005 mg/L	107	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.0504 mg/L	0.05 mg/L	101	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.00488 mg/L	0.005 mg/L	97.5	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0257 mg/L	0.025 mg/L	103	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0120 mg/L	0.012 mg/L	96.1	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.00518 mg/L	0.005 mg/L	104	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.000258 mg/L	0 mg/L	103	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0248 mg/L	0.025 mg/L	99.2	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.0261 mg/L	0.025 mg/L	104	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.00496 mg/L	0.005 mg/L	99.2	70.0	130	----
Dissolved Metals (QCLot: 1676636)										
HA2402324-002	MW23-2	Mercury, dissolved	7439-97-6	E509	0.0000840 mg/L	0 mg/L	84.0	70.0	130	----
Volatile Organic Compounds (QCLot: 1677839)										
HA2402307-001	Anonymous	Benzene	71-43-2	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Ethylbenzene	100-41-4	E611A	92.2 µg/L	100 µg/L	92.2	60.0	140	----
		Toluene	108-88-3	E611A	93.0 µg/L	100 µg/L	93.0	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	189 µg/L	200 µg/L	94.5	60.0	140	----
		Xylene, o-	95-47-6	E611A	95.6 µg/L	100 µg/L	95.6	60.0	140	----
Hydrocarbons (QCLot: 1677838)										
HA2402307-001	Anonymous	VPH C6-C10	n/a	E581.VPH	2480 µg/L	2000 µg/L	124	60.0	140	----



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:

					Reference Material (RM) Report				
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 1676573)									
QC-1676573-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	97.2	70.0	130	----
Metals (QCLot: 1677133)									
QC-1677133-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	106	70.0	130	----
Metals (QCLot: 1708168)									
QC-1708168-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	92.2	70.0	130	----
Metals (QCLot: 1713228)									
QC-1713228-003	RM	Arsenic	7440-38-2	E440	21.2 mg/kg	102	70.0	130	----



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Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

Canada Toll Free: 1 800 668 9878

Environmental Division
Halifax
Work Order Reference
HA2402324



Telephone : +1 902 707 4888

Report To: Dillon Consulting Limited
Company: Dillon Consulting Limited
Contact: Asia Reid
Phone: 902.450.5015 ext. 5045
Street: 137 Chain Lake Drive Suite 100
City/Province: Halifax / Nova Scotia
Postal Code: B3S 1B3
Invoice To: Same as Report To
Copy of Invoice with Report: YES

Project Information
ALS Client Code / QUOTE #: DICL100 / HA23-DICL100-11
Job / Project #: Build NS - Mill Village 236446
PO / AFE:
LSD:
ALS Lab Work Order # (ALS use only): HA2402324
ALS Contact: Andrew Martin
Sampler:

Table with columns: ALS Sample #, Sample Identification and/or Coordinates, Date, Time, Sample Type, and various analytical parameters (BTEX/TPH, PAHs, Gen. Chem., etc.).

Drinking Water (DW) Samples (client use)
Notes / Specify Limits for result evaluation by selecting from drop-down below
Cooling Method: ICE
Cooler Custody Seals Intact: YES

SHIPMENT RELEASE (client use)
INITIAL SHIPMENT RECEPTION (ALS use only)
FINAL SHIPMENT RECEPTION (ALS use only)

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.

GC-849 / MM-142 / OR-803 / N-251 / DW-086 / SOL-419 / 418 / 420

Appendix D

EPC Calculations

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2											
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.2 2024-11-13 1:19:53 PM								
5	From File		WorkSheet_a.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	C3										
12											
13	General Statistics										
14	Total Number of Observations			27		Number of Distinct Observations			27		
15						Number of Missing Observations			1		
16	Minimum			30.5		Mean			219.1		
17	Maximum			958		Median			154		
18	SD			187.2		Std. Error of Mean			36.02		
19	Coefficient of Variation			0.854		Skewness			2.523		
20											
21	Normal GOF Test										
22	Shapiro Wilk Test Statistic			0.742		Shapiro Wilk GOF Test					
23	1% Shapiro Wilk Critical Value			0.894		Data Not Normal at 1% Significance Level					
24	Lilliefors Test Statistic			0.245		Lilliefors GOF Test					
25	1% Lilliefors Critical Value			0.194		Data Not Normal at 1% Significance Level					
26	Data Not Normal at 1% Significance Level										
27											
28	Assuming Normal Distribution										
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL			280.6		95% Adjusted-CLT UCL (Chen-1995)			297.1		
31						95% Modified-t UCL (Johnson-1978)			283.5		
32											
33	Gamma GOF Test										
34	A-D Test Statistic			0.593		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value			0.757		Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic			0.171		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value			0.171		Data Not Gamma Distributed at 5% Significance Level					
38	Detected data follow Appr. Gamma Distribution at 5% Significance Level										
39											
40	Gamma Statistics										
41	k hat (MLE)			1.979		k star (bias corrected MLE)			1.784		
42	Theta hat (MLE)			110.7		Theta star (bias corrected MLE)			122.8		
43	nu hat (MLE)			106.9		nu star (bias corrected)			96.33		
44	MLE Mean (bias corrected)			219.1		MLE Sd (bias corrected)			164.1		
45						Approximate Chi Square Value (0.05)			74.69		
46	Adjusted Level of Significance			0.0401		Adjusted Chi Square Value			73.48		
47											
48	Assuming Gamma Distribution										
49	95% Approximate Gamma UCL			282.6		95% Adjusted Gamma UCL			287.3		
50											
51	Lognormal GOF Test										
52	Shapiro Wilk Test Statistic			0.973		Shapiro Wilk Lognormal GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
53	10% Shapiro Wilk Critical Value					0.935	Data appear Lognormal at 10% Significance Level					
54	Lilliefors Test Statistic					0.12	Lilliefors Lognormal GOF Test					
55	10% Lilliefors Critical Value					0.153	Data appear Lognormal at 10% Significance Level					
56	Data appear Lognormal at 10% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data					3.418	Mean of logged Data					5.116
60	Maximum of Logged Data					6.865	SD of logged Data					0.754
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL					307.6	90% Chebyshev (MVUE) UCL					322.3
64	95% Chebyshev (MVUE) UCL					369.2	97.5% Chebyshev (MVUE) UCL					434.4
65	99% Chebyshev (MVUE) UCL					562.4						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL					278.4	95% BCA Bootstrap UCL					296.3
72	95% Standard Bootstrap UCL					278.1	95% Bootstrap-t UCL					313.5
73	95% Hall's Bootstrap UCL					536	95% Percentile Bootstrap UCL					284.2
74	90% Chebyshev(Mean, Sd) UCL					327.2	95% Chebyshev(Mean, Sd) UCL					376.1
75	97.5% Chebyshev(Mean, Sd) UCL					444.1	99% Chebyshev(Mean, Sd) UCL					577.6
76												
77	Suggested UCL to Use											
78	95% Adjusted Gamma UCL					287.3						
79												
80	When a data set follows an approximate distribution passing only one of the GOF tests,											
81	it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL											
82												
83	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
84	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
85	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
86												

Appendix E

HHRA - ILCR and SSTL Calculations

ILCR and SSTL Calculation Worksheet

Carcinogenic COPC - Arsenic

Scenario Name: **Lifetime Composite - Public Site Visitor**

Site Name: **DRDC**
Dillon Project No.: **19-9207-9000**

Days per week on site: **5**
Hours per day on site: **2**
Weeks per year on site: **48**

Inputs

Exposure Scenario	User Defined - Lifetime Composite - Public Site Visitor, 5 days per week
Receptor	ifetime Composit
CoPC	Arsenic
Soil concentration (EPC) - Csoil	287.3 mg/kg
Target risk	1.E-05
Age-adjustment?	TRUE

Outputs

SSTL =	294	mg/kg
ILCR =	2.21E-04	ILCR > TLCR 1.0E-05

$$\text{SSTL for Arsenic (mg CoPC/kg soil)} = \frac{\text{TR} \times \text{LE}}{[\text{EF} \times ((\text{SF}_o \times \text{AF}_g \times \text{SIR}_{\text{adj}}) + (\text{SF}_o \times \text{AF}_s \times \text{SR}_{\text{adj}}) + (\text{SF}_i \times \text{AF}_l \times \text{IRS}_{\text{adj}} \times \text{ET}_H))] + \text{BSC}}$$

$$\text{SSTL} = \frac{1.00\text{E-}05 \times 29200}{[240 \times ((1.8 \times 1 \times 4.72\text{E-}05) + (1.8 \times 0.03 \times 1.56\text{E-}04) + (27.3 \times 1 \times 1.66\text{E-}08 \times 8.33\text{E-}02))] + 281}$$

$$\text{SSTL} = \mathbf{294}$$

$$\text{LADD for Arsenic (mg/kg-d) Ingestion} = \frac{\text{Csoil} \times [(\text{AF}_g \times \text{SIR}_{\text{adj}}) \times (\text{EF})]}{\text{LE}} = \frac{287.3 \times [(1 \times 4.72\text{E-}05) \times (2.40\text{E+}02)]}{2.92\text{E+}04} = 1.12\text{E-}04$$

$$\text{Dermal Contact} = \frac{\text{Csoil} \times [(\text{AF}_s \times \text{SR}_{\text{adj}}) \times (\text{EF})]}{\text{LE}} = \frac{287.3 \times [(0.03 \times 1.56\text{E-}04) \times (2.40\text{E+}02)]}{2.92\text{E+}04} = 1.10\text{E-}05$$

$$\text{Inhalation} = \frac{\text{Csoil} \times [(\text{ET}_H \times \text{AF}_l \times \text{IRS}_{\text{adj}}) \times (\text{EF})]}{\text{LE}} = \frac{287.3 \times [(8.33\text{E-}02 \times 1 \times 1.66\text{E-}08) \times (2.40\text{E+}02)]}{2.92\text{E+}04} = 3.27\text{E-}09$$

$$\text{ILCR} = \sum \text{SF} \times \text{LADD}$$

$$\text{ILCR} = (\text{SF}_o \times \text{LADD}_{\text{ing}}) + (\text{SF}_o \times \text{LADD}_{\text{derm}}) + (\text{SF}_i \times \text{LADD}_{\text{inh}})$$

$$\text{ILCR} = [(1.80\text{E+}00 \times 1.12\text{E-}04) + (1.80\text{E+}00 \times 1.10\text{E-}05) + (2.73\text{E+}01 \times 3.27\text{E-}09)]$$

$$\text{ILCR} = \mathbf{2.21\text{E-}04}$$

where:

	Value	Units	Reference
Oral Slope Factor	1.80E+00	1/ (mg CoPC/kg bw - day)	Health Canada (2021)
Inhalation Slope Factor	2.73E+01	1/ (mg CoPC/kg bw - day)	Health Canada (2021), converted from UR
Target Risk	1.00E-05	unitless	Health Canada (2021)
Absorption Factor - gut	1.00E+00	unitless	Default
Absorption Factor - skin	3.00E-02	unitless	Health Canada (2021)
Absorption Factor - lung	1.00E+00	unitless	Default
Age-adjusted Soil Ingestion Rate	4.72E-05	kg soil - year/kg bw-d	calculated
Age-adjusted Soil Dermal Contact Rate	1.56E-04	kg soil - year/kg bw-d	calculated
Age-adjusted Soil Inhalation Rate	1.66E-08	kg soil - year/kg bw-d	calculated
Exposure Hours (x/24) (considered for inhalation only)	8.33E-02	unitless	calculated = (2 hr/d) / (24 hr/d)
Exposure Days (x/7)	7.14E-01	unitless	calculated = [(5 d/wk)] / [(7 d/wk)]
Exposure Weeks (x/52)	9.23E-01	unitless	calculated = [(48 wk/yr)] / [(52 wk/yr)]
Exposure Frequency	2.40E+02	days/year	calculated = (5 d/wk) * (48 wk/yr)
Life Expectancy (life span x days/year)	2.92E+04	days	Health Canada (2021) = 80 years * 365 days
Background Soil Concentration	2.81E+02	mg CoPC/kg soil	Site Specific
Concentration of respirable particulate matter	7.60E-10	kg/m ³	Health Canada (2021)

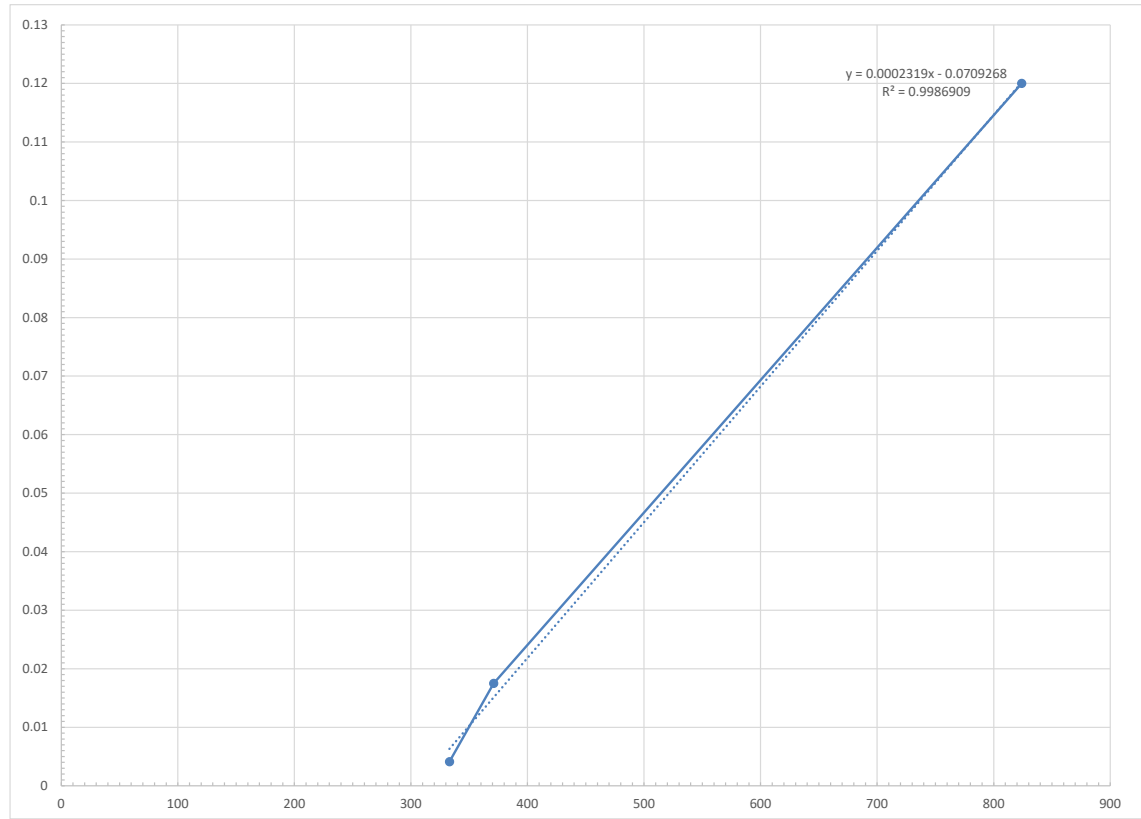
$$\Sigma 1.23\text{E-}04$$

Appendix F

HHRA - Assessment of Potable Groundwater

Location	Soil As mg/kg	Water As mg/L	Comments
Tier 1 EQS potable	10	0.01	
MW23-1	104	0.00132	
24SS4	150	0.001	water detection limit
24SS3	330	0.001	water detection limit
MW23-3	333	0.00411	
MW23-2	371	0.0175	
24SS1 / SS9	824	0.12	

trend line best fit	x	y	intercept	0.0709268
	348.9728	0.01	slope	0.0002319
	349	0.010006		



References

AEP. 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Alberta Environment and Parks. January 2019.

ASTM. 2014. ASTM E-2205/E-2205M-02(2014), Standard Guide for Risk-Based Corrective Action for Protection of Ecological Resources, ASTM International, West Conshohocken, PA, 2014, www.astm.org.

ASTM. 2016. Designation: E-2385 – 11 (Reapproved 2016). Standard Guide for Estimating Wildlife Exposure Using Measures of Habitat Quality.

Atlantic PIRI. 2012. Scientific Rationale to Support the Adoption/Development of Tier 1 Screening Levels for Soil, Surface Water, Groundwater and Sediment in the Ecological Screening Protocol for Petroleum Impacted Sites in Atlantic Canada. July 2012.

Atlantic PIRI. 2021. Atlantic RBCA (Risk-Base Correction Action) for Impacted sites in Atlantic Canada, Version 4.0, User Guidance. July 2021.

SABCS. 2008. Report on: Detailed Ecological Risk Assessment (DERA) in British Columbia. Technical Guidance. Submitted to: BC Ministry of Environment. Submitted by: Science Advisory Board for Contaminated Sites in British Columbia.

CCME. 1996. A Framework for Ecological Risk Assessment: General Guidance. Canadian Council of Ministers of the Environment. CCME Subcommittee on Environmental Quality Criteria for Contaminated Sites. The National Contaminated Sites Remediation Program, Winnipeg, MB.

CCME. 2006. CCME Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines.

CCME. 2008. Canada Wide Standard for Petroleum Hydrocarbons in Soil: Scientific Rationale. Supporting Technical Document. PN 1399. ISBN 978-1-896997-77-3 PDF.

CCME. 2020. Ecological Risk Assessment Guidance Document. Canadian Council of Ministers of the Environment.

Climate Atlas of Canada. ClimateAtlas, version 2 (July 10, 2019), using BCCAQv2 climate model data. Accessed: 2024. <https://climateatlas.ca/>.

Dillon Consulting Limited (Dillon). 2024A. Phase I Environmental Site Assessment: Mill Village Former Mine Site, Medway River Road, Charleston, NS PID No. 70169214. Prepared for Build Nova Scotia.

Build Nova Scotia

Supplemental Sampling Program and Human Health and Ecological Risk Assessment (Final) Mill Village Former Mine Site, Medway River Road, Charleston, NS PID No. 70169214

February 2025 - 23-6446



Dillon Consulting Limited (Dillon). 2024B. Phase II Environmental Site Assessment. Mill Village Former Mine Site, Medway River Road, Charleston, Nova Scotia, Property Identification Designation Number (PID No.): 70169214.

Environmental Site Assessment for Limited Remediation Protocol, Adopted by the Minister of Environment Pursuant to the Contaminated Sites Regulations, September 2021, Updated October 2022.

Government of Nova Scotia. 2021. Wildlife and Birds of Nova Scotia. Retrieved November 2024 from <https://novascotia.ca/natr/wildlife/wns/wns7f.asp>.

Health Canada. 2010. Federal Contaminated Site Risk Assessment in Canada. Part V. Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals (DQRACHEM). September 2012. Prepared by: Health Canada Contaminated Sites Division, Safe Environments Directorate.

Health Canada. 2021a. Federal Contaminated Site Risk Assessment in Canada. Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA). Version 3.0. March 2021. Health Canada Contaminated Sites Division, Safe Environments Directorate.

Health Canada. 2021b. Federal Contaminated Site Risk Assessment in Canada. Toxicological Reference Values (TRVs). Version 3.0. March 2021. Health Canada Contaminated Sites Division, Safe Environments Directorate.

Health Canada. 2021c. 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.

ICMM. 2007. MERAG: Metals Environmental Risk Assessment Guidance. International Council on Mining and Metals. www.metalsriskassessment.org.

MCP. 1996. Massachusetts Contingency Plan: Risk Characterization and Evaluation, Massachusetts Department of Environmental Protection (MADEP), Bureau of Waste Site Cleanup, 1996/1997, Ch. 9. Cited in: ASTM, 2011.

Nature North. 2023. Biology of the Ruffed Grouse. Accessed: 2023. <http://www.naturenorth.com/winter/grouse/rgrouseE-2.html>.

NatureCounts. 2023. Maritime Breeding Atlas, 2022. Accessed: 2023. <https://www.birdscanada.org/>.

NatureServe. 2023. NatureServe Network Biodiversity Location Data accessed through NatureServe

Build Nova Scotia

Supplemental Sampling Program and Human Health and Ecological Risk Assessment (Final) Mill Village Former Mine Site, Medway River Road, Charleston, NS PID No. 70169214

February 2025 - 23-6446



Explorer. NatureServe, Arlington, Virginia. Available <https://explorer.natureserve.org/>. (Accessed: Month DD, 2023). <https://explorer.natureserve.org/Search>

Ng, J.W.-M. 2009. Habitat use and home range characteristics of Common Nighthawks (*Chordeiles minor*) in mixed-grass prairies. University of Regina.

Nova Scotia Bird Society. 2023. Accessed: 2023. <https://www.nsbirdsociety.ca/library/resources/the-of-birds-of-ns>.

Nova Scotia Maximum Concentration Background Levels for the Highlands Soil Zone as presented in the Environment Canada's (EC) Background Soil Database (Version No. 1) (March 2011).

Ontario Ministry of the Environment Conservation and Parks (MECP). 2011. Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario. April, 2011. PIBS #7386e01.

Suter, G.W. 1989. Ecological endpoints. Pages 2-1 in W. Warren-Hicks, B.R. Parkhurst, and S.S. Baker Jr. (eds.) Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference document. EPA 600/3-89/013. Corvallis Environmental Research Laboratory, Corvallis, OR. Cited In: Suter II, 2007.

Suter, G.W. II., Efrogmson, R.A., Sample, B.E., and Jones, D.S. 2000. Ecological Risk Assessment for Contaminated Sites. CRC Press, Boca Raton, Florida.

Suter, G.W. II., Efrogmson, R.A., Sample, B.E., and Jones, D.S. 2000. Ecological Risk Assessment for Contaminated Sites. CRC Press, Boca Raton, Florida.

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.

S.M. Barr, C.E. White (compilers) 2017: Bedrock Geology Map of the Grand Narrows Area, NTS 11F/15, Cape Breton, Inverness, Richmond and Victoria Counties, Nova Scotia; Nova Scotia Department of Natural Resources, Map ME 2017-014, Scale 1:50,000.

The Canadian Standard Association (CSA) Standard Z769-00 for Phase II ESAs CSA, (reaffirmed in 2018).

US EPA. 1998. Guidelines for Ecological Risk Assessment. EPA/630/R-95/002F. Risk Assessment Forum. Washington, D.C.

Build Nova Scotia

Supplemental Sampling Program and Human Health and Ecological Risk Assessment (Final) Mill Village Former Mine Site, Medway River Road, Charleston, NS PID No. 70169214

February 2025 - 23-6446



US EPA. 2021. Fact Sheet: Arsenic Relative Bioavailability and In Vitro Bioaccessability of Arsenic in Soil. <https://semspub.epa.gov/work/HQ/100002716.pdf>

US EPA. 2021. Regional Screening Levels (RSLs) – Generic Tables. Updated November 2022. Available online at <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>.

US EPA. 2007. Ecological Soil Screening Levels for Polycyclic Aromatic Hydrocarbons (PAHs) Interim Final. OSWER Directive 9285.7-78. US Environmental Protection Agency. June 2007. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_pah.pdf

Build Nova Scotia

Supplemental Sampling Program and Human Health and Ecological Risk Assessment (Final) Mill Village Former Mine Site, Medway River Road, Charleston, NS PID No. 70169214

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