# CONCEPTUAL CLOSURE STUDY FOR THE HISTORIC MONTAGUE MINES TAILINGS AREAS HALIFAX, NOVA SCOTIA

## FINAL REPORT

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July 24, 2019

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July 24, 2019

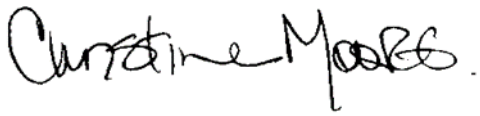
Mr. Donnie Burke

Dear Donnie:

**RE: Conceptual Closure Study for Historic Tailings at Montague Mine, Halifax, Nova Scotia- Final Report**

We appreciate the opportunity to work with you on this project and trust that this report meets your requirements. Should you have any questions or comments, please contact the undersigned.

Sincerely,



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# EXECUTIVE SUMMARY

This report presents a high-level conceptual closure plan for the mine tailings that have been deposited in the Montague gold district area referred to as the former Montague Mine site. The Montague Mine was an historical gold mining operation that produced gold from 1865 to 1940 and involved several different mines using open pit and underground mining methods. The site produced over 68,000 ounces of gold, from nearly 122,000 tonnes of mined ore. Ore was milled on-site, using a variety of stamp mills to crush and pulverize mined rock and utilizing mercury amalgamation to recover gold from the crushed ore. As a result, the area remains heavily disturbed with numerous open mine shafts, subsidence features and a number of uncontained tailings disposal areas. The collective of former mines and tailings disposal areas is referred to as "the Site" in this report.

There are environmental legacies associated with past mining activities at the Site, largely related to the presence of elevated levels of arsenic and mercury in the uncontained tailings areas as well as physical hazards from open mine workings. Arsenic is a naturally occurring element in the rocks from many parts of Nova Scotia at elevated levels due to the natural geologic conditions of the area. The Montague gold deposit contains naturally occurring arsenopyrite, an iron-arsenic-sulphide mineral. The tailings have arsenic contents ranging from several hundred up to 41,000 mg/kg (4.1%) over the tailings area. By comparison, the NS Environment (2014) human health soil quality guideline is 31 mg/kg. Mercury was added during the mine extraction process and is also present in the tailings, but at concentrations that are typically lower than the human health and ecological soil quality guidelines of 6.6 mg/kg (NS Environment, 2014). Government warning signs on the site provide a health warning indicating that high levels of arsenic are present, as well as the presence of hazards relate to mine shafts.

There has been considerable geochemical characterization of the main tailings area and surrounding soils present at this site, with early studies starting in the late 1970s and early 1980s, and extensive research from 2005 to present. Pivotal studies include the 2005 – 2006 geochemical characterization work conducted by the Geological Survey of Canada (Parsons et al, 2012), subsequent studies stemming from this early work through 2015 - 2016, which include a 3 year study examining potential remediation strategies for the site.

NS Lands Inc. issued a request for proposal in 2018 that called for the development of a conceptual closure plan for the Site with a focus on the portions of the property that are owned by the Crown. The objectives of this project were as follows:

- Identify gaps in the available information.
- Conduct additional field investigations to address the information gaps.
- Develop criteria for closure.
- Develop a conceptual closure plan for the Site with a Class D cost estimate and level 1 schedule, recognizing that there may be more than one option available to close the site.

The Project was awarded in October of 2018. Detailed investigative field studies were conducted to further the understanding of arsenic and mercury in the tailings, shallow groundwater, and nearby wetland and stream environments. In addition, sampling in tailings areas which were previously uncharacterized was also conducted. Closure criteria for both human health, and ecological health were developed using a tiered approach, and standard methods. The selected criteria can affect the size of the area requiring remedial or reclamation attention, and hence have an important role when examining options, and costs associated with options. The development of the criteria was conducted using a tiered approach, with the starting point (Tier 1) being the most conservative or protective criteria. The Tier 1 closure criteria were selected from the NSE (2014) contaminated sites regulations. It was assumed that any chemical constituent below these standards will not require further assessment. The Tier 2 criteria were established for areas that exceed the Tier 1 criteria. The approach for the development of Tier 2 criteria varied, and included either risk-based approaches, modifications with site specific data, use of background, or selection of alternative guidelines from other jurisdictions, depending on the issues and chemical constituent considered. In addition to field work and development of closure criteria, a conceptual closure plan was developed based on implementing a decision analysis process to identify, develop and select a preferred option (or options) for the closure of the mine site. As the project progressed, the Site conditions better understood, and the closure objectives and overall closure goal was identified, the preferred closure options became evident without the requirement to fulfill all the defined tasks.

The investigative field studies on the tailings areas on Crown lands provided the following results:

- Concentrations of arsenic and mercury in the main tailings area were similar to those in previous studies.
- The concentrations of arsenic in the tailings solids and in water, associated with the solids, typically represent the primary sources of risk and therefore drive the reclamation strategies at the Montague site.
- The concentrations of mercury in the tailings solids were typically below Tier 1 human health levels except for a few samples in close proximity to the former stamp mills where levels of mercury in some samples exceeded the Tier 1 level but lower that the Tier 2 value.
- Some of the tailings on site that remain exposed at the surface have developed acidic waters as a result of sulphide mineral oxidation and the majority of tailings that had a neutral pH in 2018 have the potential to develop acidic conditions in the future if unmitigated.
- Elevated arsenic levels in tailings solids and in water on the site have been transported downstream by erosion of the uncontained tailings and runoff and drainage, respectively.
- Tailings that have been deposited underwater downstream of the site are at a very low to negligible risk of acid generation and appear to represent a small to negligible source arsenic in the associated surface waters.

- The arsenic in the tailings on site as well as downstream appears to be associated with the primary mineral arsenopyrite as well as in secondary iron hydroxide solids that are visible as the rusty colored coatings.
- There appear to be some effects on arsenic levels in sediments in Lake Charles that may be related to migration of arsenic from the site.
- Overall, the findings of this investigation provide a basis for developing reclamation strategies on site to reduce the risks associated with arsenic and mercury levels as well as the mitigation of current acidic conditions and potential acidification of tailings in the future.

The conceptual closure plan comprises the following key considerations and design elements:

- Provide protection for both human and ecological health;
- Reduce human and ecological exposure to elevated levels of arsenic and mercury contained in exposed surface tailings, shallow groundwater, wetland areas, and streams;
- Delineate the tailings at the Site into different Areas based on known levels of contamination, presence of exposed tailings, location of wetland and forested areas, and if tailings are on Crown or non-Crown land;
- Prioritize the remediation of the designated Areas into Construction Stages (i.e. Stage 1, Stage 2, Stage 3 etc.) based on known levels of contamination, presence of exposed tailings, and if tailings are on Crown or non-Crown land;
- Construction Stage 1 involves high priority areas that are on Crown land and where tailings are exposed, and/or the level of contamination generally exceeds the Tier 2 criteria. Areas designated for Construction Stage 1 are the current focus of this conceptual closure plan;
- Two closure strategies are recommended for Areas prioritized for Construction Stage 1:
    - Containment cell: excavate, consolidate, and cover within a lined containment cell exposed tailings where arsenic levels exceed the Tier 2 criteria by more than ten times. This will remove the major source of arsenic from entering the environment via direct contact, surface water flow, and groundwater leaching;
    - Low permeability cover: leave tailings in place that are currently contained within wetland areas and where arsenic levels are between the Tier 2 criteria and 10 times the Tier 2 criteria, cover tailings with a low permeability cover system. This will reduce precipitation infiltration into the underlying contaminated soils, and the capillary rise of the groundwater into the surface water therefore reducing the mobilization of arsenic into the surrounding environment.
- Two containment cells are required to store the excavated tailings. The containment cells will be constructed on Site and will measure approximately 95 m by 95 m at the base and will be approximately 5 m tall. The containment cells will consist of containment berms, an impermeable liner, leachate collection system, deposited tailings, and an impermeable cover system;

- A water treatment system will be required to dewater the tailings placed in the containment cells, in support of construction;
- The low permeability liner system will comprise a low permeability geosynthetic clay liner placed overtop of the tailings followed by soil, a vegetative medium, and hydroseed;
- Ditches and access roads will be required on Site as part of closure measures;
- Site control measures will be required after the construction of the containment cells and cover systems to restrict public access to the Site. Site control measures may consist of signage, gates, fencing, or other deterrence to traffic such as boulders etc.; and,

The Site will need to be managed in perpetuity and will require routine maintenance and surveillance.

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# Glossary of Terms and Acronyms

**Acid Base Accounting (ABA)** – A series of chemical analyses and calculated values used to estimate the magnitude of the acid generation potential and acid neutralization potential of a sample. Acid potential (AP) is related to the sulphide mineral content and the neutralization potential (NP) is related to carbonate mineral content and to some other minerals that can consume acid.

**Acid Potential (AP)** – The total acid a material is capable of generating, including acid that dissolves, is neutralized, and forms acid salts as a result of oxidation of iron sulphide minerals.

**Acid Drainage (AD)** – A general term applied to any drainage with an acidic pH or excess acidity resulting from sulphide mineral oxidation.

**Arsenopyrite** – An iron-arsenic-sulphide mineral. It is the most common arsenic-bearing mineral found worldwide.

**Biomagnification** – Increasing accumulation of concentrations of a substance in the tissues of tolerant organisms at successively higher levels in a food chain.

**Carbonate-NP (Carb-NP)** – The NP resulting from calcium and magnesium carbonates.

**Conceptual Site Model** – A representation of ways that chemical substances move from sources through the environmental media, such as water and air, to environmental receptors through biological, physical and chemical processes.

**Constituents of Potential Concern (COPC)** – A chemical constituent that is site-related and of sufficient concentration in one or more environmental media to represent a risk concern.

**Contaminant** – Species or materials introduced by humans which were either not previously present that contaminates other substances.

**Crown Lands** – Any part of land under the administration and control of the Minister.

**Drainage** – The manner in which the waters of an area exist and move, including surface runoff, streams and groundwater pathways.

**Ecological Risk Assessment (ERA)** – A process to determine the likelihood of adverse ecological effects posed by one or more environmental stressors, such as physical and chemical factors during mining activities.

**Geosynthetic Clay Liners (GCL)** – Geotextile and bentonite clay composites engineered for a variety of environmental containment applications. A GCL layer has a very low permeability to water and is designed to restrict water flow through it.

**Hardpan** – A dense layer of soil or tailings, potentially formed due to the accumulation of certain mineral salts, most notably iron and calcium, to form hard cohesive complexes with soil particles, sometimes formed under acidic conditions.

**Leachate** – A solution obtained from percolating solvent, such as water, through solids substances, during which soluble chemical constituents are extracted into the solvent.

**LiDAR** – A aerial surveying method that measures distances to a target by illuminating the target with laser light and measuring the reflected light with a sensor, typically to determine elevations of the land surface over a specified area.

**Life of Mine (LOM)** – The time in which, through the employment of the available capital, the ore reserves--or such reasonable extension of the ore reserves as conservative geological analysis may justify--will be extracted.

**Mercury Amalgamation** – A concentrating process in which metallic gold or silver is mixed with mercury to form the metal laden mercury amalgam and gets concentrated. Historically used to extract gold and silver from ore. The gold and silver were recovered by heating and evaporating the mercury.

**Modified Sobek neutralization potential (Modified Sobek-NP)** – The NP quantified using method modified from Sobek, treating a sample with a known quantity of hydrochloric acid (HCl) to a pH of 2 to 2.5 and allowing the sample to react and consume some of the acid added. The acid solution is then titrated to determine the amount of acid consumed. The method was developed to estimate the carbonate mineral content as a representation of NP.

**Neutralization Potential (NP)** – The total acid a material is capable of neutralizing.

**Ore** – Rock, sediments, or non-lithified materials that contain economically recoverable levels of coal, metals, or minerals.

**Neutralization Potential Ratio (NPR)** – Effective neutralization potential (NP) divided by acid potential (AP) of a solid sample.

**Rinse pH** – The pH of the solution created when a non-pulverized sample is mixed with distilled/deionized water. Pulverizing is avoided to ensure only the weathered surfaces contribute to the measured pH. This can provide an estimate of drainage pH.

**Porewater** – Water that fills the voids between the grains of sediment and soil.

**Potentially Acid Generating (PAG)** – Describes material that is predicted to become net acidic in the future as a result of the depletion of neutralization potential while sulphide mineral oxidation continues.

**Severe Effect Level (SEL)** – The level of chemical constituent(s)of sediment above which it is considered heavily polluted and likely to affect the health of sediment-dwelling organisms.

**Soil Cement Bentonite (SCB) cut off wall** – A slurry cutoff wall constructed with soil, cement and bentonite. It is typically used to restrict the flow or movement of contaminated groundwater.

**Species Sensitivity Distribution (SSD)** – cumulative probability distributions of toxicity values for multiple species.

**Stamp Mill** – A type of mill machine that crushes ore materials by pounding rather than grinding. Historically used to prepare ores for extraction of economic metals or minerals.

**Tailings** – The ground rock waste product from a mine mill or process plant; the materials remaining after the economically valuable elements are removed from ore.

## LIST OF ABBREVIATIONS

| | |
|---|---|
| ABA | acid base accounting |
| AP | acid potential |
| COPC | constituents of potential concern |
| GCLs | geosysnthetic clay liners |
| HRM | Halifax Regional Municipality |
| LOM | Life of Mine |
| MAD | median absolute deviation |
| m | metres |
| $m^3$ | cubic metres |
| $Mm^3$ | million cubic metres |
| Mt | million tonnes |
| MOECC | Ontario Ministry of Environment and Climate Change |
| NPR | neutralization potential ratio |
| NP | neutralization potential |
| Non-PAG | non-potentially acid generating |
| PAG | potentially acid generating |
| SCB | Soil Cement Bentonite |
| SEL | Severe Effect Level |
| Sobek-NP | Sobek neutralization potential |
| SSD | Species Sensitivity Distribution |
| tpd | tonnes per day |

# 1.0 INTRODUCTION

This report presents a high-level conceptual closure plan for the mine tailings that have been deposited in the Montague gold district area referred to as the former Montague Mine site. The Montague Mine was an historical gold mining operation that involved several different mines using open pits and underground mining methods. As a result the area remains heavily disturbed with numerous unreclaimed open mine shafts, subsidence features and a number of uncontained tailings disposal areas. The collective of former mines and tailings disposal areas is referred to as "the Site" in this report.

Gold was discovered at this site in 1862. Mining was carried out continuously from 1865 to 1928 and then intermittently until 1940 (Parsons et al., 2012a). The Site has a storied past producing over 68,000 ounces of gold from nearly 122,000 tonnes of mined ore.

Montague Mines is one of 64 abandoned historic gold mining districts across Nova Scotia (Drage, 2015). Ore was milled on-site, using a variety of stamp mills to crush and pulverize mined rock and utilizing mercury amalgamation to recover gold from the crushed ore. There are environmental legacies associated with past mining activities at the Site, largely related to the presence of elevated levels of arsenic and mercury in the tailings as well as physical hazards from open mine workings. Arsenic is a naturally occurring element in the rocks from many parts of Nova Scotia at elevated levels due to the natural geologic conditions of the area. The Montague gold deposit contains naturally occurring arsenopyrite, an iron-arsenic-sulphide mineral. Mercury was added during the mining process. Section 2 provides a detailed overview of the site history and description.

This project was undertaken by Intrinsik, who led a team of specialist consultants (Ecometrix, Wood, and Klohn Crippen Berger), for Nova Scotia Lands Incorporated (NS Lands Inc.) in accordance with a contract established between Intrinsik and NS Lands Inc. in October 2018.

This report describes the Site and the objectives of this project; the scope of services that was undertaken; the closure criteria that were developed; the results of a field program; and possible closure options for the tailings developed to a conceptual level. Approximate costs and an implementation schedule are also included.

# 2.0 SITE HISTORY AND GENERAL DESCRIPTION

## 2.1 Background on Site

The Montague gold district is located in the community of Montague Gold Mines, within the Halifax Regional Municipality (HRM), Nova Scotia. Figure 2-1 provides the location of Montague Mines, while Figure 2-2 provides a closer view of the Montague Mines site, with Crown lands identified. In Figure 2-2, the main tailings area is clearly identified, as well as more distant tailings areas which are part of the current scope of this project.

This section focuses on the main tailings area at Montague Mines, since all previous studies in this historic mining district have been conducted in this area, with a few older studies studying downstream areas such as Barry's Run and Lake Charles. The main tailings area appears as an open wetland, with tailings distributed throughout the wetland. The wetland is largely submerged in high flow periods, but also has open dry areas which can generate dust. Drage (2015) reported that approximately 122,000 tonnes of tailings are present in this area, within a tailings field of approximately 0.1 $km^2$.

Government warning signs are present indicating high levels of arsenic on some areas of the site, but there continues to be evidence of trail biking activities at this site. Photos 1 to 5 illustrate the variety of conditions and aspects of the main tailings area, while a memo outlining background data and research on Montague Mines is provided in Appendix A, and a summary of information is presented herein, with additional details in Section 4.

There has been considerable geochemical characterization of the main tailings area and surrounding soils present at this site, with arsenic concentrations ranging up to 41,000 mg/kg. The arsenic concentrations are elevated over a wide area throughout the tailings, relative to the NS Environment (2014) human health soil quality guideline of 31 mg/kg. Mercury contents in the tailings range up to 8.4 mg/kg in the main tailings with three samples exhibiting higher mercury concentrationsat the former Stamp Mill location (Parsons et al., 2012a). The mercury contents across the main tailings area generally meet the human health and ecological soil quality guidelines established for inorganic mercury (6.6 mg/kg, CCME, 1999; NS Environment, 2014), with some elevated mercury results being reported in locations of the former Stamp Mill and central tailings areas, whereas wooded and soils near residential areas were generally less than 1 mg/kg Hg (Maritime Testing, 2009).

Groundwater data collected as part of the Maritime Testing (2009) study within the main tailings area found that all samples collected from the 3 groundwater wells were less than the applicable mercury drinking water guideline of 1 µg/L, but all arsenic data exceeded the drinking water quality guideline of 10 µg/L, and ranged up to 3,100 µg/L.

**Figure 2-1: Location of Montague Mines**

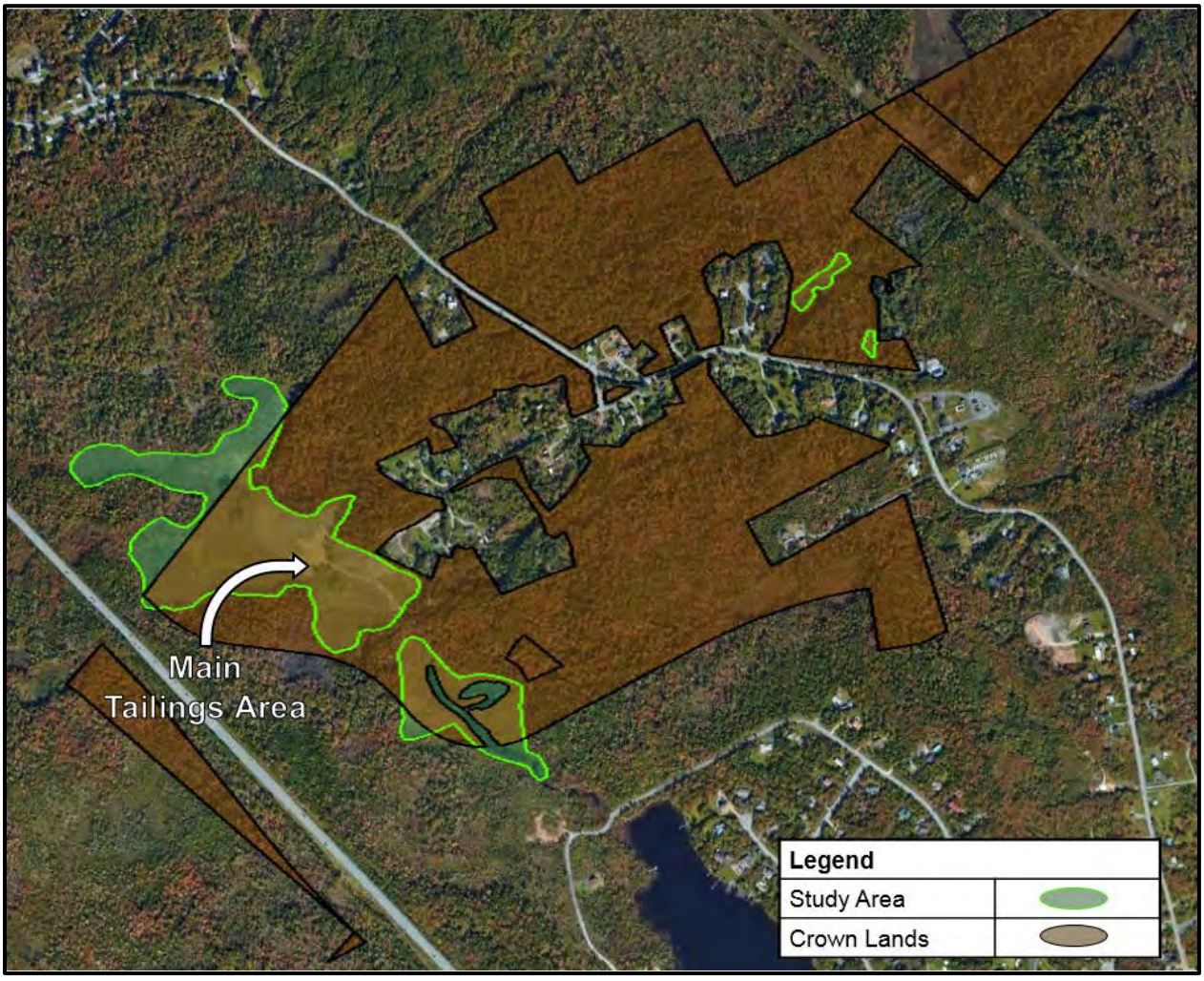


**Figure 2-2: Montague Gold Mines – Study Area**

**Photo 1: Panorama of Main Tailings Area, with Dirt Bike/ATV tracks in Foreground. Dry Conditions (2018)**

**Photo 2: Montague Mines Main Tailings Area with Dirt Bike Ramp and Shovels (2018)**

**Photo 3: Montague Mines Main Tailings Area During High Water Events (photo curtesy of Dr. M. Parsons)**

**Photo 4: Government Health Warning Signs, Montague Mines, at Entry to Site (2018)**

**Photo 5: Main Tailings Hardpan Area, Montague Mines (2018)**

A 3-year NSERC research grant (2009 – 2011) called “Optimal remediation of arsenic-contaminated mine sites to protect human and ecosystem health” was conducted at the Site involving several universities including Queen’s University, Trent University, University of Ottawa, as well as NRCan. This project was led by Dr. Heather Jamieson of Queen’s, and included NS Environment, SRK Consulting and Amec Earth and Environmental (now Wood). This research project focused on the Montague and Goldenville sites, and is highly relevant to the current project.

Key findings of the NSERC research grant are as follows (Jamieson, 2012; Parsons et al. 2012b; Rowe and Hosney, 2012):

- Traditional remediation approaches are unlikely to be successful, due to the complex geochemistry of the tailings, which has been altered due to chemical weathering over the last 70 years. The original mineral hosts for arsenic have been altered over time, which has resulted in new arsenic-bearing minerals with varying solubility and stability. Also, deposition of the tailings in wetland areas present additional complications, with respect to possible remedial approaches.
- These sites are close to residential areas and have been used, and in some cases, continue to be used for recreational purposes, despite noticeable warning signs related to high arsenic concentrations. Reclamation must protect both human and ecological health and consider community interest in using the sites into the future.
- The project team developed a characterization tool to classify the tailings into four main types based on their distinct geochemical and mineralogical properties. These types include (as described by Jamieson, 2012):

  - Wetland tailings (permanently saturated, unoxidized, arsenopyrite-bearing tailings - vegetated);
  - Oxic surface tailings (near-surface, weathered, arsenopyrite partially oxidized to various Fe-As minerals – normally unvegetated);
  - High Ca/As tailings (different original host rock, Ca-Fe-As minerals, fine-grained; note – not present at Montague, but present at Goldenville);
  - Hardpan (cemented, high As, Fe-As minerals, partially oxidized sulfide concentrate)

- The research concluded that each of these tailing types require a different remediation approach, based on both field and laboratory testing. The authors concluded that tailings located in wetland areas are relatively unreactive if left undisturbed and below water. These tailings represent a large portion of the affected area at Montague. When disturbed and exposed to the atmosphere, they tend to generate acid drainage, and release high concentrations of arsenic. This research also suggested that hardpan tailings will continue to produce acidic, metal-rich waters under current field conditions, as well as when a shallow soil cover is applied (30 cm), without a hydraulic barrier, such as a GCL. Under current field conditions, reaction with the surrounding tailings is helping to prevent severe impacts on surface water. The authors point out that attempts to re-process tailings in mining could have significant adverse impacts, particularly if wetland located tailings are disturbed.
- The research also concluded that unsaturated tailings will continue to release arsenic to surface and ground waters under existing field conditions. In addition, this will also occur under a shallow soil cover without a hydraulic barrier. Laboratory testing examining leachate generated with a 30 cm till cover, in the absence of a hydraulic barrier (e.g. geosynthetic clay liners (GCL)) may slow sulphide oxidation during wet periods but may also destabilize As-bearing oxide minerals over time. The inclusion of a GCL assists to limit the transport of contaminants from the tailings to local surface waters (Parsons et al, 2012b). In June 2012, Rowe and Hosney (2012) presented NS Environment with a range of recommended remediation strategies for these sites, that enables a selection of the most effective and cost-effective approaches to reclaiming tailings at these sites.

Much of this research and data collected in earlier studies have been reviewed and considered in the current project.

## 2.2 Key Considerations and Challenges

As shown in the above sections, the Montague site is complicated, with respect to the existing conditions at the sites and determining effective and cost-efficient closure strategies. Challenges include the following:

- Size of Tailings Area(s) is large with seasonal flooding: The main tailings area of Montague Mines cover a vast wetland area as the tailings were sluiced from a number of mining areas into Mitchell Brook, and subsequently spread out over a large wetland, likely extending downstream into Lake Charles. The extent of the tailings areas at the Site presents a significant challenge, relative to finding cost effective closure strategies. In addition, there is a considerable amount of water at this site, with seasonal flooding. This adds to the complexities of the site, due to water management issues, and the moisture content of the tailings.
- Presence of Uninvestigated Additional Tailings Deposits: The main tailings areas at Montague have undergone considerable geochemical characterization, but uncharacterized tailings deposits are evident in the area, which required investigation in this study. The potential contributions of these uncharacterized areas to overall loadings of constituents to the environment, including arsenic and mercury, are as yet unknown.
- Geochemistry related to Arsenic: Due to the extremely elevated levels of arsenic in some of the tailings, closure of the Site must proceed with caution. The tailings have been weathering for more than 70 years. Geochemical studies have already been conducted on this site (e.g., Parsons et al., 2010), and found that the mobility of arsenic under various cover scenarios is strongly controlled by the mineral hosts for arsenic in the tailings. When leached with natural rainwater, highly weathered tailings containing secondary minerals such as scorodite produced acidic drainage (pH ~ 2.5) with high arsenic concentrations. In contrast, weathered tailings with relatively high calcium/arsenic ratios and calcium-iron arsenates such as Yukonite produced water with near-neutral pH values and moderate arsenic concentrations. Additional testing revealed that tailings containing arsenic mainly as arsenopyrite oxidized within six months to generate acidic leachates (pH < 3) with extremely high concentrations of arsenic. Consideration of these results is critical relative to the potential options for closure. Based on this, and other research, the levels of arsenic at these sites and the potential for local generation of acidic waters represent considerable challenges relative to finding a pragmatic, cost effective closure solution.
- Closure options: Closure options must be compatible with the unique geochemical conditions related to weathered sulphide tailings containing arsenic. Closure strategies for tailings typically involve the application of soil or alternate covers to reduce water infiltration and/or oxygen entry to the tailings. The presence of arsenic in secondary forms in these weathered tailings pose additional geochemical challenges for closure. Closure options involving an organic rich soil cover or liming could increase the bioaccessibility and mobility of arsenic in the environment, leading to greater environmental risks than currently present at the Site (DeSisto et al., 2017). Although organics may be helpful for growing vegetation, the carbon can also act to dissolve the iron oxides that currently contain the secondary arsenic and thereby release greater

loadings of arsenic to enter that groundwater below the tailings. Closure planning needs to consider the complex geochemical constraints in order to mitigate downstream environmental effects.

- Tailings are present off Crown lands. Tailings areas present in non-Crown lands areas and may have influenced the soil or groundwater chemistry on private lands. This issue is not part of the current project, as the scope was limited to Crown land, but this remains an important consideration for future Stages, and costing estimates for closure.
- Potential for biomagnification of mercury. Tailings are present in terrestrial and aquatic habitats at the Site. While the tailings are reasonably well characterized, less is known with respect to aquatic exposures. While mercury in the tailings is less of a concern from a human health perspective (relative to arsenic), inorganic mercury can methylate in the environment and bio-magnify in the food chain. As a result, mercury could become a driver in terms of ecological protection. Research related to this issue at Montague Mines is currently on-going and has revealed some biomagnification of mercury in emergent insects (LeBlanc et al, 2018).

## 2.3 Objectives of this Project

NS Lands is interested in building on the previous work and determining the possible costs and schedule for closing the tailings at the Site. To that end, NS Lands Inc. issued a request for proposal in 2018 that called for the development of a conceptual closure plan for the Site with a focus on the portions of the property that are owned by the Crown. The objectives of this project were as follows:

- Identify gaps in the available information.
- Conduct additional field investigations to address the information gaps.
- Develop criteria for closure.
- Develop a conceptual closure plan for the Site with a Class D cost estimate and level 1 schedule, recognizing that there may be more than one option available to close the site.

# 3.0 SCOPE OF SERVICES

## 3.1 Summary of Scope that was Executed

In undertaking this Project, the Intrinsik team referred to this as Design Stage 1 – Conceptual Closure Plan. Subsequent design stages would involve developing feasibility designs that have an improved cost estimate and implementation schedule and utlimately moving into construction. Also, subsequent design stages would also address the property that is not owned by the Crown.

As noted above, the objective Design Stage 1 involved the development of a conceptual closure plan for the historic tailings at Montague Mines within Crown land and provide an associated cost estimate and schedule.

When developing the conceptual closure plan for the Crown land, the Intrinsik team also considered the closure plan for all of the tailings (whether on Crown land or on private property), so as to provide adequate context when dealing with the Crown land tailings.

The scope of services for Design Stage 1 involved the following tasks:

- Background information review;
- Site visit;
- Gap Analysis;
- Field investigation program;
- Closure Criteria development;
- Option development and assessment;
- Option selection;
- Closure Cost estimate and scheduling;
- Stakeholder engagement strategy; and,
- Reporting.

The specific areas that were investigated in this Project are outlined in Figure 3-1. These areas included the main tailings area that has been the focus of several previous investigations, as well as several additional tailings areas that have never undergone previous geochemical characterizations. Some of these additional tailings areas reach off Crown lands, and were not sampled in this Project, as they were not considered within the scope of the investigations at this time. Tailings areas off Crown lands, and private properties which may have been influenced by historic tailings (e.g., through wind blown dusts), were excluded from this stage if investigation but would be considered in Design Stage 2.

At the completion of Design Stage 1, a scope of work was developed for Design Stage 2. The term Design Stage 2 is used in this report, so as not to be confused with the different stages of construction. Design Stage 2 will focus on advancing the closure designs for Construction Stage 1 (the high priority areas that are on Crown lands), as well as collection of additional data and further study for areas that have only undergone a cursory sampling effort in Design Stage

1, as well as areas which have not yet been sampled (non-Crown lands areas). As part of this exercise, conceptual designs will be developed for the other areas that require remediation that are now on Crown lands and are a lower priority, but still exceed the remediation criteria. Design Stage 2 will involve both human health and ecological risk assessment approaches to assist in determining the need for remediation of these, and non-Crown lands areas, and to enable refinement of the current closure criteria, based on risk.

## 3.2 Deviation from Scope in the Proposal

As noted above, a contract was established between NS Lands Inc. and Intrinsik in October 2018 for the execution of this project. The scope of services was completed mainly as described in the contract, although, there were a couple of deviations from the original contract as the Project progressed. The following tasks were not completed as originally defined:

- The site-wide water quality model was not developed to provide contaminant loadings, water quality and quantity predictions to assist in the evaluation of the impacts of potential closure options. The assessment focused on the development of the conceptual site model at this stage, as well as the characterization of the source terms. This level of detail was sufficient to support a conceptual closure options selection. More detailed modelling and predictions will be used to refine and support a risk-based investigation of closure options as part of Stage 2.
- Options selection task consisted of implementing a formal decision analysis process, utilizing a closure planning model based on the Kepner Tregoe decision making tool to identify, develop and select a preferred option (or options) for the closure of the mine site. This process had defined 10 activities of which four (4) of the activities were completed. As the Project progressed, the Site conditions better understood, and the closure objectives and overall closure goal was identified, the preferred closure options became evident without the requirement to fulfill all the defined tasks. In addition, there was not an opportunity to engage additional stakeholders beyond the project team to advance the decision analysis. There may become a need for a formal decision analysis in the future when additional stakeholders are involved in the mine closure project.

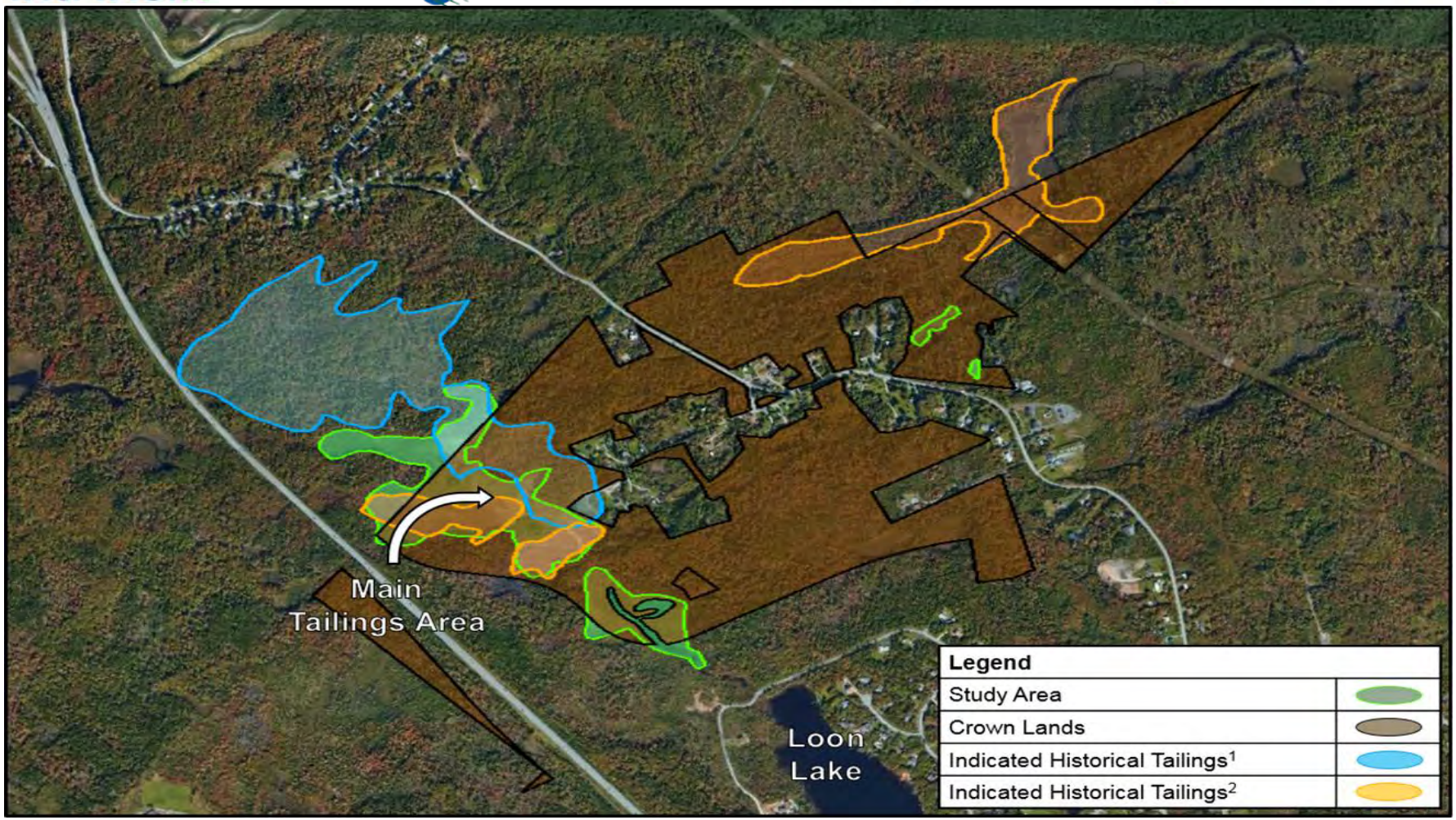


**Figure 3-1: Montague Gold Mines – Study Area**

**Notes:**
1) Blue shaded areas from Messervey (1938).
2) Orange shaded areas from Smith and Goodwin (2009).

# 4.0 SITE SETTING

This section provides details on the Site that were available prior to the execution of this Project. As noted above, Appendix A contains additional background information.

## 4.1 Mining and Tailings Production

The historic mining approaches used involved extraction and milling of ore on site and treatment with mercury to extract gold at a variety of Stamp mills, with the subsequent release of “tailings”, the residual processed ore to the environment. At Montague Mines, the tailings were directly deposited into Mitchells Brook and/or adjacent wetland areas. The abandoned mine area has considerable volumes of tailings covering many hectares of the surrounding environment, including areas which have been characterized and studied quite extensively (e.g., Parsons et al., 2012a) and tailings areas which have never under gone any sampling and chemical analysis, or quantification of approximately volumes.

The primary issues of concern at Montague Mines relate to arsenic and mercury in the receiving environment. Arsenic is naturally enriched in the rocks, soil, sediment, surface water and groundwater of many areas of Nova Scotia, due to the natural geology of this province, which are underlain by bedrock of the Meguma Supergroup (see Parsons and Little, 2015; Goodwin et al., 2010). This gold deposits contain naturally occurring arsenopyrite, an iron arsenic mineral, at elevated concentrations (up into the percent range). The presence of mercury in the tailings is related the extraction process used at the time, which involved mercury amalgamation to collect the gold. This process resulted in the release of mercury at elevated levels, relative to current soil and sediment quality guidelines.

## 4.2 Soils and Tailings Chemistry

Tailings geochemistry studies by Parsons et. al. (2012a) are mentioned in Section 2.0 and are discussed further in Appendix A. Historical studies prior to the Parsons et al (2012a) work are limited and are similarly discussed in Appendix A. Additional soils characterization within and off the main tailings area and some preliminary groundwater characterization within the main tailings area has also been conducted (Maritime Testing (1985) Ltd., 2009). The Maritime testing study (2009) was focused on gathering supplementary soils data in areas of the tailings that had not yet been characterized in earlier studies, as well as in areas between the main tailings areas and nearby residential properties (sampling on Crown lands only). Arsenic concentrations ranged from 7 mg/kg to 12,000 mg/kg in the < 2mm fraction, with one sample taken from within the tailings are measuring 17,000 mg/kg (Maritime Testing, 2009). Mercury results from within the < 2 mm fraction sized samples ranged from 0.02 mg/kg up to 25 mg/kg (sample taken in tailings area). The sampling protocol involved sampling at a 0 to 5 cm soil depth (the public health layer), as well as coring to deeper depths, with soil samples being fractionated to 2 mm size, as well as a smaller fraction of < 150 µm. A total of 54 locations were sampled with a total of 77 samples being collected (including surface and cored samples). Arsenic in the < 150 µm fraction ranged from 6 mg/kg up to 35,000 mg/kg, with the highest samples being taken from within the tailings area (Maritime Testing, 2009). Drage (2015) cites an average arsenic concentration for the main tailings of approximately 13,000 mg/kg. Additional solids investigations have been conducted in other studies within the NSERC grant previously mentioned.

In addition to site-related investigations, Parsons and Little (2015) conducted a study to determine possible background levels of arsenic in the Montague Mines area. Arsenic (0 – 5 cm; <2 mm size fraction) ranged from 4–273 mg/kg (median 42 mg/kg; median + 2 median absolute deviations 139 mg/kg; 98$^{th}$ percentile 264 mg/kg), with mercury ranging from 0.072–0.490 mg/kg (median 0.164 mg/kg; median + 2 median absolute deviations 0.374 mg/kg; 98$^{th}$ percentile 0.447 mg/kg).

## 4.3 Geology

A detailed description of the geological site conditions can be found in Parsons and Little (2015) and is summarized below.

*"Orogenic lode gold deposits occur throughout southern mainland Nova Scotia, and are hosted by turbiditic metasedimentary rocks of the Cambro-Ordovician Meguma Supergroup. This supergroup consists of the lower metasandstone-dominated Goldenville Group and the overlying slate-dominated Halifax Group, with a combined vertical thickness of at least 11 km. These sediments were deformed and regionally metamorphosed to greenschist and upper amphibolite facies during the mid- to late- Devonian Neoacadian Orogeny, and subsequently intruded by large volumes of mainly peraluminous granitoid rocks at ca. 385–357 Ma. Most of the auriferous quartz veins are located within the Goldenville Group, are structurally controlled, and generally occur near anticlinal fold hinges. The most abundant accessory minerals in the quartz veins include chlorite, biotite, muscovite, and plagioclase. Carbonates (ferroan dolomite to ankerite and calcite) and sulphide*

*minerals are associated with all types of auriferous veins. Arsenopyrite is the predominant sulphide mineral, with variable amounts of pyrrhotite, pyrite, chalcopyrite, galena and rare sphalerite, and molybdenite (Kontak and Jackson 1999)."*

## 4.4 Geochemistry and Groundwater

Remedial strategies at these types of sites can typically involve the application of a soil cover to remove exposure pathways. While this approach has been successful at many sites, the high levels of arsenic at this site under a soil cover (with organic matter) could result in dissolution of arsenic and high arsenic mobility. Understanding pathways for arsenic mobilizing in the environment from the tailings to the receiving environment is critically important in terms of determining remedial strategies. The pathways are relatively straightforward and are represented by surface runoff and surface water flow as well as subsurface flow through the groundwater that will discharge locally to the surface water. The interaction between tailings minerals and water, specifically porewater that will migrate away from the tailings through surface and subsurface pathways, is critical to understand, for the purposes of defining chemical source terms to describe existing conditions and predict future water quality in support of closure options identification and selection.

Previous field investigations that have been reported by DeSisto (2014, 2017) indicated that the Montague tailings are typically shallow in the main areas ranging up to 1.5 to 2.0 m for maximum depths. The tailings are known to be highly weathered at the surface and typically contain water table condition within the tailings, preserving unweathered tailings below. As described in more detail below, the DeSisto (2014) thesis examined arsenic mobility at Montague Mines and Goldenville and yielded important information on:

1) characterization of pre-remediation geochemical controls on arsenic mobility in subsurface tailings;

2) establishing hydrogeological influences on arsenic mobility; and

3) identifying geochemical changes that result when a low organic soil cover is applied to the tailings.

As summarized in DeSisto (2016), several mechanisms were identified for arsenic under both reducing and oxidizing conditions. Under reducing conditions, dissolved As concentrations are also controlled by desorption of arsenic from the dissolution of iron (hydr)oxides and the sorption or co-precipitation with carbonates. Under oxidizing conditions, arsenic mobility was suggested to be controlled by the oxidation of primary arsenopyrite and the subsequent precipitation of iron arsenates, iron oxyhydroxides and secondary calcium-iron arsenates, and sorption onto iron oxyhydroxides and gangue minerals.

According to DeSisto (2011), the interaction between the groundwater and surface water at the Montague site was found to be minimal as horizontal flow dominated at the time of sampling in the streams that cross-cut the tailings.

Results from the DeSisto (2017) study suggest that the use of a low-organic content soil cover would not create reducing conditions that could destabilize oxidized, secondary phases of

arsenic that are present in the Montague tailings. However, the results of this study suggested that oxygen penetration through the cover during dry seasons could continue to release arsenic to tailings pore waters via sulfide oxidation.

Several additional studies have been completed surrounding the potential application of reactive covers (Kavalench, 2012), as well as the application of covers that reduce infiltration into the tailings (Rowe and Hosney, 2012).

An investigation of the geochemical effects surrounding the usage of physical barriers to reduce human exposure to the Montague tailings was completed by Kavalench (2012). A laboratory column study was used to investigate arsenic mobility from the tailings solids under three different scenarios: un-remediated tailings exposed to acid rain; tailings remediated with a crushed limestone cover; and tailings remediated with a vegetative cover. Results from this study suggest that the application of a vegetative cover on the tailings may enhance arsenic mobilization by reductive dissolution, whereas the limestone cover did not. However, there is no evidence that a limestone cover had any mitigating effects.

An additional thesis by Hosney is also critical to the current project. The objective of the study was to test the effectiveness of 3 geosysnthetic clay liners (GCLs) for the tailings at Montague Mines, as well as Goldenville. The research involved actual placement of test covers at Montague Mines in August of 2009, with subsequent site visits and sampling in August 2010, 2011, and 2012. In addition, additional sampling is projected for 2019, to investigate the 10-year outcomes of the placement of these test covers (Rowe and Hosney, 2012; Hosney and Rowe, 2013). This work addressed the effectiveness of geosynthetic clay liners (GCL) for limiting water flow through the tailings as a potential rehabilitation option. The investigation was specific to GCL materials and the results can be used to support options selection using that type of liner material.

## 4.5 Human and Environmental Risk Work

No human health risk assessments have been conducted for the Site, or the adjacent uncharacterized tailings areas. A considerable amount work was completed to characterize the bioaccessibility of arsenic within tailings samples at Montague Mines as well as several other historic tailings sites (e.g., Royal Roads University, 2007; Laird et al., 2007; ESG, 2009; Walker et al., 2009; Meunier et al., 2010; Meunier et al., 2011a; 2011b; as well as other publications). The percentage of bioaccessible arsenic varied from less than 1% to 49% at the tested historic gold districts, with a median of 7.3%. Specific results for Montague tailings ranged from 1.1 to 25 % bioaccessible arsenic.

Air quality has also been studied at Montague (Corriveau et al., 2011). Arsenic concentrations at Montague ranged from 13.3 ng/m$^3$ (1 – 0.5 µm particles) to 8,200 ng/m$^3$ (particles > 16 µm) (10 hour sampling interval, at 1.0 L/min flow rate).

With respect to ecological risk studies, some early studies of the potential environmental impact of tailings within the wetland environment on stream waters, sediments, vegetation, fish and aquatic organisms in this district have been published by EPS (1978), Brooks et al. (1981, 1982), and Dale and Freedman (1982). But there is a considerable gap in time before additional

studies were found in the published literature. For example, terrestrial wildlife studies at Montague have included investigations of arsenic speciation in meadow voles (*Microtus pennsylvanicus*) collected at Montague (Saunders et al., 2010), as well as a second study wherein an ecological risk assessment on meadow voles was conducted at three (3) Nova Scotia tailings sites, one of which was Montague Mines (Saunders et al, 2011). This study involved the application of soil bioaccessibility data to the risk assessment and compared these outcomes to results based on an assumption that arsenic in soils was 100% bioaccessible, as well as exposure estimates derived through the analysis of arsenic concentrations in stomach contents (Saunders et al., 2011). Arsenic speciation work has also been conducted on eight (8) orders of terrestrial invertebrates collected at three (3) historic gold mining sites, including Montague Mines (Moriarty et al., 2009). Several studies have been conducted in the Montague Mines site (stamp mill location), most recently by Dr. Linda Campbell's group at Saint Mary's University. These studies included investigations into whether low-dose selenium could reduce environmental toxicity of both arsenic and mercury in tailings samples from the Old Stamp Mill at the Montague site (Chapman et al., 2016) as well as ecological investigations of uptake of mercury and arsenic in benthic and emergent insects in Mitchell Brook and the Old Stamp Mill (Montague) (LeBlanc et al, 2018); toxicity testing of sediments to mayflies, *Hexagenia sp.* (survival and growth) and a freshwater snail species (*Cipanopaludine sp*.; survival, growth, fecundity and reproduction); abundance and diversity of benthic and emergent insects; and chemistry of sediments in Muddy Pond, which is another historic gold mine district (Chapman et al., 2018). As part of this work, a risk assessment framework was developed to guide wetland assessments from within the various gold districts. In addition, preliminary testing of the potential for low dose nanoscale zero valent iron treatments to reduce toxicity of wetland sediments to mayflies and snails has also been undertaken (Chapman et al., 2018). These studies are on-going under several research grants awarded to Dr. Linda Campbell, of Saint Mary's University.

# 5.0 DEVELOPMENT OF CLOSURE CRITERIA

## 5.1 Approach

This section discusses the closure criteria that are to be met by the closure plan for the identified tailings areas. The criteria can affect the size of the area requiring remedial or reclamation attention, and hence have an important role when examining options, and costs associated with options. Criteria were developed for:

- Terrestrial soil quality
- Surface water and sediment quality
- Groundwater quality

The criteria should provide protection for both human health and ecological health. The development of the criteria was conducted using a Tiered approach, with the starting point (Tier 1) being the most conservative or protective criteria. The Tier 1 closure criteria were selected from the NSE (2014) contaminated sites regulations. Any contaminant below these standards will not require further assessment, relative to closure of these two sites. The NSE (2014) criteria consider both human and ecological health.

The Tier 2 criteria were established for areas that exceed the Tier 1 criteria. The approach for the development of Tier 2 criteria varied, and included either risk-based approaches, modifications with site specific data, use of background, or selection of alternative guidelines from other jurisdictions, depending on the issues and inorganic compound.

Based on the historical data for the Site (e.g., Parsons et al., 2012a; Maritime Testing Ltd., 2009), and other available data from various graduate theses and research projects (e.g, DeSisto, 2014, 2017; Rowe and Hosney, 2012; Hosney and Rowe, 2013 ), the predominant inorganics of concern are arsenic and mercury, and therefore closure criteria focused on these two elements and the approaches taken are discussed in Section 5.1. To examine whether criteria were needed for other constituents of potential concern (COPCs), some historic data (Parsons et al., 2012a and Maritime Testing Ltd, 2009), as well as the 2018 field data, were screened against the NS Tier 1 EQS, and discussed further (See Section 5.2).

## 5.2 Closure Criteria for Arsenic and Mercury

For arsenic and mercury, the following standards currently exist (see Table 5-1) and were applied to the Site as Tier 1 closure criteria.

**Table 5-1: Tier 1 Closure Criteria for Arsenic and Mercury, Based on Pathway Specific Standards Established for Various Media for Protection of Human and Ecological Health (NSE, 2014)**

| Contaminant | Soil Standards (mg/kg) | | Sediment Standards (mg/kg) | | Surface Water (µg/L) | | Groundwater (µg/L) | | Tissue Residues (µg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| | Human Health | Ecological health | Human Health | Ecological Health (aquatic life) | Human Health | Ecological Health (aquatic life) | Human Health | Aquatic Life | Protection of Wildlife (consumption of aquatic biota) |
| Arsenic | 31[a] | 17[b]/380[c] | NA | 17 | NA | 5 | 10[e] | 5[f] | |
| Mercury (total) | 6.6[a] | 12[b] | NA | 0.486 | NA | 0.026 | 1[e] | 0.026[f] | |
| Methyl mercury | 1.6[a] | 1/0.8[b, d] | NA | NA | NA | 0.004 | 0.3[e] | 0.004[f] | 33[g] |

a Human health soil contact/ingestion (NSE, 2014)
b Ecological soil contact (NSE, 2014)
c Ecological soil and food ingestion (NSE, 2014)
d Ecological soil contact for fine and coarse soils, where values differ due to soil texture (NSE, 2014)
e Value only applies for potable groundwater
f Value applies where source is 0 – 10 m from surface water body; otherwise, a 10-fold dilution factor can be applied.
g CCME, 2000 (established for storm petrol, a small ocean-feeding avian species)
NA: not available

Where arsenic or mercury exceed these standards, or if attaining these standards relative to closure options is found to be challenging, risk-based (Tier 2) closure criteria can be applied for the receptor groups of interest. The risk-based approaches vary by receptor group and are explained below. The Tier 2 closure criteria for arsenic and mercury are provided in Table 5-2. Details on the development of these values are as follows:

### 5.2.1 Soils Tier 2 Values

The human health Tier 2 criteria for arsenic and mercury were developed using the CCME soil quality guideline equation, modified with site specific background data for arsenic and mercury, as summarized in Parsons and Little (2015). The statistical metric selected to represent background was median + 2 median absolute deviation (MAD), as per Parson and Little (2015). In addition, site specific bioaccessibility data for arsenic was used; no such data exist for mercury, so it was assumed to be 100% bioaccessible in soils in the Tier 2 calculations. The 95$^{th}$ Upper Confidence Limit of the mean (95UCLM) of bioaccessibility from work conducted on tailings samples from the Site, was selected for arsenic (ESG, 2009). Since the Stage 1 project only pertains to areas within Crown lands, a recreational land use scenario was applied. While there are multiple warning signs at this Site which state the following: “Health Warning. Soils on this site contain high levels of arsenic. Keep off this Site at the request of the Chief Medical Officer of Health.”, there is evidence of active site use, related to walking and dirt biking. For arsenic, the Tier 2 criteria for recreational land use only consider the adult life stage, as per CCME. Therefore, the development of closure criteria assumed some recreational land use, as follows:

- 2 hours per day, 2 days per week, for 35 weeks per year of usage for adults; and,
- 10 hours per day for 5 days per week in the summer (8 weeks) and 10 hours per day for 2 days per week in the spring and fall (27 weeks) per year for children.

In Stage 2 of this project, a Tier 2 closure criteria for a residential scenario may be required for areas off Crown lands, in the instance that tailings may have impacted third party properties.

The ecological health Tier 2 closure criteria for arsenic were based on background data, since background exceeded the available Tier 1 NSE environmental quality standards. Alternative values were considered based on the Ontario Ministry of Environment and Climate Change (MOECC) (2016) soil component values (Table 3; Full Depth, non-potable water scenario; residential/parkland scenario) for arsenic (20 mg/kg for soil invertebrates, and 50 mg/kg for mammals and birds), but at Montague, background is elevated relative to these values, and hence, background was selected (see Table 5-2). For mercury, the MOECC (2016) soil component values of 10 mg/kg (plants and soil organisms) and 20 mg/kg (birds and mammals) were evaluated. The NS Tier 1 value of 12 mg/kg was applied as the Tier 2 criteria, with the application of the MOECC value for birds and mammals for inorganic mercury (20 mg/kg). Comparison of the historical data (Parsons et al., 2012a; Maritime Testing, 2009) as well as the 2018 field data, are provided in Appendix B.

### 5.2.2 Sediment Tier 2 Values

Sediment quality criteria are difficult to revise without conducting a site specific risk assessment to gather data on toxicity and bioavailability of contaminants, using multiple lines of evidence. The only generic regulatory values that are available, apart from CCME (NS Tier 1 standards are based on CCME), are the Severe Effect Level (SEL) values from OMOE (2008), but it is uncertain as to whether these will be accepted by NSE, and how applicable they are for the Site, as they do not account for site specific bioavailability of either arsenic or mercury. Exceedance of the SEL values suggests a level of contamination that is expected to be detrimental to the majority of sediment-dwelling organisms (OMOE, 2008). Since the Site consists of tailings, which can have lower bioavailability of metals, exceedance of this level of guideline at Montague may have a more limited potential for adverse effects, then at sites with bioavailable contaminants. Additional data are not available at this time but can be captured as part of Stage 2.

### 5.2.3 Surface Water Tier 2 Values

Tier 2 protection of aquatic life values were derived for arsenic, using a Species Sensitivity Distribution (SSD) approach, as per CCME (2007). The derived value of 30 µg/L is a hazardous concentration to 5% of species (HC5) (In addition, HC10 and HC20 values are also provided (HC10: 68 µg/L; HC20: 163 µg/L). Details are provided in Appendix B. For mercury, the CCME guideline was also used in Tier 2, as this guideline does not consider biomagnification. The receiving environments at the Site include wetland areas which have a potential to result in biomagnification of mercury. As a result, a more relaxed criteria was not selected. A more advanced approach will be undertaken in Stage 2 to determine a mercury Tier 2 surface water criteria.

Human health surface water values are not required and would be less stringent than those used to protect aquatic life.

### 5.2.4 Groundwater Tier 2 Values

For human health, it is currently not confirmed whether there are linkages between the site groundwater in the wetland areas and nearby groundwater drinking water wells. Hence, at this time, the human health Canadian drinking water quality guidelines for arsenic and mercury (cited as NS Tier 1 values) are recommended, until groundwater flow can be determined, and it can be confirmed if nearby groundwater wells are impacted by the tailings.

For aquatic life, wells that are in close proximity to surface water sources require the implementation of protection of aquatic life values. Deeper wells could have more relaxed criteria, and could include a 10-fold dilution factor, if wells are > 10 m from a surface water source.

### 5.2.5 Tissue Residue Tier 2 Values

No site-specific tissue residue values for protection of human or ecological health have been developed at this time, as no tissue sampling has been conducted under Stage 1 of the project (e.g. fish tissue analysis). For methyl mercury, the CCME tissue residue guideline of 33 ug/kg can be modified for a more representative species (such as a blue heron, or other avian wetland species), rather than the current storm petrol used in the guideline development. The storm petrol is a small ocean feeding bird, and therefore is not relevant to the site.

### 5.2.6 Tier 3 Criteria

A Tier 3 level of criteria may also be considered for development. This type of criteria may include a less stringent degree of protection for some receptor groups and would be built on the concept of setting goals for the overall closure project which are striving to see improvement in the ecosystem, relative to current conditions.

The purpose of the alternative criteria is to illustrate the sensitivity of the potential closure options to variations in the criteria. This is discussed further in the subsequent sections. If NS Lands Inc. determines that the preferred closure option will meet the Tier 2 or a more relaxed Tier 3 criteria, then regulatory acceptance relative to the NSE (2014) requirements will have to be discussed with appropriate government departments, which can be undertaken in Stage 2.

**Table 5-2: Tier 2 Closure Criteria for Arsenic and Mercury for Protection of Human and Ecological Health**

| Contaminant | Soil Standards (mg/kg) | | Sediment Standards (mg/kg) | | Surface Water (µg/L) | | Groundwater (µg/L) | | Tissue Residues (µg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| | Human Health (Recreational Land Use) | Ecological health | Human Health | Ecological Health (aquatic life) | Human Health | Ecological Health (aquatic life) | Human Health | Aquatic Life (shallow groundwater) | Protection of Wildlife (consumption of aquatic biota) |
| Arsenic | 750[a] | 139[b]/380[c] | NA | 33[e] | NA | 30[f]/68/163 | 10 | 30[f]/68/163 | NP |
| Mercury (total) | 29[a] | 12/20[d] | NA | 2[e] | NA | 0.026[g] | 1 | 0.026[g] | NP |
| Methyl mercury | NA | NA | NA | NP | NA | NP | NP | NP | NP |

NA - Not applicable;
NP - Not provided at this time, as no chemistry data available for this media.
A Montague Mines site specific value; recreational land use
B Montague Mines site specific value, based on background (median + 2 MAD; Parsons and Little, 2015)
C Ecological soil and food ingestion (NSE, 2014)
d Tier 1 NSE (2014) guideline; and OMOE bird and mammal value (OMOE,2008)
e These values are Severe Effect Level sediment quality guidelines (OMOE, 2008)
f Species Sensitivity Distribution Water Quality Objective, as per CCME, 2007; (HC5/HC10/HC20); Intrinsik, 2019; see Appendix B
g The CCME guidelines are retained for Tier 2, as in light of the receiving environment (wetland at both sites), this value may not be adequately protective relative to biomagnification (which is not accounted for in the CCME guideline).

Screening of the historic data against the Tier 1 And 2 criteria for arsenic and mercury was conducted and is presented in Appendix B. Based on the screening, arsenic is considered the primary constituents of potential concern (COPC), considering both the frequency of exceedances over the NS Tier 1 and project specific Tier 2 guidelines, as well as the degree of exceedance. Mercury is also confirmed as a COPC, but to a lesser extent than arsenic. It is retained as a COPC due to the presence of mercury related to historic mining releases in the wetland areas, wherein it has a propensity to biomagnify in food chains. It is not a dominant human health concern through soil exposure pathways, as evident from the outcomes of the screening, with similar conclusions related to terrestrial wildlife.

## 5.3 Closure Criteria for Other Inorganics (apart from Arsenic and Mercury)

Historical data from Parson et al. (2012a), as well as the 2018 field sampling data were screened against NS Tier 1 standards to identify whether other metals exceeded these standards, and merited development of Tier 2 closure criteria. Appendix B provides a summary of screening outcomes for metals in soils (tailings), sediments and surface waters, against NS Tier 1 EQS for both human health and ecological health, for all elements analyzed. Table 5-3 further summarizes that information relative to screening against soil quality standards. With regard to human health, iron most frequently exceeded the Tier 1 standards, followed by antimony and cobalt. Other elements exceeded the standards on a more sporadic basis, as seen in Table 5-3. For ecological health comparisons, antimony, cobalt and copper most frequently exceeded the Tier 1 values. The degree of exceedance in both human and ecological health screenings, relative to arsenic, was far lower (see Appendix B for screening tables).

**Table 5-3: Screening of Remaining Inorganic Compounds Against NS Tier 1 Soil Quality Standards: Number of Samples Exceeding Standards (# samples exceeding standard/number of samples taken)**

| Metals/Metalloid | Soils/Tailings | | | |
|---|---|---|---|---|
| | Parsons,2012a – Human Health | 2018 Field Data-Human Health | Parsons 2012a – Ecological Health[a] | 2018 Field Data-Ecological Health[a] |
| Aluminum | 3/46 | 4/30 | NGA | NGA |
| Antimony | 30/46 | 15/30 | 19/46; NGA | 3/30; NGA |
| Barium | 0/46 | 0/30 | 0/0 | 0/30; 2/30 |
| Cadmium | 0/46 | 0/30 | 0/0 | 0/30; 1/30 |
| Chromium | 0/46 | 0/30 | 0/NGA | 1/30; NGA |
| Cobalt | 11/46 | 12/30 | 13/46; NGA | 14/30; NGA |
| Copper | 0/46 | 0/30 | 19/46; 0/46 | 17/30; 0/30 |
| Iron | 45/46 | 29/30 | NGA | NGA |
| Lead | 7/46 | 3/30 | 1/46; 17/46 | 1/30; 19/30 |
| Nickel | 0/46 | 0/30 | 8/46; 0/46 | 8/30; 0/30 |
| Selenium | 0/46 | 0/30 | 7/46; 0/46 | 10/30; 0/30 |
| Tin | 0/46 | 0/30 | 1/46; NGA | 0/30; NGA |
| Vanadium | 2/46 | 5/30 | 1/46; NGA | 1/30; NGA |
| Zinc | 0/46 | 0/30 | 10/46; 0/46 | 9/30; 0/30 |

a NGA: no guideline available; first numbers are the Soil contact guideline screening outcomes; second numbers are the Soil and Food Ingestion screening outcomes; shaded cells indicate where samples > NS Tier 1 EQS

The 2018 wetland samples were screened and comparisons of the data to NS Tier 1 guidelines is presented in Table 5-4. Most samples taken by Parsons et al (2012a) were located on the main tailings, and hence, the comparison against sediment quality guidelines was not undertaken for that dataset.

**Table 5-4: Screening of Remaining Inorganic Compounds Against NS Tier 1 Sediment Quality Standards: Number of Samples Exceeding Standards (# samples exceeding standard/number of samples taken)**

| Metals/Metalloid | Number of samples >NS Tier 1 Sediment Standards[a] |
|---|---|
| Cadmium | 1 / 23 |
| Iron | 6 / 23 |
| Lead | 11 / 23 |
| Manganese | 9 / 23 |
| Nickel | 3 / 23 |
| Selenium | 2 / 23 |
| Zinc | 4 / 23 |

Note: shaded cells indicate where samples >NS Tier 1 EQS

Screening of total metals and dissolved metals concentrations in the surface water was also undertaken. The results of this screening are presented in Table 5-5, with details provided in Appendix B.

**Table 5-5: Primary Chemicals of Potential Concern, Based on Surface Water Data (2018) - Montague**

| COPCs | Main Tailings | Ponds Atop Main Tailings | Off Site Tailings (Gold Lane and Vaughan Lane areas) | Far Field Tailings |
|---|---|---|---|---|
| **Primary COPC** | As; Hg; Cu | As; Hg | SW17 (near Gold Lane) has no surface water COPCs, based on available data; SW18 (near Vaughan Lane) appears elevated for a number of parameters, due to suspended particulate. | As |
| **Secondary COPC** | Pb; Al (?) | Cu (?) | | none |

With respect to inorganics other than arsenic and mercury exceeding NS Tier 1 soil, sediment and surface water standards for either human health or ecological health, these substances will be re-evaluated in the closure program once specific areas for cleanup (based on arsenic concentrations) have been identified. Exceedances of other contaminants will be investigated to evaluate whether that the specific areas exceeding guidelines are either captured in the closure program, or a site specific (risk based) Tier 2 guideline based on appropriate land merits development. In general, the degree of exceedance for other inorganics (such as antimony, cobalt, lead, vanadium, etc.), is small in comparison to that which occurs for arsenic; therefore, arsenic is considered the toxicity driver with respect to tailings. Additional development of Tier 2 and/or Tier 3 criteria will be captured in Stage 2 and may include other data in order to incorporate bioavailability issues, and/or toxicity potential.

# 6.0 SITE CHARACTERIZATION

## 6.1 Hydrology

High level hydrological assessment was completed at the Montague Site. The area within and around the site boundaries is relatively flat and is dominated by wetland, making it challenging to determine flow direction and flow connections. High resolution LiDAR survey and aerial photography was used to make assumptions on flow direction and location of hydraulic connections. Figure 6-1 shows the general surface water sub catchment areas within the Montague Mines area. In general, surface water flows from Loon Lake northwest via Mitchell Brook through Montague Mines and continues via Mitchell Brook that flows south through discharging into Lake Charles (not shown on figure). As previously noted the area is relatively flat and floods seasonally, during seasonal flooding a portion of the northern section of the Site flows north. Verification of flow direction and / or water monitoring will be required to support future work.

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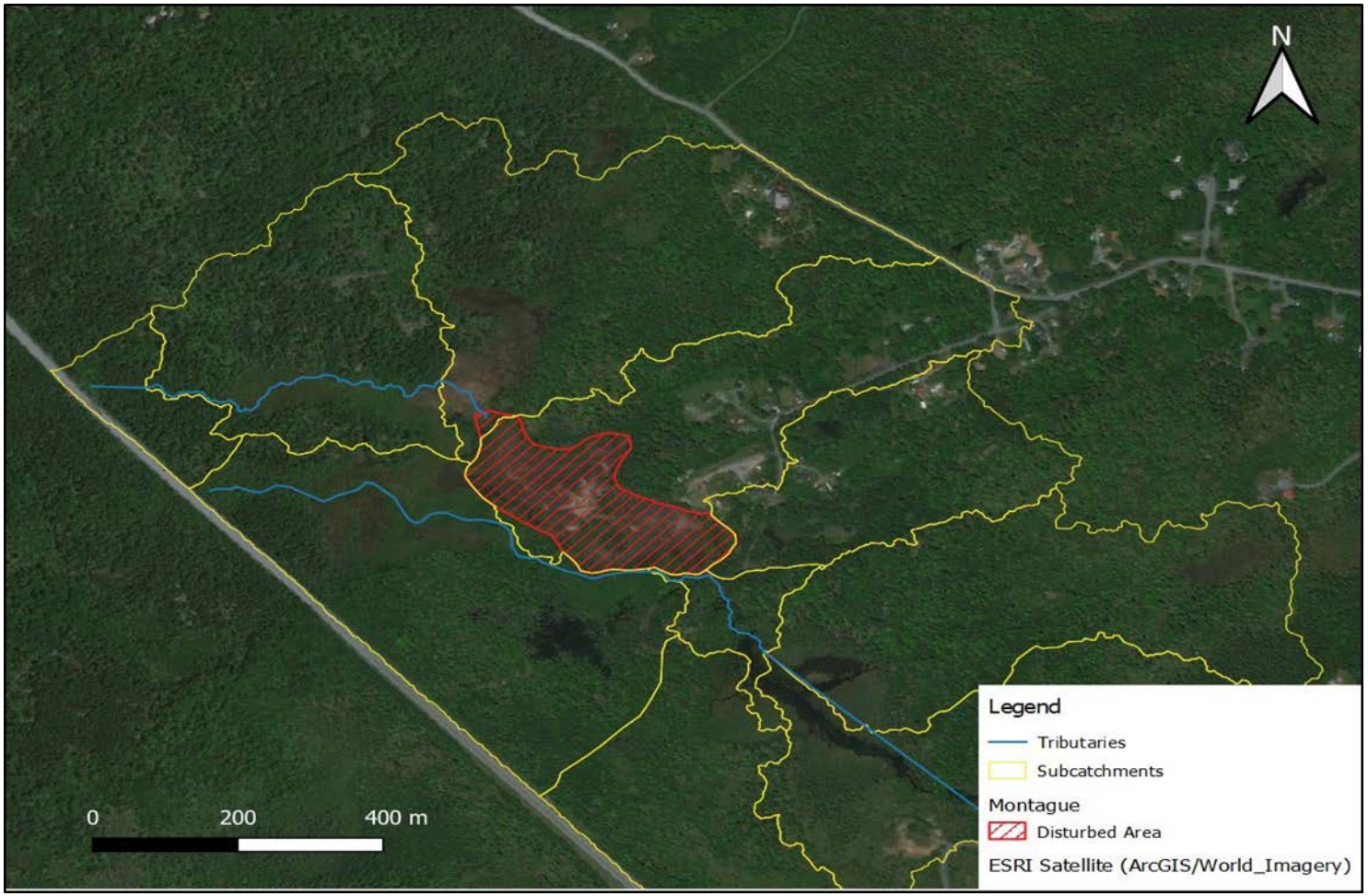


**Figure 6-1: Montague Mines Surface Water Catchment Areas**

## 6.2 Field Program

The field sampling program was completed in the period 22 to 30 November 2018. The sampling program included the collection of water and solids across the site as well as upstream and downstream locations. Where available, water samples were collected at the ground surface and in local water bodies and at ponds and lakes both upstream and downstream of the site. Solid samples were collected across the site with a hand Auger to provide samples from discreet depths down to 2 m below ground surface. Selected solid samples were also processed to extract the porewater that was also analysed. Several piezometers were installed at selected locations, typically with shallow (less than 1 mbgs) and deep (less than 2 mbgs) screens. Water samples were collected from the many piezometers and analysed. Sediments below ponded water were collected by coring to depths of about 0.5 m. The sediments were also processed to extract porewater that was also analysed. Solid samples from the area in the immediate vicinity of the surface exposed tailings were also subjected to rinse pH measurements.

## 6.3 Summary of Field Program Results

The following sections provide a summary of the field sampling and analytical results for the Montague site, including downstream and upstream locations. More detailed information can be found in Appendix C.

### 6.3.1 Rinse pH

Figure 6-2 displays all sample sites with a visual depiction of the rinse pH measurements, where the green symbols indicates pH values that are greater than 6, yellow indicates pH values between 4 and 6, and red indicates pH values that were less than 4. Rinse pH values were obtained in order to review the potential for acidic conditions and the presence of hardpan materials.

The lowest rinse pH values of 3.2 and 3.7, were observed to be within the hardpan portion of the lower Montague tailings (Figure 6-2). The hardpan refers to tailings that have been cemented by the formation of chemical precipitates. This condition is typically attributed to sulphide tailings that are highly oxidized and have formed iron hydroxide solids that has acted to cement the tailings particles together. The hardpan area tailings were also observed to be coarser grained, sand-like particles that would be expected to be well drained and therefore be exposed to oxygen in the air, resulting in oxidation of the sulphide minerals.

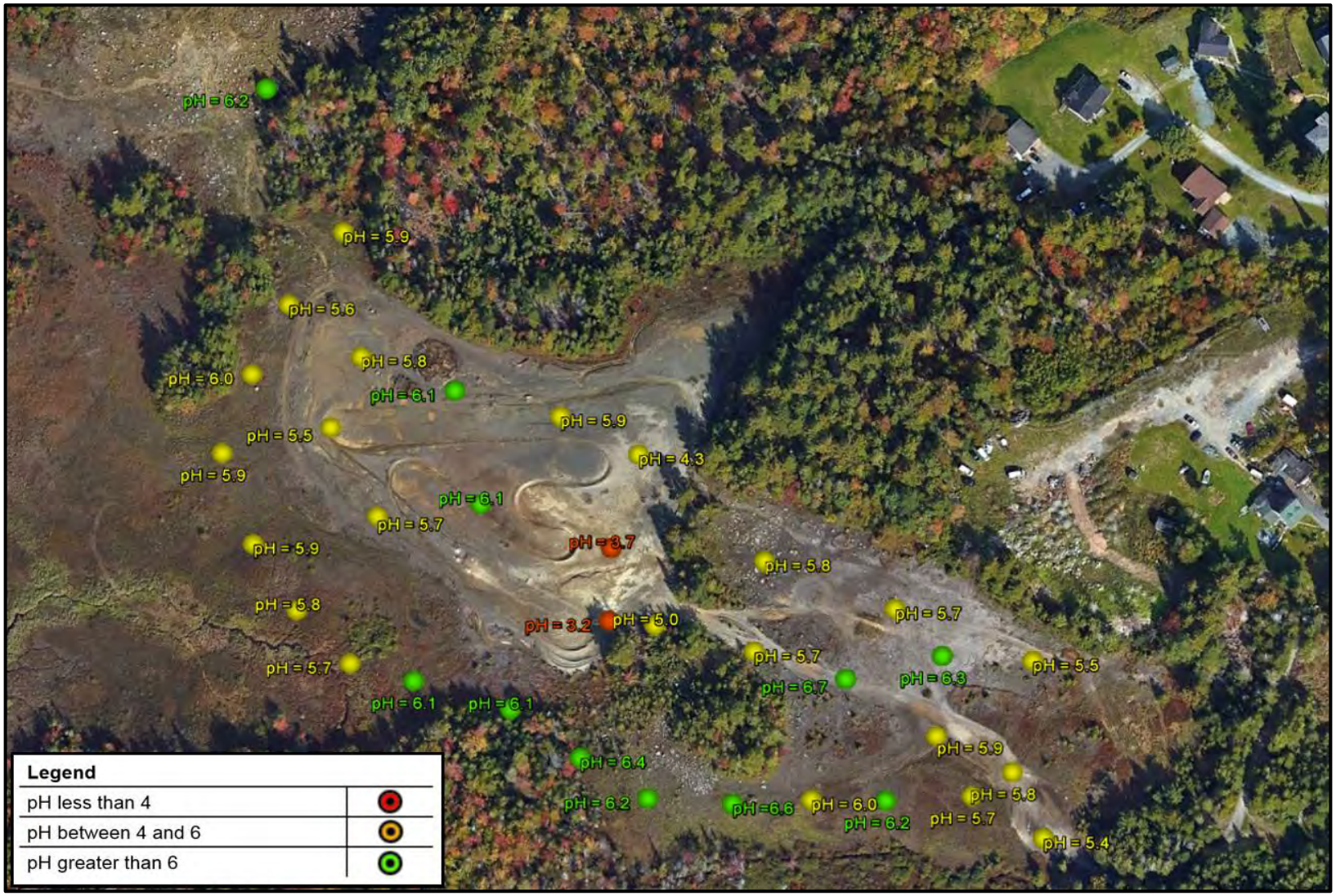


**Figure 6-2: Montague Mines - Surficial Solids Rinse pH**

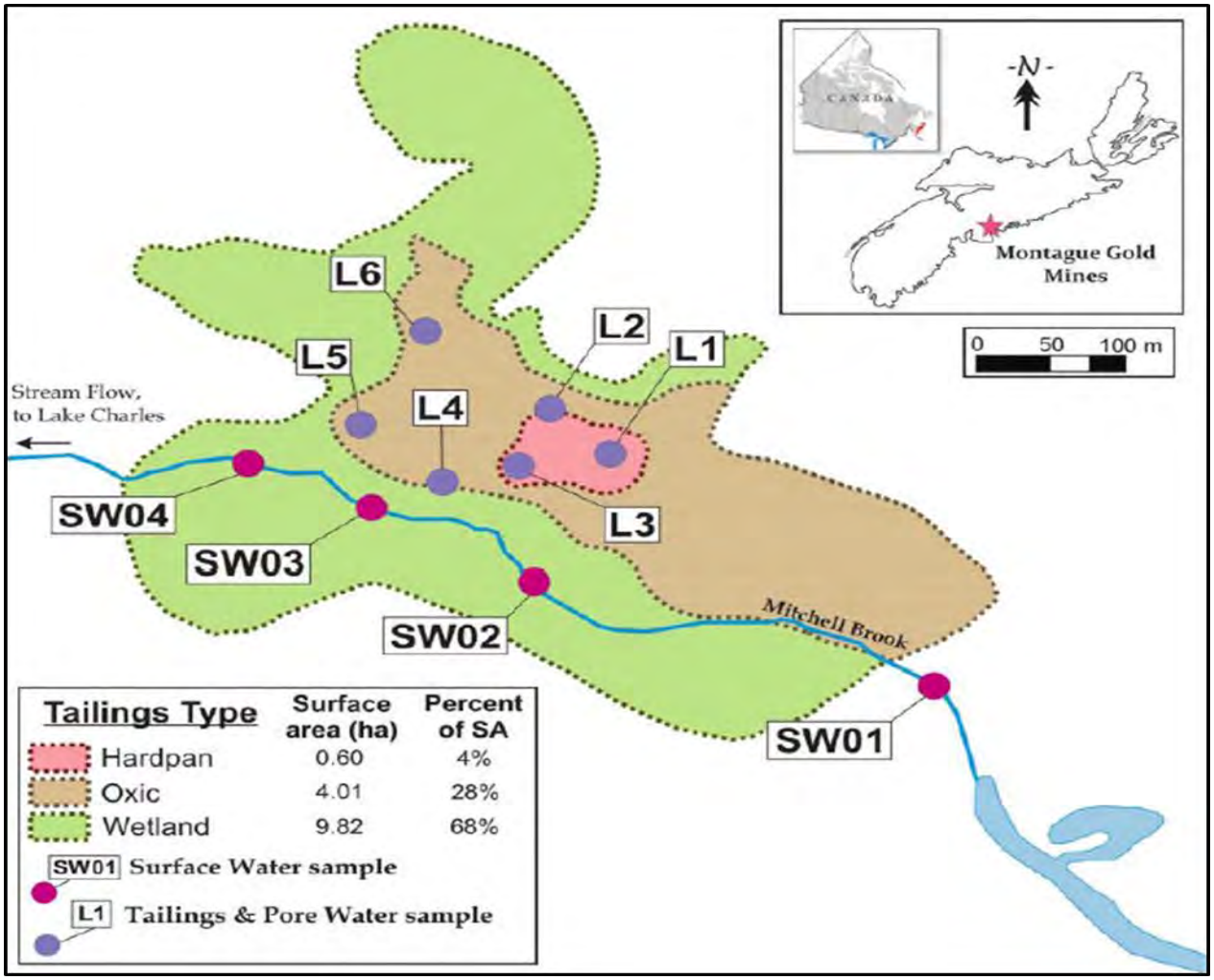


**Figure 6-3: Montague Mines – Distribution of Near-Surface Tailings Types at Montague (DeSisto 2014)**

### 6.3.2 Acid Base Accounting (ABA)

The solid samples were analysed for acid base accounting (ABA) characteristics, including total sulphur and sulphide-sulphur, modified Sobek neutralization potential (Sobek-NP) and carbonate content. The ABA results provide information on the potential for acid generation as a result of sulphide mineral oxidation. The acid potential (AP) is derived from the sulphide-sulphur content and is expressed in units of kilograms of $CaCO_3$ per tonne of tailings (kg-$CaCO_3$/t). The neutralization potential (NP) was measured with a modified Sobek method (Lawrence, 1991) as well as calculated from the carbonate content and expressed in the same units as those of AP. The ratio of NP/AP is used to determine the potential for acid generation if all of the sulphide is oxidized at some time in the future. Sulphide oxidation creates sulphuric acid that can lower the pH of any contact water if there is insufficient NP to neutralize the acid produced. The NP/AP ratio is also referred to as the neutralization potential ratio (NPR). When mine materials contain sulphide and have NPR values less than one, the material would be expected to generate free acidity at some time in the future if oxidation is not mitigated. These materials are referred to as potentially acid generating (PAG). Materials with NPR values greater than 2 and that have NP that is effective at neutralizing water to pH values of 6 and greater would not be expected to generate free acidity. These materials would remain neutral into the indefinite future and are referred to as non-potentially acid generating (non-PAG). Materials with NPR values greater than one and less than 2 may or may not produce free acid and therefore are characterized as uncertain with respect to the potential for acid generation.

The Sobek-NP was analysed on a subset of samples and carbonate was measured on all samples. The Sobek-NP results were compared to the carbonate-NP (Carb-NP) results and the results are displayed graphically in Figure 6-4. The results show that the Sobek NP values ranged from about -30 to +10 kg-$CaCO_3$/t and the Carb-NP values ranged from about 0 to 4 kg-$CaCO_3$/t. The negative values are the result of materials that have already generated free acidity and have pH values less than 6. With these tailings, it was assumed that the Carb-NP values represented the effective NP. Therefore, all NPR values were calculated using the Carb-NP.

The Carb-NP/AP ratios were plotted with the sulphide-sulphur contents in Figure 6-5. This figure also shows the NPR criteria for PAG and non-PAG materials. These results indicate that the majority of samples will be characterized as PAG with insufficient NP to maintain neutral conditions. It is also evident from the results that the lower Carb-NP/AP values are associated with the higher sulphide-sulphur contents. These results imply that although only a few samples exhibited acidic rinse pH values, the majority of the tailings are likely PAG as summarized in Table 6-2 and are expected to generate acid at some time in the future in the absence of any mitigating factors.

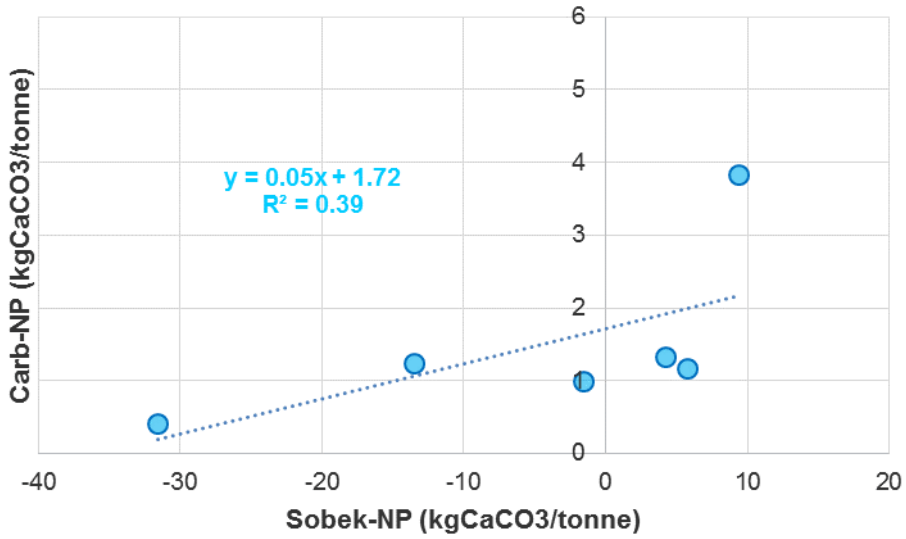


**Figure 6-4: Montague Mines - Carb-NP vs. Modified Sobek-NP**

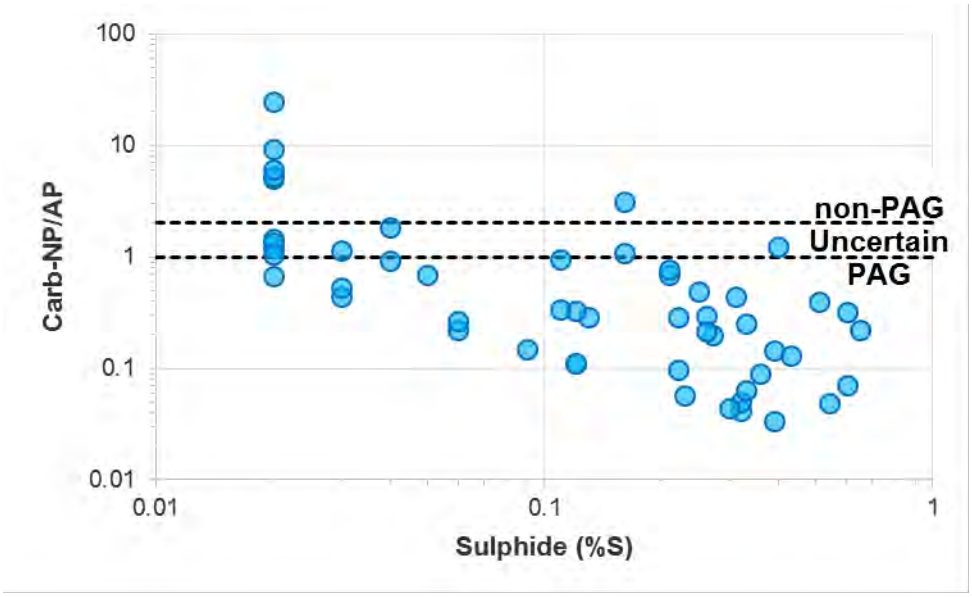


**Figure 6-5: Montague Mines - Carb-NP/AP vs. Sulphide**

**Table 6-1: Montague Mines – Classification of Acid Generation Status**

| Location | Carb-NPR | | | |
|---|---|---|---|---|
| | Count | PAG<br>Carb-NPR < 1 | Uncertain<br>1 ≤ Carb-NPR < 2 | Non-PAG<br>Carb-NPR ≥ 2 |
| Montague | 52 | 38 | 8 | 6 |
| | | 73% | 15% | 12% |

As will be elaborated later in this report, where tailings are currently saturated, this has been a benefit with respect to limiting sulphide oxidation. Sulphide minerals in the tailings that occur, either underwater in ponds and wetlands, or below the water table will be protected from oxidation and would not be expected to generate acid in the future.

The sample locations and the Carb-NPR results are displayed in Figure 6-6. The red symbols represent PAG material, green symbols represent non-PAG materials, and orange symbols represent materials with an uncertain potential for acid generation. It is evident from the distribution that PAG materials occur at all areas that were sampled, including the sediments in Loon Lake, upstream, and those in Barry's Run, Lake Charles and Lake Major. Even though the lake sediments have not yet been positively identified as tailings, the presence of sulphide-sulphur and the low Carb-NP values result in characterization of the sediments as PAG. Overall, these results imply that the PAG characteristics of the tailings require consideration for any proposed mitigation strategies.

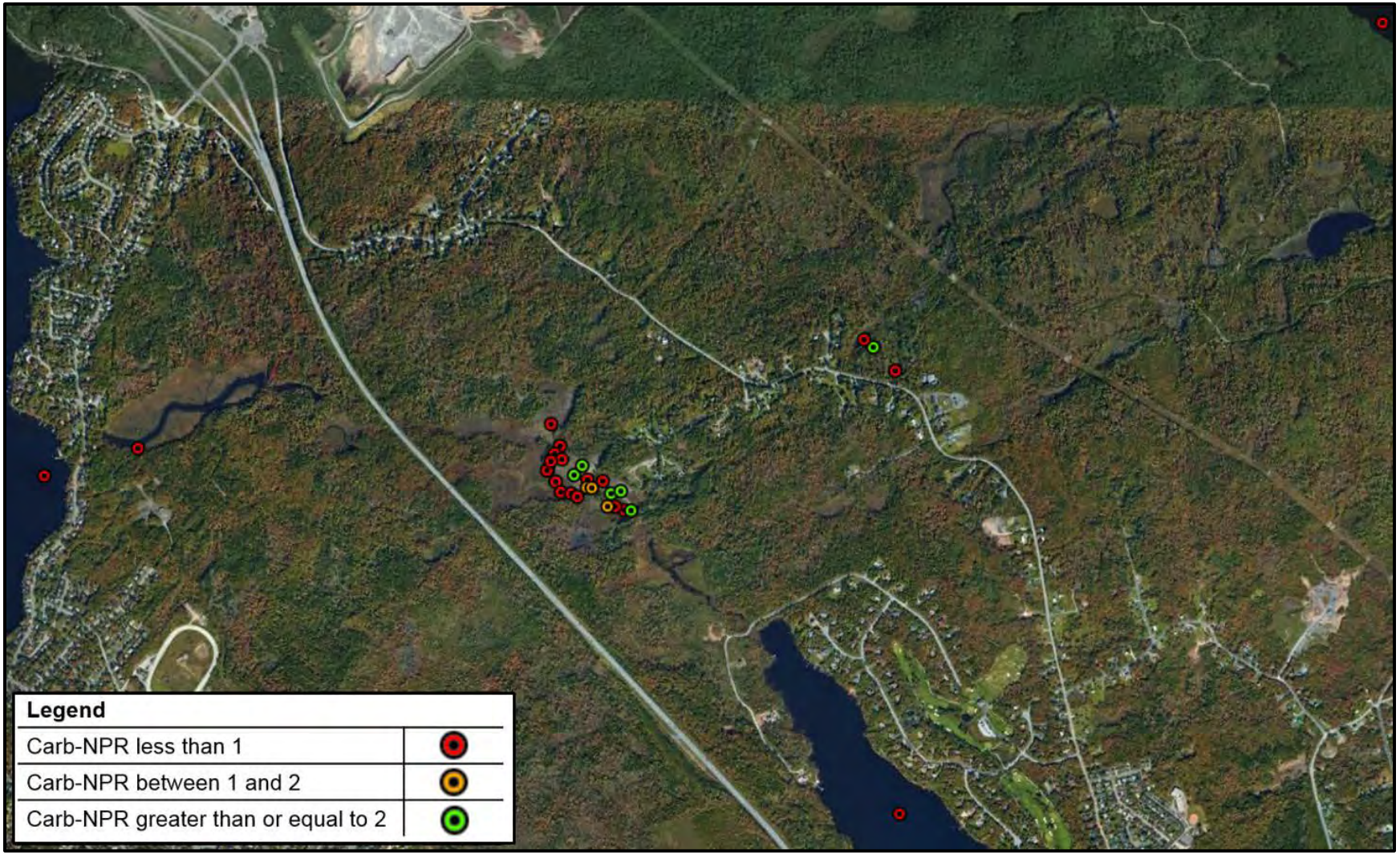


**Figure 6-6: Montague Mines – Carb-NPR**

### 6.3.3 Arsenic and Mercury Contents in the Tailings Solids

The results for the solids samples are summarized in a series of images of the site that show the concentrations of arsenic and mercury relative to the Tier 1 and Tier 2 risk criteria for human health as presented in Section 5.1. The results from this study that are shown in the figures represent the surface-most solids contents measured at each sampling station. The detailed results can be found in Appendix C. The results from historical sampling completed between 2003 and 2008, representing surface samples, were included in the figures to complement the results from the study (i.e., Parsons et al, 2012a, Maritime Testing, 2009, Parsons and Little, 2015 datasets are included in the figures).

The results for arsenic in the surface solids across the entire site are shown in Figure 6-7, including the sediments in Loon Lake, Lake Charles and Lake Major and those for the central area of the site are shown in Figure 6-8. In these figures, the red symbols represent concentrations of arsenic that are greater than 10 times the Tier 2 criterion, orange symbols represent arsenic values between the Tier 2 criterion and 10 times the tier 2 value, yellow symbol represents values between the Tier 1 and Tier 2 criteria, and green symbols represent arsenic concentrations that are less than the Tier 1 criterion. The diamond symbols represent samples from this study and circles represent the historical data.

It is evident from these results that there is a clustering of samples with the highest values within the central area of the main tailings deposition area. There are a few additional locations that have arsenic concentrations above the Tier 2 criterion (i.e. in the vicinity of Gold Lane road and beyond the Hydro corridor to the northeast) and several locations that have levels between the Tier 1 and Tier 2 criteria. These results provide an indication of the priority tailings areas and also indicate the areas adjacent to the highest concentrations that should be considered for further assessment at Stage II of the site investigation.

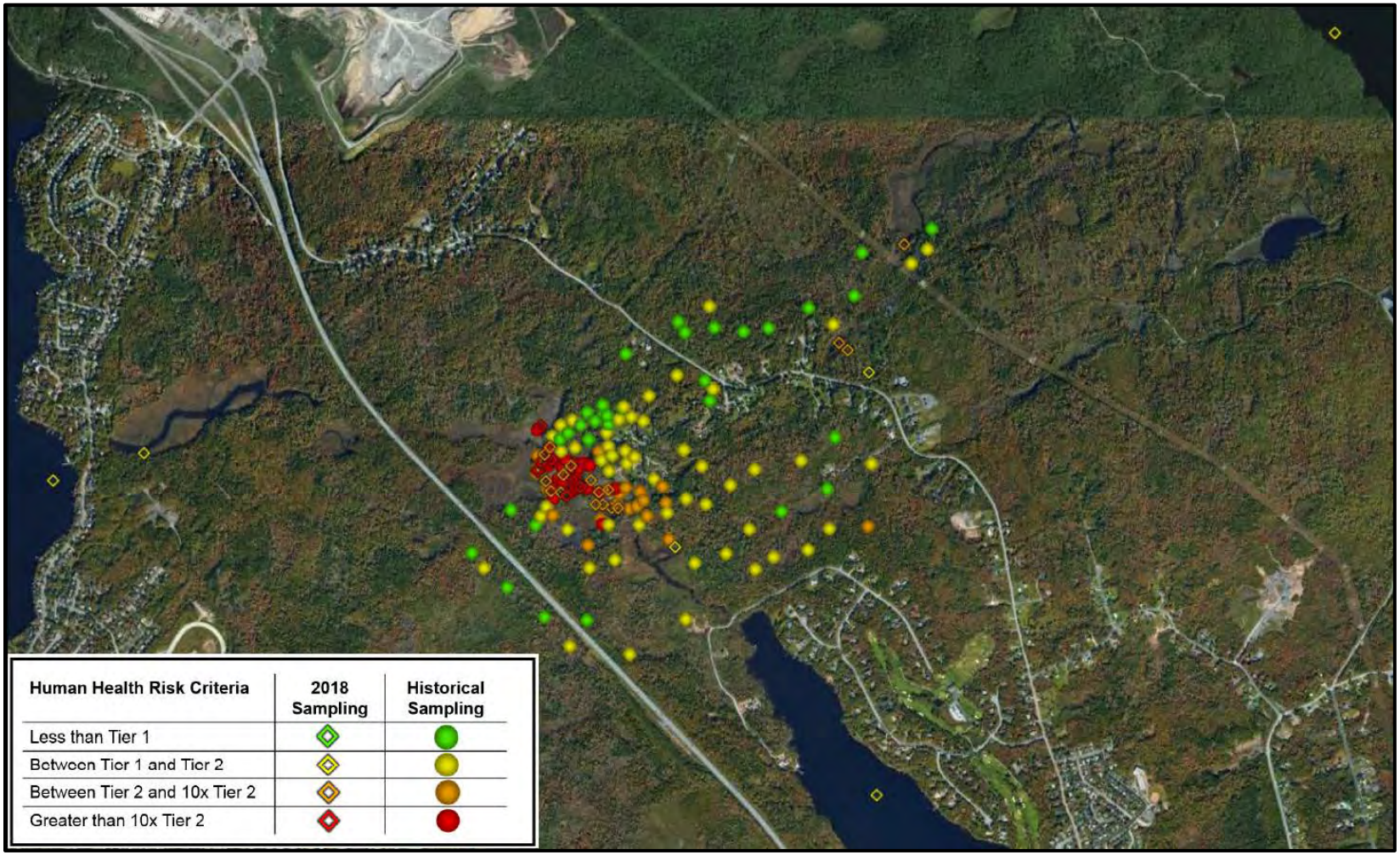


**Figure 6-7: Montague Mines – Near-Surface Arsenic Contents – All Locations**

Note:
Tier 1 Arsenic Criteria = 31 mg/kg
Tier 2 Arsenic Criteria = 750 mg/kg

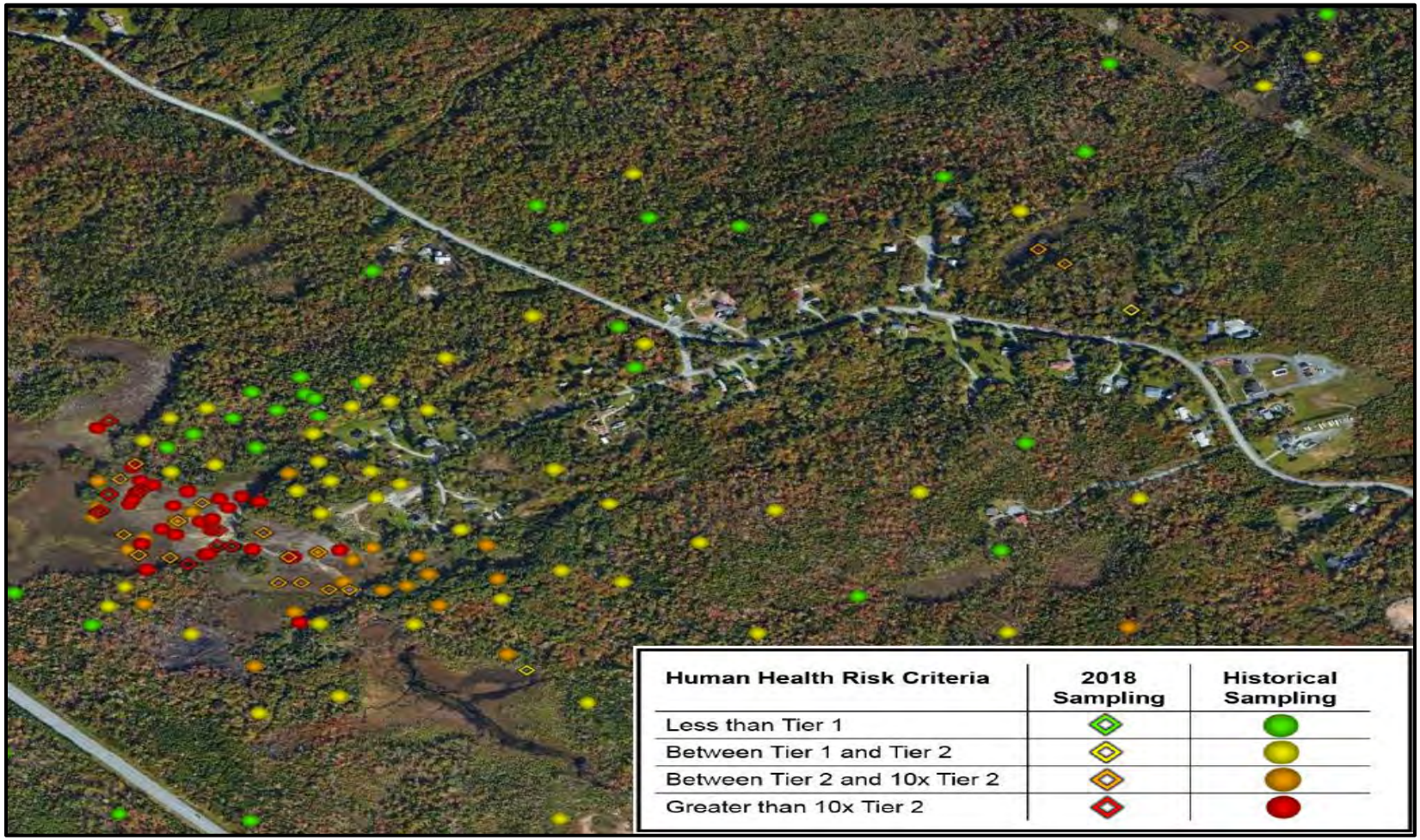


**Figure 6-8: Montague Mines – Near-Surface Arsenic Contents – Central Region**

Note:
Tier 1 Arsenic Criteria = 31 mg/kg
Tier 2 Arsenic Criteria = 750 mg/kg

The results for mercury concentrations in the solids are summarized for the entire site and focused on the central tailings area in Figures 6-9 and 6-10, respectively. The results are presented in a similar manner to those of arsenic with colour schemes relating to the Tier 1 and Tier 2 human health risk criteria for mercury in soils. In contrast to the results for arsenic, the majority of samples have concentrations of mercury that are less than that of the Tier 1 criterion. Though a few samples had concentrations greater than the Tier 2 criterion, the majority of the samples that exceeded the Tier 1 criteria were less than the Tier 2 value. The samples with mercury contents greater than the Tier 2 criterion were in locations in close proximity to historical mills. Based on the mercury results in solids, it is evident that mitigation of areas or zones of risk defined by the arsenic levels will incorporate those areas with risks related to mercury.

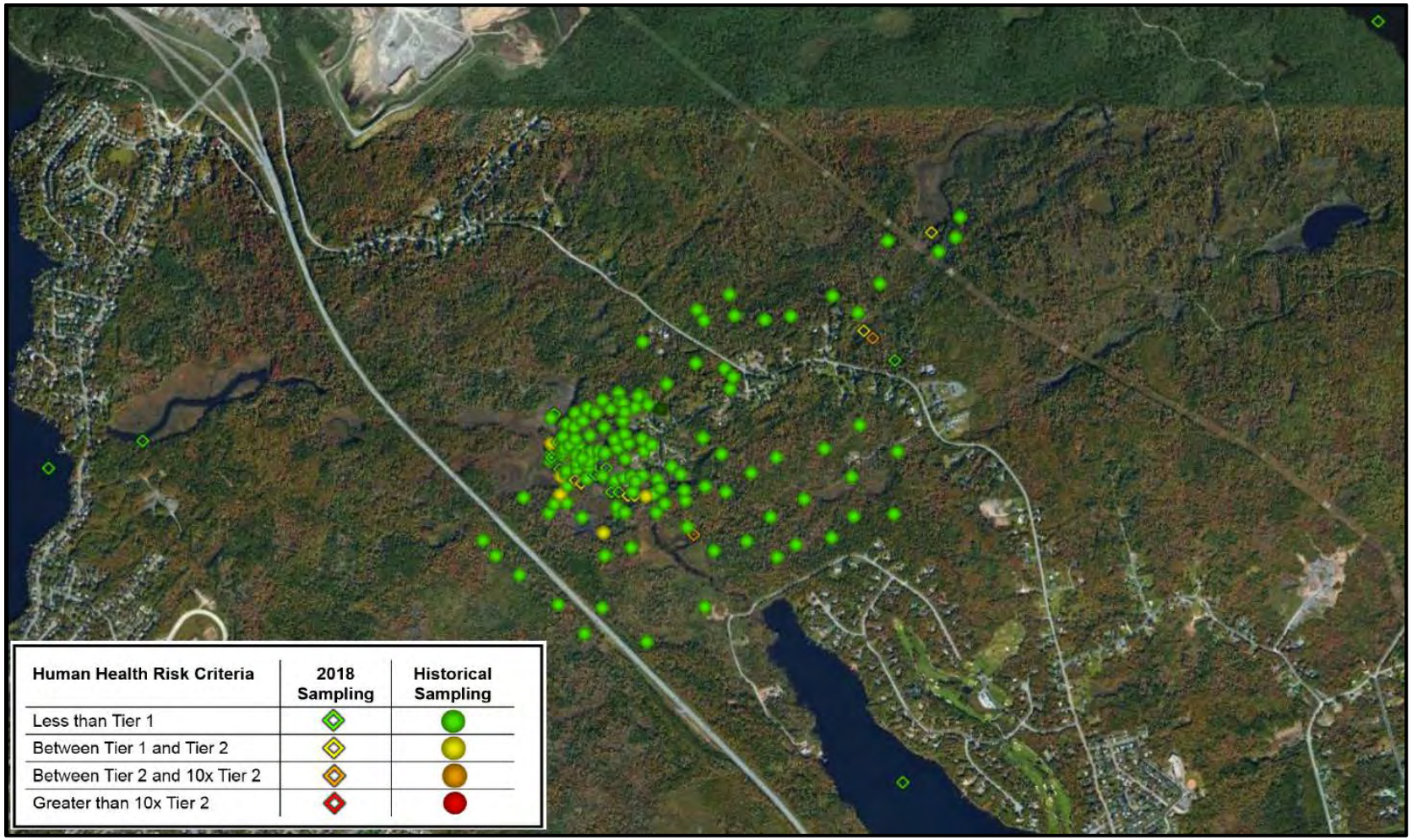


**Figure 6-9: Montague Mines – Near-Surface Mercury Contents – All Locations**

Note:
Tier 1 Mercury Criteria = 6.6 mg/kg
Tier 2 Mercury Criteria = 29 mg/kg

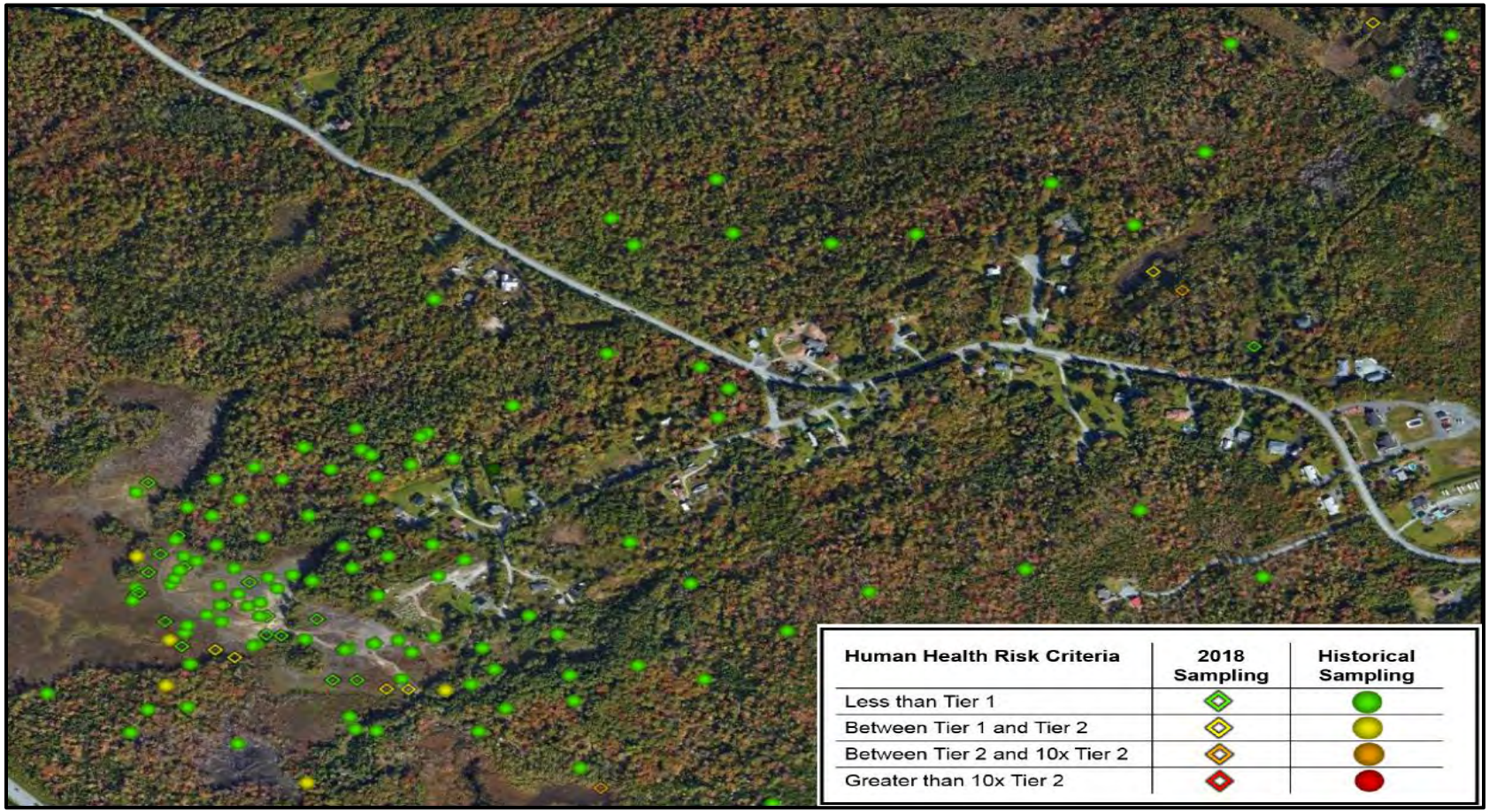


**Figure 6-10: Montague Mines – Near-Surface Mercury Contents – Central Region**

Note:
Tier 1 Mercury Criteria = 6.6 mg/kg
Tier 2 Mercury Criteria = 29 mg/kg

### 6.3.4 Surface Water – Arsenic and Mercury

The results for total arsenic concentrations in surface water are summarized in Figure 6-11. Locations included in the surface water analysis are: Loon Lake, Mitchell Brook, Barry's Run, Lake Charles, the Gold Lane road pond, and Lake Major. The colour scheme for the symbols are based on the Tier 1 and Tier 2 criteria for risk to aquatic organisms in water. The concentrations for total and dissolved arsenic are also summarized in Table 6-2. The concentrations of total arsenic were less than the Tier 1 criterion in Loon Lake and Lake Major. Arsenic concentrations in the other surface water samples exceeded the Tier 1 value and remained less than the Tier 2 criterion.

The results for total mercury concentrations in surface water are summarized in Figure 6-12 and the total and dissolved concentrations are provided in Table 6-2. All surface water samples had mercury concentrations less than the Tier 1 criterion.

The total and dissolved concentrations of arsenic and mercury were analysed in order to distinguish concentrations that may be associated with suspended solids that can implicate erosion for migration of COPCs. Assessment of the values shown in Table 6-2 indicates that the concentrations of total and dissolved constituents are similar in all but one location, Mitchell Brook. The total arsenic concentration in Mitchell Brook was about four times higher than the dissolved concentration. The Brook had a high flow rate at the time of sampling and would be expected to include suspended solids. The Gold Lane road pond sample analyses indicated that the total arsenic and mercury concentrations were marginally lesser than their measured dissolved contents; however, this QA/QC discrepancy does not affect the Tier 1 and Tier 2 criteria classification for this sample.

**Table 6-2: Surface Water: Total and Dissolved Arsenic and Mercury**

| Location | Sample ID | Arsenic (mg/L) | | Mercury (mg/L) | |
|---|---|---|---|---|---|
| | | Total | Dissolved | Total | Dissolved |
| Loon Lake | M-SW12 | 0.000537 | 0.000505 | <0.000002 | <0.00002 |
| Mitchell Brook | M-SWMB | 0.0124 | 0.00289 | <0.000002 | <0.000002 |
| Barry's Run | M-SW11 | 0.026 | 0.0215 | 0.0000023 | <0.00002 |
| Lake Charles | M-SW10 | 0.0171 | 0.0153 | <0.000002 | <0.00002 |
| Gold Lane Road Pond | M-SW17 | 0.0216 | 0.024 | 0.000003 | 0.000004 |
| Lake Major | M-SW9 | 0.00076 | 0.000626 | <0.000002 | <0.00002 |

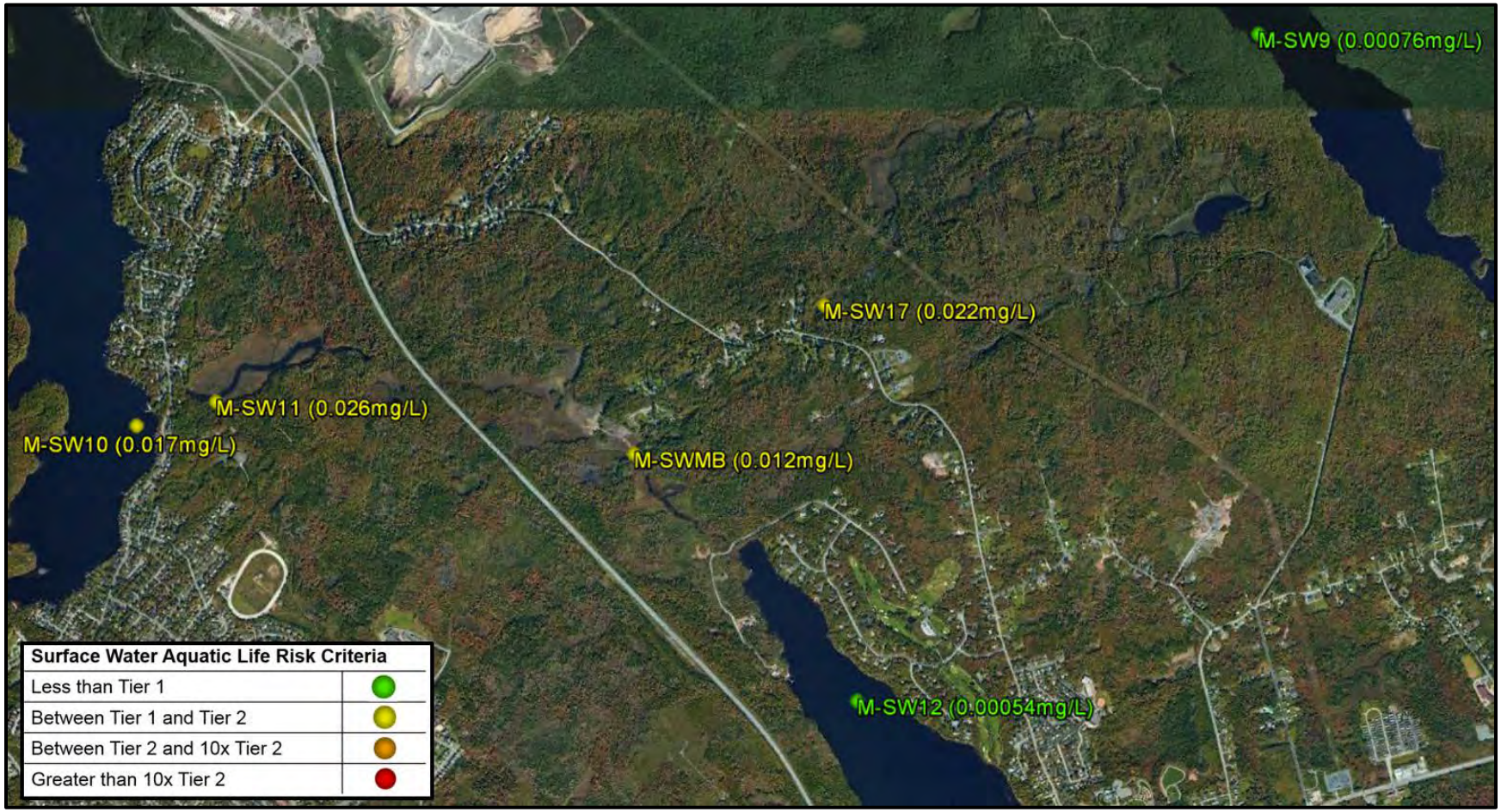


**Figure 6-11: Montague Mines – Surface Water Total Arsenic Concentrations**

Note:
Tier 1 Arsenic Criteria = 0.005 mg/L
Tier 2 Arsenic Criteria = 0.03 mg/L

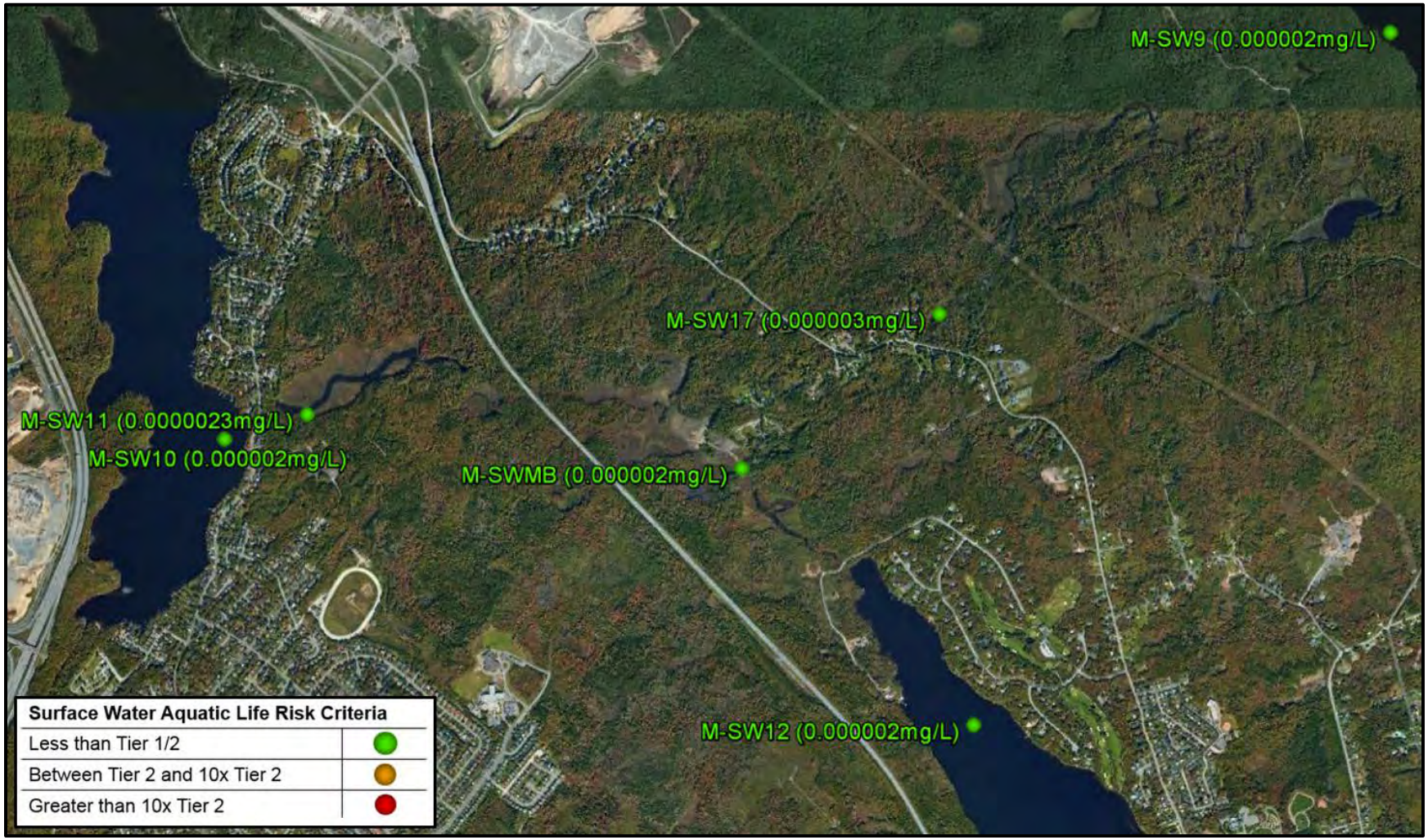


**Figure 6-12: Montague Mines – Surface Water Total Mercury Concentrations**

Note:
Tier 1 and Tier 2 Criteria = 0.000026 mg/L

### 6.3.5 Porewater – Arsenic and Mercury Concentrations in Porewater

The maximum concentrations of dissolved arsenic in porewater, from any sample depth collected at each sampling location, are summarized for the entire site and with a focus on the main tailings area in Figures 6-13 and 6-14. There are no established risk criteria for COPCs in porewater. However, the arsenic Tier 2 criterion for protection of aquatic life in surface water was used for illustrative purposes. The colour scheme in the figures shows green symbols for concentrations less than the tier 2 criterion, yellow for values between Tier 2 and 10 times the Tier 2 criterion, orange for values between 10 times and 100 times the Tier 2 value and red for concentrations greater than 100 times the Tier 2 criterion. The maximum arsenic concentrations in porewater were typically in the range of 1 to 10 mg/L with one value as high as 62 mg/L. In general, elevated porewater concentrations occur in similar locations having elevated concentrations in the solids.

Porewater concentrations from sediment core samples from surface water locations including Loon Lake, Barry's Run, Lake Charles, the Gold Lane road pond, and Lake Major) are also shown in these figures. Porewater in the Loon Lake and Lake Major sediments had arsenic concentrations that were less than the Tier 2 criterion whereas the arsenic concentration in the Lake Charles sediment porewater was greater than the Tier 2 criterion. The porewater at Barry's Run was between 10 times the Tier 2 value and 100 times the Tier 2 value whereas the porewater at the Gold Lane road pond was greater than 100 times the Tier 2 value.

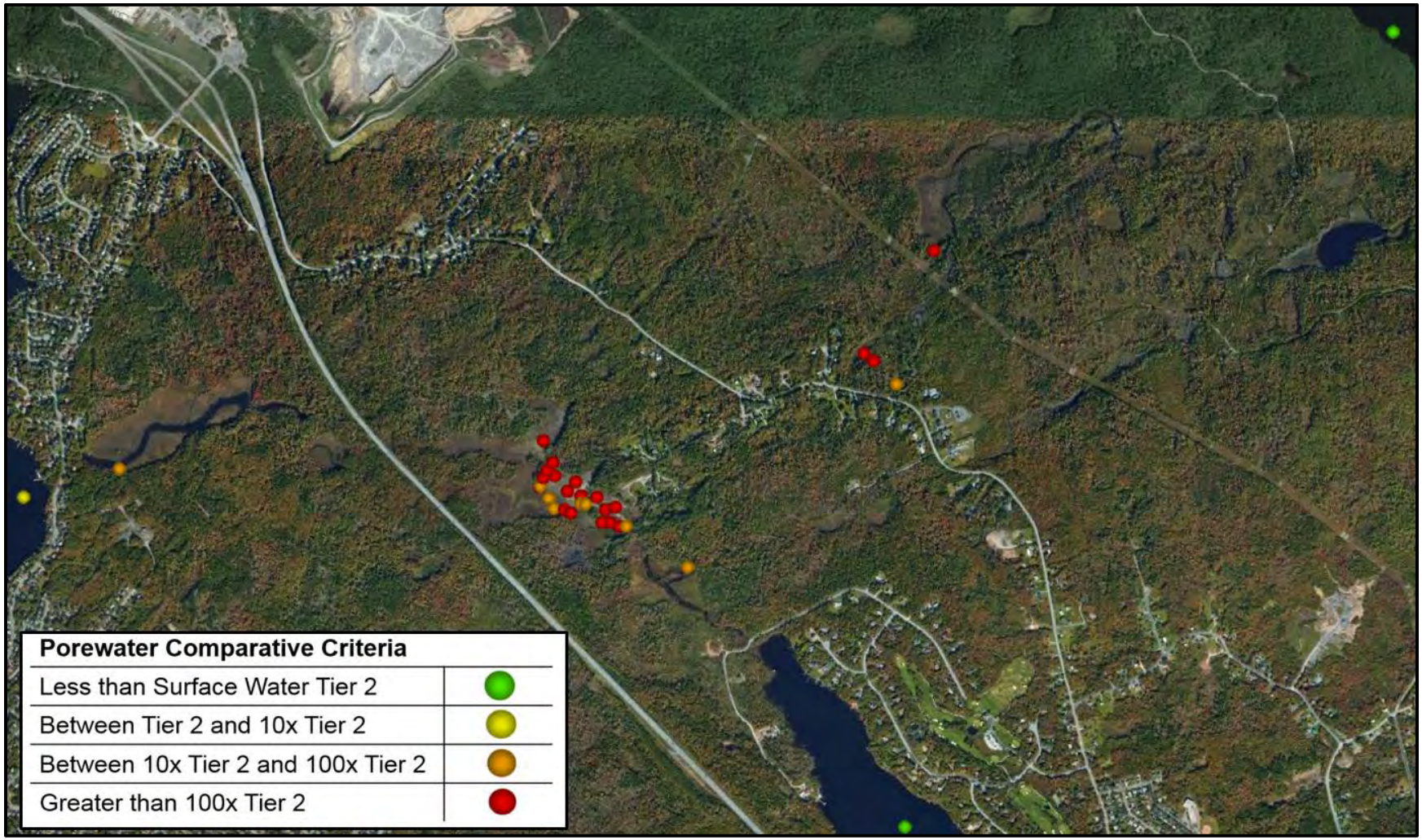


**Figure 6-13: Montague Mines – Maximum Porewater Arsenic Concentrations – All Locations**

Note:
Presented in comparison to Tier 2 Surface Water Criteria of 0.03 mg/L (e.g. 10x Tier 2 = 0.3 mg/L, 100x Tier 2 = 3 mg/L).

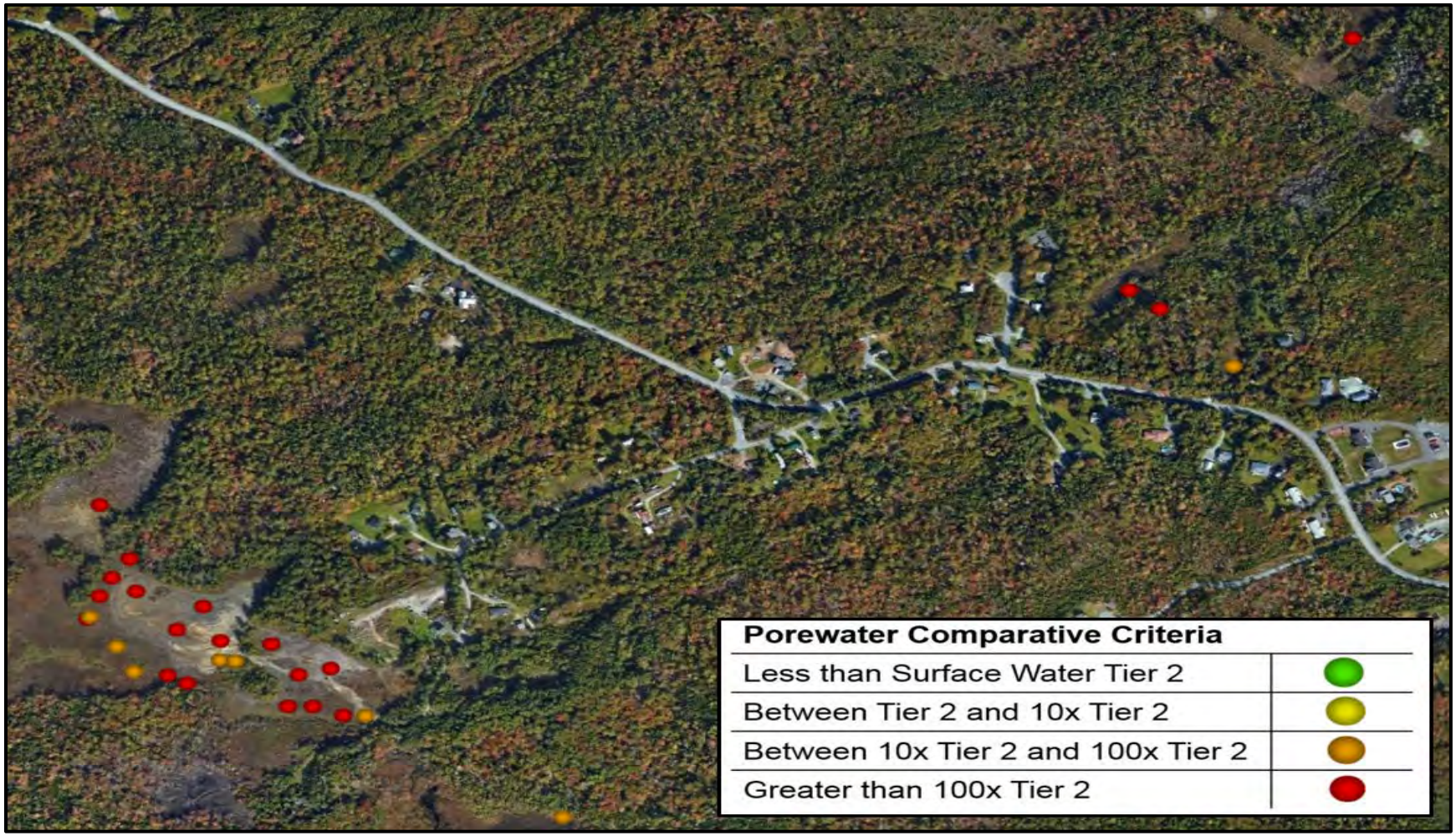


**Figure 6-14: Montague Mines – Maximum Porewater Arsenic Concentrations – Central Region**

Note:
Presented in comparison to Tier 2 Surface Water Criteria of 0.03 mg/L (e.g. 10x Tier 2 = 0.3 mg/L, 100x Tier 2 = 3 mg/L).

The maximum concentrations of dissolved mercury in porewater, from any sample depth collected at each sampling location, are summarized for the entire site and with a focus on the main tailings area in Figures 6-15 and 6-16, respectively. The colour scheme for the symbols in the figures is the same as that used for arsenic and is based on the mercury Tier 2 surface water criterion for risk to aquatic organisms. The dissolved mercury concentrations in porewater have similar relative concentrations to the Tier 2 criterion as those for arsenic.

Porewater concentrations from sediment core samples from surface water locations including Loon Lake, Barry's Run, Lake Charles, the Gold Lane road pond, and Lake Major) are also shown in these figures. The mercury porewater concentrations in the sediments were less than the surface water Tier 2 criteria for Loon Lake, Barry's Run, and Lake Charles. At Lake Major the mercury porewater concentration was between the Tier 2 value and 10 times the Tier 2 value. The Gold Lane road pond sediment mercury porewater concentration was between 10 times the Tier 2 value and 100 times the Tier 2 value.

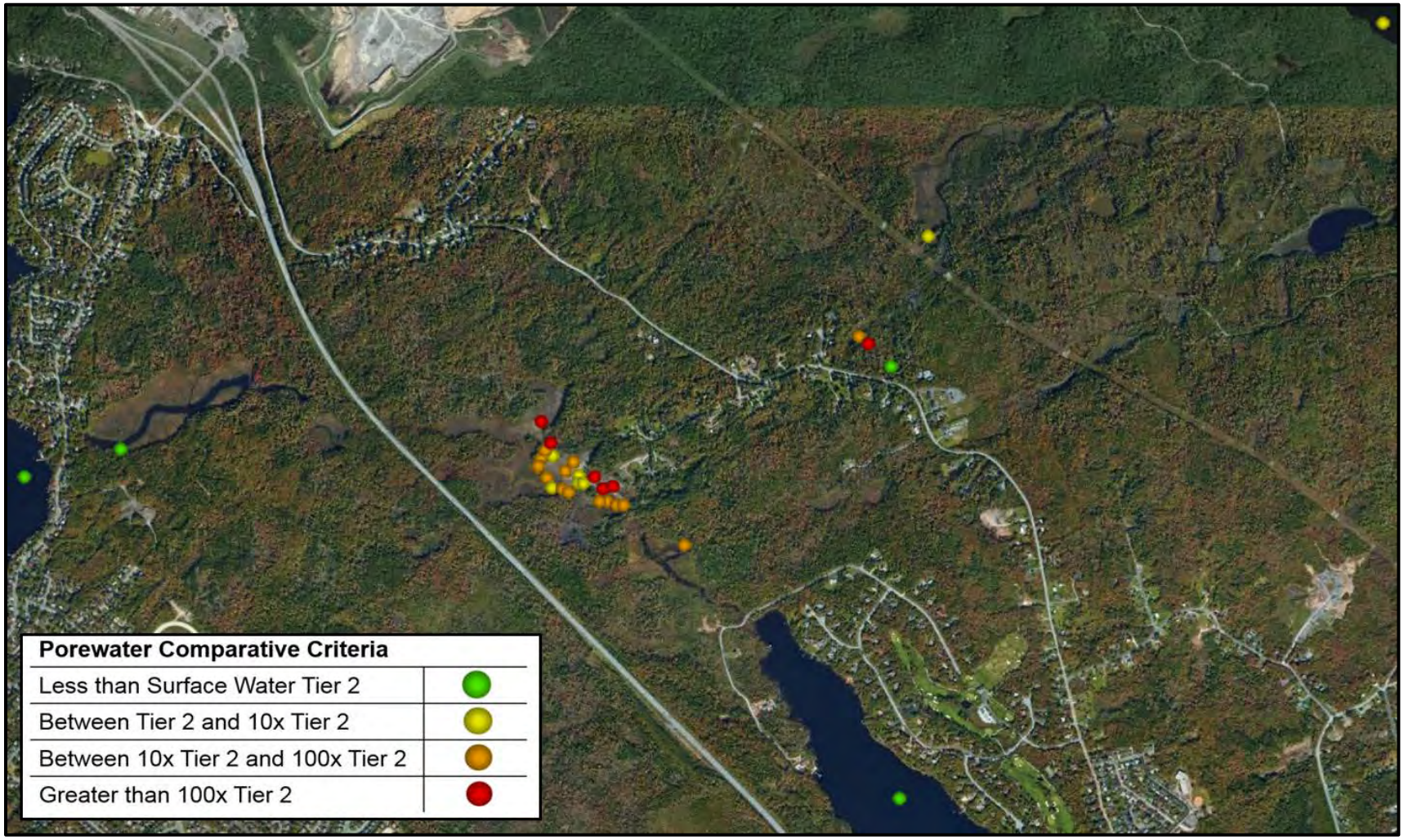


**Figure 6-15: Montague Mines – Maximum Porewater Mercury Concentrations – All Locations**

Note:
Presented in comparison to Tier 2 Surface Water Criteria of 0.000026 mg/L (e.g. 10x Tier 2 = 0.00026 mg/L, 100x Tier 2 = 0.0026 mg/L).

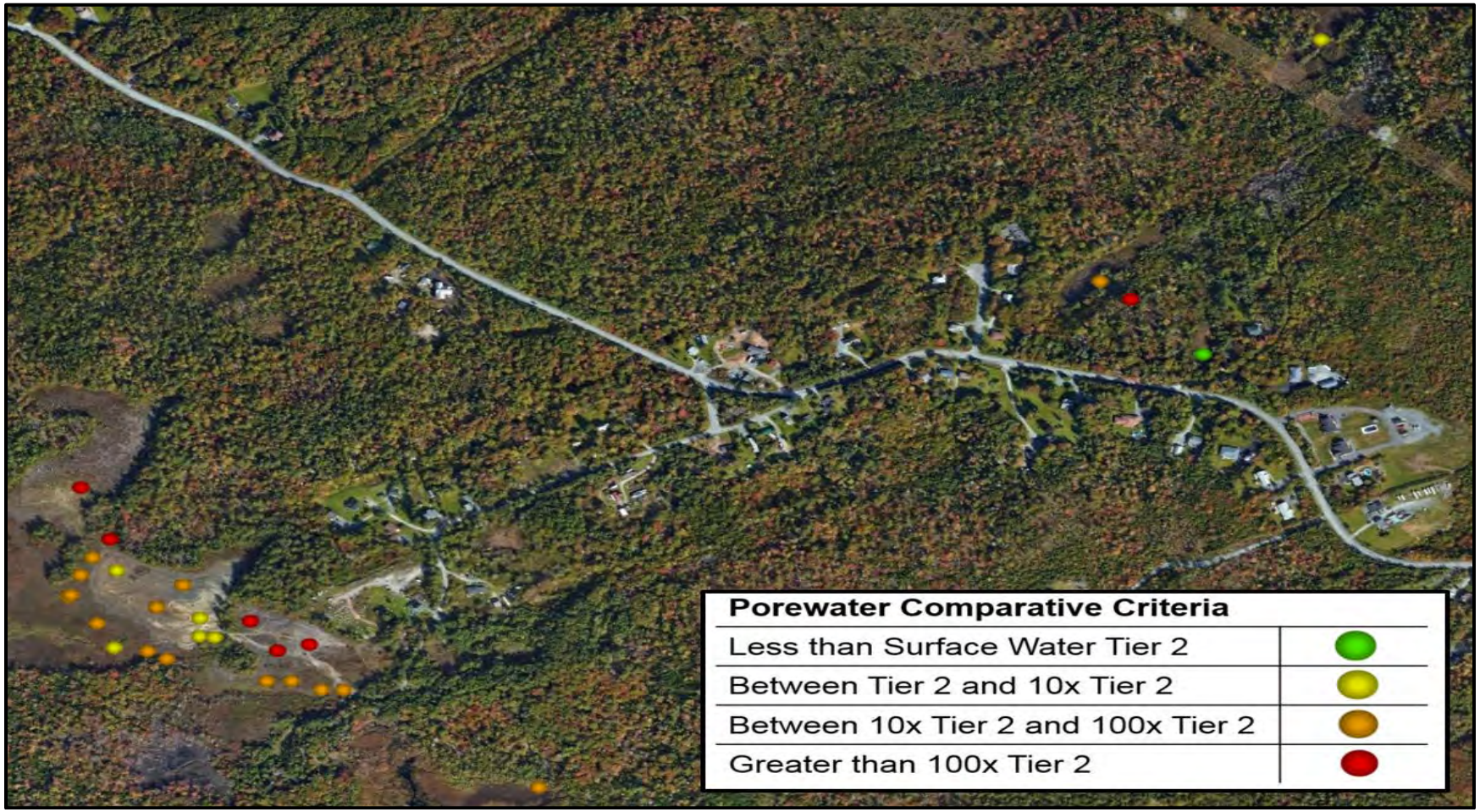


**Figure 6-16: Montague Mines – Maximum Porewater Mercury Concentrations - Central Region**

Note:
Presented in comparison to Tier 2 Surface Water Criteria of 0.000026 mg/L (e.g. 10x Tier 2 = 0.00026 mg/L, 100x Tier 2 = 0.0026 mg/L).

### 6.3.6 Piezometers - Shallow Subsurface Water

Eight mini piezometers were installed at four stations across the site as shown in Figure 6-17. The mini piezometers provide samples of shallow groundwater near the water table and somewhat below the water table at each of the locations. The results from the subsurface piezometer samples were also compared to the water chemistry associated with porewater and surface water at similar locations. The results for dissolved arsenic and mercury as well as the installation depths of each piezometer are summarized in Table 6-3. The concentrations of dissolved arsenic and mercury were in ranges similar to those observed for porewaters within tailings across the site.

**Figure 6-17: Montague Mines – Mini Piezometer Locations**

**Table 6-3: Shallow Subsurface Water: Dissolved Arsenic and Mercury**

| Sample ID | | Screened Depth Range (cm-bgs) | Dissolved Arsenic | Dissolved Mercury |
|---|---|---|---|---|
| | | | mg/L | |
| M-Pz1 | Shallow | 47 to 60 | N/A[1] | <0.00002 |
| | Deep | 177 to 190 | 19.8 | 0.000029 |
| M-Pz2 | Shallow | 47 to 60 | 0.985 | <0.00002 |
| | Deep | 87 to 100 | 12.5 | 0.000238 |
| M-Pz3 | Shallow | 47 to 60 | 0.127 | <0.00002 |
| | Deep | 167 to 180 | 0.0436 | <0.00002 |
| M-Pz4 | Shallow | 47 to 60 | 0.178 | 0.00003 |
| | Deep | 87 to 100 | 0.0968 | 0.000048 |

**Note:**
1) No arsenic results available, sample was destroyed in transit.

The dissolved arsenic concentrations in surface water, porewaters and subsurface piezometer samples at each station are summarized in Figures 6-18 to 6-19. For reference, the water concentrations were also compared to the solids arsenic contents at each depth at all mini piezometer stations.

The results for M-Pz1, located southeast of upper main tailings area, are presented in Figure 6-18. At this station, the dissolved arsenic concentration in the water at surface was less than 1 mg/L while the concentrations in porewaters ranged from about 11 mg/L near surface to less than 1 mg/L at a depth of almost 2 m below ground surface. The concentration of dissolved arsenic in the subsurface piezometer sample at the 2 m depth was on the order of 20 mg/L. The arsenic contents in the solids varied from a low of about 700 mg/kg to 2100 mg/kg. At this station, the dissolved arsenic concentrations in porewater were highest at the surface and lowest at depth. In contrast, the piezometer subsurface water sample exhibited a concentration of 20 mg/L for dissolved arsenic that was not in good agreement with the concentration in the porewater at the same depth. Additional samples from this piezometer are warranted to determine the potential causes of this discrepancy.

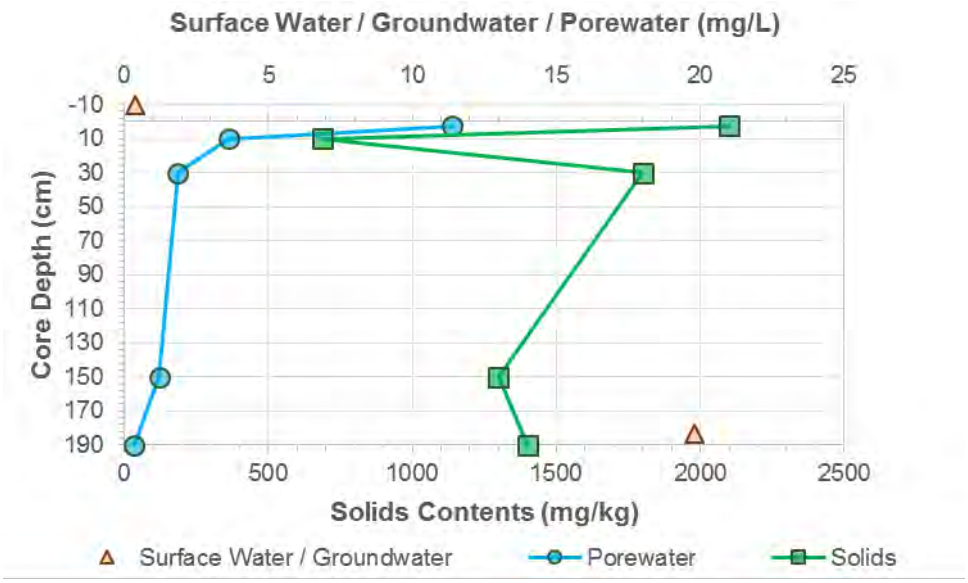


**Figure 6-18: Montague Mines – M-Pz1 Arsenic Chemistry**

The results from the core at piezometer station M-Pz2 are shown in Figure 6-19. The trends in the results at the station were similar to those at station M-Pz1. The concentration of dissolved arsenic in water at the surface was less than 1 mg/L while the concentrations in porewaters ranged from about 13 mg/L in the shallow subsurface to about 1 mg/L in porewater at a depth of 90 cm. The two piezometer samples exhibited dissolved arsenic concentrations of about 1 mg/L at a depth of 50 cm and 12.5 mg/L at a depth of 90 cm below ground surface, respectively. While the concentration of arsenic in the porewater agrees reasonably well with the piezometer sample at a depth of 50 cm, there is a discrepancy between the concentrations in the porewater at 90 cm depth and the piezometer sample at the same depth. Again, additional sampling of the piezometers is warranted to evaluate the discrepancy between these results.

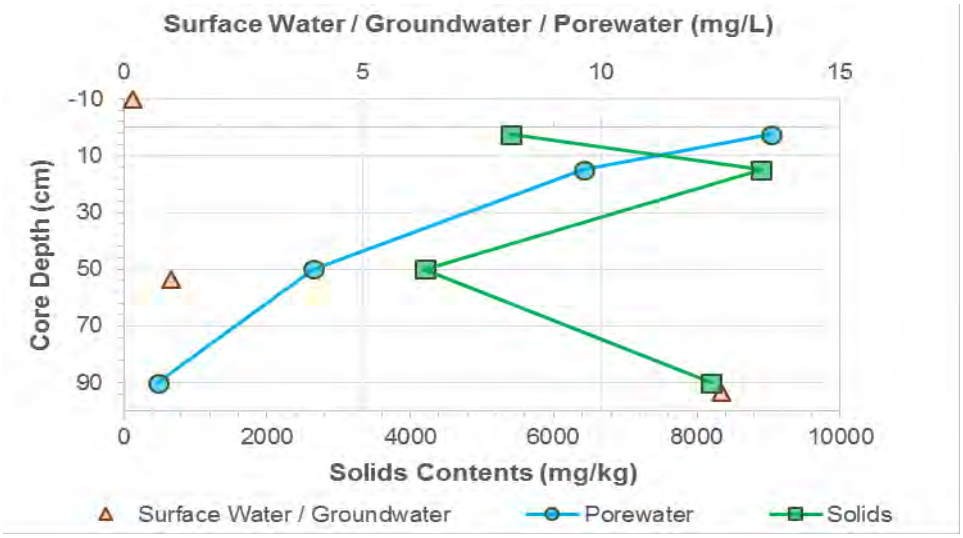


**Figure 6-19: Montague Mines – M-Pz2 Arsenic Chemistry**

The results from piezometer monitoring station M-Pz3 are presented in Figure 6-20. While the concentrations of dissolved arsenic in the porewaters and in the piezometer water samples are typically much lower than those at stations M-Pz1 and M-Pz2, the arsenic contents in the solids were in a similar range to those at the other stations, varying between about 2000 and 5,500 mg/kg. The dissolved arsenic concentration in surface water near station M-Pz3 was on the order of 0.03 mg/L, while the concentrations in porewaters ranged from about 0.27 mg/L in the shallow subsurface to a high of about 0.9 mg/L at a depth of about 60 cm below ground surface. At this station, the concentrations from the piezometer samples were lower than those exhibited by the porewaters. Again, further sampling of this piezometer is warranted to address potential discrepancies.

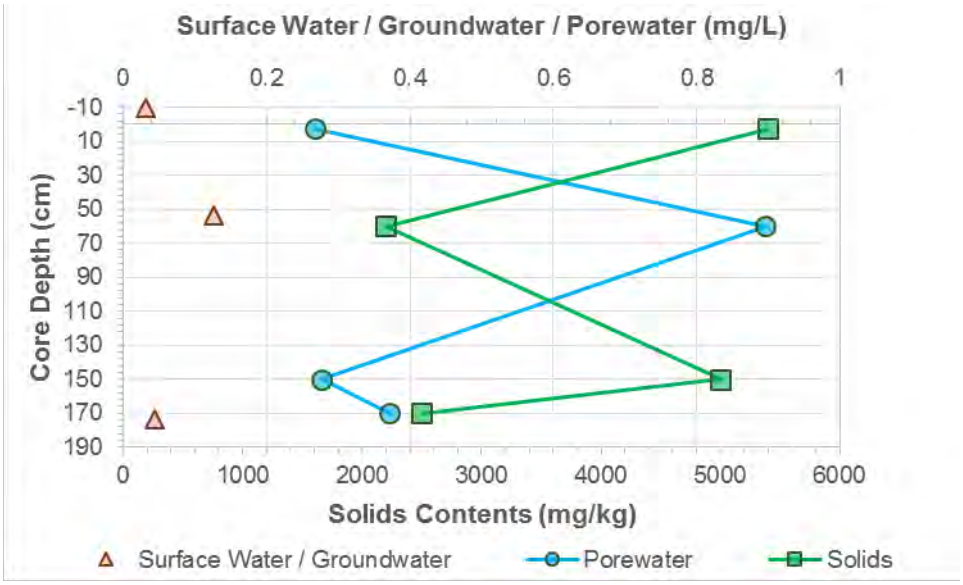


**Figure 6-20: Montague Mines – M-Pz3 Arsenic Chemistry**

The arsenic results at piezometer station M-Pz4 are shown in Figure 6-21. Consistent with other sampling stations, the dissolved arsenic concentration water at the surface was less than 1 mg/L while those in the porewaters ranged from approximately 0.7 mg/L to 11.5 mg/L, increasing from the shallow subsurface to a depth of about 80 cm below ground surface. At this station, the concentrations in the many piezometer samples were less than 0.2 mg/L and exhibited concentrations that were lower than those in the porewaters at the corresponding depths. The arsenic contents in the solids were similar to those at the other stations and ranged from about 500 mg/kg to 11,000 mg/kg with the highest arsenic content in the shallow subsurface sample. At this station, the arsenic concentrations in the piezometer samples were less than those in the corresponding porewaters and additional piezometer sampling appears warranted to further evaluate these potential discrepancies.

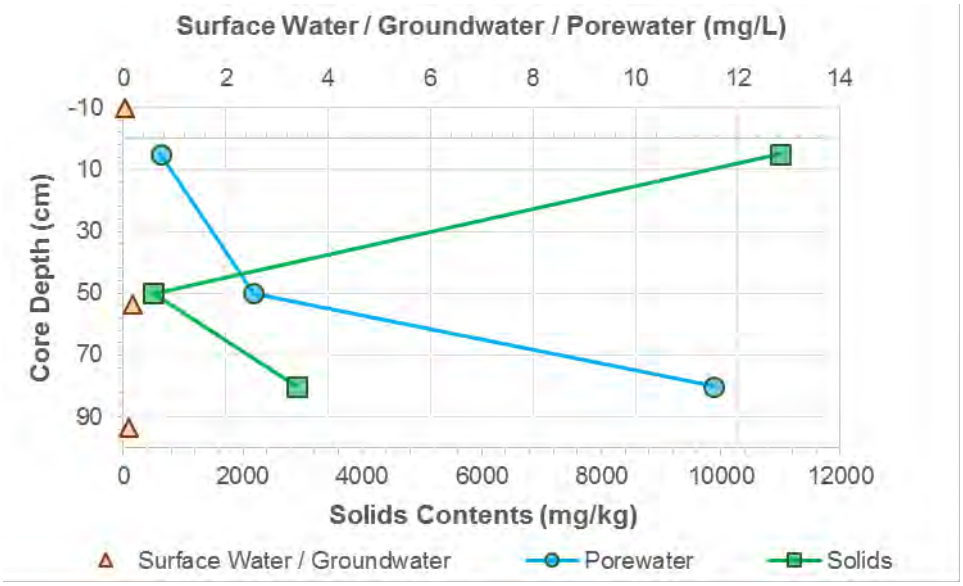


**Figure 6-21: Montague Mines – M-Pz4 Arsenic Chemistry**

These results show that, at all stations, there are samples with solids arsenic contents that are consistent with those expected for tailings materials. The dissolved arsenic concentrations in the porewaters and the piezometer samples are consistently higher than those observed in the water at surface. The higher concentrations in the waters from the shallow subsurface compared to those in the overlying water indicate that dissolved arsenic can be transported by diffusion from the shallow subsurface into the water column. This indicates that concentrations of arsenic above background levels in the water at surface are likely to occur as a result of arsenic transport from the shallow tailings materials. This represents a potential transport pathway for dissolved arsenic from the tailings into the surface water environment.

With water overlying the tailings at these locations, it is very likely that the subsurface water is moving upward to discharge into the overlying water as well. Upward movement of subsurface water occurs as a result of higher hydraulic heads at depth and a lower hydraulic head in the overlying water. This is typical of lake bottoms, wetlands, and shorelines along rivers and streams where groundwater originates in higher ground with higher hydraulic heads and discharges in lower topographic areas where water occurs on surface. This combination of upward diffusion and upward flow of subsurface water would further contribute to arsenic loadings into the overlying water.

At locations M-Pz3 and M-Pz4 the porewater arsenic concentrations increase from the very shallowest sample to the next sample at depth. In these cases, the arsenic concentration gradient is upward, in that the diffusive flux occurs from the higher concentration to the lower concentration, in these cases upward. At the other stations, M-Pz1 and M-Pz2, the higher concentration is near the water tailings interface followed by a lower concentration at depth. At these stations, the arsenic concentration gradient is downward, in that the diffusive flux occurs from the high concentration near the water tailings interface down to the lower concentration at the deeper locations. The piezometer stations represent arsenic fluxes both up into the water column above the sample and downward into the deeper porewater below the highest concentration porewater.

At locations with high concentrations near the water tailings interface it is likely that arsenic leaching may be occurring in the shallow tailings, closest to the tailings surface. The arsenic leaching may be occurring at periods when there is no water above the tailings during the dryer summer season. Drying out of the tailings surface will likely result in seasonal oxidation and release of arsenic prior to development of a water cover above the tailings during the wetter seasons. This could reasonably explain the occurrence of the highest concentrations in porewaters closest to the tailings surface.

### 6.3.7 Additional Characterization

The results of the water and solids characterization on samples from the field program allowed further interpretation of the potential sources and forms of arsenic that are associated with tailings and downstream sediments. A comparison between arsenic and sulphide contents in the solid samples is summarized graphically in Figure 6-22. Although the correlations are not strong between sulphide and arsenic contents, it is evident that they do correlate for tailings-containing samples (e.g. 'Main Tailings Surface' and 'Main Site Core' in Figure 6-22). The correlation would be expected if the primary source of arsenic was related to the common iron arsenic sulfide mineral, arsenopyrite (FeAsS). Arsenopyrite was positively identified as an abundant sulphide mineral in the Montague tailings by DeSisto (2014). Therefore, the correlation between arsenic content and sulphide content is expected in these tailings. The arsenic leaching occurs when the sulphide mineral is oxidized, releasing arsenic and other oxidation products including sulphate and iron. The sulphate is moderately soluble and will leach and the water whereas iron has variable solubility depending upon the pH and the oxidation conditions. At neutral pH, iron will oxidize further and precipitate as ferric hydroxide ($Fe(OH)_3$) that visually presents as the rusty colour of oxidized tailings. In the absence of oxygen, below the oxidation zone in tailings, some iron can remain as ferrous ($Fe^{2+}$) in solution and can be mobile. Under acidic conditions, iron in ferrous and ferric ($Fe^{3+}$) forms can remain in solution and be transported by the subsurface porewater.

These findings indicate that mitigation of arsenic release from the tailings will require consideration of oxidation of the primary and reduced form of arsenic, arsenopyrite. Eliminating or limiting the oxidation of arsenopyrite will be required to limit the ongoing production of soluble arsenic that can be transported by water.

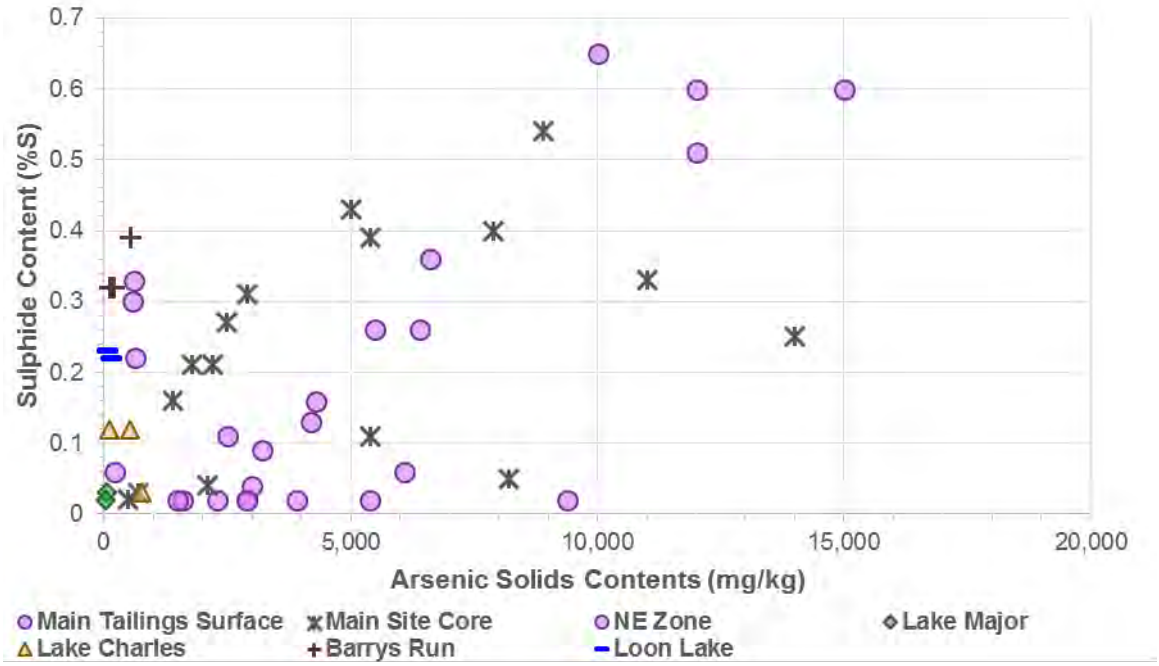


**Figure 6-22: Montague Mines – Sulphide vs. Arsenic Contents in Tailings and Sediments**

Additional assessment of elemental correlations show that arsenic and iron are associated in the tailings solids as shown in Figure 6-23 (e.g. As seen in the 'Main Tailings Surface' and 'Main Site Core' samples). This correlation is partly the result of the iron and arsenic together in the primary form of arsenopyrite. However, it is well known that arsenic in water will be taken up by the precipitation of ferric hydroxide solids that are relatively stable but can still be coincident with arsenic water concentrations that are on the order of a few to tens of mg/L. Arsenic can therefore be strongly correlated with iron because of the uptake during the formation of secondary solids such as ferric hydroxide after the iron is released from the primary arsenopyrite and other iron sulphide minerals such as pyrite ($FeS_2$). These arsenic rich ferric hydroxide solids were also positively identified by DeSisto (2014).

These results indicate that mitigation of arsenic leaching from the tailings will also need to consider the oxidized form of arsenic in the solids. The mitigation strategies should not include measures that could potentially reduce the ferric hydroxide solids and release arsenic in the process. For example, an organic rich substance should not be used for a cover to be in direct contact with oxidized tailings. The organic material can act as a reductant to transform ferric hydroxide into soluble ferrous iron and result in the release of the associated arsenic in the solids.

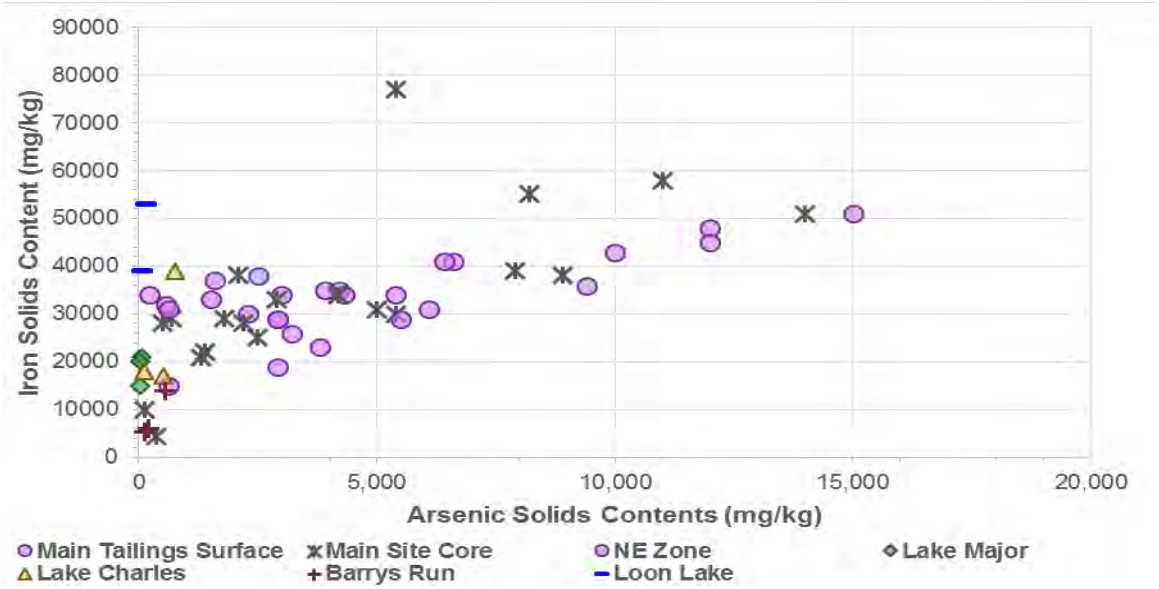


**Figure 6-23: Montague Mines – Iron vs. Arsenic Contents in Tailings and Sediments**

The results of the 2018 field program provide a basis to refine the conceptual site model for arsenic and mercury migration from the primary tailings deposition area into the receiving environment. The arsenic originates from the primary mineral form, arsenopyrite, and can be transformed to a secondary solid form incorporated into ferric hydroxide solids. The arsenic concentrations in the porewaters associated with the tailings are typically highest near the surface, whether on land or underwater. Tailings with no overlying water can represent a source of arsenic to the runoff during rainfall and snowmelt events. This transport of dissolved arsenic results in loadings to the downstream environment. In addition, runoff events can also lead to erosion of solids and the transport of solid particulates containing arsenic to the downstream as well.

Tailings that are seasonally or permanently under water cover can also represent a source of arsenic to the water column. The evidence from this field investigation suggest that arsenic transport into the water column can occur as a diffusion process, transporting arsenic from the shallow depths containing high concentrations of arsenic to water column with lower concentrations of arsenic. In addition, tailings that are permanently or are seasonally underwater will likely represent discharge zones for subsurface waters and there can be transport of arsenic with the upward flow of the subsurface water into the water column. These transport pathways will need to be considered for any mitigation strategies. A more complete conceptual site model for arsenic is presented in Section 6.2.

The evidence from the field program indicates that mercury occurs at higher contents in solids near the historical mills where it would have been used in the processing of the gold ores. The origin of mercury in the tailings is related to the processing of the ores and does not occur naturally as does arsenic. The detectable concentrations of mercury in water were also observed close to the former mill locations. Mercury concentrations in water are very limited and therefore the loadings of mercury from the tailings to the environment are also limited. Mercury tends to accumulate in organic materials and therefore small concentrations in water

can become magnified into larger concentrations in solid organic material such as sediments in lakes, wetlands and ponds.

### 6.3.8 Historical Tailings Deposition Areas

The areas characterized in this Stage 1 investigation were those areas thought to have been impacted by historical tailings deposition. However, following the conclusion of the Stage 1 field program additional information pertaining to potential historical deposition areas was uncovered.

A figure showing areas that may have also been impacted by historical tailings deposition are shown in Figure 6-24. These areas are sizable and are largely outside of the bounds of the Stage 1 investigation. Efforts should be made to characterize these areas during additional Stage 2 investigations.

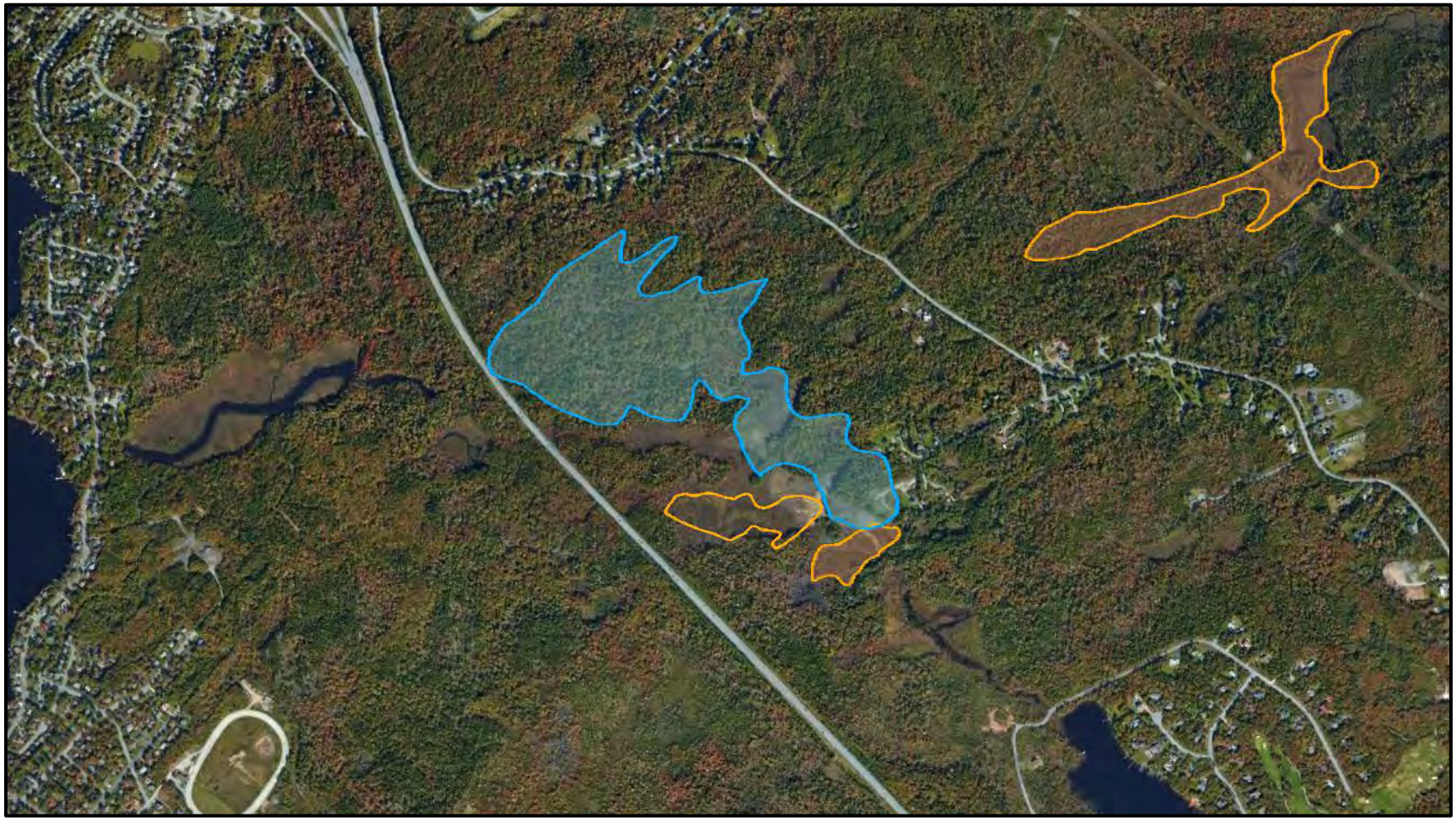

**Figure 6-24: Indicated Historical Tailings Deposition Areas**

Notes:
Blue shaded areas from Messervey (1938).
Orange shaded areas from Smith and Goodwin (2009).

## 6.4 Development of a Conceptual Site Model

The conceptual model for the site is critical to understanding the sources from which the chemical constituents of potential concern (COPC) originate, the pathways through which the COPCs travel and the receptors that are potentially exposed to the COPCs. The conceptual model therefore, includes a description of processes that release COPCs at the sources, the processes that result in movement of the COPCs in the environment and the modes of exposures of receptors to the COPCs. The objective of the conceptual model is to understand the components that contribute to the potential risks associated with the sources of COPCs, as well as to identify strategies that will mitigate the sources and/or connections between the sources and receptors. A schematic of the conceptual site model is shown in Figure 6-25.

At the Montague site, the gold tailings originally deposited at the end of pipe from the milling operations are the original source of COPCs. Although there were likely two or more milling operations at the Site, the conceptual model does not require any differentiation of those source areas. The tailings would have been discharged as a slurry into low-lying areas at the site. There is no evidence of any containment structures for the original tailings deposition and therefore the solids in the tailings were distributed downstream as far as the water flow carried the solids load.

The key COPCs that were the focus of this investigation included arsenic and mercury. Only arsenic is considered in Figure 6-25. Mercury has a distinctly different geochemical controls and associated pathways and will be considered separately from arsenic.

Arsenic is a naturally occurring chemical constituent within the residual rock material that was milled and then released as a non-economic by-product of the gold extraction process. The original arsenic in the tailings solids was likely in the form of arsenopyrite (FeAsS). Arsenic can be released from this primary mineral form during oxidation processes, resulting in the formation of oxidation products that include dissolved iron, arsenic and sulphate.

Mercury was used as an amalgam in the gold extraction process. Although the mercury is typically collected to recover the gold, some release of mercury typically occurs during the process. Mercury would have originated in the liquid form of the element which has a very low solubility in water. Dissolved mercury, typically has a very limited mobility in water because of its tendency to sorb onto many types of solids, particularly organic material. This has important implications in the potential pathways for mercury in the environment and will be considered more fully as part of Stage 2, as part of the refinement in defining closure designs.

From the original tailings source areas, there are two primary pathways that are associated with constituent transport; air and water. The tailings solids are relatively fine grained and are subject to dusting that can be carried with ground-level winds and dispersed along the direction of the prevailing wind. Dispersed tailings dust can then represent a secondary source of tailings and associated COPCs. The air pathway is recognized herein as being a potentially important one, although it is considered to be secondary to that of water.

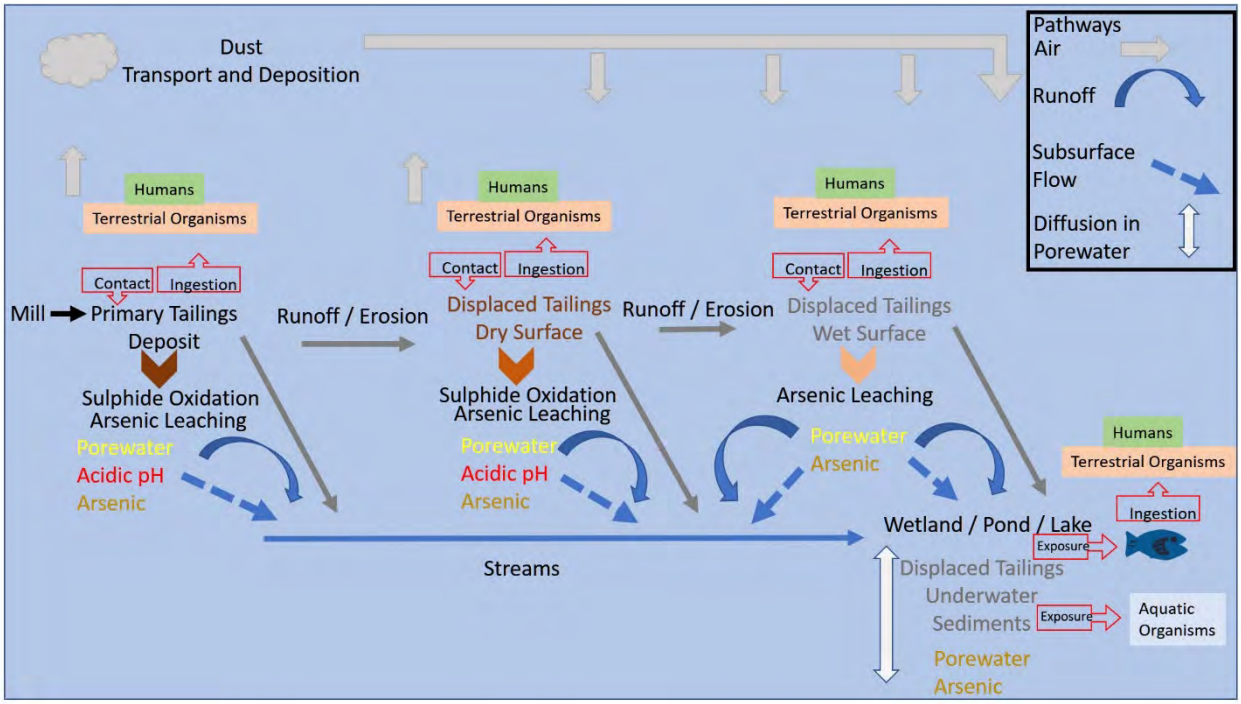


**Figure 6-25: Conceptual Site Model for the Montague Site.**

Water represents the primary pathway for both tailings solids and dissolved COPCs at the Montague site. Originally, the water in the tailings slurry, that was released from the milling operations, would have carried the fine-grained material farthest from the mill while depositing the coarser-grained material closest to the discharge point. This is clearly evident from visual evidence in the field that includes the observation of coarser sandy size particles near the former mill areas and fine silty particles downstream, including the wetland areas.

After primary deposition, runoff during precipitation and snowmelt events will have also been responsible for erosion of tailings and translocation of solids from upstream to downstream areas as well. Areas that had no vegetation growth to stabilize the tailings solids, with fully exposed material at surface, would have been subjected to ongoing erosion by runoff to the local streams or to local depressions without drainage features. Tailings that enter the streams may eventually be transported to the ponds along Barry's Run and to Lake Charles to the west and to a small stream north of the power transmission corridor to the east toward Lake Major.

Water also serves as a pathway for dissolved COPCs both on surface and underground. The soluble or dissolved COPCs originate when the solids leach constituents into the porewater that typically originate as infiltrating water resulting from rainfall and snowmelt events. Shallow porewaters in the tailings typically have higher concentrations of COPCs originating from sulfide minerals oxidation reactions that occur when oxygen enters the tailings pores that are only partially filled with water. Oxygen moves readily downward through the air filled pores and supports oxidation reactions that release soluble constituents, including acid and arsenic, to the porewater. During rainfall or snowmelt events, shallow porewater can be flushed from the tailings and enter the runoff to follow natural hydrologic pathways downstream.

The natural water table within the tailings is only a short distance below ground surface, typically within 1 to 2 m of the surface. Tailings that are below the water table surface will be fully saturated, with all pores filled with water, protecting the sulfide minerals from oxidation by oxygen. Therefore, oxidation and the production of oxidation products, including arsenic, will be very limited to negligible below the water table. However, the oxidation products that form in the zone below ground surface and above the water table, will typically percolate downward through the tailings and laterally toward local drainage features such as streams or ponds. This subsurface pathway typically represents a small flow component but can represent higher concentrations that form in the zone above the water table. The subsurface flow is driven by the input of water from rainfall events and snowmelt. In this area with a shallow water table and abundant surface water features, interaction of the porewaters affected by contact with the tailings with deeper subsurface water or groundwater is highly unlikely. Therefore, the shallow subsurface pathways toward local drainage features should be the focus for any mitigation.

Displaced tailings that have been deposited in wet areas and maintain a wet surface will likely be water saturated much of the time. The saturated tailings with water filled pore spaces prevents or substantially limits oxygen access to the tailings and oxidation of the sulfide minerals that result in the production of acid and/or arsenic in porewater. Therefore, the tailings that are effectively saturated with water at the surface have a low to negligible risk of further oxidation and production of acid. The wet tailings however, can contain arsenic in porewater at elevated concentrations as a result of the release of arsenic from secondary solid phases.

Fine grained tailings that have been transported downstream to ponds in Barry's Run and Lake Charles will have been deposited as lake sediments and will be characterized with elevated concentrations in the solids. In addition, elevated concentrations in the surface water can partition to natural particulates suspended in the water column that will settle and also become a component of the sediment accumulating on the bottom of the ponds and lakes. As sediments accumulate in the pond and lake, the history of deposition will be evident in sediment cores that show changes in arsenic concentration with depth that reflect the influence of sediment originating from the tailings. The porewater within the lake sediments will be elevated with respect to background concentrations as a result of the release of arsenic from the secondary solid phases on the tailings particles. The concentrations of arsenic in the sediment porewater can then be transported up into the water column as a result of diffusive processes in which arsenic will migrate from the higher concentrations zone in the porewater to the lower concentration in the lake water column.

The tailings solids and the waters containing elevated concentrations of arsenic can represent potential exposures for organisms, including humans. Tailings at ground surface represent two (2) possible types of exposure, including contact with skin, for humans, and potential incidental ingestion for other terrestrial organisms including humans. All surface water represents a potential exposure for terrestrial organisms by way of ingestion as well as contact with skin, for humans. Water with elevated arsenic concentrations in streams ponds and lakes represents a potential exposure to aquatic organisms. Ingestion of arsenic by organisms can result in exposure to other biota via the food web if those original organisms are ingested as food sources.

The conceptual site model shows that tailings that remain dry and exposed at the ground surface represent an ongoing source of arsenic and risk of exposure to terrestrial and aquatic

organisms, including humans. While the surface tailings represent a potential for contact, the more important source is related to the ongoing production of dissolved arsenic, and/or acid, that occurs in the porewater and can be transported by runoff and shallow subsurface flow to the downstream environment. Reduction of risk related to arsenic in the tailings needs to consider the processes that produce the soluble arsenic and/or the pathways that transport the porewaters, with elevated arsenic concentrations, out of the tailings and into the receiving environment.

In tailings that are dry at surface, porewater migration is related to infiltration of percolating water resulting from rainfall and snowmelt. In tailings that are wet at surface, the runoff will remain as a potentially important pathway as a result of flushing of the shallow porewater from the tailings. However, lateral movement of porewater through the subsurface may not be as important a pathway to the receiving environment. While tailings that are saturated at the surface are not likely to produce acid from sulfide mineral oxidation, arsenic leaching from secondary solid phases may continue to be a source of arsenic in the wet tailings porewater.

The tailings that becomes sediment in the downstream ponds and lakes will be protected against oxidation of sulfide minerals. Some leaching of secondary arsenic solids may occur into the sediment porewater. With mitigation of the sources of arsenic from tailings in the upstream areas, the arsenic concentrations in sediment porewater would be expected to decrease naturally over time rather than to continue to accumulate in the sediments. This behaviour can be evaluated through modelling of the arsenic from the source areas to the receiving environment.

## 6.5 Closure Areas

The closure areas were outlined based on the extent of know and assumed tailings areas at the Site were inferred based upon reviewing two primary historical sources including:

1. Nova Scotia Department of Natural Resources Map (NSDNR, 2018); and,
2. Nova Scotia Department of Mines Report and Map (NSDM, 1938), and
3. Reviewing recent sampling and analysis completed by EcoMetrix, where past and present sampling data was compared to Nova Scotia tiered environmental quality standards.

The NSDNR (2018) map provides a summary of sampling locations and As and Hg concentrations for three separate field investigations including:

1. NSDNR – Modified Phase II (Maritime Testing, 2009);
2. Geological Survey of Canada Open File 7150 (Parsons et al, 2012a); and
3. Background (Parsons and Little, 2015).

This map identifies tailings areas, wetlands, property boundaries, and the extent of crown lands. Based on this map, it has been assumed that in general, the extent of known tailings often corresponds to identified wetland areas. This map was used to identify which tailings areas were located on and off Crown land.

The NSDM (1938) report and map provides a description of the extent of the tailings areas downstream of the stamp mill based on ground observations and examinations of aerial

photographs. The report describes mill tailings flowing into 'swamp' and 'bog' areas around the site, with slimes from the tailings settling over a great part of these areas. Based on this map, it has been further assumed that in general, the extent of tailings corresponds to identified wetland areas, in addition to areas that may now be overgrown by trees.

Recent sampling and analysis by the study team provides additional confirmation to portions of the assumed extent of tailings obtained from the NSDNR (2018) and NSDM (1938) maps; however, additional study is required to properly delineate the full extents of these areas. Based on the results of the site investigations, the tailings at the Site were delineated as follows and as shown in Figure 6-26 and their approximate surface areas are provided in Table 6-4.

### 6.5.1 Area 1

Area 1 is identified as the main tailings area and is directly downstream of the former mill location. Area 1 was divided into seven sub-areas based on the site conditions; i.e. exposed tailings, wetlands, forested, etc., as well as the known levels of contamination. These areas are also divided, where required, into Crown and non-Crown lands.

Area 1A - this area consists mainly of exposed tailings, this area is frequently used by locals as a dirt bike/ATV track.

Area 1B - this area is south of 1A and was outlined as a wetland and slightly forested area.

Area 1C - is located south east of 1A and east of 1E. This is a wetland area and Mitchell Brook runs through the center of this Area.

Area 1D – is a located northwest of Area 1 and is a wetland/rock field zone. This area is also on and off Crown land.

Area 1E - is located south east of 1A and west of 1C. This is a wetland area and Mitchell Brook runs through the center of this Area, and is located on and off Crown land.

Area 1F – is a small area southeast of 1A. This area is at a slightly higher topography and consists mainly of forested region.

### 6.5.2 Area 2

Area 2 – is the weltand area east of the main tailings area and downstream of Loon Lake. A historical stamp mill was located in this area, resulting in remenant tailings.

### 6.5.3 Area 3

Area 3 – covers several small area northeast of the main tailings area and are based on the NSDNR historical mapping. This area was divided into four subareas based on their separation from each other. Subareas 3C and 3D are also on and off Crown land. This area includes the Gold Lane tailings, as well as the tailings near Vaughan lane, and an extension of the gold lane tailings to the north east.

Area 3A – is northeast of Gold Lane and is a small wetland behind residential houses. There is recent small scale gold exploration within this area.

Area 3B – is a small pocket wetland east of Area 3A (near Vaughan lane).

Area 3C – is approximately 100 m north of 3A, with the south end crossing over the power transmission corridor. The northern section of this area is off Crown land and is mainly a wetland.

Area 3D – is approximately 200 m east of the southern section of 3C. It is a small wetland in a forested area that is both on and off Crown land.

### 6.5.1 1938

There are five sub-areas identified as 1938. These areas have not been investigated and are outlined based on the NSDM (1938).

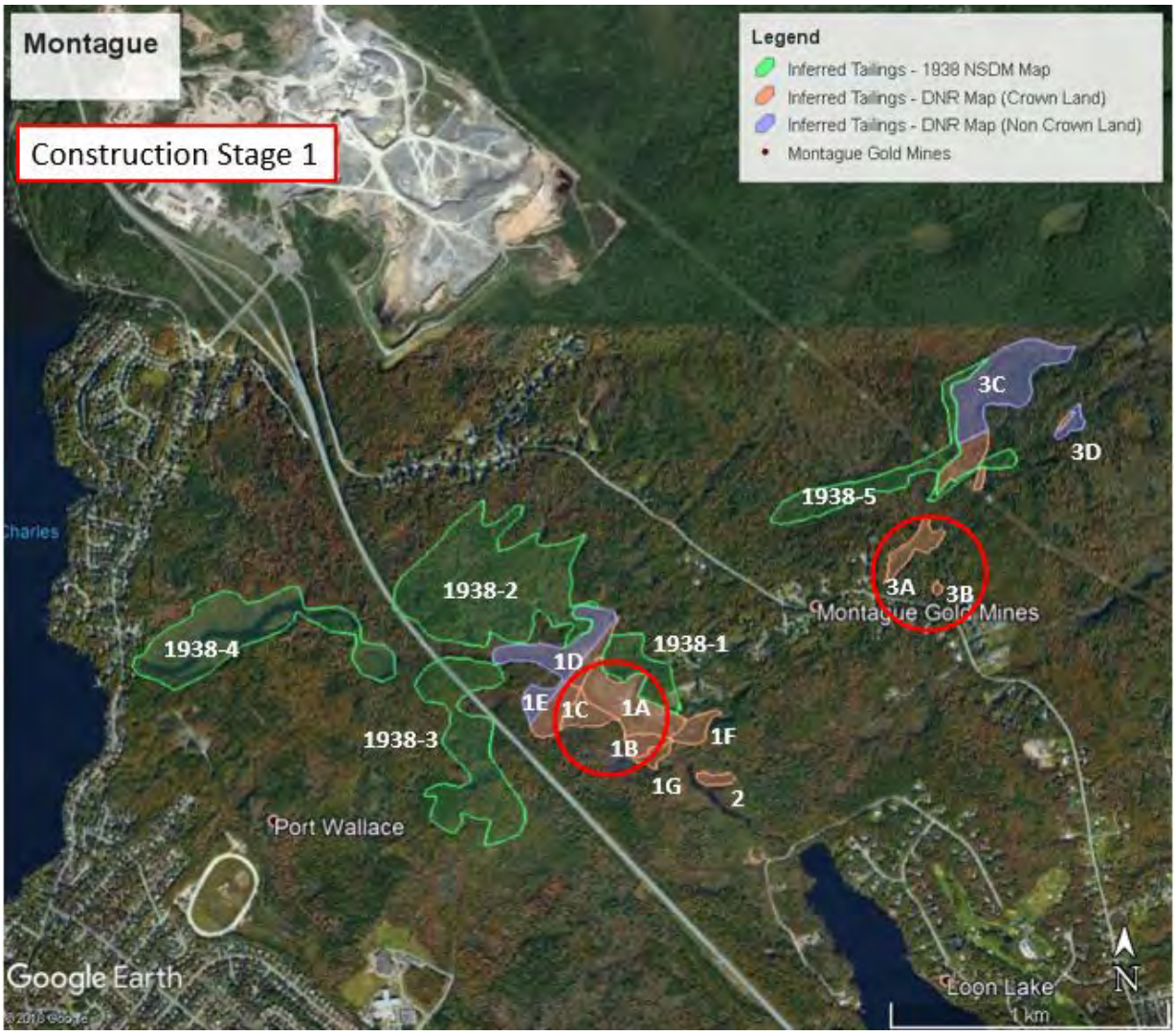


**Figure 6-26: Areas of Known and Potentially Impacted by Historical Mining**

**Table 6-4: Approximate Size of Tailings Areas**

| Area | Size (m2) | Crown / Non-Crown |
|---|---|---|
| 1A | 48,000 | Crown |
| 1B | 8,800 | Crown |
| 1C | 13,500 | Crown |
| 3A | 15,600 | Crown |
| 3B | 1,200 | Crown |
| 1D | 10,900 | Crown |
| | 38,200 | Non-Crown |
| 1E | 16,500 | Crown |
| | 9,600 | Non-Crown |
| 1F | 10,600 | Crown |
| 1G | 5,900 | Crown |
| 2 | 5,200 | Crown |
| 3C | 19,100 | Crown |
| | 69,900 | Non-Crown |
| 3D | 1,400 | Crown |
| | 5,300 | Non-Crown |
| 1938-1 | 38,900 | Non-Crown |
| 1938-2 | 223,300 | Non-Crown |
| 1938-3 | 126,700 | Non-Crown |
| 1938-4 | 142,600 | Non-Crown |
| 1938-5 | 68,200 | Non-Crown |

# 7.0 CONCEPTUAL CLOSURE PLAN

As discussed in Section 3.2, a conceptual closure plan was developed based on implementing a decision analysis process to identify, develop and select a preferred option (or options) for the closure of the mine site. As the Project progressed, the Site conditions better understood, and the closure objectives and overall closure goal was identified, the preferred closure options became evident without the requirement to fulfill all the defined tasks. There may be a need for a formal decision analysis in the future when additional stakeholders are involved in the mine closure project. Appendix G provides a summary of the decision analysis process.

## 7.1 Construction Stage 1 – Crown Land

As noted in Section 3.1, the implementation of the closure plan will proceed in construction stages, with Construction Stage 1 involving the high priority areas that are on Crown lands where the tailings are exposed and/or the level of contamination generally exceeds the Tier 2 criteria, in most cases by more than ten times. Hence, only Areas 1A, 1B, 1C, 3A, and 3B were considered as noted above.

There are two recommended closure strategies for Construction Stage 1; the first consists of the excavation, consolidation and cover with an impermeable liner for the Area 1A tailings, and an in-situ low permeability cover for Areas 1B, 1C, 3A, and 3B.

Excavation and Consolidation for Area 1A

This closure strategy involves the excavation of approximately 2 m depth of tailings and overburden soils in Area 1A and consolidating these materials into an impermeable containment cell. Areas that have been excavated will be backfilled with “clean” backfill. In addition to the containment cell construction (discussed below), the following items are required:

- Ditching to divert “clean” surface water away from the construction zone;
- Access roads;
- Laydown areas for site construction trailer, materials, equipment, and a portable water treatment facility;
- Cut-off wall to control the offsite migration of contaminated surface and shallow sub-surface water from the excavation zone;
- Excavation of a water treatment pond;
- Water treatment system; and,
- Site control measures.

The 2 m excavation depth is based on an assumed depth of tailings and overburden where the arsenic concentrations in the solids content and associated porewater this material results in leaching into the surface and groundwater leading to elevated concentrations. The excavation depth will be refined in each area based on the area specific concentrations.

### 7.1.1 Containment Cell

In general, the containment cell for the tailings excavated in Area 1A will consist of containment berms, an impermeable liner, leachate collection system, deposited tailings, and impermeable cover system. A drainage channel (“swale”) will be constructed on the upper surface to control

the drainage of “clean” precipitation off the surface of the cover into a nearby creek. This option is reserved for Area 1A where high levels of arsenic have been found. By placing these tailings in the containment cell, the major source of arsenic is removed from entering the environment via surface water flow and groundwater leaching. A typical section of the containment cell is shown in Section A, Figure 7-1. The design of the containment cell includes:

- Storage capacity for excavated tailings;
- Rectangular configuration;
- Two adjacent containment cells each measuring 95 m long by 95 m wide along the base;
- Containment berms constructed using workable excavated tailings or till, 5 m tall, 2.5H:1V side slopes, and 5 m crest width;
- Impermeable base liner consisting of:
    - Bituminous liner;
    - 0.3 m of 75 mm minus clear stone drainage blanket; and,
    - Geotextile.
- Impermeable top cover consisting of:
    - Bituminous liner;
    - 0.3 m of “clean” till cover;
    - 0.3 m of vegetative medium; and,
    - Hydroseeding the surface of the vegetative medium to promote vegetation growth.
- Drainage swale bisecting the top cover and leading to nearby creek. Assumed drainage swale section is the same as the ditch design.

It is assumed that that some of the tailings excavated at the Site will be deposited into the containment cell in a saturated condition. The drainage blanket at the base of the cell will allow the tailings to drain and settle. Leachate collected from the drainage blanket will need to be treated. The containment cell design does not currently consider how the leachate is collected (active or passive); pumping and piping systems may be required and have not been included in the design. Once the deposited tailings have reached a predetermined degree of dewatering and settlement, the low permeability top cover can be installed.

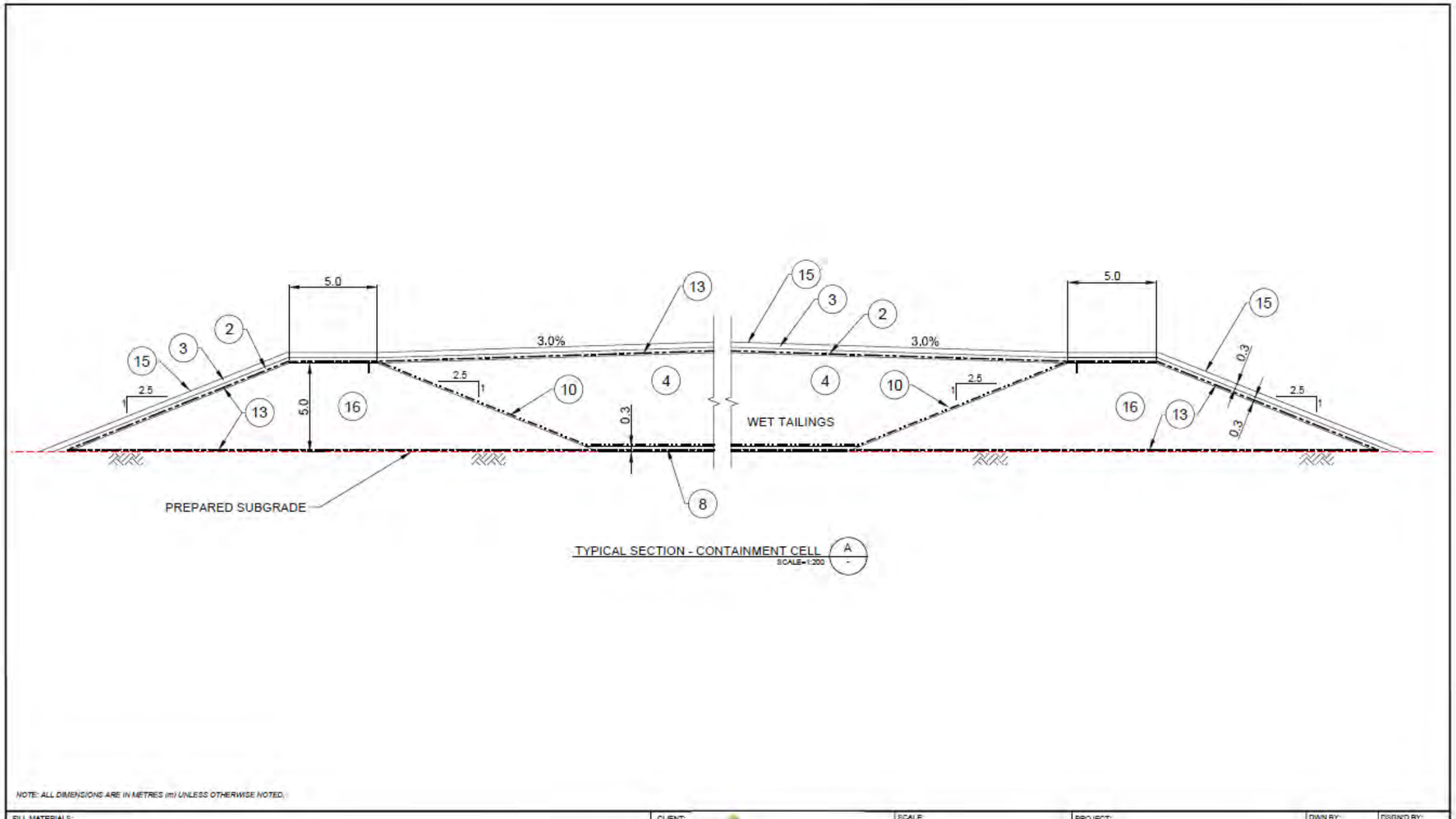


**Figure 7-1: Containment Cell Typical Details**

### 7.1.2 Ditching

A typical ditch, used to divert surface water away from the construction zone, is shown in Section B, Figure 7-2. The general design details of the proposed ditching include:

- Clearing, stripping, grubbing of the ditch alignment plus additional allowance for construction equipment to traffic along the crest;
- Excavation of the ditch section with 1 m depth, 1 m base width, and 3H:1V side slopes;
- Installation of geotextile liner across the base of the ditch with 1.5 m overlap/tie-in on ditch crest; and,
- Installation of 0.3 m of 200 mm rip rap erosion protection material with 1.5 m overlap on ditch crest.
- Rip rap will be sourced from a local quarry. Ditch sizing may be subject to change based on further detailed study of site hydrologic conditions.

Costs associated with the disposal of cleared, stripped, and grubbed materials has not been accounted for in the cost estimate. “Clean” soils excavated from the proposed ditch alignments might be utilized in the construction of other items (i.e. containment cells); however, this has not been accounted for in the cost estimate.

### 7.1.3 Access Roads

A typical access road, used to allow construction equipment to traffic overtop of soft site soil conditions, is shown in Section C, Figure 7-2. The design of the proposed access roads includes:

- 6 m road width with 1.5H:1V side slopes;
- Clearing, stripping, and grubbing of the road alignment;
- Installation of geogrid overtop of soft soils to provide structural support to road base materials;
- Placement of 1.0 m of 150 mm minus rockfill; and,
- Placement of 0.3 m of 75 mm minus road topping gravel.

Rockfill and road topping gravel are assumed to be sourced from a local quarry. Costs associated with the disposal of cleared, stripped, and grubbed materials has not been accounted for in the cost estimate.

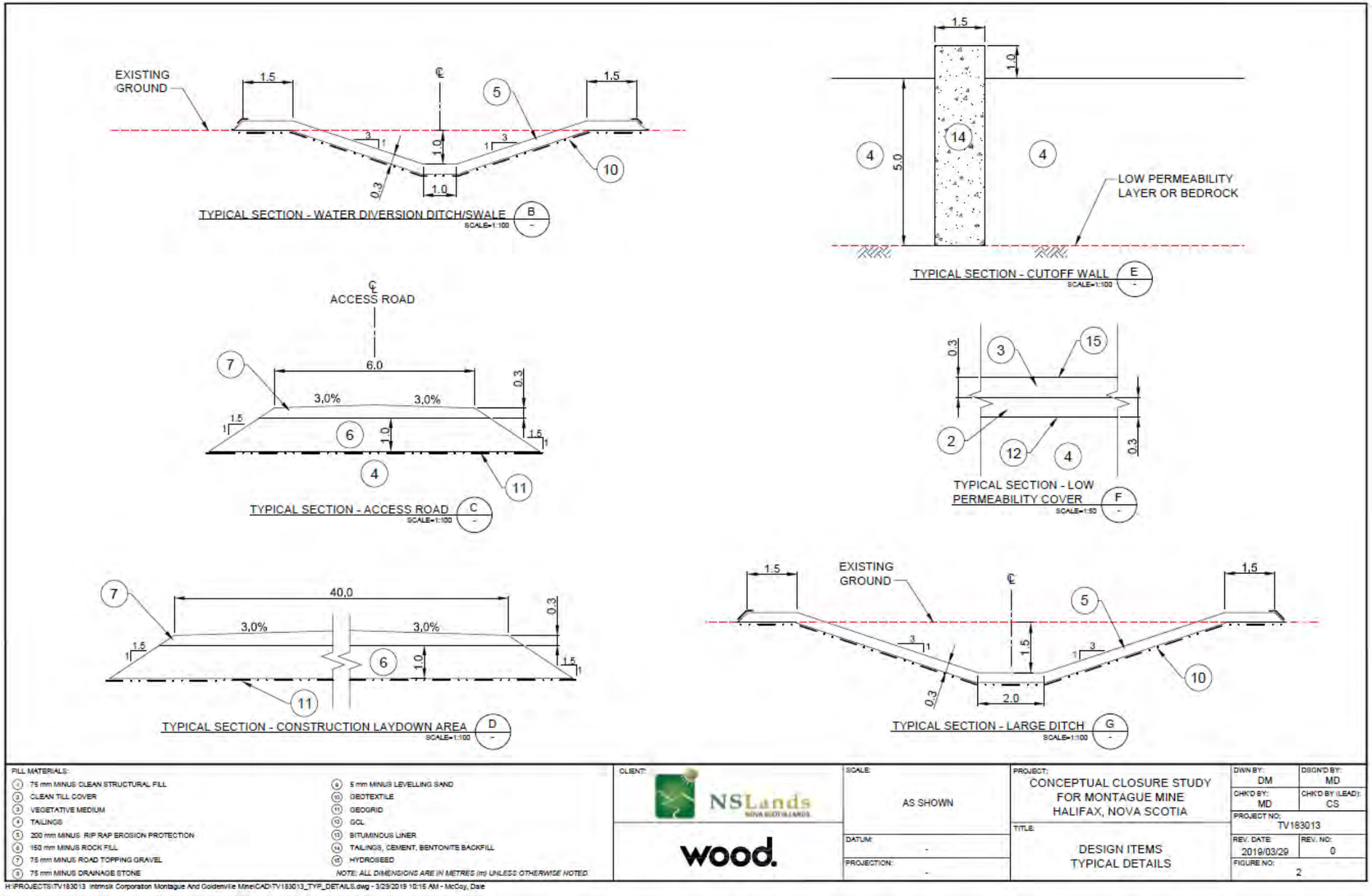


**Figure 7-2: Design Items Typical Details**

### 7.1.4 Laydown Areas

A typical laydown area, used for the storage of construction trailers, materials, equipment, and portable water treatment units, is shown in Section D, Figure 7-2. The design of the laydown areas includes:

- 40 m x 40 m wide with 1.5H:1V side slopes:
- Clearing, stripping, and grubbing of the laydown area footprint;
- Installation of geogrid overtop of soft soils to provide structural support to base materials;
- Placement of 1.0 m of 150 mm minus rockfill; and,
- Placement of 0.3 m of 75 mm minus road topping gravel.

Rockfill and road topping gravel are assumed to be sourced from a local quarry. Costs associated with the disposal of cleared, stripped, and grubbed materials has not been accounted for in the cost estimate.

### 7.1.5 Cut-Off Wall / Soil Cement Bentonite (SCB) Cut-Off Wall

A cutoff wall is required to control the offsite migration of contaminated surface and shallow sub-surface water from the excavation zone, this can be achieved in a couple of different ways including sheet pile walls or a soil cement bentonite (SCB) cut-off wall. For the purpose of the options development and costing, the SCB cut-off wall has been included. A typical SCB cut-off wall is shown in Section E, Figure 7-2. The design of the SCB cut-off wall includes:

- Installation of an access road (as detailed above) to allow access of excavation equipment along proposed alignment of the cut-off wall;
- Excavation of a 1.5 m wide trench, down to 5 m depth below existing ground surface to assumed depth of underlying low permeability native soils or bedrock;
- On-site mixing of excavated materials (tailings) with cement and bentonite and placement and compaction of materials back into trench to form stabilized low permeability cut-off wall; and,
- Mounding of SCB material to 1 m above grade to deter surface water drainage from entering the excavation zone.

### 7.1.6 Water Treatment Pond

A water treatment pond will be required to contain and treat contaminated surface water and shallow groundwater within the excavation zone. The design of the water treatment pond includes:

- Storage capacity to receive a 1:10-year precipitation event, and average 7-day precipitation, over a 7-ha catchment area;
- 9,510 $m^3$ total volume of storage;

- 2 m depth excavation into tailings, with 70 m length and 70 m width;
- Containment on the downstream side of the pond by the SCB cut-off wall described in Section; and,
- Backfilling the pond with “clean” backfill once construction has been completed.

### 7.1.7 Water Treatment System

Areas requiring excavation of tailings present a risk of impacting groundwater and surface water during construction. These areas will require water management and treatment systems to capture and treat contaminated water within the construction zone prior to being released into the environment. A portable modular water treatment system is recommended for treatment of water collected in the water treatment pond described in Section 7.1.6. This type of system is contained within shipping containers for ease of transport and setup. A chemical treatment system will consist of solids/water separation. Once the remediation works are complete and the surface water quality within the construction zone meets the targeted criteria, the water management system can be removed. Additional hydrotechnical study of the site is required before more accurate estimates of anticipated surface water and groundwater volumes requiring treatment can be made. For this reason, an allowance of 7% of total direct construction costs for water treatment has been applied at this time.

### 7.1.8 Site Control Measures

Once the areas have been remediated site control measures will be required to restrict public access to the Site. These measures are required to protect the remedial measures from damage due to foot and/or vehicle traffic. Site control measures may consist of signage, gates, fencing, or other deterrence to traffic such as boulders. Until the closure measures are further refined in subsequent design stages, the exact nature of the site control measures is unknown. Until the closure measures are further refined in subsequent design stages, the exact nature of the site control measures is unknown. For this reason, an allowance of 3% of total direct construction costs for site control measures has been applied at this time.

### 7.1.9 Low Permeability Cover for Areas 1C, 3A, and 3B

This closure strategy involves covering the tailings in-situ utilizing a low permeability liner system. This approach provides a protective cover over contaminated soils, reduces precipitation infiltration into the underlying contaminated soils, and the capillary rise of the groundwater into the surface water; therefore, reducing mobilization of arsenic into the surrounding environment. For these areas, additional characterization in conjunction with risk assessment may reduce the areas requiring remedial attention.

In addition to the low permeability cover, the following items are required:

- Ditching to control surface water drainage off the cover;
- Channel realignment stream if required;
- Access roads;
- Laydown area for site materials and equipment; and,

- Site control measures.

### 7.1.10 Cover

A typical low permeability cover is shown in Section F, Figure 7-2. The design of the low permeability cover includes:

- Installation of a GCL overtop of the delineated tailings area. An additional 10% has been assigned to each delineated tailings area to allow for proper tie-in of the cover to the surrounding areas;
- Placement of 0.3 m of “clean” till cover;
- Placement of 0.3 m of a vegetative medium (topsoil); and,
- Hydroseeding the surface of the vegetative medium to promote vegetation growth.

### 7.1.11 Ditching

It is assumed that some form of ditch will be required to control surface water runoff from the low permeability cover. In general, it has been assumed that the ditch will bisect the area, and the cover would be graded toward the ditch. The ditch design is similar to those described in Section 7.1.2; however, it is assumed that clearing, stripping, and grubbing would not be required since the ditch will be installed in conjunction with the low permeability cover.

For areas crossed by a stream, it is assumed that a larger ditch section is required as shown in Section G, Figure 7-2. The larger ditch section is 1.5 m deep, 2 m base width, and 3H:1V side slopes.

### 7.1.12 Site Control Measures

Once the areas have been remediated site control measures will be required to restrict public access to the Site. These measures are required to protect the remedial measures from damage due to foot and/or vehicle traffic. Site control measures may consist of signage, gates, fencing, or other deterrence to traffic such as boulders. Until the closure measures are further refined in subsequent design stages, the exact nature of the site control measures is unknown.

## 7.2 Construction Stage 2 – Crown Land

Construction Stage 2 involves lower priority areas that are on Crown lands that included Areas 1D, 1E, 1F, 1G, 2, 3C, and 3D. Based on the limited information within these areas, the levels of contamination are generally between the Tier 1 and Tier 2 criteria. Although, additional field investigations will be required to further delineate the areas of contamination, and risk assessment studies could reduce the extent of areas requiring remedial attention, it has been assumed at this time that an in-situ low permeable cover will be required to remediate these areas. Other innovative solutions or approaches to reduce risks in these wetland areas could be explored and may offer more cost effective solutions.

## 7.3 Construction Stage 2 - off Crown Land

Construction Stage 2 involves lower priority areas that are off Crown lands within the Areas 1D, 1E, 3C, and 3D. Based on the limited information within these areas, the levels of

contamination are generally between the Tier 1 and Tier 2 criteria. Although, additional field investigations will be required to further delineate the areas of contamination, it has been assumed at this time that an in-situ low permeable cover will be required to remediate these areas. Similar statements to those made in Section 7.3 apply for this area, as well as in Section 7.4.

## 7.4 Construction Stage 3 - off Crown Land

Construction Stage 3 involves lower priority areas that are on Crown lands that included Areas identifed with 1938. Based on the limited information within these areas, Although, additional field investigations will be required to further delineate the areas of contamination, it has been assumed at this time that an in-situ low permeable cover will be required to remediate these areas.

## 7.5 Other Closure Options Considered

In addition to the options of (i) excavation, consolidate, and cover and (ii) placing a low permeability cover, we considered the following additional options:

1) Do nothing – Leaving the tailings in-situ and do not disturb the areas with excavation or covers;
2) Water Cover - Leaving the contaminated tailings in place and providing water cover by means of flooding; and,

### 7.5.1 Do Nothing

The option to “do nothing” may be recommended for some areas as additional field investigations are completed, a site-wide water balance and contaminant model is constructed to better understand:

- the existing contaminant loadings to the surrounding environment;
- the potential reduction in contaminant loadings expected with the implementation of each the closure option;
- the potential impact or increase in contaminant loadings expected through site disturbance.

In some areas, the best option may be to do nothing, allowing the existing conditions remain as is with the expectation over time the contaminants will remain stable in-situ or slowly improve. An understanding of the soil/tailings, surface water and groundwater conditions to be developed through additional site investigations and contaminant modelling. A site specific risk assessment will be required to determine which, if any, areas could be left untouched as disturbing them may mobilize contaminants degrading the surface and/or groundwater into the downstream environments. A site specific risk assessment could also reduce the size of areas requiring remedial attention.

### 7.5.2 Water Cover

The option of a water cover was considered mainly to reduce human exposure to surface tailings and limit sulphide oxidation. This would involve the construction of a dam (or series of dams) along the west side of the site and allowing water backup and flood over Areas 1A, 1B, and 1C. The local topography is generally flat with a slight grade heading northwest toward Lake Charles. This would require the construction of a 630 m long berm, approximately 5 m tall, to provide a 1 to 2 m of water cover over the tailings. Due to the topography, Area 1A would not be completely covered and would still require some form of excavation and consolidation or covering of the surface tailings.

Dam construction costs, and long-term considerations for maintaining a minimum thickness of water cover, climactic conditions, dam maintenance considerations, and potential water quality issues proved this option less desirable than the excavate, cover, and consolidate, and low permeability cover options.

# 8.0 CLOSURE COSTS

The following sections provide estimated closure costs for the various identified areas of contamination or potential contamination. The closure cost estimate for the Construction Stage 1 or high priority areas within Crown land are provide in Section 8.1

As part of this exercise, conceptual closure strategies were also considered for the other areas that require remediation that are on Crown land, exceed the closure criteria but have been identified as a lower priority, as described in Section 7.0. At this time, it has been assumed these areas will require a low permeable cover, although site investigations are required to fully delineate these areas, assess the site conditions and determine the most appropriate closure measures required to meet the closure criteria. Therefore, Sections 8.2 and 8.3 provide the closure costs ranges, although these may change as additional studies are conducted.

## 8.1 Construction Stage 1 – Crown Land

The estimated cost for the Construction Stage 1 remediation costs for the Montague Gold Mine site is $15,600,000 (excluding taxes); this cost was developed to a Class D estimate with an accuracy range of -20% to +30% as summarized in Table 8-1. A detailed cost breakdown for each area, indicating the various key design items applied to each area, materials quantity estimates, unit rates, and allowances for indirect costs, general contingency, water treatment, and site control measures are provided in Table A1, in Appendix E.

Unit rates were based on project experience within the Atlantic provinces. Material costs were based on local supplier rates, where applicable, and budgetary cost estimates from other suppliers where required.

**Table 8-1: Montague Gold Mine Class D Closure Cost Estimate – Construction Stage 1 Summary**

| Area | Size ($m^2$) | Option | Direct Costs | Indirect Costs | General Contingency | Sub Total | Water Treatment | Site Control Measures | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Construction Stage 1** | | | | | | | | | |
| 1A | 48,000 | Excavate, Consolidate and Cover | $6,890,000 | $2,280,000 | $1,840,000 | **$11,010,000** | $490,000 | $210,000 | **$11,710,000** |
| 1B | 8,800 | Low Permeability Cover | $560,000 | $190,000 | $150,000 | **$900,000** | $20,000 | $20,000 | **$940,000** |
| 1C | 13,500 | Low Permeability Cover | $860,000 | $290,000 | $230,000 | **$1,380,000** | $20,000 | $30,000 | **$1,430,000** |
| 3A | 15,600 | Low Permeability Cover | $830,000 | $280,000 | $220,000 | **$1,330,000** | $20,000 | $30,000 | **$1,380,000** |
| 3B | 1,200 | Low Permeability Cover | $80,000 | $30,000 | $30,000 | **$140,000** | $10,000 | $10,000 | **$160,000** |
| | | | | | **Total:** | **$14,760,000** | | | **$15,620,000** |
| | | | | | **-20%** | **$11,900,000** | | | **$12,500,000** |
| | | | | | **+30%** | **$19,200,000** | | | **$20,400,000** |

## 8.2 Construction Stage 2 - Crown Land

There are several areas that may require some level of remediation but have been designated as lower priority based on the known levels of contamination. There are other areas of uncertainty at this time as field investigations have either not been undertaken (such as in areas outside of Crown lands) or are limited at this time. These areas are shown on Figure 8-1 and may cost between $3.1M to $9.4M to remediate based on an assumption of surface area of approximately 69,600 $m^2$ containing tailings and an in-situ low permeable cover is the preferred option. These costs are considered to be highly uncertain at this time and could be reduced through further site investigation and risk assessment (in Design Stage 2), which may indicate that some areas require limited remedial attention. In addition, depending upon outcomes of Stage 2 studies, other remedial approaches, or further research on innovative solutions to reduce risks in wetland areas in particular, may offer more cost effective approaches to these tailings affected areas.

## 8.3 Construction Stage 2 - off Crown Land

There are several areas of private land that may require some level of remediation but are uncertain at this time as field investigations have not been undertaken. These areas are shown on Figure 8-2 and may cost between $4.2M to $12.7M to remediate based on an assumption of surface area of approximately 123,000 $m^2$ containing tailings and an in-situ low permeable cover is the preferred option. In addition, the available data indicate a need to conduct site investigations on nearby Non-Crown properties, to rule out the need for remedial action associated with wind blown dusts that may have impacted properties in the immediate vicinity of the main tailings area.

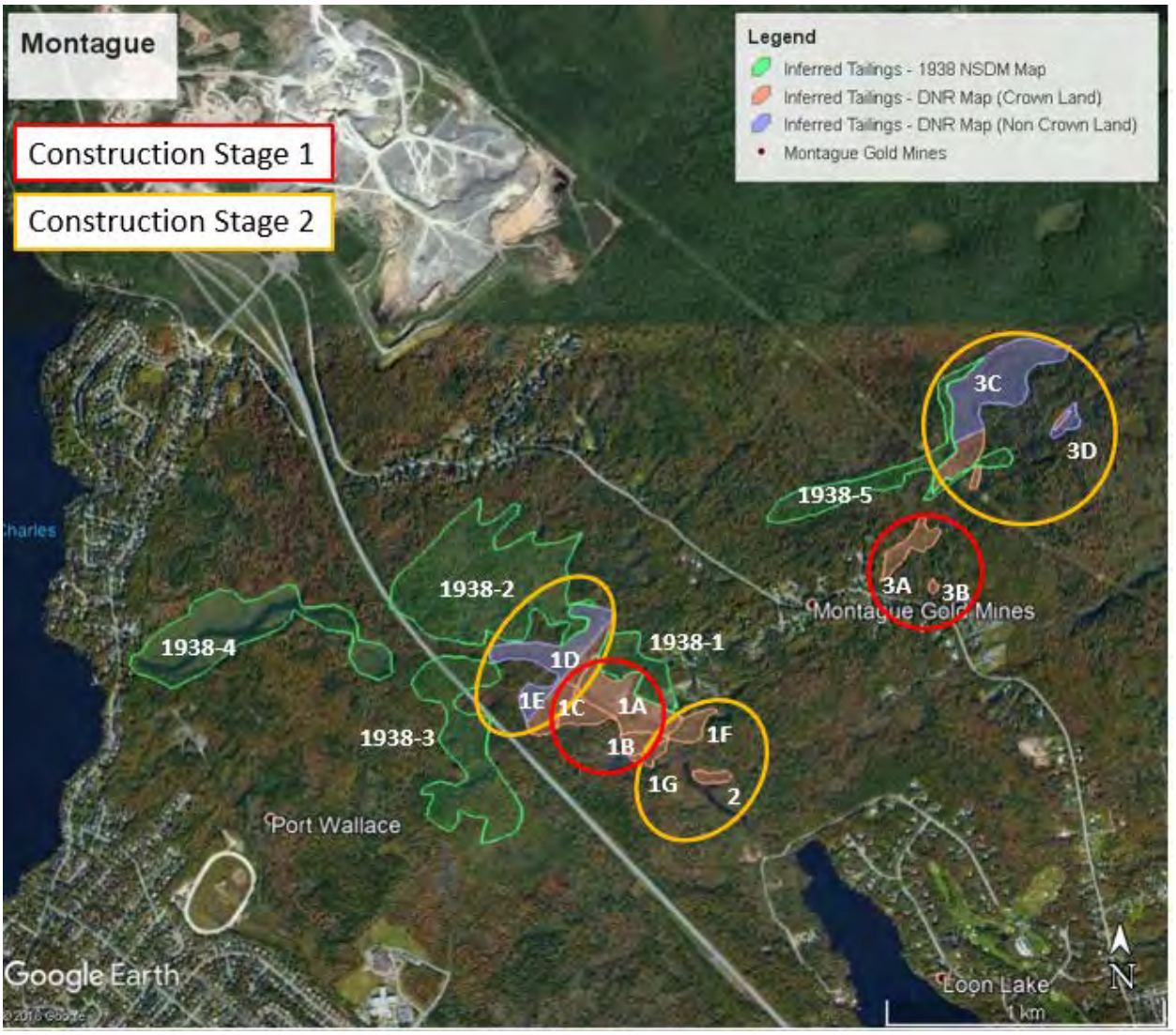


**Figure 8-1: Construction Stage 2 – Crown Land Areas**

## 8.4 Construction Stage 3 - off Crown Land

Historical reports have identified several areas where tailings were deposited as noted by the green 1938 areas shown on Figure 8-2.. These areas appear to be overgrown with wetland or forest vegetation and cover almost 600,000 $m^2$. There has been little to no investigations in these areas to determine if there are tailings below the surface, and the level of contamination and if some level of remediation is required.

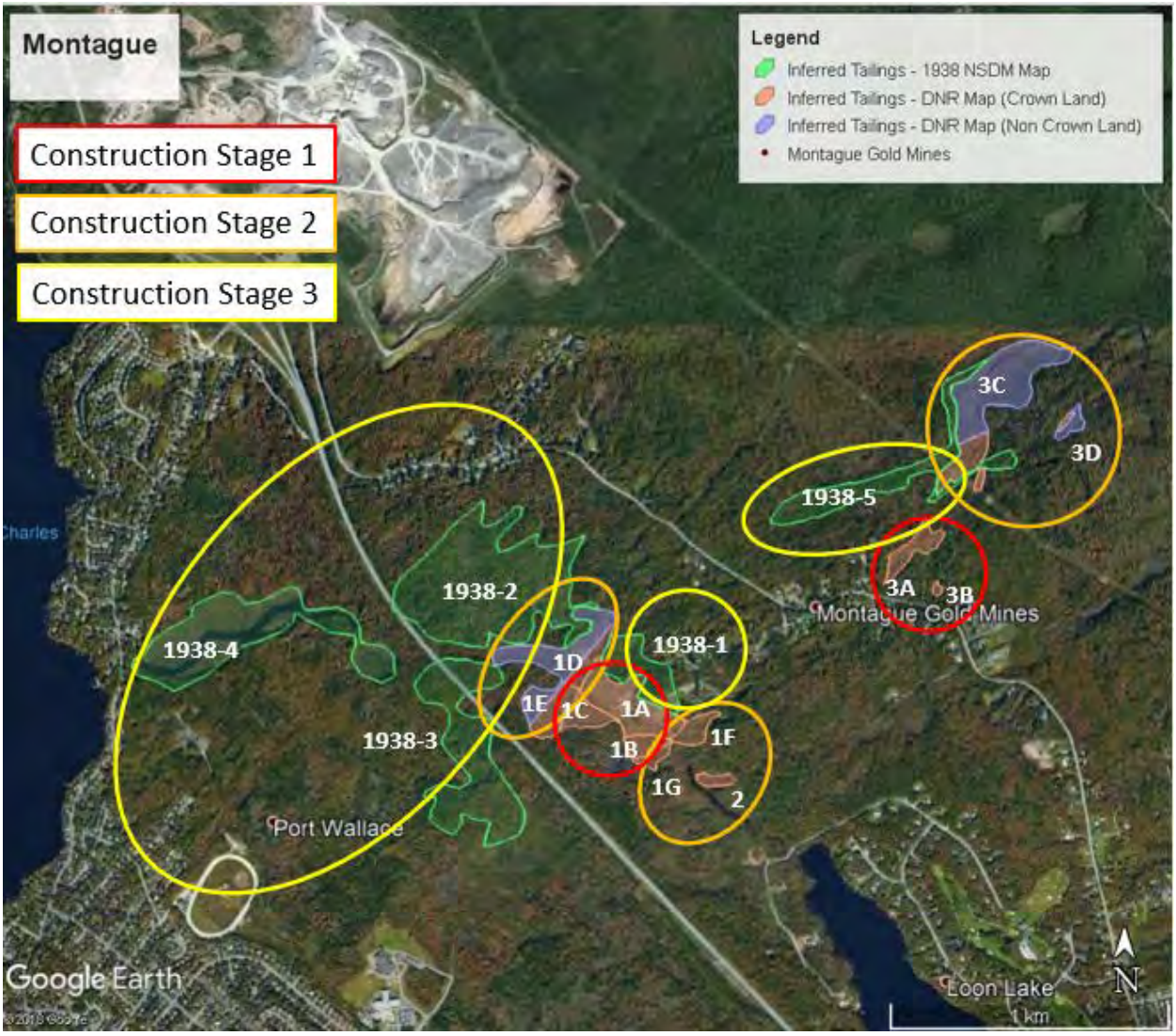


**Figure 8-2: Construction Stage 3 – Off Crown Land Areas**

## 9.0 **IMPLEMENTATION SCHEDULE**

The following is a Level 1 implementation schedule for Construction Stage 1 site remediation.

| **Construction Stage 1 - Implementation** | | | Year 1 | Year 2 | | | | | | | | | | Year 3 | | | | | | | | | Year 4 | Year 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oct - Dec | Jan - Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan - April | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan - Dec | Jan - Apr | May | Jun | Jul | Aug |
| **Task** | | **Duration** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Permitting** | | 6 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Area 1A - Excavate, consolidate and cover** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construct access roads, laydown areas | Crew 1 | 2 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install ditches | Crew 1 | 2 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install cutoff wall | Subcontractor | 3 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Water Treatment Pond** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Excavate water treatment pond | Crew 1 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water treatment of construction zone | Subcontractor | 17 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water treatment of containment cell leachate | Subcontractor | 36 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Backfill water treatment pond | Crew 1 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Containment Cell 1** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construct Containment Cell 1 | Crew 1 | 2 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Excavate east side of A1, place in Cell 1 | Crew 1 | 2 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Backfill east side of A1 | Crew 1 | 2 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dewater and consolidate tailings | Crew 1 | 30 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install cell cover system | Crew 1 | 2 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Containment Cell 2** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construct Containment Cell 2 | Crew 1 | 2 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Excavate west side of A1, place in Cell2 | Crew 1 | 2 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Backfill west side of A1 | Crew 1 | 2 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dewater and consolidate tailings | Crew 1 | 22 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install cell cover system | Crew 1 | 2 months | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Area 1B - Low permeability cover** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construct access roads, laydown areas | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install ditch | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install cover | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Area 1C - Low permeability cover** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Construction Stage 1 - Implementation | | | Year 1 | Year 2 | | | | | | | | | | Year 3 | | | | | | | | | Year 4 | Year 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oct - Dec | Jan - Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan - April | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan - Dec | Jan - Apr | May | Jun | Jul | Aug |
| Construct access roads, laydown areas | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install ditch | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install cover | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Area 3A - Low permeability cover** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construct access roads, laydown areas | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install ditch | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install cover | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Area 3B - Low permeability cover** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construct access roads, laydown areas | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Install cover | Crew 2 | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | |

# 10.0 STAGE 2 TERMS OF REFERENCE

This report has presented the conceptual closure plan for the Montague Mine site. The next stage of design is to move the conceptual plans to pre-feasibility and feasibility level design so that accurate cost estimates and implementation schedules can be develop and permitting can be obtained. After approval is granted for the remediation, then detailed designs will be completed with development of construction packages (tender drawings and specifications). The next stage of the design work is referred to as Design Stage 2, so as not to be confused with the different stages of construction. Design Stage 2 will focus on advancing the designs for Construction Stage 1 (the high priority areas that are on Crown land). As part of this exercise, conceptual designs will be developed for the other areas that require remediation that are not on Crown land and are a lower priority, but still exceed the remediation criteria.

The following tasks should be undertaken for Design Stage 2:

1. Design criteria:
    a. Conduct risk assessment to refine site specific remediation criteria
    b. Consult with regulators and stakeholders (residents, communities of interest, etc.) on the proposed concepts and proposed remediation criteria to establish the project criteria and possible options.
    c. Prepare design basis memorandum.
2. Field Investigation (including Non-Crown owned land):
    a. Characterize the groundwater for the site to determine the effects on groundwater and how the remedial options will be affected by or affect groundwater.
    b. Conduct additional soil sampling to better characterize areas that have been identified as potential areas of concern from Design Stage 1, as well as areas that have not yet been characterized (Non-Crown lands).
    c. Conduct additional soil sampling including pore water characterization.
    d. Conduct additional surface water sampling and obtain flow measurements at key locations for use in the contaminants loading model.
    e. Conduct ecological and biological testing of wetland and aquatic substrate to inform the remedial options for the wetlands and streams, based on ecological risk assessment approaches.
    f. Conduct human and ecological risk assessment of Non-Crown owned lands to inform remedial options.
    g. Conduct sufficient investigation to support the engineering design of the possible options (borrow sources, constructability, etc.).
    h. Prepare factual report describing results of field investigation programs.
3. Focused human health risk assessment of Lake Charles:
    a. Conduct field investigation specific to Lake Charles that obtains sediment and fish samples and complete human health risk assessment; this work will be completed as part of Stage 2.
    b. Convey results to NS Lands Inc. for distribution to relevant agencies.

4. Stakeholder Consultation Program:
    a. In addition to the consultation required to establish the remediation criteria, conduct additional consultation with stakeholders to apprise them of the progress of the design and obtain input to the project.
    b. Convene meetings in the communities as public information sessions and/or town hall meetings.
    c. Prepare summary of the meetings and consultation sessions.
5. Contaminant Loading Model
    a. Develop contaminant loading model for the site(s).
    b. Calibrate with observed surface water flows and quality.
    c. Test the effectiveness of the different conceptual options on the surface water quality.
    d. Prepare report describing the results of the contaminant loading model.
6. Conceptual Design Update:
    a. Based on the established design criteria and the results of the field programs and contaminants loading model, update the conceptual designs that were developed in Design Stage 1 for the entire site. The conceptual designs are to be advanced sufficiently to better frame the options that are to be considered for Construction Stage 1.
    b. Prepare a report that provides the conceptual design update.
7. Pre-feasibility Design for Construction Stage 1:
    a. Advance the conceptual options that were developed for Crown Land to pre-feasibility level design with associated costing and implementation schedule.
8. Select Preferred Option:
    a. Update the decision analysis that was initiated in Design Stage 1 with the information obtained in this project.
    b. Utilizing the decision analysis approach, select the preferred option for each site that is to be advanced to feasibility level design.
    c. Prepare a report that summarizes the pre-feasibility designs, the decision analysis, and the basis for the selection of the preferred option.
9. Feasibility Design:
    a. Conduct appropriate analyses to support feasibility level design for the preferred option for each site.
    b. Develop Class B cost estimate.
    c. Develop Level 3 schedule.
    d. Prepare design report that describes the feasibility level design.
10. Regulatory Approval Package:
    a. Prepare necessary documents and supporting information for submission to NS ENV for regulatory approval for the proposed plan.
11. Detailed Design and Tendering Scope
    a. Prepare a scope of work for the development of the detailed designs and tender.

## 11.0 CLOSING REMARKS

This report was prepared by the following authors. We trust that this report meets your requirements

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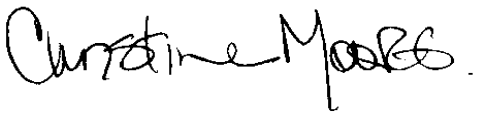

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# APPENDIX A

## Background Information Review

# MEMO

NS Lands Conceptual Closure Plan: Montague and Goldenville Mines

| | |
|---|---|
| **To:** | D. Burke, NS Lands |
| **From:** | Christine Moore, Intrinsik; Sarah Barabash, EcoMetrix; Ron Nicholson; EcoMetrix; Andy Small, Kholn; Carman Stevens, Wood |
| **Date**: | November 16 2018 |
| **Subject:** | Task 2 - Background Information Review: Montague Mines - Draft |
| **CC:** | Elliot Sigal, Intrinsik |

**Task 2: Montague Mines Background Data Review**

The purpose of this memo is to outline data and results of investigations that have been conducted at the Montague Mines site, such that the proposed field program for the current study builds on the existing dataset to fill in data gaps and further the understanding of the geochemistry at this site and assists in developing a scientifically sound closure plan for the site. Not every study conducted on this site is included, but rather summary information of key studies is focused upon.

The Montague gold district is located in the community of Montague Gold Mines, within the Halifax Regional Municipality (HRM), Nova Scotia. Figure 1-1 provides the location of Montague Mines, as well as Goldenville Mines, which is discussed in a separate memo.

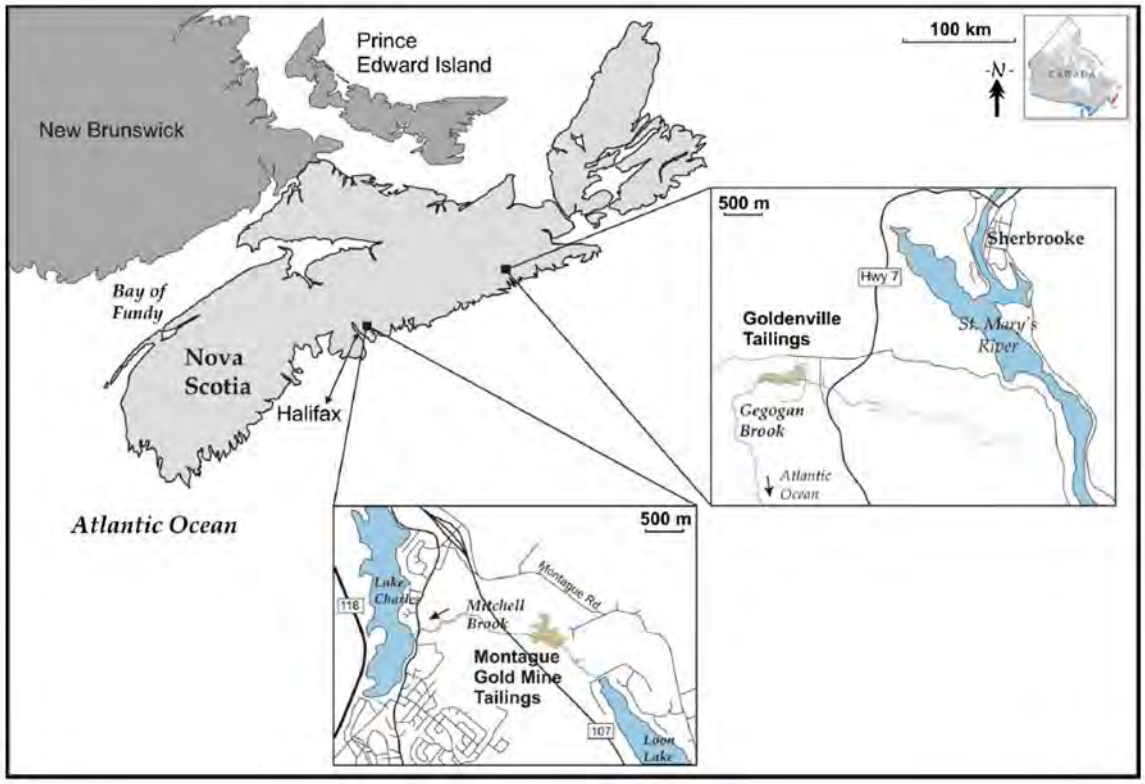



**Figure 1-1: Location of Montague Mines** Figure From: DeSisto, S.L. H. Jamieson, and M.Parsons. 2017. Arsenic mobility in weathered gold mine tailings under low-organic soil cover. Environmental Earth Sciences (2017) 76:773.

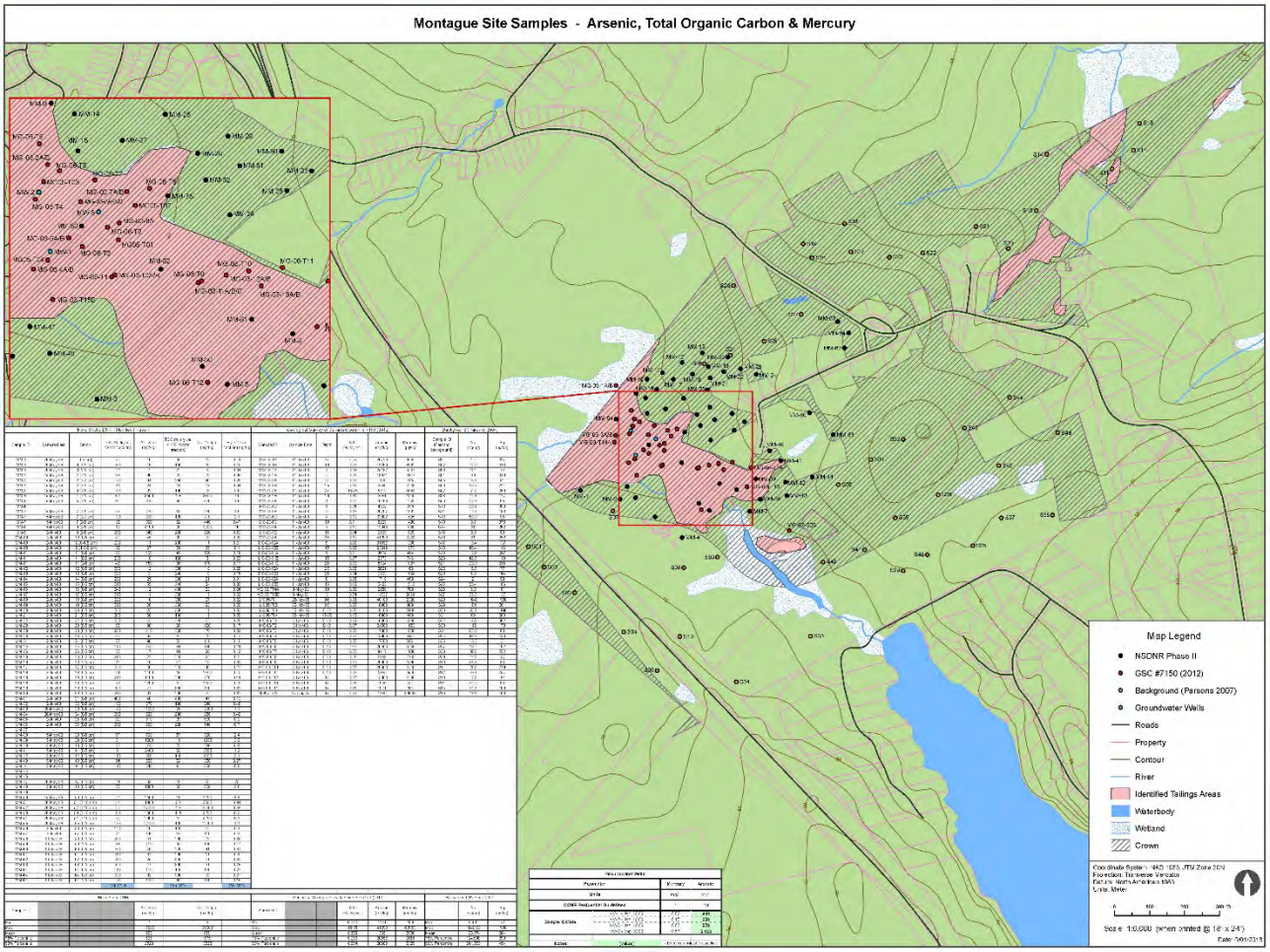
Parsons et al (2012) provide a summary of historic gold mining activities at this site, which included the discovery of gold in 1862, with mining being carried out continuously from 1865 to 1928, and then intermittently until 1940. Ore was milled on-site, using a variety of stamp mills with mercury amalgamation. The tailings were discharged into nearby Mitchell Brook, which originates from Loon Lake, and discharges further downstream into Lake Charles. This site produced over 120,000 ounces of gold (Drage, 2015), and is only one of a total of 64 abandoned historic gold mining districts across Nova Scotia. There were no environmental regulations at the time these activities took place, and as a result, there are significant environmental legacies associated with past mining activities at this site, largely related to the presence of elevated levels of arsenic and mercury in the tailings. As discussed in Parsons et al (2012), studies have found tailings in wetland areas along Mitchell Brook, and sediment coring conducted in Lake Charles found a fine layer of tailings approximately 2.5 km downstream of the Montague stamp mills (EPS 1978; Mudroch and Clair 1985). Tailings were also deposited in a wetland along Birch Cove Brook, which drains eastward toward Lake Major (Parsons et al, 2012).

Arsenic is naturally enriched in the rocks, soil, sediment, surface water and groundwater of many areas of Nova Scotia, due to the natural geology of this province, which are underlain by bedrock of the Meguma Supergroup (see Parsons and Little, 2015; Goodwin et al, 2010). The Montague gold deposit contains naturally occurring arsenopyrite, an iron arsenic mineral, at elevated concentrations (up into the percent range for

both sites). The presence of mercury in the tailings is related the extraction process used at the time, which involved mercury amalgamation to collect the gold. This process resulted in the release of mercury at elevated levels in Montague, relative to environmental quality guidelines.

The area at Montague Mines now appears as an open wetland, with tailings distributed throughout the wetland. The wetland is largely submerged in high flow periods, but also has open dry areas which can generate dust. Government warning signs are present indicating high levels of arsenic, but there continues to be evidence of trail biking activities at this site.

There has been considerable geochemical characterization of the tailings and surrounding soils present at this site, with arsenic concentrations ranging up to 4.1 wt. %, and mercury in tailings ranging up to 8.4 mg/kg in the main tailings with three samples exhibiting higher mercury concentrations of 16 mg/kg, 25 mg/kg and highest concentrations (70 mg/kg) being located at the former Stamp Mill location (Parsons et al, 2012). The mercury data generally meet the human health and ecological soil quality guidelines established for inorganic mercury (6.6 mg/kg, CCME, 1999; NS Environment, 2014), but there are a few sampling locations at Montague Mines which markedly exceed the guideline. The arsenic concentrations are elevated over a wide area, relative to the NS Environment (2014) guideline of 30 mg/kg. In addition to tailings chemistry data, soils characterization within and off of the tailings area and some preliminary groundwater characterization within the main tailings area has also been conducted (Maritime Testing (1985) Ltd., 2009). The Maritime testing study (2009) was focused on gathering supplementary soils data in areas of the tailings that had not yet been characterized in earlier studies, as well as in areas between the main tailings areas and nearby residential properties. The sampling protocol involved sampling at a 0 to 5 cm soil depth (the public health layer), as well as coring to deeper depths, with soil samples being fractionated to 2 mm size, as well as a smaller fraction of < 150 µm. A total of 54 locations were sampled with a total of 77 samples being collected (including surface and cored samples). Arsenic concentrations ranged from 7 mg/kg to 12,000 mg/kg in the < 2mm fraction, with one sample taken from within the tailings are measuring 17,000 mg/kg (Maritime Testing, 2009). Arsenic in the < 150 µm fraction ranged from 6 mg/kg up to 35,000 mg/kg, with the highest sample being taken from within the tailings area (Maritime Testing, 2009). Mercury results from within the < 2 mm fraction sized samples ranged from 0.02 mg/kg up to 25 mg/kg (sample taken in tailings area). Elevated mercury results were reported in locations of the former Stamp Mill and central tailings areas, whereas wooded and residential areas were generally less than 1 mg/kg Hg (Maritime Testing, 2009). No < 150 µm analysis was conducted for mercury. Groundwater data collected as part of the Maritime Testing (2009) study within the tailings area found that all samples collected from the 3 groundwater wells were less than the applicable mercury drinking water guideline of 1 µg/L, but all arsenic data exceeded the drinking water quality guideline of 10 µg/L, and ranged up to 3,100 µg/L. The data from Parsons et al (2012) and Maritime Testing (2009 – also referred to as DNR, 2009) are provided in Figure 1-2.




In addition to site-related investigations, Parsons and Little (2015) conducted a study to determine possible background levels of arsenic in the Montague Mines area. This study is important for determining baseline concentrations of arsenic, as in many areas of Nova Scotia, arsenic is elevated above typical environmental quality guidelines. The top 0 – 5 cm of soil were collected from a total of 46 sampling locations near Montague. In addition, at selected sites, samples of individual soil horizons (H, Ae, B, and C) were also taken to examine the vertical distribution of elements in the soil profile. The authors selected sampling locations within Crown lands that represented both up-ice and down-ice of the glacial transport direction, in order to study the effects of glacial dispersion. Parsons and Little (2015) found that concentrations of As and Hg in all soil horizons are generally higher down-ice, southeasterly, of the ore zones in both districts, reflecting glacial erosion and transport of mineralized bedrock. Arsenic (0 – 5 cm; <2 mm size fraction) ranged from 4–273 mg/kg (median 42 mg/kg; median + 2 median absolute deviations 139 mg/kg; 98$^{th}$ percentile 264 mg/kg), with mercury ranging from 0.072–0.490 mg/kg (median 0.164 mg/kg; median + 2 median absolute deviations 0.374 mg/kg; 98$^{th}$ percentile 0.447 mg/kg). These data are presented on Figure 1-2, and can be used to characterize background arsenic and mercury concentrations within the study area. Note that during this study, the authors discovered a previously unknown tailings deposit just north of Mitchells Brook, between Loon Lake and the main tailings area. A small stamp mill foundation was noted, and tailings at this site

(marked as MG07-S28 on Figure 1-2) were found buried beneath approximately 5 cm of spruce needles and humus. Arsenic concentrations of 1860 mg/kg and mercury concentrations of 70 mg/kg (<2 mm, *aqua regia* digestion) were reported (these data were excluded from the background calculations). This is an area that requires characterization in the current study.

With respect to environmental investigations, Parsons et al (2012) indicate that some early studies of the potential environmental impact of tailings within the wetland environment on stream waters, sediments, vegetation, fish and aquatic organisms in this district have been studied by EPS (1978), Brooks *et al.* (1981, 1982), and Dale and Freedman (1982). Dale and Freedman (1982) collected 8 different vegetation species and tailings samples along the tailings flats. In addition, banded killifish were placed in cages in Mitchell Brook, downstream of the tailings and left for 4 weeks for an accumulation study. Collected vegetation species were found to have arsenic concentrations ranging from 1 to 2 orders of magnitude above reference species.

Exposures to Banded killifish in Mitchell Brook were not lethal to the fish, and resulted in tissue accumulation of arsenic, as expected (0.639 ug/g As wet weight, relative to control fish at 0.446 ug/g). Additional plant bioassays were also run, using varying levels of nutrient additives (Dale and Freedman, 1982). More recently, a number of research projects have been underway at Saint Mary's University, under the direction of Dr. Linda Campbell. The goal of these research projects was to not only characterize risk to wetland biota within the historic gold mining districts, but to also assess potential remediation tools that could be used to reduce toxicity *in situ*, since removal of vast quantities of tailings from the 64 historic mining districts is not feasible.

An investigation into whether low-dose selenium could reduce environmental toxicity of both arsenic and mercury was conducted on tailings samples from the Old Stamp Mill at the Montague site (Chapman et al, 2016). In this study, tailings were treated with various doses of sodium selenite. Reclamation grass planted in treated and untreated tailings showed significantly reduced toxicity with increasing selenium concentrations (biomass; % emergence and root length).

Earthworms (*Eisenia andrei*) were introduced to the experimental treatments, and earthworm mercury concentrations were found to decrease with increasing selenium concentration, but this effect was confounded by differing mercury concentrations in the tailing material. Other studies have been conducted in the Montague Mines site (stamp mill location), including ecological investigations of uptake of mercury and arsenic in benthic and emergent insects in Mitchell Brook (which was the reference location – the area between Loon Lake and the main tailings area was considered reference) and the Old Stamp Mill (Montague); toxicity testing of sediments to mayflies, *Hexagenia sp.* (survival and growth) and a freshwater snail species (*Cipanopaludine sp*.; survival, growth, fecundity and reproduction); abundance and diversity of benthic and emergent insects; and chemistry of sediments in Muddy Pond, which is another historic district (Chapman et al, 2018). As part of this work, a risk assessment framework was developed to guide wetland assessments from within the various gold districts. In addition, preliminary testing of the potential for low dose nanoscale zero valent iron treatments to reduce toxicity of wetland sediments to mayflies and snails has also been undertaken (Chapman et al, 2018). These studies are on-going under several research grants.

Terrestrial wildlife studies at Montague have included investigations in meadow voles (*Microtus pennsylvanicus*) collected at Montague (Saunders et al, 2010). Tissue analysis for total arsenic and various

arsenic species was conducted, relative to a reference population. Meadow voles at Montague had substantially higher concentrations of total arsenic than animals from an uncontaminated reference area. Speciation analysis revealed that extractable arsenic in internal tissues was present mainly as monomethylarsonic acid (up to 14% of total arsenic). A statistically significant relationship was observed between the reduction of glutathione in vole livers and the increase in liver arsenic concentrations, and micronucleated monochromatic red blood cells were also significantly elevated in voles from Montague Mines.

A second study (Saunders et al, 2011) conducted an ecological risk assessment of meadow voles at 3 Nova Scotia tailings sites, one of which was Montague Mines. This study involved the application of soil bioaccessibility data to the risk assessment, and compared these outcomes to results based on an assumption that arsenic in soils was 100% bioaccessible, as well as exposure estimates derived through the analysis of arsenic concentrations in stomach contents. The use of site-specific bioaccessibility (hazard quotient= 120 at Montague Mines) and stomach arsenic contents (hazard quotient= 6.7 at Montague Mines) in the ERA resulted in lower numeric risk than compared to risk calculated with 100% bioavailability (hazard quotient=680 at Montague Mines). Biomarker results were found to be in line with the site specific bioaccessibility results, identifying the importance of factoring in bioaccessibility in ERAs at tailings sites.

Arsenic speciation work has also been conducted on 8 orders of terrestrial invertebrates collected at 3 historic gold mining sites, including Montague Mines (Moriarty et al, 2009). Total arsenic concentrations for invertebrates at Montague were found to be highest in slugs (53 mg/kg wet weight), followed by moths and dragonflies (22 mg/kg wet weight), with lower concentrations in spiders and grasshoppers. All invertebrates exhibited elevated arsenic concentrations, relative to reference invertebrates. Arsenic speciation analysis revealed that terrestrial invertebrates store ingested arsenic largely as inorganic arsenic, with trace amounts of arsenobetaine and arsenocholine being identified in slugs, ants, and spiders.

A considerable amount work was completed to characterize the bioaccessibility of arsenic within tailings samples at Montague (e.g., Royal Roads University, 2007; Laird et al, 2007; ESG, 2009; Walker et al, 2009; Meunier et al, 2010; Meunier et al, 2011a; 2011b; as well as other publications). Walker et al (2009) discussed the influence of minerology on bioaccessibility and environmental mobility of arsenic. These authors concluded that the minerology of arsenic in weathered tailings is highly variable, and the minerology was controlled by a number of factors, including presence/absence of mill concentrates, water saturation, and carbonate minerals). This variability has an influence on environmental mobility and bioaccessibility of near-surface tailings and soils.

Work conducted by ESG (2009) involved physiologically-based extraction test (PBET) testing using a standard two-stage process (gastric and intestinal phases). Health Canada guidance was followed and a range of soil particle sizes as well as liquid to solid ratios were investigated. Fifty six samples from a variety of gold mining districts were tested, and 89 percent returned a greater bioaccessibility of arsenic in the gastric + intestinal phase than in the gastric phase. The percentage of bioaccessible arsenic varied from less than 1% to 49%, with a median of 7.3%. Specific results for Montague tailings ranged from 1.1 to 25 % bio accessible. Fraction of the samples to differing sieve sizes (<250, <150 and <45 µm) was also conducted. Results were not statistically significant, but the authors recommended the use of the < 150 µm fraction results. The authors conducted preliminary calculations following a strict interpretation of Health Canada guidelines with respect

to the incremental cancer risk associated with arsenic exposure for the case of a permanent resident and a transient site user near gold mining district sites. The authors indicate that redevelopment and increased usage of the tailings sites may trigger changes in the bioaccessibility of arsenic through soil amendments and weathering of previously unexposed layers of tailings and soils. Such factors should be taken into consideration when planning the future of these sites. Other studies are not discussed in detail herein, but should be considered if human health risk assessment is being undertaken in future stages of the project.

Air quality has also being studied at Montague (Corriveau et al, 2011). This study involved the collection of dust samples, with the sampling being conducted when dirt bikes were actually being used at the site. Samples were fractionated into 10 particle size ranges and analyzed for a total of 10 chemicals, including arsenic. Arsenic concentrations at Montague ranged from 13.3 ng/$m^3$ (1 – 0.5 µm particles) to 8,200 ng/$m^3$ (particles > 16 µm) (10 hour sampling interval, at 1.0 L/min flow rate).

An important 3-year NSERC research grant (2009 – 2011) called "Optimal remediation of arsenic-contaminated mine sites to protect human and ecosystem health" was conducted involving several universities including Queen's University, Trent University, University of Ottawa, as well as NRCan. This project was led by Dr. Heather Jamieson of Queen's, and included NS Environment, SRK Consulting and AMEC Earth and Environmental (now WOOD). This research project focused on the Montague and Goldenville sites, and hence is highly relevant to the current project. The results of this project were presented to NS Environment in 2012. The long-term objectives for this project were (excerpted directly from Jamieson, 2012):

- "Design appropriate remediation strategies for As-rich abandoned gold mines in NS that prevents As concentrations increasing in downstream surface and groundwater and reduce risk to human health for individuals using the area for recreational purposes;
- Define the geochemical and microbial controls on the stability of different As-hosting minerals in oxidized gold mine tailings and the importance of colloidal As transport into surface and ground water;
- Enhance method development and novel applications of several advanced analytical techniques;
- Identify critical features for protective remediation design at As-rich mine sites elsewhere
- Provide a model for remediation design incorporating re-use of sites by local communities."

The NSERC Strategic Grant public summary of outcomes and benefits to Canada (2012) provides an excellent overview of the outcomes of this project, which resulted in a number of MSc (J. Kavalench; P. Beddoes; K. Tindale; L. Yellowhorn) and PhD theses (S. DeSisto; M. Hosney). The DeSisto (2014) thesis is important, as it is directly related to the remediation or closure of the tailings areas at both Goldenville and Montague Mines.

The main objectives of the DeSisto (2014) study were to: 1) characterize pre-remediation geochemical controls on arsenic mobility in subsurface tailings; 2) establish hydrogeological influences on arsenic mobility; and 3) identify geochemical changes that result when a low organic soil cover is applied to the tailings. This

research creates a jumping off point for the current study, in that significant work was developed by DeSisto (2014) which can be built upon.

The Ph.D. document (DeSisto, 2014) contains key information on the tailings solids, porewaters, shallow groundwater and surface water at the Montague site. The water quality data will provide a basis for confirming conditions across the site in support of selection of reclamation options. The results identify the solid phases that contain arsenic that will be valuable in selecting rehabilitation strategies by accounting to the stabilities of the phases under different geochemical conditions. The tailings were also identified as having some material that would be classified as potentially acid generating and others that are non-potentially acid generating and these classifications are important when selecting rehabilitation options.

The Hosney thesis is also critical to the current project, and appears to be in progress as of the date of this document. The objective of this thesis was to test the effectiveness of 3 geosysnthetic clay liners (GCLs) for the tailings at these two sites. This aspect of the overall research grant involved actual placement of test covers at Montague mines in August of 2009, with subsequent site visits and sampling in August 2010, 2011, and 2012. In addition, additional sampling is projected for 2019, to investigate the 10-year outcomes of the placement of these test covers (Rowe and Hosney, 2012; Hosney and Rowe, 2013). This work addressed the effectiveness of geosynthetic clay liners (GCL) for limiting water flow through the tailings as a potential rehabilitation option. The investigation was specific to GCL materials and the results can be used to support options selection using that type of liner material.

Key findings of the NSERC research grant (which include some of DeSisto's and Hosney's work) are as follows:

- Traditional remediation approaches are unlikely to be successful, due to the complex geochemistry of the tailings, which has been altered due to chemical weathering over the last 70 years. The original mineral hosts for arsenic have been altered over time, which has resulted in new arsenic-bearing minerals with varying solubility and stability. Also, deposition of the tailings in wetland areas present additional complications, with respect to possible remedial approaches.

- These sites are close to residential areas and have been used, and in some cases, continue to be used for recreational purposes, despite noticeable warning signs related to high arsenic concentrations. Reclamation must protect both human and ecological health, and consider community interest in using the sites into the future.

- The project team developed a characterization tool to classify the tailings into four main types based on their distinct geochemical and mineralogical properties. These types include (as described by Jamieson, 2012):

    - Wetland tailings (permanently saturated, unoxidized, arsenopyrite-bearing tailings - vegetated);

    - Oxic surface tailings (near-surface, weathered, arsenopyrite partially oxidized to various Fe-As minerals – normally unvegetated);

- High Ca/As tailings (different original host rock, Ca-Fe-As minerals, fine-grained; note – not present at Montague, but present at Goldenville);
- Hardpan (cemented, high As, Fe-As minerals, partially oxidized sulfide concentrate)

Figure 1-3 outlines the various tailings types at the Montague site. Three of the four tailings types were found to be potentially acid generating (Hardpan; Oxic surface tailings and wetland tailings, with hardpan exhibiting the highest acid generating potential).

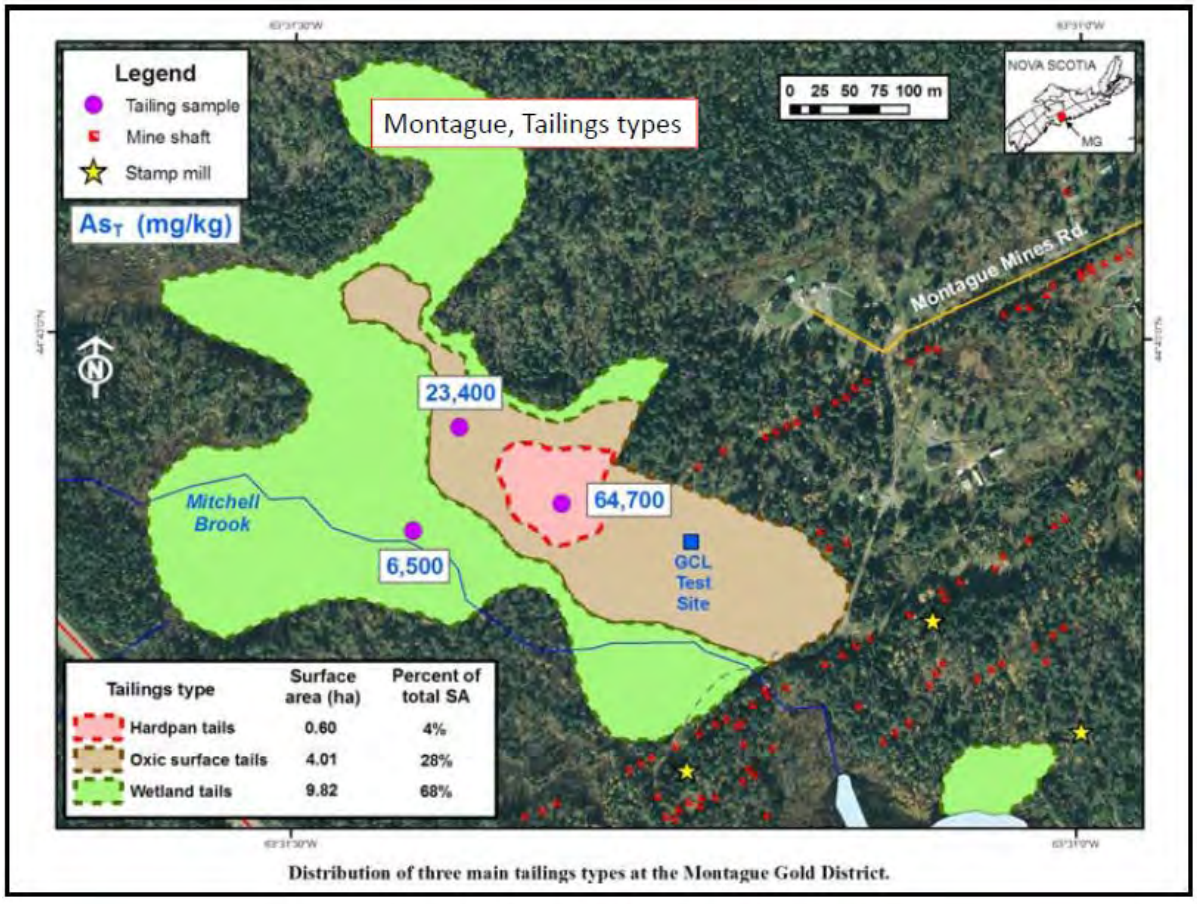



**Figure 1-3: Distribution of Tailings Types at Montague Mines (from Jamieson, 2012)**

Surface water concentrations were measured in several areas of the Montague site as part of the research conducted. Figure 1-4 provides data presented by Jamieson (2012).

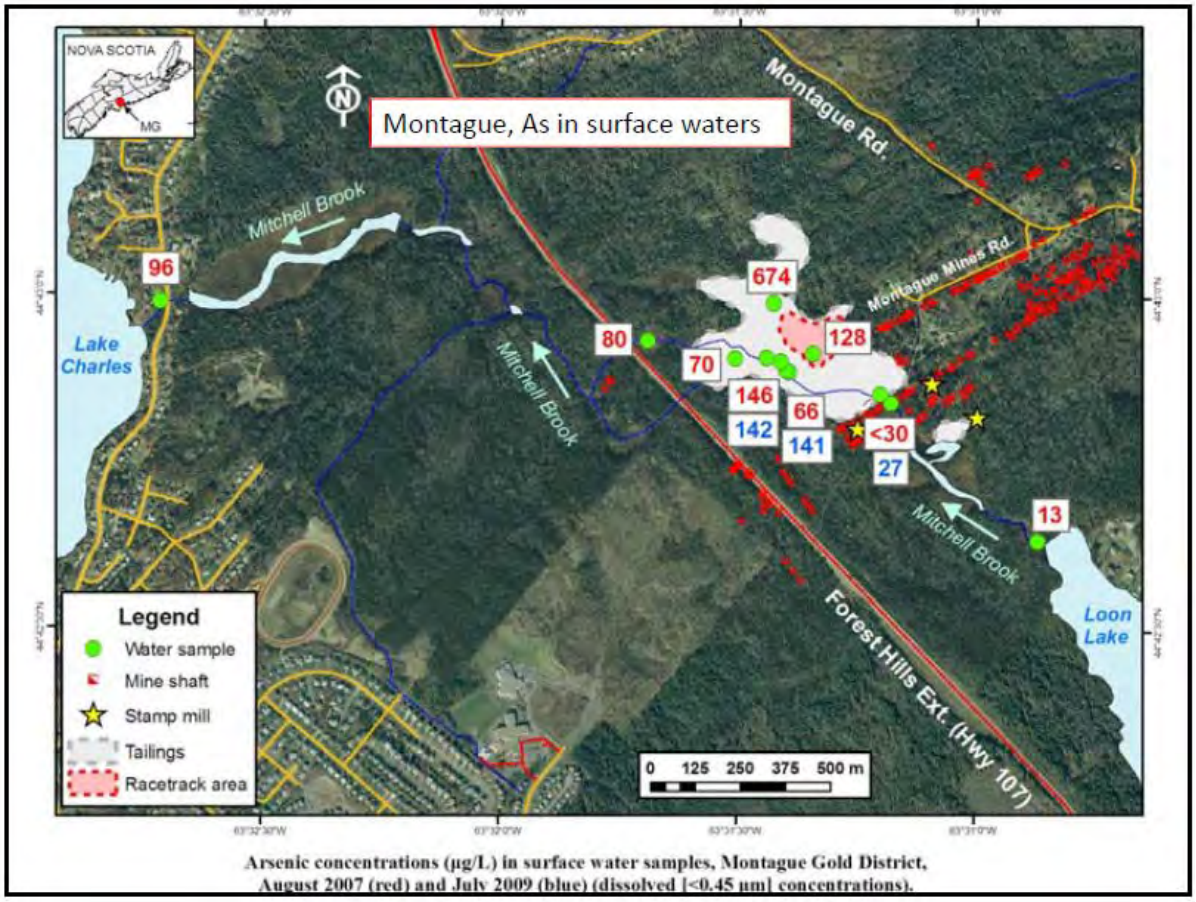



**Figure 1-4 Arsenic Concentrations in surface water (Montague Mines Gold District) µg/L; August 2007 (red) and July 2009 (Blue) (dissolved < 0.45 µm) (from Jamieson, 2012)**

Water table elevations were calculated from the measured depths to the water table (see Figure 1-5), and groundwater at Montague was concluded to flow parallel with the stream. Information on depth to the water table will be important for rehabilitation option selection. As with tailings below water in the wetlands, tailings below the water table are expected to be geochemically stable.

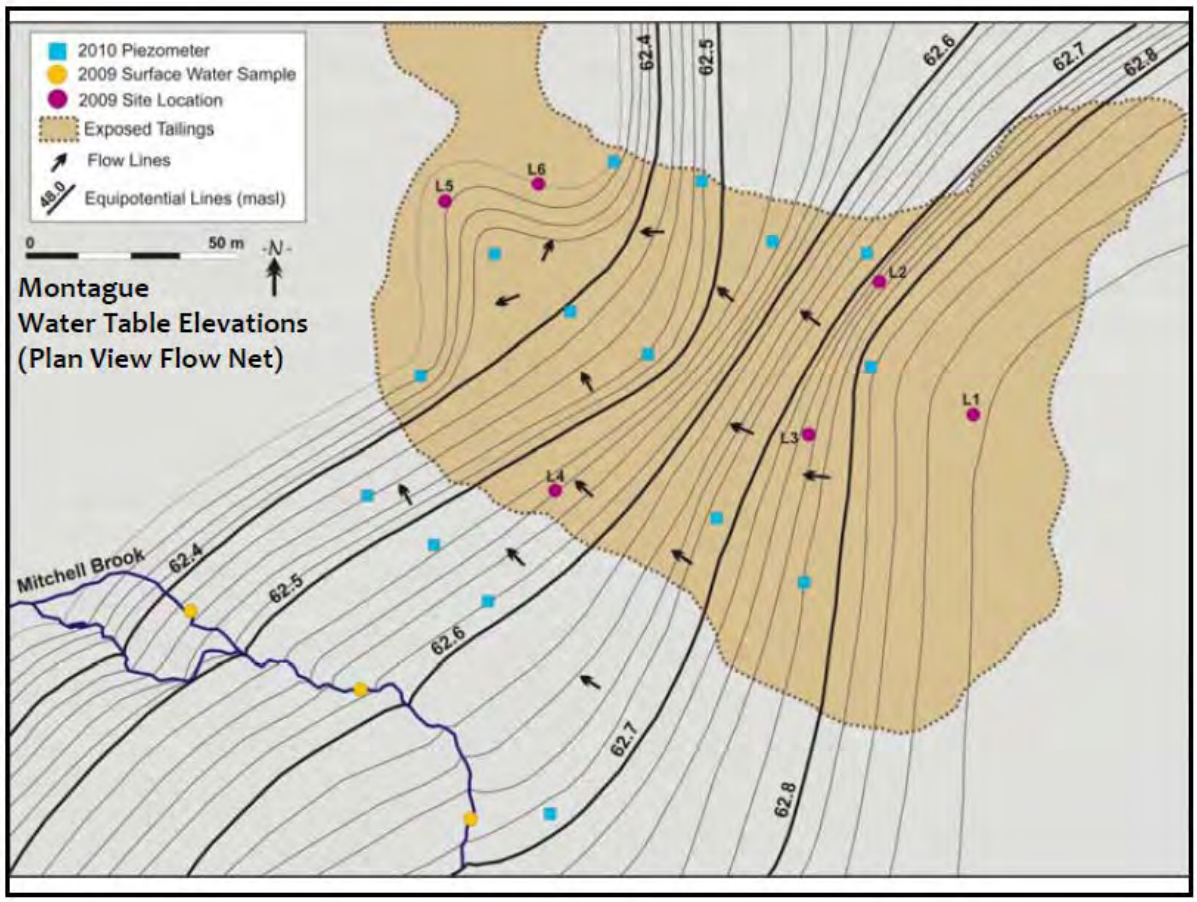



**Figure 1-5 Montague Water Table Elevations (from Jamieson, 2012)**

The research concluded that each of these tailing types require a different remediation approach, based on both field and laboratory testing. The authors concluded that tailings located in wetland areas are relatively unreactive if left undisturbed and below water. These tailings represent a large portion of the affected area at Montague. When disturbed and exposed to the atmosphere, they tend to generate acid drainage, and release high concentrations of arsenic. The authors point out that attempts to re-process tailings in mining could have significant adverse impacts, particularly if wetland located tailings are disturbed.

The research also concluded that unsaturated tailings will continue to release arsenic to surface and ground waters under existing field conditions. In addition, this will also occur under a shallow soil cover without a hydraulic barrier. In June 2012, Rowe and Hosney (2012) presented NS Environment with a range of recommended remediation strategies for these sites, that enables a selection of the most effective and cost-effective approaches to reclaiming tailings at these sites. These options will be reviewed and considered in this project.

An additional reclamation study, examining mine soil amendments at the Montague site, has also been conducted (Piorkowski, 2014). This study examined vegetation performance (above ground biomass; below

ground biomass and root:shoot ratio) in a phytostabilization experiment at Montague, using municipal soild waste (for organic matter and nutrients), wood chips (Carbon: Nitrogen adjustment) and steel slag (arsenic absorbent and alkalinity). Hairgrass was incubated for 50 days, post germination, and vegetation was assessed for biomass and metals levels. The optimal application rates were found to be 85 mg/ha MEW compost, with 24 Mg/Ha steel slag and 2 mg/ha wood chips. These results will be reviewed for relevance in support of options selection.

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# APPENDIX B

## Closure Criteria and Screening of Datasets

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## B-1. ARSENIC SPECIES SENSITIVITY DISTRIBUTION INTRODUCTION

The typical starting point for assessment of surface water data in an aquatic effects assessment are the Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (WQGl - FWAL), established by the Canadian Council of Ministers of the Environment (CCME). These guidelines are generic, national recommendations which reflect the most current scientific data at the time they were developed. They are intended to provide protection to all forms of aquatic life and aquatic life cycles, including the most sensitive life stages, at all locations across Canada (CCME, 2007). Since they are generic and do not account for site-specific factors that can alter toxicity, these national guidelines can be modified using widely accepted procedures, to derive site-adapted or site-specific water quality objectives (SSWQOs) for a given project or location (CCME, 2003). Modifications to the generic guidelines allow for protection of aquatic species accounting for specific conditions in the receiving environment and can be done following the CCME (2007) water quality guideline protocol document. For the purposes of this assessment, the recalculation procedure was used to derive a SSWQO for arsenic using the SSD approach as per guidance from the CCME (2007) protocol.

### B-1.1 Data Considered in the Derivation of the Existing CCME Arsenic Guideline

The CCME WQGl was developed following a review of toxicity data from 21 different species of fish, 14 species of invertebrates and 14 species of plants (CCME, 2001). Toxicity endpoints upon which the chronic CCME (2001) WQGl-FW was developed are provided in Table B-1, where available. Note that chronic data for *Anabus testudineus* (climbing perch) and *Clarius batrachus* (walking catfish) are not included in Table B-1, as these species are not relevant to Canadian waters. The final guideline derived by the CCME was based on the 14-day EC50 (growth) for the algae *Scenedesmus obliquus* (Vocke et al., 1980), which was the most sensitive freshwater organism to arsenic identified. The 50 µg/L EC50 was multiplied by a safety factor of 0.1, to obtain the current guideline value of 5 µg/L (CCME, 1991).

**Table B-1 Chronic Toxicity Data for Species Used by CCME for Arsenic WQGl-FW Derivation [1]**

| Species Used in Toxicity Study | Toxicity Endpoint | Metric | Value (µg/L) | Chemical Form | Reference |
|---|---|---|---|---|---|
| *Bosmina longirostris* | Immobility | 96-hour EC50 | 850 | Sodium arsenate | Passino and Novak, 1984 |
| *Oncorhynchus mykiss* | Lethality | 28 day LC50 | 550 | NA | Birge et al., 1978 |
| *Cyclops vernalis* | Reduced growth (20%) | 14 day EC20 | 320 | NA | Borgmann et al., 1980 |
| *Daphnia magna* | Reproduction (16% ↓ in reproduction) | 21 day EC16 | 520 | Sodium arsenate | Biesinger and Christensen, 1972 |
| *Gammarus pseudolimnaeus* | Lethality | 7 day LC80 | 960 | NA | Spehar et al., 1980 |
| *Ceriodaphnia dubia* | Immobilization | 7 day LOEC | 1000 | NA | Spehar and Fiant, 1986 |
| *Scenedesmus obliquus* | Growth | 14 day EC50 | 50 | Inorganic AsV | Vocke et al., 1980 |

| | | | | | |
|---|---|---|---|---|---|
| *Melosira granulata* | Growth | 14 day EC50 | 75 | NA | Planas and Healey, 1978 |
| *Ochromonas vallesiaca* | Growth | 14 day EC50 | 75 | NA | Planas and Healey, 1978 |

Notes:
NA = not available
1. Data obtained from CCME (2001).

### B-1.2 Review of Available Arsenic Toxicity Data

Toxicity data for use in the derivation of the arsenic SSWQO were compiled from a number of sources, including the following:

- CCME, 2001 Water quality guideline document for arsenic
- US EPA ECOTOX database (www.epa.gov/ecotox/); all forms of arsenic were searched
- Literature searches for arsenic toxicity review papers

A summary of the identified toxicity data for arsenic is provided in Table B-2. Toxicity data for tropical species were excluded as they do not inhabit waterbodies in the Nova Scotia region. It should also be noted that this is not a comprehensive arsenic review, however, this review is considered to capture most relevant toxicity studies. It was assumed that the CCME conducted a thorough literature search in the derivation of the guideline, and hence the starting point for the literature search was literature commencing following that point. In addition, not all studies were reviewed in detail. The focus of this research was to identify chronic studies, using standardized accepted protocols, on relevant species to Canadian waters.

Chronic test durations are discussed in CCME (2007) and include tests for non-lethal endpoints with durations greater than or equal to 21 days for fish (juveniles or adults), or greater than or equal to 7 days for egg and larval studies. For aquatic invertebrates, chronic test durations are considered to be greater than or equal to 96-h for non-lethal endpoints for shorter-lived invertebrates (e.g., *D. magna)*, for nonlethal endpoints of ≥ 7 days duration for longer-lived invertebrates (e.g., crayfish), and lethal endpoints from tests of ≥ 21 days duration for longer-lived invertebrates. Lethal endpoints from shorter-lived invertebrates from tests with <21-day exposure periods are considered on a case-by-case basis. For algal species, all toxicity tests with algae with exposure durations of longer than 24 hours are considered long-term exposure tests because of the length of the algal life cycle compared to the duration of the exposure.

Only those studies of acceptable quality were included in Table B-2.

### B-1.3 Identifying Relevant Chronic Toxicity Data

To calculate a chronic SSD, the CCME (2007) has set out the following minimum data requirements which must be met for a Type A guideline:

- Fish: Three studies on freshwater fish species, including one salmonid and one non-salmonid.

- Invertebrates: Three studies on freshwater aquatic / semi-aquatic invertebrate species, at least one of which is a planktonic crustacean species. For semi-aquatic species, life stage tested must be aquatic.
- Plants / Algae: At least one study on freshwater vascular plant or freshwater algal species. Where plants or algae are identified as being among the most sensitive species, the chemical of interest is classified as phytotoxic and three studies on freshwater plant or algal species are then required to derive a long term SSD.

Freshwater toxicity data for arsenic was summarized in Table B-2. Each of these toxicity studies were evaluated for quality and categorized as Primary, Secondary or Unacceptable (ranking available on request). Toxicity data from Primary and Secondary studies are considered acceptable for use in the derivation of a SSWQO, however unacceptable data are not. Note that studies by Birge were considered suspect based on a review of the U.S. EPA's water quality criteria for aluminum and arsenic, which revealed that the corresponding data from these studies were listed as 'other data' but were not included in the datasets used for criteria derivation; no reason was given for this exclusion. The Birge (1978) and Birge et al. (1978) data have been found to yield anomalously low toxic concentrations for numerous microelements and were excluded from the SSD. Therefore, the results from these experiments were considered questionable and were not included.

Briefly, for Primary studies, toxicity test must have used currently acceptable standard methods and measured concentrations must be reported. Studies must have sensitive test endpoints with preferred test endpoints for Primary studies including effects on embryonic development, hatching, or germination success; survival of juvenile stages, growth, reproduction; and survival of adults. Other effects such as behavioural or endocrine-disrupting effects can be used if it can be demonstrated these effects are a result of the exposure, they result in an adverse ecological effect and the studies are scientifically sound. For secondary studies, the requirements for standard test methods and measured concentrations are less stringent. The same preferred test endpoints exist for Secondary studies in addition to pathological and behavioural effects (if ecological relevance can be shown, but the requirement for this is not a stringent as it is for primary data) and physiological effects. Toxicity data that do not meet the criteria for either Primary or Secondary studies are considered to be Unacceptable. Additional clarification of Primary, Secondary and Unacceptable studies is provided in CCME (2007).

From the compiled freshwater arsenic toxicity data (Table B-2), those studies designated as Primary or Secondary were considered for use in deriving the SSD.

**Table B-2 Arsenic Chronic Toxicity Data**

| Species | Chemical | Water Quality Parameters | | | Test Duration / Life Stage | Chronic Value (µg/L) | Reference |
|---|---|---|---|---|---|---|---|
| | | pH | T (°C) | Alkalinity / Hardness (mg/L; $CaCO_3$) | | | |
| **Aquatic Invertebrate** | | | | | | | |
| *Daphnia magna* (Water flea) | Sodium arsenite (As III) | 7.2 – 8.1 | 20.8 | 37 – 45/46 - 49 | 28 day survival; reproduction NOEC | 633 | Lima et al., 1984 |
| *Daphnia magna* | Sodium arsenite (As III) | 7.2 – 8.1 | 20.8 | 37 – 45/46 - 49 | 28 day survival; reproduction LOEC | 1320 | Lima et al., 1984 |
| *Daphnia magna* | Arsenite (As III) | 7.4 | 21.5 +/-3 | 45.5/47.2 | 28 day (growth and reproduction) NOEC | 630 | Call et al, 1983 |
| *Daphnia magna* | Arsenite (As III) | 7.4 | 21.5 +/-3 | 45.5/47.2 | 28 day (growth and reproduction) LOEC | 1320 | Call et al, 1983 |
| *Daphnia magna* | Sodium arsenate ($Na_2HAsO_4$) | 7.4 – 8.2 | NR | 42.3 / 45.3 | 21 day EC16 (16% ↓ in reproduction) | 520 | Biesinger and Christensen, 1972 |
| *Daphnia magna* | Arsenic III | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 14 day Survival and Reproduction; NOEC | 955 | Spehar et al, 1980 |
| *Daphnia magna* | Arsenic V | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 14 day Survival and Reproduction; NOEC | 932 | Spehar et al, 1980 |
| *Daphnia magna* | Arsenic trioxide ($As_2O_3$) | Measured but NR | 21+1 | NR | 21 day IC10 (reproduction) | 1300 | Tisler and Zagorc-Koncan, 2002 |
| *Cyclops vernalis; C. bicuspidatusthomasi* (Copepod) | Sodium arsenite (As III) | 7.6 - 8.8 | 15 | 88 / 139 | 14 day EC20 | 320 | Borgmann et al., 1980 |
| *Hyallela azteca* (Amphipod) | Sodium arsenate ($Na_2HAsO_4$) | 7.23 – 8.83 | 25 | 84 / 124 | 7 day LC50 | 483 | Borgmann et al., 2005 |
| *Ceriodaphnia dubia* (Water flea) | Sodium Arsenate (As V) | 7.9 | 25.8 | 50.5/119.4 | 8 day survival (IC 12.5) | 1020 | Naddy et al, 1995 |
| *Ceriodaphnia dubia* | Specific form NR; data for low UV radiation | 7.29 – 9.27 | 25 | NR | 24 day to 3rd generation NOEC brood size | 1000 | Hansen et al, 2002 |
| *Ceriodaphnia dubia* | Specific form NR; data for low UV radiation | 7.29 – 9.27 | 25 | NR | 24 day to 3rd generation survival NOEC | 1500 | Hansen et al, 2002 |
| *Ceriodaphnia dubia* | Sodium arsenite (As III) | 8.1 – 8.2 | 25 +/- 2 | 97 – 112/100 – 165 | 7 day MATC (immobilization) | 1140 | Spehar and Fiandt, 1986 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Pteronarcys dorstata* (Stonefly) | Arsenic III | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day Survival; NOEC | 961 | Spehar et al, 1980 |
| *Pteronarcys dorstata* | Arsenic V | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day Survival; NOEC | 973 | Spehar et al, 1980 |
| *G. fossarum* (Amphipod) | $As^{3+}$ (sodium arsenite) | 8 | 12 +/- 2 | NR | 10-day LC50 | 200 | Canivet et al, 2001 |
| *G. pseudolimnaeus (amphipod)* | $As^{3+}$ | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 7 day LC80<br>14 day LC15 | 960<br>88 | Spehar et al, 1980 |
| *G. pseudolimnaeus (amphipod)* | As V | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 14 day LC20 | 973 | Spehar et al, 1980 |
| *H. campanulate* (snail) | $As^{3+}$ | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day LC5 (LOEC) | 960 | Spehar et al, 1980 |
| *H. campanulate* (snail) | As V | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day LC10 (LOEC) | 973 | Spehar et al, 1980 |
| *S. emarginata* (snail) | $As^{3+}$ | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day LC0 (NOEC) | 960 | Spehar et al, 1980 |
| *S. emarginata* (snail) | As V | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day LC10 (LOEC) | 973 | Spehar et al, 1980 |
| *H. sulfurea* (Ephemeroptera) | $As^{3+}$ | 8 | 12 +/- 2 | NR | 10-day LC50 | 1650 | Canivet et al, 2001[a] |
| *A. aquaticus* (Isopod) | $As^{3+}$ | 8 | 12 +/- 2 | NR | 10-day LC50 | 2300 | Canivet et al, 2001 |
| *N. rhenorhodanensis* (Amphipod) | $As^{3+}$ | 8 | 12 +/- 2 | NR | 10-day LC50 | 3900 | Canivet et al, 2001 |
| *H. pellucidula* (Trichoptera) | $As^{3+}$ | 8 | 12 +/- 2 | NR | 10-day LC50 | 2400 | Canivet et al, 2001 |
| *Physa fontinalis* (Snail) | $As^{3+}$ | 8 | 12 +/- 2 | NR | 10-day LC50 | 2200 | Canivet et al, 2001 |
| *G. pulex* (amphipod) | Arsenic acid ($H_3AsO_4$) | NR | 10.0 | NR | 10 day Survival; LC10 | 376.5 | Vellinger et al. 2013[a] |
| **Aquatic Plant / Algae** | | | | | | | |
| *Melosira granulata* (Diatom) | $Na_3AsO_4$ (arsenate) | NR | 20 | NR | IC20/ LOEC (growth) (8 – 24 days) | 75 | Planas and Healey, 1978 |
| *Ochromonas vallesiaca* (Algae) | $Na_3AsO_4$ (arsenate) | NR | 20 | NR | IC35/ LOEC (growth) (8 – 24 days) | 75 | Planas and Healey, 1978 |
| *Ankistrodesmus falcatus (Algae)* | Disodium arsenate | 7 | 24 +/- 2 | -/- | 14 day EC50 (growth) | 256 | Vocke et al, 1980 |
| *Scenedesmus obliquus* (Green algae) | Disodium arsenate | 7 | 24 +/- 2 | -/- | 14 day EC50 (growth) | 48 | Vocke et al, 1980 |
| *Scenedesmus subspicatus* (Green algae) | Arsenic trioxide ($As_2O_3$) | NR | 21+1 | NR | 72 hour EC10 (growth – biomass) | 9400 | Tisler and Zagorc-Koncan, 2002 |
| *Chlorella sp.* (Algae) | As (III) | 7.6 | 27 | NR | 72 IC50 growth | 25,200 | Levy et al, 2005 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Chlorella sp.* (Algae) | As (V) | 7.6 | 27 | NR | LOEC/72 h IC50 growth | 1930/ 25400 | Levy et al, 2005 |
| *Monoraphidium arcuatum* (Algae) | As (III) | 7.6 | 27 | NR | LOEC/ 72 h IC50 growth | 3750/ 14600 | Levy et al, 2005 |
| *Monoraphidium arcuatum* (Algae) | As(V) | 7.6 | 27 | NR | LOEC/ 72 h IC50 growth | 81/254 | Levy et al, 2005 |
| **Freshwater Fish and Amphibians** | | | | | | | |
| *Pimephales promelas* (Fathead minnow) | Sodium arsenite (As III) | 7.2 – 8.1 | 23 - 25 | 37 – 45/46 - 49 | 29 day post-fertilization (weight, length) NOEC | 2130 | Lima et al., 1984 |
| *Pimephales promelas* | Sodium arsenite (As III) | 7.2 – 8.1 | 23 - 25 | 37 – 45/46 - 49 | 29 day post-fertilization (weight, length) LOEC | 4300 | Lima et al., 1984 |
| *Pimephales promelas* | Sodium arsenite (As III) | 7.4 | 25 +/- 3 | 42.4/43.9 | 32 day (growth) MATC | 3330 | Spehar and Fiandt, 1986 |
| *Pimephales promelas* | Arsenite (As III) | 7.2 | 23 +/- 2.7 | 38/49.2 | 30 day post fertilization (growth) NOEC | 2130 | Call et al, 1983 |
| *Pimephales promelas* | Arsenite (As III) | 7.2 | 23 +/- 2.7 | 38/49.2 | 30 day post fertilization (growth) LOEC | 4300 | Call et al, 1983 |
| *Pimephales promelas* | Sodium arsenate (As V) | 6.7 - 7.8 | 25 | - /45 - 48 | 30 day early life stage test ; growth; NOEC | 530 | DeFoe, 1982 |
| *Pimephales promelas* | Sodium arsenate (As V) | 6.7 - 7.8 | 25 | - /45 - 48 | 30 day early life stage test ; growth; LOEC | 1500 | DeFoe, 1982 |
| *Rana pipiens* (Northern leopard frog) | Arsenic V | 7.9 | 22 - 23 | 170 | 113-day survival, growth, and metamorphosis NOEC | 1000 | Chen et al. 2009 |
| *Micropterus salmoides* (Largemouth bass) | $NaAsO_2$ | NR | NR | NR | 28-day LC1 | 4601 | Birge et al, 1978 |
| *Oncorhynchus kisutch* (Coho salmon) | $As_2O_3$ | 8.2 | 3.8 – 13.8 | 88/ 69 | 6 month LOEC (juvenile migration) | 300 | Nichols et al, 1984 |
| *Oncorhynchus kisutch* | $As_2O_3$ | 8.2 | 3.8 – 13.8 | 88/ 69 | 6 month NOEC (juvenile survival, growth) | 300 | Nichols et al, 1984 |
| *Oncorhynchus mykiss* (Rainbow trout) | $NaAsO_2$ | NR | NR | NR | 28-day LC1 | 40 | Birge et al, 1978 |
| *Oncorhynchus mykiss* | Arsenic III | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day Survival; NOEC | 961 | Spehar et al, 1980 |
| *Oncorhynchus mykiss* | Arsenic V | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day Survival; NOEC | 973 | Spehar et al, 1980 |
| *Oncorhynchus mykiss* | $NaAsO_2$ | 7.4 | 13 +/- 0.5 | -/104 | 28 day LC1 | 39.7 | Birge, 1978 |
| *Oncorhynchus mykiss* | $NaAsO_2$ | 7.4 | 13 +/- 0.5 | -/104 | 28 day LC50 | 540 | Birge, 1978 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Oncorhynchus mykiss* | Arsenic III ($As_2O_3$) | 7.8 | 13.4 | 282/380 | 181-d growth LOEC<br>181-d growth NOEC<br>181-d threshold of chronic toxicity | 9640<br>2480<br>4900 | Rankin and Dixon, 1994 |

Notes:
T = temperature; NR = not reported
A Data generated by Canivet et al, 2001 and Vellinger et al, 2013 are included in Table A-2 for completeness, but are not considered for the SSD as a 10-day LC50 is not considered long enough to be classified as a chronic study

## B-1.4 Arsenic SSD

Consistent with CCME (2007) guidance, a species sensitivity distribution (SSD) approach was used to derive a Type A guideline. The SSD approach was comprised of identifying chronic toxicity data for species relevant to Nova Scotian waters, analyzing the data using a regression approach and selecting the final chronic effects benchmark. The HC5 (*i.e.*, the concentration that is hazardous to no more than 5% of a species in the community) was selected as the final chronic effects benchmark as per CCME (2007) guidance.

Further details of the approach are provided in the following sections.

### *SSD Modelling*

Data for the aquatic community including freshwater fish, invertebrates, and aquatic vascular and non-vascular plants were used to develop a species sensitivity distribution for arsenic. SSD Master v3 (CCME, 2007) was used to fit four sigmoid-shaped (cumulative distribution function – CDF) models to the chronic toxicity values for freshwater species. SSD Master v3 was designed to facilitate the derivation and selection of appropriate SSD models for use in benchmark setting and risk assessment. The CCME currently uses this application in the development of Type A water quality guidelines for the protection of aquatic life. SSD Master v3 evaluates the data using four models including the Normal, Logistic, Extreme Value (Gompertz) and Gumbel (Fisher-Tippett) models (CCME, 2007). In arithmetic space the Weibull model is also available. The application is fully automated and Excel-based. SSD Master v3 uses the standard Excel Solver add-in to fit the CDF models. Solver proceeds through different combinations of model parameter values until the sum of square error term cannot be further minimized. The application automatically generates residual plots and goodness-of-fit, probability-probability (p-p) and quantile-quantile (q-q) plots, as well as plots of the SSDs and associated approximate confidence intervals.

As is evident in Table B-2, there were a number of test durations, endpoints, and effects reported in the arsenic freshwater toxicity studies. Based on guidance for a CCME WQGl - FWAL (CCME, 2007), the most sensitive endpoint (i.e., growth, reproduction, and mortality) based on appropriate standard test durations are preferred. For the development of a long-term WQGl - FWAL, growth and reproduction endpoints (non-lethal) are preferred. Ideally, the data used to generate the SSD would be regression based (ECx/LCx) for no to low toxic effects (e.g., EC<25). The preferred order of endpoints is: ECx/ICx representing a no-effects threshold >EC10/IC10 > EC11-25/IC11-25 > MATC > NOEC > LOEC> nonlethal EC26-49/IC26-49 > nonlethal EC50/IC50 (CCME, 2007).

In the case of arsenic, there is a varied dataset available with many endpoints and durations for numerous species (Table B-2). The most common endpoint available for most taxa is the no observed effect concentration (NOEC). This is not the preferred endpoint for WQGl - FWAL development as it typically has a significant amount of uncertainty associated with it. NOECs and LOECs are generally poor predictors of low toxic effects (Moore and Caux, 1997). However, there are sufficient NOECs to derive an SSD for the aquatic community using the

CCME WQGl Type A approach, based on the data available. The one exception is for aquatic plants. There are few aquatic plant studies available that are relevant and of acceptable quality. The available data report only LOECs, EC50 and EC10 data for growth (Table B-2), but all of these studies are of an acceptable duration to represent chronic exposures. While only LOECs, EC50 and EC10 data were available for use in the SSD modeling, the effects reported occurred at much lower concentration than were associated with no-effects in other studies, with the exception of the EC10 (growth – biomass) for *Scenedesmus subspicatus* of 9400µg/L (Tisler and Zagorc-Koncan, 2002). As such, all of these data with alternative endpoints (non – NOEC studies) were considered appropriate for use in the SSD modeling.

When deriving an SSD for an aquatic community, it is important to ensure that no one species over-weights the SSD due to its relative sensitivity/tolerance. In many datasets, standard test organisms (e.g., fathead minnow, *Daphna magna*) can bias the results due to the abundance of data for those species. Therefore, when multiple data were available for the same species, the geometric mean of these values was used to represent that species in the SSD. This calculation was required for *Daphnia magna*, *Pimphales promelas*, and *Ceriodaphnia dubia*.

Also, when arsenic III and V data were present for a single species, only the most sensitive dataset was entered into the SSD.

Table B-3 presents the dataset used in the generation of the SSD.

Certain studies had to be excluded, despite being of adequate quality, due to their duration, relative to chronic exposures. These include Canivet et al (2001) and Vellinger et al (2013), which only involved 10 day study durations. Due to the survival endpoint in these studies, and the species tested, a duration of > 21 days would be required for these data to be included in a chronic SSD (as per CCME protocols). Similarly, some of Spehar et al (1980) data for amphipods was of shorter duration (7 day to 14 day) and therefore had to be excluded.

**Table B-3 Data Selected and Geometric Means for the same Species for the Species Sensitivity Distribution for Arsenic**

| Species | Chemical | Water Quality Parameters | | | Test Duration / Life Stage | Chronic Value (µg/L) | Geometric Mean Value (µg/L) | End Point | Reference | Rating |
|---|---|---|---|---|---|---|---|---|---|---|
| | | pH | T (°C) | Alkalinity / Hardness (mg/L; $CaCO_3$) | | | | | | |
| **Aquatic Invertebrates** | | | | | | | | | | |
| *Daphnia magna* | Sodium arsenite (As III) | 7.2 – 8.1 | 20.8 | 37 – 45/46 - 49 | 28 day survival; reproduction NOEC | 633 | 631.5 | NOEC | Lima et al., 1984 | P |
| *Daphnia magna* | Arsenite (As III) | 7.4 | 21.5 +/- 3 | 45.5/47.2 | 28 day (growth and reproduction) NOEC | 630 | | NOEC | Call et al, 1983 | P |
| *Ceriodaphnia dubia* | Specific form not stated; low UV radiation only reported | 7.29 – 9.27 | 25 | NR | 24 day to 3rd generation NOEC brood size | 1000 | 1224.7 | NOEC | Hansen et al, 2002 | S |
| *Ceriodaphnia dubia* | Specific form not stated; low UV radiation only reported | 7.29 – 9.27 | 25 | NR | 24 day to 3rd generation survival NOEC | 1500 | | NOEC | Hansen et al, 2002 | S |
| *Cyclops vernalis; C. bicuspidatus thomasi* (Copepod) | Sodium arsenite (As III) | 7.6 - 8.8 | 15 | 88 / 139 | 14 day EC20 | 320 | | EC20 | Borgmann et al., 1980 | S |
| *H. campanulate* (snail) | $As^{3+}$ | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day LC5 (LOEC) | 960 | | LOEC | Spehar et al, 1980 | P |
| *S. emarginata* (snail) | $As^{3+}$ | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day LC0 (NOEC) | 960 | | LOEC | Spehar et al, 1980 | P |
| *Pteronarcys dorstata* | Arsenic III | 6.9 – 7.3 | 14 - 16 | 40 – 44/42 - 45 | 28 day Survival; NOEC | 961 | | NOEC | Spehar et al, 1980 | P |
| **Aquatic Plants** | | | | | | | | | | |
| *Ankistrodes mus falcatus (Algae)* | Disodium arsenate | 7 | 24 +/- 2 | -/- | 14 day EC50 (growth) | 256 | | EC50 | Vocke et al, 1980 | P |

| Species | Chemical | Water Quality Parameters | | | Test Duration / Life Stage | Chronic Value (µg/L) | Geometric Mean Value (µg/L) | End Point | Reference | Rating |
|---|---|---|---|---|---|---|---|---|---|---|
| | | pH | T (°C) | Alkalinity / Hardness (mg/L; $CaCO_3$) | | | | | | |
| *Chlorella sp.* (Algae) | As (V) | 7.6 | 27 | NR | LOEC/72 h IC50 growth | 1930 | | LOEC | Levy et al, 2005 | S |
| *Monoraphidium Arcuatum* (Algae) | As(V) | 7.6 | 27 | NR | LOEC/ 72 h IC50 growth | 81 | | LOEC | Levy et al, 2005 | S |
| *Scenedesmus obliquus* (Green algae) | Disodium arsenate | 7 | 24 +/- 2 | -/- | 14 day EC50 (growth) | 48 | | EC50 | Vocke et al, 1980 | P |
| *Scenedesmus subspicatus* (Green algae) | Arsenic trioxide ($As_2O_3$) | NR | 21+1 | NR | 72 hour EC10 (growth – biomass) | 9400 | 9400 | EC10 | Tisler and Zagorc-Koncan, 2002 | P |
| *Melosira granulata* | $Na_3AsO_4$ (arsenate) | NR | 20 | NR | LOEC (growth) (8 – 24 days) | 75 | 75 | LOEC | Planas and Healey, 1978 | S |
| *Ochromonas vallesiaca* | $Na_3AsO_4$ (arsenate) | NR | 20 | NR | LOEC (growth) (8 – 24 days) | 75 | 75 | LOEC | Planas and Healey, 1978 | S |
| **Freshwater Fish and Amphibians** | | | | | | | | | | |
| *Pimephales promelas* | Sodium arsenite | 7.2 – 8.1 | 23 - 25 | 37 – 45/46 - 49 | 29 day post-fertilization (weight and length) NOEC | 2130 | 1339.7 | NOEC | Lima et al., 1984 | P |
| *Pimephales promelas* | Arsenite | 7.2 | 23 +/- 2.7 | 38/49.2 | 30 day post fertilization (growth) NOEC | 2130 | | NOEC | Call et al, 1983 | P |
| *Pimephales promelas* | Sodium arsenate | 6.7 - 7.8 | 25 | - /45 - 48 | 30 day early life stage test ; growth; NOEC | 530 | | NOEC | DeFoe, 1982 | S |
| *Oncorhynchus kisutch* | $As_2O_3$ | 8.2 | 3.8 – 13.8 | 88/ 69 | 6 month survival and growth (juvenile): NOEC | 300 | | NOEC | Nichols et al, 1984 | P |
| *Oncorhynchus mykiss* | Arsenic III | 7.8 | 13.4 | 282/380 | 181-d growth NOEC | 2480 | | NOEC | Rankin and Dixon, 1994 | P |
| Rana pipiens (Northern leopard frog) | Arsenic V | 7.9 | 22 - 23 | 170 | 113-day survival, growth, and metamorphosis NOEC | 1000 | | NOEC | Chen et al. 2009 | S |

***SSD Results***

Table B-4 presents the data selected to model the SSD and the associated plotting positions in the graph.

**Table B-4 Data Selected for the Species Sensitivity Distribution and Associated Plotting Positions**

| Taxon Grouping | Species | Concentration (µg/L) | Log Concentration | Plotting Position | Species Number |
|---|---|---|---|---|---|
| Plant | *Scenedesmus obliquus* | 48 | 1.681241237 | 0.03 | 1 |
| Plant | *Melosira granulata* | 75 | 1.875061263 | 0.08 | 2 |
| Plant | *Ochromonas vallesiaca* | 75 | 1.875061263 | 0.14 | 3 |
| Plant | *M.arcuatum* | 81 | 1.908485019 | 0.19 | 4 |
| Plant | *Ankistrodesmus falcatus* | 256 | 2.408239965 | 0.25 | 5 |
| Fish | *Oncorhynchus kisutch* | 300 | 2.477121255 | 0.31 | 6 |
| Invertebrate | *Cyclops vernalis; C. bicuspidatusthomasi* | 320 | 2.505149978 | 0.36 | 7 |
| Invertebrate | *Gammarus pulex* | 376.5 | 2.575764981 | 0.42 | 8 |
| Invertebrate | *Daphnia magna* | 631.5 | 2.800373355 | 0.47 | 9 |
| Invertebrate | *H. campanulate* | 960 | 2.982271233 | 0.53 | 10 |
| Invertebrate | *S. emarginata* | 960 | 2.982271233 | 0.58 | 11 |
| Invertebrate | *Pteronarcys dorstata* | 961 | 2.982723388 | 0.64 | 12 |
| Amphibian_Reptile | *rana pipens* | 1000 | 3 | 0.69 | 13 |
| Invertebrate | *Ceriodaphnia dubia* | 1224.7 | 3.088029718 | 0.75 | 14 |
| Fish | *Pimephales promelas* | 1339.7 | 3.127007557 | 0.81 | 15 |
| Plant | *Chlorella* | 1930 | 3.285557309 | 0.86 | 16 |
| Fish | *Oncorhynchus mykiss* | 2480 | 3.394451681 | 0.92 | 17 |
| Plant | *Scenedesmus subspicatus* | 9400 | 3.973127854 | 0.97 | 18 |

Overall, the extreme value distribution provided the best overall fit for the generation of an SSD for the aquatic community according to the Anderson-Darling (AD) goodness-of-fit test statistic (AD statistic = 0.440, $p > 0.05$) and the Mean Square Error in the Lower Tail (MSE lower tail: 0.0286). However, for the purposes of the SSWQO, the fit of the distribution around the HC5 value in the lower tail is of greater importance. Visual inspection of the curve (Figure A-1) indicates that the extreme value model does not represent the data in the lower tail as well as the normal model, which comes much closer to the lowest value in the dataset (48 µg/L for *Scenedesmus obliquus*) (Figure A-2). Comparison of the confidence limits around the HC5 values for the extreme value and normal distributions indicates that the confidence limits around the HC5 of the extreme value distribution (lower confidence limit = 17.56 µg/L; upper confidence limit = 48.87 µg/L; HC5 = 29.29 µg/L) is also wider than that for the normal distribution (lower confidence limit = 41.94 µg/L; upper confidence limit = 68.38 µg/L; HC5 = 53.55 µg/L). A summary of the model results is presented in Table A-5 for comparison purposes. Therefore, based on overall fit, the extreme value distribution provides a better fitting model; however, based on the fit at the lower tail of the distribution, the normal distribution provides a better fitting model and as such, likely provides a more realistic prediction of the HC5. To be conservative however, the HC5 from the extreme value model was selected for use as it provides a lower HC5 (selected extreme value model HC5 is 29.29 µg/L; rounded to 30 µg/L).

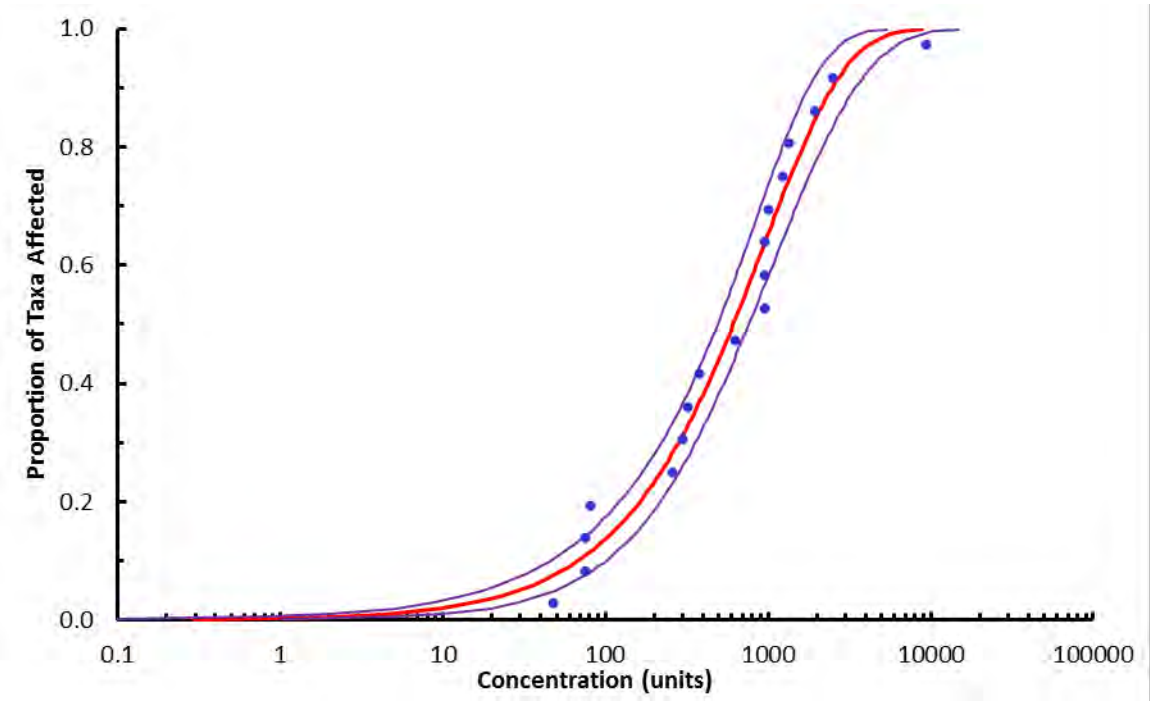


**Figure B-1 SSD Based on the Sensitivity of the Freshwater Aquatic Community to Arsenic using the Extreme Value Model**

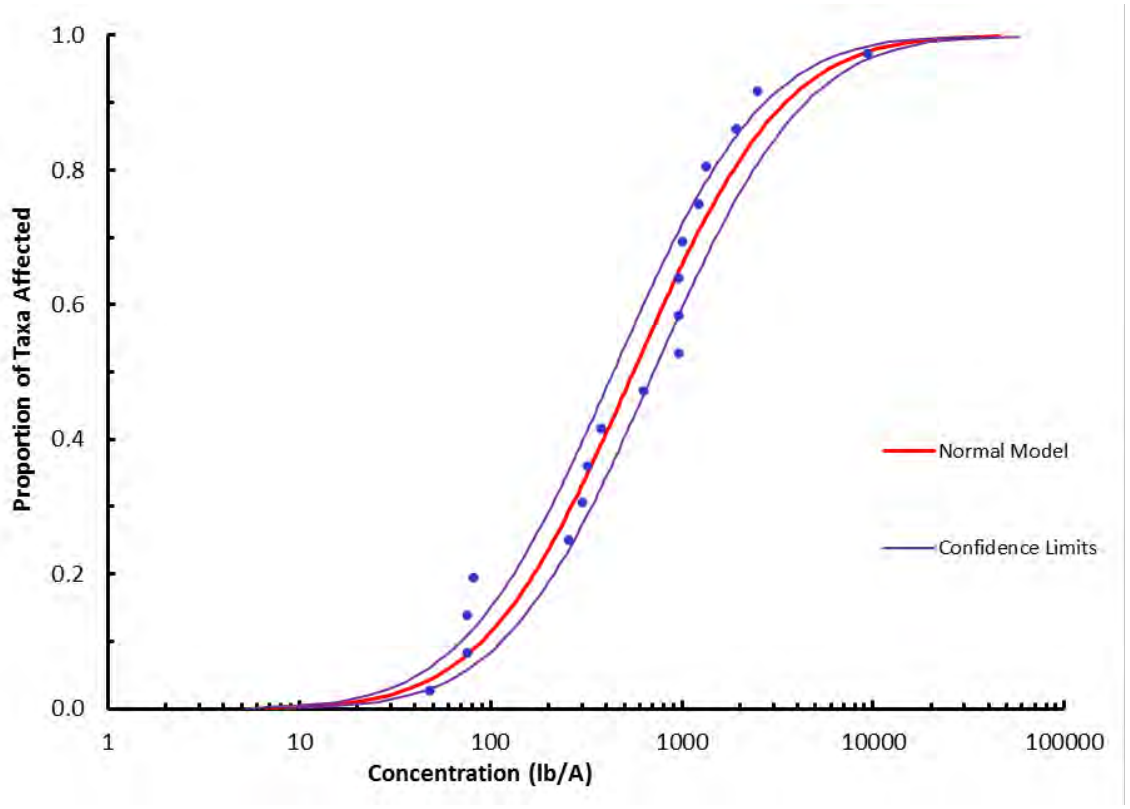

**Figure B-2 SSD Based on the Sensitivity of the Freshwater Aquatic Community to Arsenic using the Normal Model**

**Table B-5 Comparison of Goodness of Fit Statistics and Model Results (HC5 in µg/L) based on the results from SSD Master v3**

| Result | Normal | Logistic | Extreme Value | Gumbel |
|---|---|---|---|---|
| **MSE** | 0.0035 | 0.0034 | 0.0025 | 0.0057 |
| **MSE Lower Tail** | 0.0368 | 0.0353 | 0.0286 | 0.0554 |
| **Data from specified distribution? Anderson-Darling (n>5)** | Yes | Yes | Yes | Yes |
| **Anderson-Darling Statistic ($A^2$)** | 0.417 | 0.404 | 0.440 | 0.789 |
| **HC50 (µg/L)** | 558.376 | 565.929 | 610.058 | 514.600 |
| **HC5 (µg/L)** | 53.55 | 45.93 | 29.29 | 76.32 |
| **Lower confidence limit on the mean (expected HC5)** | 41.94 | 31.86 | 17.56 | 46.50 |
| **Upper confidence limit on the mean (expected HC5)** | 68.38 | 66.22 | 48.87 | 125.27 |

The equation for the extreme value model is:

$$f(x) = 1 - e^{-e^{(X-\mu)/S}}$$

Where, *f(x)* = proportion of taxa affected;

*x* = concentration metameter;

$\mu$ = location parameter; and

*s* = scale parameter (always positive).

The fitted model parameters were: $\mu$ = 2.97 and *s* = 0.506 for the toxicity dataset used in µg/L. The HC5 (concentration that will affect 5% of species in the SSD) was 29.29 µg/L with an approximate lower confidence limit (LCL) of 17.56 µg/L and upper confidence limit (UCL) of 48.87 µg/L.

### B-1.5 Proposed SSWQO for Arsenic

The HC5 value of **30 µg/L** (29.29 µg/L rounded upwards) is proposed as the SSWQO for arsenic.

While this HC5 value is above the CCME WQGl-FWAL of 5 µg/L (2001), it is more conservative than the toxicity endpoint upon which the CCME WQGl-FWAL is based (i.e., 14-day EC50 (growth) of 48 µg/L for the algae *Scenedesmus obliquus* (Vocke et al., 1980), which was the most sensitive freshwater organism to arsenic identified).

This proposed SSWQO for arsenic is less than the U.S. EPA (1995) CCC for arsenic of 150 µg/L based on dissolved concentrations.

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## B-2. SCREENING OF HISTORICAL TAILINGS AND SOILS DATASETS:

As per the background review, historical datasets are available for Montague Mines. These studies include the following:

- Parsons et al, 2012 (Sampling conducted between 2003 – 2006)
- Maritime Testing (2009) (sampling conducted in 2007-2009)

The Parsons et al (2012) dataset includes a full ICP metals scan, whereas the Maritime Testing (2009) datasets were focused only on arsenic and mercury (based on the outcomes of the Parsons et al, 2012) datasets.

To ensure a comprehensive assessment, the Parsons et al (2012) and Maritime Testing (2009) datasets were screened against the NS Tier 1 (2014) standards. In addition, both datasets were also screened against the Tier 2 criteria developed for this project (for arsenic and mercury only), to determine whether any samples exceed those criteria. For human health, the Tier 2 criteria are based on a recreational land use. The results of these comparisons are provided in Attachment 1, in the following tables:

- Table B-1: Montague Mines – Tier 1 Human Health Soil Screen, Parsons et al, 2012 Data
- Table B-2: Montague Mines – Tier 1 Ecological Soil Screen, Parsons et al, 2012 Data
- Table B-3: Montague Mines – Tier 1 Human Health Soil Screen, Maritime Testing 2009
- Table B-4: Montague Mines – Tier 1 Ecological Soil Screen, Maritime Testing 2009
- Table B-5: Montague Mines – Tier 2 Human Health Soil Screen, Parsons et al, 2012 Data
- Table B-6: Montague Mines- Tier 2 Ecological Soil Screen, Parsons et al, 2012 Data
- Table B-7: Montague Mines – Tier 2 Human Health Soil Screen, Maritime Testing 2009 Dataset
- Table B-8: Montague Mines – Tier 2 Ecological Soil Screen, Maritime Testing 2009 Dataset

The screening resulted in the following outcomes for Montague Mines (Table 1 – Human health screening; Table 2 – Ecological Screening). As the historic datasets are largely samples taken in the terrestrial parts of the sites (which are occasional submerged under water), the focus of this screening effort was on the soils standards (as opposed to sediment standards, which would be more appropriate for areas permanently underwater). The historical data screening also included samples for all profile depths (as opposed to just surface samples).

## Table 1 Inorganics Exceeding NS Tier 1 Soil Standards and Project-Specific Tier 2 Human Health Criteria from Historical Sampling Programs on Montague Mines

| Metals/Metalloid | Parsons et al, 2012 | | Maritime Testing Ltd. 2009[a] | |
|---|---|---|---|---|
| | >NS Tier 1 Standards[b] | >Tier 2 NS Lands Recreational Criteria[c] | NS Tier 1 Standards[d] | Tier 2 NS Lands Recreational Criteria[e] |
| Arsenic | Yes; 46 of 46 samples> Tier 1 standard | Yes; 46 of 46 samples> Tier 1 standard | Yes; 68 of 92 samples > Tier 1 standard | Yes; 24 of 92 samples > Tier 2 recreational criteria |
| Mercury | Yes; 2 of 46 samples > Tier 1 standard | Yes; 1 of 46 samples > Tier 2 recreational criteria | Yes; 4 of 92 samples > Tier 1 Standard | No; 0> Tier 2 criteria |
| Aluminum | Yes; 3 of 46 samples > Tier 1 standard | See analysis below | No other analytes available | No other analytes available |
| Antimony | Yes; 30 of 46 samples> Tier 1 standard | See analysis below | | |
| Cobalt | Yes; 11 of 46 samples > Tier 1 standard | See analysis below | | |
| Iron | Yes; 45 of 46 samples > Tier 1 standard | See analysis below | | |
| Lead | Yes; 7 of 46 samples > Tier 1 standard | See analysis below | | |
| Vanadium | Yes; 2 of 46 samples > Tier 1 guideline | See analysis below | | |

Notes:

[a] Soil samples from Maritime Testing (2009) program only included arsenic and mercury analysis; samples from all soil depths were included in the screening

[b] See Table B-1

[c] See Table B-5

[d] See Table B-3

[e] See Table B-7

## Table 2 Inorganics Exceeding NS Tier 1 Soil Standards and Project-Specific Tier 2 Ecological Health Criteria from Historical Sampling Programs on Montague Mines

| Metals/Metalloid | Parsons et al, 2012 | | | Maritime Testing Ltd. 2009[a] | | |
|---|---|---|---|---|---|---|
| | > NS Tier 1 Soil Contact Standard[b] | >NS Tier 1 Food and Soil Ingestion Standards[c] | >Tier 2 NS Lands Project Specific Criteria[d] | >NS Tier 1 Standards[e] | >NS Tier 1 Food and Soil Ingestion Criteria[f] | >Tier 2 NS Lands Project Specific Criteria[g] |
| Arsenic | Yes; 46 of 46 samples> Tier 1 standard | Yes; 46 of 46 samples> Tier 1 standard | Yes; 46 of 46 samples> Tier 2 Ecological standard of | Yes; 81 of 92 samples > Tier 1 soil contact | Yes; 29 of 92 samples > Tier 2 soil and food ingestion | Yes, 42 > 139 mg/kg arsenic |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 139 mg/kg | standard | criteria | |
| Mercury | Yes; 1 of 46 samples > Tier 1 standard | No standard available | Yes; 1 of 46 samples > Tier 2 Ecological criteria | Yes; 2 of 92 samples > Tier 1 Soil Contact Standard | No standard available | Yes; 2 > 12 mg/kg mercury |
| Antimony | Yes; 19 of 46 samples> Tier 1 standard | No standard available | See analysis below | No other analytes available | | |
| Cobalt | Yes; 13 of 46 samples > Tier 1 standard | No standard available | See analysis below | | | |
| Copper | Yes; 19 of 46 samples > Tier 1 soil contact standard | No; 0 of 46 samples > Tier 1 food and soil ingestion standard | See analysis below | | | |
| Lead | Yes; 1 of 46 samples > Tier 1 soil contact standard | Yes; 17 of 46 samples > Tier 1 food and soil ingestion standard | See analysis below | | | |
| Nickel | Yes; 8 of 46 samples > Tier 1 soil contact standard | No; 0 of 46 samples > Tier 1 soil and food ingestion standard | See analysis below | | | |
| Selenium | Yes; 7 of 46 samples > Tier 1 soil contact standard | No; 0 of 46 samples > Tier 1 soil and food ingestion standard | See analysis below | | | |
| Tin | Yes; 1 of 46 samples > Tier 1 soil contact standard | No standard available | See analysis below | | | |
| Vanadium | Yes; 1 of 46 samples > Tier 1 soil contact standard | No standard available | See analysis below | | | |
| Zinc | Yes; 10 of 46 samples > | No; 0 of 46 samples > | See analysis below | | | |

| | | | | |
|---|---|---|---|---|
| | Tier 1 soil contact standard | Tier 1 soil and food ingestion standard | | |

Notes:
[a] Soil samples from Maritime Testing (2009) program only included arsenic and mercury analysis; samples from all soil depths were included in the screening
[b] See Table B-2
[c] See Table B-2
[d] See Table B-6
[e] See Table B-4
[f] See Table B-4
[g] See Table B-8

Based on the screening conducted, arsenic is considered the primary Chemical of Potential Concern (COPC), in light of both the frequency of exceedances over the NS Tier 1 and project specific Tier 2 guidelines, as well as the degree of exceedance. Mercury is also confirmed as a COPC, but to a lesser extent than arsenic. It is retained as a COPC due to the presence of mercury related to historic mining releases in the wetland areas, wherein it has a propensity to biomagnify in food chains. It is not a dominant human health concern through soil exposure pathways, as evident from the outcomes of the screening, with similar conclusions related to terrestrial wildlife.

With respect to inorganics exceeding NS Tier 1 soil standards for either human health (Table 1) or ecological health (Table 2) which lack Tier 2 project specific criteria, these substances will be re-elevated in the closure program once specific areas for cleanup (based on arsenic concentrations) have been identified. In Table 1 (human health), iron exceeded the NS Tier 1 standard most frequently (45 of 46 samples), followed by antimony (30 of 46 samples). Other elements were less frequent in terms of exceedances (Aluminium; 3 of 46 samples; cobalt 11 of 46 samples; lead 7 of 46 samples and vanadium in 2 of 46 samples). Exceedances of other contaminants will be investigated to evaluate whether the specific areas exceeding guidelines are either captured in the closure program, or whether a site specific (risk based) Tier 2 guideline based on appropriate land use needs to be developed and applied. In general, the degree of exceedance for other inorganics (such as antimony, cobalt, lead, vanadium, etc.), is small in comparison to that which occurs for arsenic, and hence, arsenic is considered the toxicity driver with respect to tailings analysis.

Note that several elements are missing NS Tier 1 soil standards. These include bismuth, caesium, calcium, cerium, gallium, germanium, gold, hafnium, indium, lanthium, lithium, magnesium, manganese, niobium, phosphorus, potassium, rhenium, rubidium, scandium, sodium, sulfur, tantalum, tellurium, thorium, titanium, tungsten, yittrium and zirconium. All of these elements are naturally occurring, and several are essential elements. These elements were not considered further due to the considerably elevated concentrations of arsenic in the tailings, which were considered to be major drivers in terms of toxicity.

## B-2.1 Screening of 2018 Tailings and Soils Datasets Against Soil Quality Guidelines:

Field data collected in 2018 as part of the Stage 1 Conceptual Closure plan were screened against NS Tier 1 soil standards for both human and ecological health (NSE, 2014). In addition, the dataset was also screened against the Tier 2 criteria developed for this project (for arsenic and mercury only), to determine whether any samples exceed those criteria. For human health, the Tier 2 criteria are based on a recreational land use, as discussed in Section 4 of the main report.

The results of these comparisons are provided in Attachment 1, in the following tables:

- Table B-9: Montague Mines – Tier 1 Human Health Soil Screen, 2018 Data
- Table B-10: Montague Mines – Tier 1 Ecological Soil Screen, 2018 Data
- Table B-11: Montague Mines – Tier 2 Human Health Soil Screen, 2018 Data
- Table B-12: Montague Mines – Tier 2 Ecological Soil Screen, 2018 Data
- Table B-13: Montague Mines – Tier 1 Ecological Sediment Screen, 2018 Data

The screening resulted in the following outcomes for the 2018 dataset for Montague Mines (Table B-9 – Human health screening; Table B-10 – Ecological Screening). Since the 2018 datasets included samples in both the terrestrial parts of the sites (which are occasional submerged under water) as well as wetland areas, screening was conducted using the soils standards, as well as the sediment standards. Tables reflecting the sediment standard screening are presented later in this document. The 2018 data screening only included surface samples (as opposed to all cored samples). Table 3, below, summarizes the 2018 data screening for human health Tier 1 and 2 closure criteria, whereas Table 4 summarizes the ecological health screening for the 2018 dataset.

**Table 3 Inorganics Exceeding NS Tier 1 Soil Standards and Project-Specific Tier 2 Human Health Criteria from 2018 Sampling Program on Montague Mines**

| Metals/Metalloid | >NS Tier 1 Standards[a] | >Tier 2 NS Lands Recreational Criteria[b] |
|---|---|---|
| Arsenic | Yes; 30 of 30 samples> Tier 1 standard | Yes; 26 of 30 samples> Tier 2 recreational criteria |
| Mercury | Yes; 8 of 30 samples > Tier 1 standard | Yes; 2 of 30 samples > Tier 2 recreational criteria |
| Aluminum | Yes; 4 of 30 samples > Tier 1 standard | See analysis below |
| Antimony | Yes; 15 of 30 samples> Tier 1 standard | See analysis below |
| Cobalt | Yes; 12 of 30 samples > Tier 1 standard | See analysis below |
| Iron | Yes; 29 of 30 samples > Tier 1 standard | See analysis below |
| Lead | Yes; 3 of 30 samples > Tier 1 standard | See analysis below |
| Vanadium | Yes; 5 of 30 samples > Tier 1 standard | See analysis below |

Notes:

[a] See Table B-9

[b] See Table B-11

**Table 4 Inorganics Exceeding NS Tier 1 Soil Standards and Project-Specific Tier 2 Ecological Health Criteria from 2018 Sampling Programs on Montague Mines**

| Metals/Metalloid | 2018 Dataset | | |
|---|---|---|---|
| | > NS Tier 1 Soil Contact Standard[a] | >NS Tier 1 Food and Soil Ingestion Standards[b] | >Tier 2 NS Lands Project Specific Criteria[c] |
| Arsenic | Yes; 30 of 30 samples> Tier 1 soil contact standard | Yes; 28 of 30 samples> Tier 1 food and soil ingestion standard | Yes; 28 of 30 samples> Tier 2 Ecological standard of 139 mg/kg |
| Mercury | Yes; 6 of 30 samples > Tier 1 standard | No standard available | Yes; 6 of 30 samples > Tier 2 Ecological criteria |
| Antimony | Yes; 3 of 30 samples> Tier 1 soil contact standard | No standard available | See analysis below |
| Barium | No; 0 of 30 samples > Tier 1 soil contact standard | Yes; 2 of 30 samples> Tier 1 food and soil ingestion standard | See analysis below |
| Cadmium | No; 0 of 30 samples > Tier 1 soil contact standard | Yes; 1 of 30 samples> Tier 1 food and soil ingestion standard | See analysis below |
| Chromium | Yes; 1 of 30 samples> Tier 1 soil contact standard | No standard available | See analysis below |
| Cobalt | Yes; 14 of 30 samples > Tier 1 soil contact standard | No standard available | See analysis below |
| Copper | Yes; 17 of 30 samples > Tier 1 soil contact standard | No; 0 of 30 samples > Tier 1 food and soil ingestion standard | See analysis below |
| Lead | Yes; 1 of 30 samples > Tier 1 soil contact standard | Yes; 19 of 30 samples > Tier 1 food and soil ingestion standard | See analysis below |
| Nickel | Yes; 8 of 30 samples > Tier 1 soil contact standard | No; 0 of 30 samples > Tier 1 soil and food ingestion standard | See analysis below |
| Selenium | Yes; 10 of 30 samples > Tier 1 soil contact standard | No; 0 of 30 samples > Tier 1 soil and food ingestion standard | See analysis below |
| Vanadium | Yes; 1 of 30 samples > Tier 1 soil contact standard | No standard available | See analysis below |
| Zinc | Yes; 9 of 30 samples > Tier 1 soil contact standard | No; 0 of 30 samples > Tier 1 soil and food ingestion standard | See analysis below |

Notes:
[a] See Table B-10
[b] See Table B-10

[c] See Table B-12

Based on the screening conducted, arsenic is considered the primary Chemical of Potential Concern (COPC), in light of both the frequency of exceedances over the NS Tier 1 and project specific Tier2 guidelines, as well as the degree of exceedance. Mercury is also confirmed as a COPC, but to a lesser extent than arsenic. It is retained as a COPC due to the presence of mercury related to historic mining releases in the wetland areas, wherein it has a propensity to biomagnify in food chains. It is not a dominant human health concern through soil exposure pathways, as evident from the outcomes of the screening, with similar conclusions related to terrestrial wildlife.

With respect to inorganics exceeding NS Tier 1 soil standards for either human health (Table 3) or ecological health (Table 4) which lack Tier 2 project specific criteria, these substances will be re-evaluated in the closure program once specific areas for cleanup (based on arsenic concentrations) have been identified. In Table 3 (human health), iron exceeded the NS Tier 1 standard most frequently (29 of 30 samples), followed by antimony (15 of 30 samples). Other elements were less frequent in terms of exceedances (Aluminium; 4 of 30 samples; cobalt 12 of 30 samples; lead 3 of 30 samples and vanadium in 5 of 30 samples). Exceedances of other contaminants will be investigated to evaluate whether that the specific areas exceeding guidelines are either captured in the closure program, or a site specific (risk based) Tier 2 guideline based on appropriate land use is developed and applied. In general, the degree of exceedance for other inorganics (such as antimony, cobalt, lead, vanadium, etc.), is small in comparison to that which occurs for arsenic, and hence, arsenic is considered the toxicity driver with respect to tailings analysis.

Note that several elements are missing NS Tier 1 soil standards. These include bismuth, calcium, lithium, magnesium, manganese, potassium, sulphur, titanium, and yittrium. All of these elements are naturally occurring, and several are essential elements. These elements were not considered further due to the considerably elevated concentrations of arsenic in the tailings, which were considered to be major drivers in terms of toxicity.

## B-2.2 Screening of 2018 Tailings and Soils Datasets Against Sediment Quality Guidelines:

**Table 5 Inorganics Exceeding NS Tier 1 Sediment Standards from 2018 Sampling Program on Montague Mines**

| Metals/Metalloid | >NS Tier 1 Standards[a] |
|---|---|
| Arsenic | Yes; 30 of 23 samples> Tier 1 standard |
| Mercury | Yes; 20 of 23 samples> Tier 1 standard |
| Cadmium | Yes; 1 of 23 samples> Tier 1 standard |
| Iron | Yes; 6 of 23 samples> Tier 1 standard |
| Lead | Yes; 11 of 23 samples> Tier 1 standard |
| Manganese | Yes; 9 of 23 samples> Tier 1 standard |
| Nickel | Yes; 3 of 23 samples> Tier 1 standard |
| Selenium | Yes; 2 of 23 samples> Tier 1 standard |
| Zinc | Yes; 4 of 23 samples> Tier 1 standard |

Notes:
[a] See Table B-13

The results of the screening indicate that arsenic is the primary COPC, based on the frequency and degree of exceedance over the NS Tier 1 sediment standards. Mercury is also screened on as a COPC with 20 of 23 samples exceeding NS Tier 1 standards, though in general, exceedances are to a lesser degree than that of arsenic. A number of other elements also exceeded NS Tier 1 sediment standards including cadmium (1 of 23 samples), iron (6 of 23 samples), lead (11 of 23 samples), manganese (9 of 23 samples), nickel (3 of 23 samples), selenium (2 of 23 samples), and zinc (4 of 23 samples), however much less frequently. Similar to the soil screening of the 2018 data, the degree of exceedance for these inorganics is generally small in comparison to that which occurs for arsenic, and hence, arsenic is considered the toxicity driver with respect to tailings analysis.

### B-2.3 Screening of 2018 Surface Water Sampling Against Aquatic Life Standards

All surface water and shallow piezometer data collected in 2018 at Montague Mines were evaluated relative to the NS Tier 1 standards for surface water. The screening process was conducted as outlined below, to identify which compounds merited further consideration in the closure process (and hence, required development of Tier 2 closure criteria).

A tiered screening approach was established to determine which inorganics required further consideration in the closure process and development of Tier 2 closure criteria:

- Step 1:
    - Total metals from surface water samples, and shallow Piezometer sampling locations were screened against NS Tier 1 surface water quality guidelines
- Step 2:
    - A screening check was conducted to determine if Total metals data exceeding NS Tier 1 were within background ranges for both surface water and shallow groundwater (background data ranges were considered to be Loon Lake and Lake Major);
    - As some NS Tier 1 guidelines have been updated by CCME (such as cadmium and zinc) or have not been modified according to site specific modifying factors (such as aluminium, cadmium, zinc, copper and nickel), additional screening was conducted against these modified guidelines, where Total metals samples exceeded NS Tier 1 standards.
    - To determine if the exceedances were wide spread across the site, a 95$^{th}$ percentile of Montague main tailings area data (samples across the main wetland site, not including Loon Lake or Lake Major, which are considered background), exceeded either the Tier 1, maximum background, or revised CCME).
    - A final Chemicals of Potential Concern (COPC) list for Total metals was generated, based on samples which were found to exceed NS Tier1 guidelines, adjusted CCME guideline, and background data. These samples and COPCs were moved to Step 3.

For Montague Mines, Table 6 provides a summary of outcomes of Step 1 and 2 (Table B-14 in the attachment provides the outcome of the total metals screen, and Table B-15 provides the outcome of Step 2):

**Table 6: Total Metals Surface Water or Shallow Piezometer Samples Exceeding NS Tier 1, Adjusted NS Tier 1 and Maximum Background Metals Concentrations (Montague Mines 2018 Data)**

| Chemical of Potential Concern | Loon Lake to Lake Charles – Samples Exceeding NS Tier 1; Adjusted NS Tier 1; and Background (N=10) | Ponds Atop Main Tailings - Samples Exceeding NS Tier 1; Adjusted NS Tier 1; and Background (N=3) | Gold Lane and Vaughan Lane Tailings (N=2) | Gold Lane Extension (Far Field)(N=2) |
|---|---|---|---|---|
| Mercury | M-SW13; M-Pz1; M-Pz4 | M-SW14; M-SW16 | M-SW18 | None |
| Aluminium | M-Pz4; M-SW11 | M-SW16 | M-SW18 | None |
| Arsenic | All (except Loon Lake) | All | All | M-SW19 |
| Cadmium | M-SW13; M-Pz1; M-Pz4; M-SW11 | None | M-SW18 | None |
| Cobalt | None | None | M-SW18 | None |
| Copper | M-SW13; P-Pz1; M-Pz4; M-SW5 | All | M-SW18 | None |
| Iron | M-SW13; P-Pz1; M-Pz4; M-SW5 | M-SW15 | M-SW18 | None |
| Lead | M-SW13; P-Pz1; M-Pz4; M-SW5 | M-SW15 | M-SW18 | None |
| Manganese | M-Pz4 | None | M-SW18 | None |
| Selenium | None | None | M-SW18 | None |
| Silver | None | None | M-SW18 | None |
| Vanadium | None | None | M-SW18 | None |
| Zinc | None | M-SW16 | M-SW18 | None |

- Step 3:
    - For COPCs and samples screening on after Steps 1 and 2 (listed in Table 1):
        - For the affected samples, the dissolved data were evaluated to determine if the total metals sample was elevated due to suspended particulate matter.
        - Comparisons to dissolved metals criteria (US EPA) was undertaken to determine whether sampling location was in exceedance, and COPC remained on list of substances requiring further evaluation.

The outcomes of Step 3 for Montague Mines are presented in Table 7 and 8.

**Table 7 Evaluation of Total and Dissolved Metals Data, relative to Total and Dissolved Metals Guidelines for Gold Lane and Vaughan Lane Tailings and Gold Lane Extension/Far Field Tailings locations**

| Chemical of Potential Concern | Total Metals Adjusted Guideline | Dissolved Metals Guideline[c] | Off Site Tailings (Gold Lane; SW17; Vaughan Lane; SW18) (N = 2) mg/L | | | | Gold Lane Extension/Far Field Locations (N = 2) mg/L | |
|---|---|---|---|---|---|---|---|---|
| | | | SW17 Total | SW17 Dissolved | SW18 Total | SW18 Dissolved | M-SW19 Total | M-SW19 Dissolved |
| Mercury | 0.000026 | NGA | NA | NA | 0.000084 | 0.0000031 | NA | NA |
| Aluminium | 0.1[a]/0.23[d] | NGA | NA | NA | 24.8 | 0.0552 | NA | NA |
| Arsenic | 0.005/0.030[b] | 0.150 | 0.0216 | 0.024 | 2.65 | 0.00966 | 0.056 | 0.0429 |
| Cadmium | 0.00012[a] | 0.00043[e] | NA | NA | 0.00246 | 0.0000346 | NA | NA |
| Cobalt | 0.01 | NGA | NA | NA | 0.0788 | 0.000493 | NA | NA |
| Copper | 0.002[a] | 0.00055 (USEPA)[h] | NA | NA | 0.0746 | **0.00474** | NA | NA |
| Iron | 0.3 | 0.35 (BC – short term) | NA | NA | 156 | 0.316 | NA | NA |
| Lead | 0.00208[a] | NGA[f] | NA | NA | 0.151 | 0.00033 | NA | NA |
| Manganese | 0.82 | NGA | NA | NA | 14.6 | 0.0784 | NA | NA |
| Selenium | 0.001 | NGA | NA | NA | 0.00277 | 0.000042 | NA | NA |
| Silver | 0.0001 | NGA | NA | NA | 0.000232 | <0.000005 | NA | NA |
| Vanadium | 0.006 | NGA | NA | NA | 0.269 | 0.00056 | NA | NA |
| Zinc | 0.03 | 0.0054[g] | NA | NA | 0.54 | **0.0217** | NA | NA |

NA: No assessment required, based on Step 1 and 2 outcomes (see Table 1)

NGA: No guideline available

Shaded values are total metals concentrations exceeding total metals guidelines; **Bolded** values are dissolved metals concentrations exceeding dissolved guidelines

[a] Sample specific calculated guideline, based CCME, 2018a; pH (aluminium) or hardness (cadmium; copper; lead; nickel) of sample

[b] Tier 2 site specific arsenic guideline (SSD)

[c] US EPA, 2018a, unless otherwise noted.

[d] US EPA, 2018b. Assumed DOC 0.3 mg/L; and sample specific hardness of 71 mg/L $CaCO_3$

[e] Cadmium dissolved criterion based on hardness of 50 mg/L – sample specific hardness is 71 mg/L $CaCO_3$ (USEPA, 2016)

[f] A US EPA dissolved guideline is available for lead, but it is old (1980), and hence, unlikely to reflect current toxicology

[g] Zinc dissolved guideline based on CCME, 2018b; Dissolved Organic Carbon for this site is unknown; therefore assumed DOC of 0.25 mg/L; and hardness of 25 mg/L, with pH between 6.5 and 7.0.
[h] Copper dissolved criterion for SW18 based on hardness of 22 mg/L $CaCO_3$, assumed pH of 7.37 and temperature of 4.3 C based on SW17, and assumed DOC of 0.5 mg/L.

**Table 8 Evaluation of Total and Dissolved Metals Data, relative to Total and Dissolved Metals Guidelines for Tailings Located Between Loon Lake and Lake Charles and Tailings in Ponds Atop Main Tailings area.**

| Chemical of Potential Concern | Total Metals Adjusted Guideline | Dissolved Metals Guideline | Loon Lake to Lake Charles (N=10) mg/L | | | | | | | | | | Ponds Atop Main Tailings (N=3) mg/L | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | M-SW13 Total | M-SW13 Dissolved | M-Pz1 Total | M-Pz1 Dissolved | M-Pz4 Total | M-Pz4 Dissolved | M-SW5 Total | M-SW5 Dissolved | M-SW11 Total | M-SW11 Dissolved | M-SW14 Total | M-SW14 Dissolved | M-SW15 Total | M-SW15 Dissolved | M-SW16 Total | M-SW16 Dissolved |
| Mercury | 0.000026 | NGA | 0.000505 | 0.000111 | 0.000487 | 0.000079 | 0.00004 | <0.00002 | NA | NA | NA | NA | 0.0000373 | 0.00003 | NA | NA | 0.0000491 | 0.0000258 |
| Aluminium | 0.1/0.005/0.1[a]; 0.390/ 0.0025[j] | | NA | NA | NA | NA | 0.326 | 0.0295 | NA | NA | 0.561 | 0.395 | NA | NA | NA | NA | 0.246 | 0.0388 |
| Cadmium | 0.00004/ 0.00005/ 0.00005/ 0.00004[a] | 0.00025 (USEPA)[b] | 0.0000711 | 0.0000592 | 0.0000779 | 0.000027 | 0.00013 | 0.0000337 | NA | NA | 0.000133 | 0.000126 | NA | NA | NA | NA | NA | NA |
| Copper | 0.002/0.002/ 0.002/0.002/ 0.002/0.002/ 0.004[a] | 0.00002[c]/ 0.00051[d]/ 0.0013[e]/ 0.00041[f]/ 0.00032[g]/ 0.00041[h]/ 0.00129[i] (US EPA) | 0.0131 | **0.00941** | 0.0112 | **0.0062** | 0.00482 | **0.00135** | 0.0046 | **0.00299** | NA | NA | 0.00553 | **0.0153** | 0.00421 | **0.00206** | 0.0201 | **0.00794** |
| Iron | 0.3 | 0.35 (BC – short term) | 1.35 | 0.257 | 1.26 | 0.208 | 1.31 | 0.0218 | 0.442 | 0.0671 | NA | NA | NA | NA | 0.997 | 0.214 | NA | NA |
| Lead | 0.001[a] | NGA | 0.00791 | 0.00163 | 0.00365 | 0.000678 | 0.00259 | 0.0000298 | 0.00119 | 0.000119 | NA | NA | NA | NA | 0.00335 | 0.000762 | NA | NA |
| Manganese | 0.82 | NGA | NA | NA | NA | NA | 0.823 | 0.0339 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

NA: No assessment required, based on Step 1 and 2 outcomes (see Table 1)
NGA: No guideline available
Shaded values are total metals concentrations exceeding total metals guidelines; **Bolded** values are dissolved metals concentrations exceeding dissolved guidelines

[A] sample specific calculated guideline, based on pH (aluminium) or hardness (cadmium; copper; lead; nickel) of sample
[b] Cadmium dissolved criterion based on hardness of <25 mg/L- sample specific hardness values for main tailings area range from 8 to 30 mg/L $CaCO_3$ (USEPA, 2016)
[c] Copper dissolved criterion for M-SW13 based on hardness of 8.86 mg/L $CaCO_3$, pH of 5.69, temperature of 3 C, and assumed DOC of 0.3 mg/L.
[d] Copper dissolved criterion for M-Pz1 based on hardness of 26 mg/L $CaCO_3$, pH of 7.33, temperature of 1.1 C, and assumed DOC of 0.3 mg/L.
[e] Copper dissolved criterion for M-Pz4 based on hardness of 23.2 mg/L $CaCO_3$, pH of 7.67, temperature of 1.3 C, and assumed DOC of 0.3 mg/L.
[f] Copper dissolved criterion for M-SW5 based on hardness of 30 mg/L $CaCO_3$, pH of 7.17, temperature of 0.7 C, and assumed DOC of 0.3 mg/L.
[g] Copper dissolved criterion for M-SW14 based on hardness of 20.5 mg/L $CaCO_3$, pH of 6.99, temperature of 4.2 C, and assumed DOC of 0.3 mg/L.
[h] Copper dissolved criterion for M-SW15 based on hardness of 6.54 mg/L $CaCO_3$, pH of 7.08, temperature of 3.9 C, and assumed DOC of 0.3 mg/L.
[i] Copper dissolved criterion for M-SW16 based on hardness of 358 mg/L $CaCO_3$, pH of 7.83, temperature of 4.1 C, and assumed DOC of 0.3 mg/L.
j Aluminium inputs were hardness of 23 mg/L and pH of 7.6; DOC assumed at 0.3 mg/L (P-z4); and DOC 0.3 mg/L; pH 5; and hardness 21 mg/L for SW11

Based on the outcomes of Table 7, the following can be stated:

Vaughan Lane/Off Site Tailings area (SW18) and Gold Lane Extension/Far Field Location (SW19):

- From Table 7, mercury, aluminum, arsenic, cadmium, cobalt, copper, iron, lead, manganese, selenium, silver, vanadium and zinc are elevated in the Vaughan Lane/off site tailings area (M-SW18), relative to FWAL guidelines (total metals), and therefore merit further discussion. Only arsenic is elevated in the far field tailings location (M-SW19).
- For the Vaughan Lane Tailings Area (SW 18), no dissolved guideline is available for mercury, cobalt, lead, manganese, selenium, silver, or vanadium. Silver is non-detect in the dissolved dataset, and unlikely to pose a risk to aquatic life. Cobalt, lead, manganese and vanadium are over 100-fold lower in the dissolved dataset, which suggests suspended particulate matter in the sample, driving the total concentrations up. These elements are unlikely to be risk drivers. Similarly, selenium is 60 times lower in the dissolved results, relative to the total result. The dissolved water concentration of 0.042 µg/L is unlikely to be a risk driver, but wetland settings can magnify selenium in biota. Toxicity associated with either mercury (due to the wetland setting and potential for biomagnification) and zinc (exceedance of dissolved water quality guideline) can not be ruled out at this time, albeit the DOC content in this wetland is unknown, and could modify toxicity considerably.
- For cadmium and copper in SW18, cadmium concentrations are less than the US EPA dissolved guideline of 0.00043 mg/L, using an assumed DOC content of 0.3 mg/L, which may be low for this area. Dissolved copper appears elevated relative to the Biotic Ligand Model results, but many site specific water quality parameters are missing for this dataset, and hence, conservative assumptions have been made for input values. Risks to aquatic life can not be ruled out at this time but could be tempered by DOC in the receiving environment.
- For aluminium, M-SW18 has some suspended particulate matter in the sample which is biasing results high. While total aluminum results are above both the CCME and US EPA (2018) guidelines, there is a 500-fold difference between total and dissolved results, and hence, aluminium may not be a driver, in terms of toxicity.
- With regard to arsenic in SW18, dissolved concentrations are markedly lower than the total concentrations (0.00966 mg/L, versus 2.65 mg/L; see Table 7).
- Based on the outcomes of this screening, additional samples and consideration of solids data and pore water in the Vaughan Lane tailings area (M-SW18), as well as site specific risk assessment, would be suggested to determine need for remediation and possible need for development of Tier 3 criteria.
- With respect to the Gold Lane Tailings Extension (M-SW19), arsenic is the only element exceeding total guidelines. Total concentrations exceed the Tier 2 guideline of 0.030 mg/L, and dissolved concentrations (0.0429 mg/L; Table 2) are less than the US EPA

dissolved arsenic guideline of 0.150 mg/L. More data for this large tailings area is necessary to determine need for remediation, using a risk based approach.

Based on the outcomes of Table 8, the following can be stated:

Main Tailings Area (Loon Lake to Lake Charles):

- Arsenic data are not included in Table 8, as all samples exceeded guidelines, and hence merit further consideration in the closure process.
- Mercury is elevated in several samples across the main tailings area, (M-SW13 and M-Pz1 and M-Pz4) but is not detected in the dissolved sample of Pz4 (see Table 8).
- Cadmium is below the US EPA dissolved guidelines recently established for this chemical (US EPA2016), whereas dissolved copper concentrations across the main tailings area appear elevated, relative to site specific guidelines established using the Biotic Ligand Model (BLM). Many water quality parameters are missing at this time, and hence, conservative assumptions were made, which may be yielding more conservative guidelines that necessary. Iron concentrations are less than the acute dissolved guideline from BC MOE in all samples, but may be associated with some chronic effects, depending on concentrations. Aluminium was less than a site specific guideline for Total aluminium in P-z4, but above guidelines in M-SW11 (US EPA, 2018b). Aluminium and iron concentrations could be within the naturally occurring ranges for this area, as only a limited understanding of background is available at this time.
- A lead dissolved guideline is not available. Dissolved lead is within 5 to 80 times lower than Total lead concentrations in the main tailings area. Therefore, depending on various modifying factors, lead could impart some toxicity, but is likely not a driver.
- Manganese is only elevated in a single sample in the main tailings area (M-Pz4), and hence, is unlikely to be a toxicity driver.
- Based on the existing data, mercury, arsenic, and copper could be considered important contributors to potential toxicity at the main tailings area. Additional data related to modifying factors (such as DOC), would assist in clarifying potential toxicity of other metals, such as lead and aluminum. Cadmium is unlikely to be a driver, based on comparisons of dissolved data to the US EPA dissolved guideline.

For the Ponds Atop the Main tailings area, the following can be concluded (Table 8):

- Arsenic data are not included in the table, but are elevated in all samples, and hence, merit further consideration. Mercury is elevated in 2 of the 3 samples taken, and in light of the wetland setting, could biomagnify, and hence, merits further assessment.
- Aluminium is only elevated in a single sample, which could be within background ranges (0.246 mg/L), as it is typically elevated in Nova Scotia waters.
- Copper appears elevated, relative to the site specific guideline developed using the BLM, but DOC data are not available, and hence, conservative assumptions were made. It is

possible that copper toxicity may be modified in the wetland setting, and additional data gathering would help to clarify toxicity potential.

- Iron and lead are elevated in only a single sample, and hence, are unlikely to be toxicity drivers in this area.
- Based on the existing data, arsenic, mercury are considered to be primary COPCs. Additional data gathering will help to clarify whether copper (DOC concentrations) is also a COPC. Background data, and site specific risk assessment would assist in confirming remedial needs for this area.

Summary information for the areas sampled is provided in Table 9. For areas distant from the main tailings, additional samples, and risk assessment would assist in confirming need for, and focus of, remediation or reclamation.

**Table 9: Primary Chemicals of Potential Concern, Based on Surface Water Data (2018) - Montague**

| COPCs | Main Tailings | Ponds Atop Main Tailings | Off Site Tailings (Gold Lane and Vaughan Lane areas) | Far Field Tailings |
|---|---|---|---|---|
| **Primary COPC** | As; Hg; Cu | As; Hg | SW17 (near Gold Lane) has no surface water COPCs, based on available data; SW18 (near Vaughan Lane) appears elevated for a number of parameters, due to suspended particulate. | As |
| **Secondary COPC** | Pb; Al (?) | Cu (?) | | none |
| **Data Gaps** | Background data; DOC; additional samples in some remote tailings areas | | | |

**References:**


CCME, 2018a. Summary Table http://st-ts.ccme.ca/en/index.html

CCME, 2018b. Canadian Water Quality Guidelines for the Protection of Aquatic Life. Zinc (Dissolved). http://ceqg-rcqe.ccme.ca/download/en/360

US EPA, 2016. Aquatic Life Ambient Water Quality Criteria Cadmium. March 2016 https://www.epa.gov/sites/production/files/2016-03/documents/cadmium-final-report-2016.pdf

US EPA, 2018a. National Recommended Aquatic Life Criteria Table. https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table

US EPA, 2018b. Final Aquatic Life Criteria for Aluminium in Freshwater
https://www.epa.gov/wqc/aquatic-life-criteria-aluminum

**Table B-1 Montague Mines – Tier 1 Human Health Soil Screen, Parsons et al. 2012 Data (mg/kg dw)**

| | | Sampling Location | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Tier 1 Criteria** | **T1** | **T1** | **T2** | **T2** | **T3** | **T3** | **T4** | **T4** | **T5** | **T5** | **T6** | **T6** | **T6** | **T7** | **T7** | **T8** | **T10** | **T10** | **T11** | **T11** | **T11** | **T12** | **T12** |
| Aluminum [a] | 15400 | 12900 | 15400 | 14200 | 14400 | 9400 | 10400 | 26400 | 11400 | 11000 | 10500 | 10800 | 9400 | 10300 | 10800 | 11300 | 7000 | 10100 | 10000 | 12400 | 12300 | 18300 | 11700 | 12100 |
| Antimony | 7.5 | 21.6 | 19.1 | 21.77 | 21.89 | 7.09 | 14.82 | 2.85 | 3.25 | 23.23 | 6.29 | 23.06 | 22.18 | 8.2 | 16.75 | 1.8 | 102.1 | 37.75 | 32.05 | 12.38 | 3.63 | 5.35 | 2.45 | 2.8 |
| Arsenic | 31 | 20720.3 | 14298.8 | 25482.4 | 13674.2 | 7130.1 | 9580.4 | 5311.6 | 2061.4 | 18167.7 | 4282.1 | 20707.3 | 23681.9 | 6229.2 | 13946.1 | 2139.1 | 41298.8 | 31652.1 | 23249.1 | 9574.2 | 2372.6 | 5704.2 | 2690.8 | 2782.5 |
| Barium | 10000 | 145.6 | 53.4 | 98.4 | 35.7 | 37.7 | 23.3 | 116.4 | 26.5 | 41 | 23 | 29.5 | 28.4 | 22.6 | 24.9 | 26 | 22.3 | 31.9 | 25.6 | 30.9 | 32 | 60.2 | 27.8 | 33.7 |
| Beryllium | 38 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Bismuth | NA | 2.34 | 1.74 | 2.18 | 1.43 | 0.56 | 0.9 | 1.31 | 0.38 | 1.05 | 0.56 | 1.13 | 1.16 | 0.66 | 0.83 | 0.31 | 4.5 | 1.69 | 1.6 | 0.56 | 0.42 | 0.71 | 0.25 | 0.47 |
| Boron | 4300 | 5 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 |
| Cadmium | 14 | 0.8 | 0.31 | 0.73 | 0.46 | 0.19 | 0.49 | 1.05 | 0.24 | 0.31 | 0.14 | 0.34 | 0.17 | 0.24 | 0.22 | 0.12 | 0.19 | 0.23 | 0.21 | 0.16 | 0.14 | 0.22 | 0.09 | 0.34 |
| Caesium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Calcium [a] | NA | 5400 | 5600 | 6400 | 5500 | 1300 | 5100 | 3800 | 1100 | 2800 | 5300 | 3400 | 5300 | 4800 | 3100 | 7100 | 500 | 800 | 900 | 1300 | 3400 | 3000 | 1100 | 1400 |
| Cerium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chromium | 220 | 16.1 | 19.5 | 18 | 17.3 | 10.5 | 12.3 | 21.8 | 13.4 | 13.1 | 12.3 | 13.3 | 11.5 | 12.3 | 13.1 | 13.5 | 10.9 | 13.6 | 13.2 | 14.6 | 14.7 | 22.8 | 13.8 | 15.7 |
| Cobalt | 22 | 37.4 | 25.4 | 33.8 | 22.1 | 4.3 | 18.8 | 75.6 | 8.6 | 21 | 12.1 | 22.7 | 24.2 | 17.3 | 17.4 | 8 | 2.3 | 3.3 | 3.4 | 9.7 | 16 | 23.1 | 7.6 | 18.3 |
| Copper | 1100 | 100.18 | 83.34 | 124.54 | 95.07 | 38.54 | 75.62 | 74.5 | 40.79 | 75.27 | 48.05 | 109.26 | 43.88 | 55.1 | 76.37 | 30.66 | 33.59 | 31.23 | 18.62 | 30.41 | 45.28 | 74.87 | 25.18 | 105.97 |
| Gallium | NA | 4 | 4.9 | 4.7 | 4.6 | 2.8 | 3.1 | 4.4 | 3.6 | 3.6 | 3.2 | 3.4 | 3.1 | 3.1 | 3.4 | 3.5 | 3 | 3.7 | 3.5 | 3.8 | 3.9 | 5.8 | 3.6 | 3.7 |
| Germanium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Gold | NA | 0.5164 | 0.2271 | 0.7634 | 0.4234 | 0.0623 | 0.1736 | 0.793 | 0.2268 | 0.2753 | 0.156 | 0.3354 | 0.225 | 0.1087 | 0.3188 | 0.0622 | 1.3777 | 0.4106 | 0.334 | 0.244 | 0.1667 | 0.3141 | 1.0117 | 1.2559 |
| Hafnium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Indium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Iron [a] | 11000 | 51200 | 44700 | 59800 | 44900 | 28000 | 32700 | 52200 | 26300 | 49100 | 27900 | 45600 | 45900 | 29100 | 36200 | 27200 | 70500 | 53200 | 47800 | 36700 | 29600 | 41600 | 28600 | 30300 |
| Lanthium | NA | 23.4 | 14.4 | 18.7 | 12.3 | 17.2 | 11.3 | 29.6 | 15.3 | 8.8 | 11.3 | 10.1 | 7.3 | 10.5 | 10.1 | 16.7 | 11.5 | 14.1 | 12.6 | 18.8 | 26 | 33.2 | 18 | 27.5 |
| Lead | 140 | 141.61 | 125.9 | 131.82 | 87.57 | 34.97 | 54.22 | 167.93 | 21.92 | 60.48 | 26.25 | 65.69 | 68.36 | 43.59 | 52.93 | 13.8 | 267.58 | 101.57 | 98.3 | 37.11 | 15.25 | 35.82 | 16.57 | 17.24 |
| Lithium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Magnesium [a] | NA | 8900 | 12100 | 10200 | 12200 | 6200 | 9200 | 5100 | 7800 | 8300 | 9300 | 8000 | 7600 | 8900 | 8200 | 10100 | 4700 | 7200 | 7400 | 8600 | 9300 | 12100 | 8100 | 8100 |
| Manganese | NA | 2144 | 643 | 1653 | 658 | 292 | 482 | 8284 | 298 | 582 | 479 | 706 | 1079 | 479 | 500 | 566 | 146 | 200 | 203 | 342 | 778 | 734 | 341 | 496 |
| Mercury | 6.6 | 4.034 | 8.392 | 3.537 | 3.177 | 0.245 | 2.243 | 6.684 | 1.916 | 1.243 | 0.873 | 1.392 | 1.585 | 1.498 | 1.058 | 1.029 | 3.224 | 1.388 | 1.573 | 0.454 | 0.746 | 1.807 | 0.166 | 1.584 |
| Molybdenum | 110 | 0.47 | 0.39 | 0.46 | 0.29 | 0.13 | 0.23 | 4.18 | 0.15 | 0.26 | 0.13 | 0.38 | 0.33 | 0.19 | 0.25 | 0.1 | 1.27 | 0.55 | 0.45 | 0.23 | 0.1 | 0.13 | 0.09 | 0.14 |
| Nickel | 330 | 76.7 | 52.6 | 53.7 | 51.4 | 15 | 40 | 51.6 | 21.2 | 50 | 28.9 | 43.2 | 41.6 | 34.6 | 36.2 | 23.8 | 11.4 | 17.1 | 16.9 | 23.2 | 53 | 61.5 | 22.5 | 29.9 |
| Niobium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Phosphorus [a] | NA | 610 | 790 | 780 | 650 | 430 | 460 | 1210 | 510 | 470 | 450 | 470 | 390 | 450 | 490 | 520 | 380 | 470 | 460 | 500 | 510 | 780 | 520 | 520 |
| Potassium [a] | NA | 2600 | 5100 | 2900 | 3900 | 2100 | 2800 | 800 | 2800 | 3100 | 3200 | 3200 | 3000 | 3000 | 3200 | 3500 | 2200 | 3000 | 3100 | 3900 | 4000 | 6600 | 3500 | 4400 |
| Rhenium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Rubidium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Scandium | NA | 1.7 | 2 | 1.8 | 1.6 | 0.9 | 1.2 | 2 | 1.1 | 1.2 | 1.2 | 1.2 | 1 | 1.1 | 1.2 | 1.3 | 1 | 1.3 | 1.2 | 1.2 | 1.5 | 2.4 | 1.1 | 1.5 |
| Selenium | 80 | 1 | 0.7 | 0.8 | 0.8 | 0.2 | 0.6 | 4.5 | 0.2 | 0.8 | 0.2 | 0.8 | 0.8 | 0.4 | 0.6 | 0.1 | 3.1 | 1.2 | 1 | 0.3 | 0.1 | 0.3 | 0.1 | 0.2 |
| Silver | 77 | 0.351 | 0.236 | 0.377 | 0.278 | 0.036 | 0.138 | 0.334 | 0.069 | 0.147 | 0.08 | 0.174 | 0.185 | 0.113 | 0.135 | 0.049 | 0.719 | 0.258 | 0.228 | 0.085 | 0.061 | 0.116 | 0.103 | 0.138 |
| Sodium [a] | NA | 130 | 80 | 80 | 40 | 50 | 30 | 370 | 50 | 60 | 30 | 40 | 20 | 30 | 30 | 20 | 20 | 20 | 20 | 40 | 30 | 40 | 20 | 20 |
| Strontium | 9400 | 43.4 | 23.2 | 44.5 | 20.6 | 10.9 | 17.9 | 18.4 | 7.3 | 22.2 | 17.7 | 24.2 | 28.9 | 16.6 | 17.9 | 21.5 | 4.4 | 5.8 | 6.2 | 8.3 | 15.1 | 20 | 8.4 | 9.1 |
| Sulfur [a] | NA | 1100 | 8700 | 2900 | 8300 | 300 | 6600 | 2200 | 1300 | 5600 | 2900 | 5100 | 6800 | 4100 | 4500 | 900 | 2200 | 1400 | 1200 | 300 | 300 | 300 | 300 | 200 |
| Tantalum | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Tellurium | NA | 2.79 | 1.55 | 2.57 | 1.73 | 0.59 | 1.07 | 0.38 | 0.33 | 1.77 | 0.41 | 1.86 | 1.54 | 0.72 | 1.3 | 0.15 | 6.16 | 2.57 | 2.16 | 0.82 | 0.2 | 0.36 | 0.33 | 0.21 |
| Thorium | NA | 5.5 | 4.4 | 4.9 | 4.5 | 4.3 | 3.7 | 2.3 | 4 | 3.1 | 3.6 | 3.1 | 2.5 | 3.5 | 3.3 | 4 | 3 | 3.5 | 3.3 | 3.9 | 5.8 | 6.6 | 5.3 | 6 |
| Thallium | 1 | 0.29 | 0.34 | 0.28 | 0.3 | 0.15 | 0.2 | 0.28 | 0.21 | 0.22 | 0.19 | 0.23 | 0.2 | 0.18 | 0.22 | 0.19 | 0.26 | 0.29 | 0.25 | 0.25 | 0.23 | 0.38 | 0.23 | 0.28 |
| Tin | 9400 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Titanium [a] | NA | 600 | 750 | 770 | 760 | 420 | 500 | 230 | 610 | 570 | 530 | 540 | 490 | 530 | 540 | 600 | 420 | 510 | 530 | 700 | 720 | 1140 | 660 | 770 |
| Tungsten | NA | 1 | 0.9 | 1 | 0.9 | 0.1 | 0.4 | 1.1 | 0.1 | 1.1 | 0.1 | 0.7 | 0.4 | 0.3 | 0.7 | <0.1 | 0.7 | 0.9 | 0.3 | 0.4 | 0.2 | 0.3 | <0.1 | 0.2 |
| Uranium | 23 | 0.6 | 0.9 | 0.6 | 0.6 | 0.4 | 0.5 | 1.4 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 | 0.7 | 0.8 | 0.6 |
| Vanadium | 39 | 26 | 19 | 24 | 17 | 12 | 12 | 146 | 15 | 14 | 12 | 14 | 11 | 12 | 13 | 14 | 14 | 14 | 14 | 17 | 15 | 23 | 17 | 15 |
| Yttrium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Zinc | 5600 | 348 | 208.3 | 270.6 | 237.3 | 62.7 | 217.8 | 192.2 | 80.6 | 158.3 | 93.3 | 162.4 | 106.4 | 129.2 | 134.1 | 83.5 | 41.1 | 54.1 | 51.9 | 81.5 | 193.4 | 248.1 | 77 | 83.7 |
| Zirconium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Notes:

[a] metal concentration was converted from % dry weight to mg/kg by multiplying by a factor of 10000

Shaded values indicate an exceedance of the Tier 1 criteria

**Table B-1 (continued) Montague Mines – Tier 1 Human Health Soil Screen, Parsons et al. 2012 Data (mg/kg dw)**

| | | Sampling Location | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Tier 1 Criteria** | **T13** | **T13** | **T14** | **T15** | **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** | **T5** | **T6** | **T7** | **T8** | **T9** | **T10** | **T11** | **T12** | **T13** | **T14** | **S28** |
| Aluminum [a] | 15400 | 10400 | 11900 | 11400 | 12200 | 7100 | 11300 | 12700 | 6400 | 11200 | 6900 | 10700 | 10400 | 13700 | 16200 | 11500 | 11200 | 10800 | 10400 | 11300 | 6700 | 10800 | 8400 | 3400 |
| Antimony | 7.5 | 1.52 | 4.11 | 2.86 | 18.23 | 60.36 | 15.61 | 17.9 | 22.73 | 36.5 | 24.14 | 21.46 | 16.69 | 22.87 | 25.4 | 12.34 | 13.11 | 38.36 | 21.39 | 6.57 | 23.67 | 2.56 | 1.72 | 2 |
| Arsenic | 31 | 1718.5 | 3421.6 | 2958.4 | 14736.9 | 40100 | 16900 | 19100 | 18900 | 16000 | 24500 | 17000 | 13900 | 17700 | 20500 | 9116.5 | 9199 | 26600 | 26600 | 5365 | 13000 | 1028.3 | 1001.3 | 1860 |
| Barium | 10000 | 24 | 32.8 | 29.4 | 44.1 | 22.2 | 29.6 | 97.6 | 13.2 | 35.7 | 20.5 | 27.7 | 41.6 | 61.2 | 171 | 26.5 | 24.8 | 28.2 | 25.7 | 27 | 24.7 | 22.8 | 20.7 | 5.7 |
| Beryllium | 38 | NA | NA | NA | NA | <0.10 | 0.3 | 0.3 | <0.10 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.7 | 0.2 | 0.1 | 0.2 | 0.1 | 0.3 | 0.1 | 0.2 | 0.2 | NA |
| Bismuth | NA | 0.25 | 0.65 | 0.61 | 1.57 | 2.69 | 1.17 | 1.94 | 1.32 | 2.09 | 1.32 | 1.08 | 0.95 | 1.89 | 4.13 | 0.84 | 0.7 | 1.71 | 1.13 | 0.8 | 1.59 | 0.86 | 0.17 | 3.99 |
| Boron | 4300 | 1 | 2 | 1 | 2 | 3 | 1 | 5 | <1.00 | 1 | <1.00 | <1.00 | 1 | 1 | 2 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <20.00 |
| Cadmium | 14 | 0.08 | 0.22 | 0.14 | 0.46 | 0.14 | 0.16 | 0.69 | 0.08 | 0.36 | 0.07 | 0.25 | 0.34 | 0.65 | 1.63 | 0.25 | 0.18 | 0.16 | 0.06 | 0.17 | 0.25 | 0.38 | 0.1 | 0.13 |
| Caesium | NA | NA | NA | NA | NA | 2.53 | 3.31 | 3.05 | 0.91 | 2.87 | 2.58 | 3.14 | 2.6 | 3.41 | 3.54 | 3.02 | 2.8 | 3.49 | 3.22 | 3.34 | 1.96 | 2.9 | 1.97 | NA |
| Calcium [a] | NA | 1900 | 1400 | 1400 | 6500 | 500 | 900 | 4200 | 600 | 900 | 300 | 800 | 2800 | 4100 | 4000 | 3300 | 2500 | 800 | 800 | 1300 | 400 | 1400 | 1200 | 200 |
| Cerium | NA | NA | NA | NA | NA | 25.2 | 30.5 | 38.4 | 15.2 | 45.1 | 23.1 | 29.8 | 26.5 | 35.4 | 47.6 | 28.1 | 27.9 | 40.3 | 32 | 39.4 | 29.7 | 39.4 | 30 | NA |
| Chromium | 220 | 12.3 | 14.4 | 14 | 15 | 9.5 | 11.7 | 13.3 | 8.4 | 13.8 | 8.8 | 11.8 | 10.6 | 14.2 | 16.2 | 12.6 | 12 | 12.6 | 12 | 13.1 | 10 | 11.2 | 11.7 | 2.4 |
| Cobalt | 22 | 9.8 | 10.9 | 8.2 | 23.4 | 1.9 | 6.7 | 21.4 | 3.4 | 3.9 | 1.1 | 4.4 | 9.4 | 25.3 | 80.4 | 14.3 | 10.3 | 4.4 | 3.8 | 10.6 | 2.2 | 8.5 | 5.2 | 1.1 |
| Copper | 1100 | 36.25 | 79.63 | 59.41 | 94.72 | 34.3 | 51.91 | 120.37 | 10.69 | 59.76 | 7.98 | 27.09 | 82.09 | 110.55 | 153.34 | 67.49 | 56.91 | 14.51 | 11.95 | 45.34 | 37.51 | 101.37 | 27.61 | 32.46 |
| Gallium | NA | 3.2 | 3.7 | 3.2 | 3.5 | 3.1 | 3.4 | 4 | 2 | 3.4 | 2.6 | 3.3 | 3 | 4 | 3.6 | 3.3 | 3.2 | 3.3 | 3.3 | 3.4 | 2.6 | 3 | 2.5 | 1.1 |
| Germanium | NA | NA | NA | NA | NA | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | NA |
| Gold | NA | 0.278 | 0.2437 | 0.2318 | 0.409 | 2.3423 | 0.3216 | 0.6729 | 1.2832 | 0.5894 | 0.4721 | 0.2237 | 0.3494 | 0.6178 | 0.7489 | 0.207 | 0.2961 | 0.5665 | 0.2349 | 0.2483 | 2.7103 | 0.1364 | 0.0453 | 3.496 |
| Hafnium | NA | NA | NA | NA | NA | 0.24 | 0.2 | 0.2 | 0.11 | 0.23 | 0.22 | 0.23 | 0.18 | 0.27 | 0.07 | 0.25 | 0.25 | 0.26 | 0.23 | 0.13 | 0.15 | 0.3 | 0.11 | NA |
| Indium | NA | NA | NA | NA | NA | 0.05 | <0.02 | 0.03 | 0.03 | 0.06 | 0.02 | 0.02 | 0.03 | 0.04 | 0.08 | 0.02 | 0.02 | 0.05 | 0.03 | 0.02 | 0.04 | <0.02 | <0.02 | NA |
| Iron [a] | 11000 | 24000 | 31600 | 27100 | 44600 | 60100 | 38800 | 53200 | 36000 | 55000 | 37800 | 41400 | 39000 | 51100 | 75400 | 35600 | 34400 | 53000 | 40800 | 31600 | 35800 | 25400 | 22700 | 10200 |
| Lanthium | NA | 20.6 | 21.6 | 22 | 14.3 | 11.9 | 14 | 18.6 | 7 | 21.7 | 11.5 | 14.9 | 13.2 | 17.2 | 24.8 | 14 | 13.3 | 19.8 | 16 | 19.1 | 14.7 | 19.7 | 15.1 | 6 |
| Lead | 140 | 10.62 | 26.55 | 24.52 | 107.56 | 193.63 | 70.33 | 153.08 | 67.53 | 129.79 | 64.98 | 66.69 | 57.28 | 109.26 | 257.85 | 49.01 | 41.06 | 89.02 | 67.78 | 37.86 | 51.18 | 45.59 | 13.66 | 356.7 |
| Lithium | NA | NA | NA | NA | NA | 12.3 | 21.4 | 25.7 | 11.9 | 17.2 | 10 | 17.9 | 19.8 | 26.5 | 23.9 | 23.5 | 22 | 16.9 | 17.3 | 21.6 | 11.2 | 21.4 | 18.4 | NA |
| Magnesium [a] | NA | 7400 | 8100 | 7700 | 9700 | 4600 | 7400 | 8000 | 4600 | 7300 | 4800 | 7400 | 7200 | 9900 | 7900 | 8800 | 8300 | 7100 | 7000 | 7800 | 4500 | 7500 | 5700 | 1900 |
| Manganese | NA | 411 | 344 | 316 | 1111 | 131 | 233 | 907 | 149 | 229 | 119 | 220 | 433 | 918 | 2506 | 562 | 374 | 195 | 199 | 370 | 133 | 317 | 232 | 76 |
| Mercury | 6.6 | 0.45 | 1.512 | 0.703 | 2.861 | 2.328 | 0.909 | 3.146 | 0.499 | 1.648 | 1.153 | 1.05 | 0.917 | 3.164 | 6.559 | 1.188 | 0.778 | 1.086 | 3.416 | 0.656 | 6.23 | 0.751 | 0.484 | 69.953 |
| Molybdenum | 110 | 0.08 | 0.1 | 0.1 | 0.22 | 0.95 | 0.31 | 0.5 | 1.43 | 0.75 | 0.36 | 0.35 | 0.27 | 0.35 | 0.75 | 0.2 | 0.27 | 0.53 | 0.32 | 0.16 | 0.51 | 0.08 | 0.38 | 0.35 |
| Nickel | 330 | 23.8 | 29.6 | 20.9 | 48.6 | 11.3 | 21.2 | 38.8 | 12.2 | 19.3 | 9.6 | 17.7 | 25.9 | 49 | 71.5 | 37.3 | 29.2 | 18.6 | 15.4 | 25.7 | 9 | 25.7 | 17.2 | 4.1 |
| Niobium | NA | NA | NA | NA | NA | 0.39 | 0.16 | 0.55 | 0.48 | 0.31 | 0.29 | 0.27 | 0.3 | 0.39 | 0.7 | 0.22 | 0.22 | 0.41 | 0.27 | 0.38 | 0.3 | 0.18 | 0.22 | NA |
| Phosphorus [a] | NA | 450 | 520 | 450 | 520 | 410 | 530 | 610 | 500 | 630 | 420 | 490 | 500 | 700 | 890 | 560 | 550 | 570 | 500 | 560 | 440 | 500 | 500 | 220 |
| Potassium [a] | NA | 3200 | 3500 | 3000 | 3200 | 2700 | 3500 | 2500 | 1300 | 2900 | 3000 | 3400 | 2600 | 3400 | 2600 | 3500 | 3400 | 3500 | 3200 | 3100 | 2000 | 2800 | 2200 | 300 |
| Rhenium | NA | NA | NA | NA | NA | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | NA |
| Rubidium | NA | NA | NA | NA | NA | 22.1 | 29.4 | 22.7 | 9.1 | 24.7 | 21.5 | 26.8 | 21 | 26.2 | 20.7 | 25.9 | 26 | 29.1 | 28.2 | 29.5 | 15.2 | 23.5 | 18.1 | NA |
| Scandium | NA | 1.1 | 1.3 | 1.2 | 1.4 | 1.2 | 1.3 | 1.5 | 0.7 | 1.4 | 0.8 | 1.3 | 1.1 | 1.6 | 2 | 1.3 | 1 | 1.2 | 1.1 | 1.2 | 0.9 | 1.1 | 0.8 | 0.2 |
| Selenium | 80 | 0.1 | 0.2 | 0.2 | 0.8 | 2.3 | 0.6 | 0.9 | 0.3 | 1.4 | 0.8 | 0.7 | 0.5 | 1 | 1.9 | 0.6 | 0.4 | 1 | 0.6 | 0.3 | 0.9 | <0.10 | <0.10 | 1.3 |
| Silver | 77 | 0.034 | 0.101 | 0.083 | 0.251 | 0.465 | 0.186 | 0.404 | 0.367 | 0.289 | 0.21 | 0.145 | 0.133 | 0.307 | 0.67 | 0.123 | 0.11 | 0.204 | 0.141 | 0.106 | 0.336 | 0.16 | 0.025 | 0.914 |
| Sodium [a] | NA | 20 | 30 | 30 | 30 | 20 | 20 | 60 | 10 | 20 | 20 | 20 | 70 | 50 | 110 | 20 | 40 | 20 | 20 | 20 | 20 | 20 | 30 | <10 |
| Strontium | 9400 | 10.7 | 9.1 | 9.3 | 31.4 | 4.2 | 8 | 33.9 | 6.9 | 6.6 | 2.2 | 5.8 | 17.6 | 29.8 | 33.2 | 19.8 | 13.8 | 6.7 | 5.8 | 9.5 | 4.4 | 6.6 | 7.7 | 2.8 |
| Sulfur [a] | NA | 100 | 100 | <100 | 3500 | 1800 | 400 | 1700 | 2000 | 1200 | 1700 | 800 | 2700 | 4100 | 1000 | 1900 | 2400 | 500 | 1000 | 400 | 2200 | 200 | 200 | <200 |
| Tantalum | NA | NA | NA | NA | NA | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | NA |
| Tellurium | NA | 0.14 | 0.37 | 0.33 | 1.68 | 4.31 | 1.37 | 2.35 | 0.56 | 2.6 | 1.88 | 1.62 | 1.27 | 1.99 | 3.63 | 0.96 | 0.93 | 2.27 | 1.37 | 0.71 | 1.61 | 0.13 | 0.1 | 0.04 |
| Thorium | NA | 4.4 | 4.3 | 5 | 4.6 | 3.8 | 3.9 | 5.2 | 3.5 | 6.3 | 3.5 | 4.3 | 4.1 | 5.5 | 5.2 | 4.3 | 4.2 | 5.5 | 4.5 | 4.9 | 4.1 | 5.3 | 3.7 | 1.3 |
| Thallium | 1 | 0.19 | 0.24 | 0.24 | 0.26 | 0.3 | 0.28 | 0.27 | 0.09 | 0.3 | 0.24 | 0.29 | 0.22 | 0.32 | 0.38 | 0.26 | 0.25 | 0.32 | 0.27 | 0.27 | 0.19 | 0.22 | 0.15 | 0.15 |
| Tin | 9400 | NA | NA | NA | NA | 0.2 | 0.2 | 0.6 | 0.1 | 0.9 | 0.2 | 0.3 | 0.4 | 0.4 | 1.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.5 | 8.7 | 0.5 | NA |
| Titanium [a] | NA | 560 | 680 | 600 | 610 | 470 | 630 | 680 | 260 | 510 | 500 | 550 | 480 | 680 | 530 | 550 | 530 | 600 | 560 | 610 | 340 | 510 | 390 | 100 |
| Tungsten | NA | <0.1 | 0.4 | 0.2 | 1.1 | 1.6 | 0.5 | 0.9 | 2.1 | 3.3 | 0.3 | 0.1 | 0.6 | 1.8 | 0.8 | 0.7 | 0.9 | 2.2 | 0.4 | 0.3 | 1.4 | 0.1 | 0.2 | 0.5 |
| Uranium | 23 | 0.4 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.6 | 0.3 | 0.6 | 0.4 | 0.5 | 0.5 | 0.7 | 1.1 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.4 | 0.1 |
| Vanadium | 39 | 13 | 16 | 16 | 18 | 13 | 14 | 21 | 6 | 18 | 13 | 16 | 16 | 21 | 49 | 16 | 15 | 19 | 17 | 20 | 13 | 14 | 12 | 11 |
| Yttrium | NA | NA | NA | NA | NA | 1.7 | 2.84 | 4.08 | 2.51 | 2.74 | 1.03 | 2.15 | 2.48 | 3.64 | 6.14 | 2.7 | 2.25 | 2.39 | 1.99 | 2.7 | 1.59 | 2.61 | 2.1 | NA |
| Zinc | 5600 | 75 | 128.8 | 79.7 | 228.4 | 38 | 68.9 | 207.5 | 39 | 65.6 | 33.4 | 59.4 | 119.2 | 240.7 | 396.5 | 151.2 | 109.3 | 57 | 51.9 | 89.1 | 47.4 | 176.1 | 55.7 | 35.6 |
| Zirconium | NA | NA | NA | NA | NA | 8.1 | 7.7 | 9.7 | 4.1 | 10 | 8.6 | 8.8 | 8.6 | 12.5 | 6 | 9.6 | 9.3 | 9.1 | 9.5 | 7.6 | 8.3 | 12.6 | 5.2 | NA |

Notes:

[a] metal concentration was converted from % dry weight to mg/kg by multiplying by a factor of 10000

Shaded values indicate an exceedance of the Tier 1 criteria

**Table B-2 Montague Mines – Tier 1 Ecological Soil Screen, Parsons et al. 2012 Data (mg/kg dw)**

| | Tier 1 Criteria | | Sampling Location | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Soil Contact** | **Soil and Food Ingestion** | **T1** | **T1** | **T2** | **T2** | **T3** | **T3** | **T4** | **T4** | **T5** | **T5** | **T6** | **T6** | **T6** | **T7** | **T7** | **T8** | **T10** | **T10** | **T11** | **T11** | **T11** | **T12** | **T12** |
| Aluminum [a] | NA | NA | 12900 | 15400 | 14200 | 14400 | 9400 | 10400 | 26400 | 11400 | 11000 | 10500 | 10800 | 9400 | 10300 | 10800 | 11300 | 7000 | 10100 | 10000 | 12400 | 12300 | 18300 | 11700 | 12100 |
| Antimony | 20 | NA | 21.6 | 19.1 | 21.77 | 21.89 | 7.09 | 14.82 | 2.85 | 3.25 | 23.23 | 6.29 | 23.06 | 22.18 | 8.2 | 16.75 | 1.8 | 102.1 | 37.75 | 32.05 | 12.38 | 3.63 | 5.35 | 2.45 | 2.8 |
| Arsenic | 17 | 380 | **20720.3** | **14298.8** | **25482.4** | **13674.2** | **7130.1** | **9580.4** | **5311.6** | **2061.4** | **18167.7** | **4282.1** | **20707.3** | **23681.9** | **6229.2** | **13946.1** | **2139.1** | **41298.8** | **31652.1** | **23249.1** | **9574.2** | **2372.6** | **5704.2** | **2690.8** | **2782.5** |
| Barium | 750 | 400 | 145.6 | 53.4 | 98.4 | 35.7 | 37.7 | 23.3 | 116.4 | 26.5 | 41 | 23 | 29.5 | 28.4 | 22.6 | 24.9 | 26 | 22.3 | 31.9 | 25.6 | 30.9 | 32 | 60.2 | 27.8 | 33.7 |
| Beryllium | 5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Bismuth | NA | NA | 2.34 | 1.74 | 2.18 | 1.43 | 0.56 | 0.9 | 1.31 | 0.38 | 1.05 | 0.56 | 1.13 | 1.16 | 0.66 | 0.83 | 0.31 | 4.5 | 1.69 | 1.6 | 0.56 | 0.42 | 0.71 | 0.25 | 0.47 |
| Boron | NA | NA | 5 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 |
| Cadmium | 10 | 3.8 | 0.8 | 0.31 | 0.73 | 0.46 | 0.19 | 0.49 | 1.05 | 0.24 | 0.31 | 0.14 | 0.34 | 0.17 | 0.24 | 0.22 | 0.12 | 0.19 | 0.23 | 0.21 | 0.16 | 0.14 | 0.22 | 0.09 | 0.34 |
| Caesium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Calcium [a] | NA | NA | 5400 | 5600 | 6400 | 5500 | 1300 | 5100 | 3800 | 1100 | 2800 | 5300 | 3400 | 5300 | 4800 | 3100 | 7100 | 500 | 800 | 900 | 1300 | 3400 | 3000 | 1100 | 1400 |
| Cerium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chromium | 64 | NA | 16.1 | 19.5 | 18 | 17.3 | 10.5 | 12.3 | 21.8 | 13.4 | 13.1 | 12.3 | 13.3 | 11.5 | 12.3 | 13.1 | 13.5 | 10.9 | 13.6 | 13.2 | 14.6 | 14.7 | 22.8 | 13.8 | 15.7 |
| Cobalt | 20 | NA | 37.4 | 25.4 | 33.8 | 22.1 | 4.3 | 18.8 | 75.6 | 8.6 | 21 | 12.1 | 22.7 | 24.2 | 17.3 | 17.4 | 8 | 2.3 | 3.3 | 3.4 | 9.7 | 16 | 23.1 | 7.6 | 18.3 |
| Copper | 63 | 300 | 100.18 | 83.34 | 124.54 | 95.07 | 38.54 | 75.62 | 74.5 | 40.79 | 75.27 | 48.05 | 109.26 | 43.88 | 55.1 | 76.37 | 30.66 | 33.59 | 31.23 | 18.62 | 30.41 | 45.28 | 74.87 | 25.18 | 105.97 |
| Gallium | NA | NA | 4 | 4.9 | 4.7 | 4.6 | 2.8 | 3.1 | 4.4 | 3.6 | 3.6 | 3.2 | 3.4 | 3.1 | 3.1 | 3.4 | 3.5 | 3 | 3.7 | 3.5 | 3.8 | 3.9 | 5.8 | 3.6 | 3.7 |
| Germanium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Gold | NA | NA | 0.5164 | 0.2271 | 0.7634 | 0.4234 | 0.0623 | 0.1736 | 0.793 | 0.2268 | 0.2753 | 0.156 | 0.3354 | 0.225 | 0.1087 | 0.3188 | 0.0622 | 1.3777 | 0.4106 | 0.334 | 0.244 | 0.1667 | 0.3141 | 1.0117 | 1.2559 |
| Hafnium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Indium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Iron [a] | NA | NA | 51200 | 44700 | 59800 | 44900 | 28000 | 32700 | 52200 | 26300 | 49100 | 27900 | 45600 | 45900 | 29100 | 36200 | 27200 | 70500 | 53200 | 47800 | 36700 | 29600 | 41600 | 28600 | 30300 |
| Lanthium | NA | NA | 23.4 | 14.4 | 18.7 | 12.3 | 17.2 | 11.3 | 29.6 | 15.3 | 8.8 | 11.3 | 10.1 | 7.3 | 10.5 | 10.1 | 16.7 | 11.5 | 14.1 | 12.6 | 18.8 | 26 | 33.2 | 18 | 27.5 |
| Lead | 300 | 70 | **141.61** | **125.9** | **131.82** | **87.57** | 34.97 | 54.22 | **167.93** | 21.92 | 60.48 | 26.25 | 65.69 | 68.36 | 43.59 | 52.93 | 13.8 | **267.58** | **101.57** | **98.3** | 37.11 | 15.25 | 35.82 | 16.57 | 17.24 |
| Lithium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Magnesium [a] | NA | NA | 8900 | 12100 | 10200 | 12200 | 6200 | 9200 | 5100 | 7800 | 8300 | 9300 | 8000 | 7600 | 8900 | 8200 | 10100 | 4700 | 7200 | 7400 | 8600 | 9300 | 12100 | 8100 | 8100 |
| Manganese | NA | NA | 2144 | 643 | 1653 | 658 | 292 | 482 | 8284 | 298 | 582 | 479 | 706 | 1079 | 479 | 500 | 566 | 146 | 200 | 203 | 342 | 778 | 734 | 341 | 496 |
| Mercury | 12 | NA | 4.034 | 8.392 | 3.537 | 3.177 | 0.245 | 2.243 | 6.684 | 1.916 | 1.243 | 0.873 | 1.392 | 1.585 | 1.498 | 1.058 | 1.029 | 3.224 | 1.388 | 1.573 | 0.454 | 0.746 | 1.807 | 0.166 | 1.584 |
| Molybdenum | 40 | NA | 0.47 | 0.39 | 0.46 | 0.29 | 0.13 | 0.23 | 4.18 | 0.15 | 0.26 | 0.13 | 0.38 | 0.33 | 0.19 | 0.25 | 0.1 | 1.27 | 0.55 | 0.45 | 0.23 | 0.1 | 0.13 | 0.09 | 0.14 |
| Nickel | 50 | 355 | 76.7 | 52.6 | 53.7 | 51.4 | 15 | 40 | 51.6 | 21.2 | 50 | 28.9 | 43.2 | 41.6 | 34.6 | 36.2 | 23.8 | 11.4 | 17.1 | 16.9 | 23.2 | 53 | 61.5 | 22.5 | 29.9 |
| Niobium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Phosphorus [a] | NA | NA | 610 | 790 | 780 | 650 | 430 | 460 | 1210 | 510 | 470 | 450 | 470 | 390 | 450 | 490 | 520 | 380 | 470 | 460 | 500 | 510 | 780 | 520 | 520 |
| Potassium [a] | NA | NA | 2600 | 5100 | 2900 | 3900 | 2100 | 2800 | 800 | 2800 | 3100 | 3200 | 3200 | 3000 | 3000 | 3200 | 3500 | 2200 | 3000 | 3100 | 3900 | 4000 | 6600 | 3500 | 4400 |
| Rhenium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Rubidium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Scandium | NA | NA | 1.7 | 2 | 1.8 | 1.6 | 0.9 | 1.2 | 2 | 1.1 | 1.2 | 1.2 | 1.2 | 1 | 1.1 | 1.2 | 1.3 | 1 | 1.3 | 1.2 | 1.2 | 1.5 | 2.4 | 1.1 | 1.5 |
| Selenium | 1 | 4.5 | 1 | 0.7 | 0.8 | 0.8 | 0.2 | 0.6 | 4.5 | 0.2 | 0.8 | 0.2 | 0.8 | 0.8 | 0.4 | 0.6 | 0.1 | 3.1 | 1.2 | 1 | 0.3 | 0.1 | 0.3 | 0.1 | 0.2 |
| Silver | 20 | NA | 0.351 | 0.236 | 0.377 | 0.278 | 0.036 | 0.138 | 0.334 | 0.069 | 0.147 | 0.08 | 0.174 | 0.185 | 0.113 | 0.135 | 0.049 | 0.719 | 0.258 | 0.228 | 0.085 | 0.061 | 0.116 | 0.103 | 0.138 |
| Sodium [a] | NA | NA | 130 | 80 | 80 | 40 | 50 | 30 | 370 | 50 | 60 | 30 | 40 | 20 | 30 | 30 | 20 | 20 | 20 | 20 | 40 | 30 | 40 | 20 | 20 |
| Strontium | NA | NA | 43.4 | 23.2 | 44.5 | 20.6 | 10.9 | 17.9 | 18.4 | 7.3 | 22.2 | 17.7 | 24.2 | 28.9 | 16.6 | 17.9 | 21.5 | 4.4 | 5.8 | 6.2 | 8.3 | 15.1 | 20 | 8.4 | 9.1 |
| Sulfur [a] | NA | NA | 1100 | 8700 | 2900 | 8300 | 300 | 6600 | 2200 | 1300 | 5600 | 2900 | 5100 | 6800 | 4100 | 4500 | 900 | 2200 | 1400 | 1200 | 300 | 300 | 300 | 300 | 200 |
| Tantalum | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Tellurium | NA | NA | 2.79 | 1.55 | 2.57 | 1.73 | 0.59 | 1.07 | 0.38 | 0.33 | 1.77 | 0.41 | 1.86 | 1.54 | 0.72 | 1.3 | 0.15 | 6.16 | 2.57 | 2.16 | 0.82 | 0.2 | 0.36 | 0.33 | 0.21 |
| Thorium | NA | NA | 5.5 | 4.4 | 4.9 | 4.5 | 4.3 | 3.7 | 2.3 | 4 | 3.1 | 3.6 | 3.1 | 2.5 | 3.5 | 3.3 | 4 | 3 | 3.5 | 3.3 | 3.9 | 5.8 | 6.6 | 5.3 | 6 |
| Thallium | 1.4 | 1 | 0.29 | 0.34 | 0.28 | 0.3 | 0.15 | 0.2 | 0.28 | 0.21 | 0.22 | 0.19 | 0.23 | 0.2 | 0.18 | 0.22 | 0.19 | 0.26 | 0.29 | 0.25 | 0.25 | 0.23 | 0.38 | 0.23 | 0.28 |
| Tin | 5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Titanium [a] | NA | NA | 600 | 750 | 770 | 760 | 420 | 500 | 230 | 610 | 570 | 530 | 540 | 490 | 530 | 540 | 600 | 420 | 510 | 530 | 700 | 720 | 1140 | 660 | 770 |
| Tungsten | NA | NA | 1 | 0.9 | 1 | 0.9 | 0.1 | 0.4 | 1.1 | 0.1 | 1.1 | 0.1 | 0.7 | 0.4 | 0.3 | 0.7 | <0.1 | 0.7 | 0.9 | 0.3 | 0.4 | 0.2 | 0.3 | <0.1 | 0.2 |
| Uranium | 500 | 33 | 0.6 | 0.9 | 0.6 | 0.6 | 0.4 | 0.5 | 1.4 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 | 0.7 | 0.8 | 0.6 |
| Vanadium | 130 | NA | 26 | 19 | 24 | 17 | 12 | 12 | 146 | 15 | 14 | 12 | 14 | 11 | 12 | 13 | 14 | 14 | 14 | 14 | 17 | 15 | 23 | 17 | 15 |
| Yttrium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Zinc | 200 | 640 | 348 | 208.3 | 270.6 | 237.3 | 62.7 | 217.8 | 192.2 | 80.6 | 158.3 | 93.3 | 162.4 | 106.4 | 129.2 | 134.1 | 83.5 | 41.1 | 54.1 | 51.9 | 81.5 | 193.4 | 248.1 | 77 | 83.7 |
| Zirconium | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Notes:

[a] metal concentration was converted from % dry weight to mg/kg by multiplying by a factor of 10000

Shaded values indicate an exceedance of the Tier 1 soil contact guideline

Bolded values indicate an exceedance of the Tier 1 soil and food ingestion guideline

**Table B-2 (continued) Montague Mines – Tier 1 Ecological Soil Screen, Parsons et al. 2012 Data (mg/kg dw)**

| | Tier 1 Criteria | | Sampling Location | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Soil Contact** | **Soil and Food Ingestion** | **T13** | **T13** | **T14** | **T15** | **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** | **T5** | **T6** | **T7** | **T8** | **T9** | **T10** | **T11** | **T12** | **T13** | **T14** | **S28** |
| Aluminum [a] | NA | NA | 10400 | 11900 | 11400 | 12200 | 7100 | 11300 | 12700 | 6400 | 11200 | 6900 | 10700 | 10400 | 13700 | 16200 | 11500 | 11200 | 10800 | 10400 | 11300 | 6700 | 10800 | 8400 | 3400 |
| Antimony | 20 | NA | 1.52 | 4.11 | 2.86 | 18.23 | 60.36 | 15.61 | 17.9 | 22.73 | 36.5 | 24.14 | 21.46 | 16.69 | 22.87 | 25.4 | 12.34 | 13.11 | 38.36 | 21.39 | 6.57 | 23.67 | 2.56 | 1.72 | 2 |
| Arsenic | 17 | 380 | **1718.5** | **3421.6** | **2958.4** | **14736.9** | **40100** | **16900** | **19100** | **18900** | **16000** | **24500** | **17000** | **13900** | **17700** | **20500** | **9116.5** | **9199** | **26600** | **26600** | **5365** | **13000** | **1028.3** | **1001.3** | **1860** |
| Barium | 750 | 400 | 24 | 32.8 | 29.4 | 44.1 | 22.2 | 29.6 | 97.6 | 13.2 | 35.7 | 20.5 | 27.7 | 41.6 | 61.2 | 171 | 26.5 | 24.8 | 28.2 | 25.7 | 27 | 24.7 | 22.8 | 20.7 | 5.7 |
| Beryllium | 5 | NA | NA | NA | NA | NA | <0.1 | 0.3 | 0.3 | <0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.7 | 0.2 | 0.1 | 0.2 | 0.1 | 0.3 | 0.1 | 0.2 | 0.2 | NA |
| Bismuth | NA | NA | 0.25 | 0.65 | 0.61 | 1.57 | 2.69 | 1.17 | 1.94 | 1.32 | 2.09 | 1.32 | 1.08 | 0.95 | 1.89 | 4.13 | 0.84 | 0.7 | 1.71 | 1.13 | 0.8 | 1.59 | 0.86 | 0.17 | 3.99 |
| Boron | NA | NA | 1 | 2 | 1 | 2 | 3 | 1 | 5 | <1 | 1 | <1 | <1 | 1 | 1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <20 |
| Cadmium | 10 | 3.8 | 0.08 | 0.22 | 0.14 | 0.46 | 0.14 | 0.16 | 0.69 | 0.08 | 0.36 | 0.07 | 0.25 | 0.34 | 0.65 | 1.63 | 0.25 | 0.18 | 0.16 | 0.06 | 0.17 | 0.25 | 0.38 | 0.1 | 0.13 |
| Caesium | NA | NA | NA | NA | NA | NA | 2.53 | 3.31 | 3.05 | 0.91 | 2.87 | 2.58 | 3.14 | 2.6 | 3.41 | 3.54 | 3.02 | 2.8 | 3.49 | 3.22 | 3.34 | 1.96 | 2.9 | 1.97 | NA |
| Calcium [a] | NA | NA | 1900 | 1400 | 1400 | 6500 | 500 | 900 | 4200 | 600 | 900 | 300 | 800 | 2800 | 4100 | 4000 | 3300 | 2500 | 800 | 800 | 1300 | 400 | 1400 | 1200 | 200 |
| Cerium | NA | NA | NA | NA | NA | NA | 25.2 | 30.5 | 38.4 | 15.2 | 45.1 | 23.1 | 29.8 | 26.5 | 35.4 | 47.6 | 28.1 | 27.9 | 40.3 | 32 | 39.4 | 29.7 | 39.4 | 30 | NA |
| Chromium | 64 | NA | 12.3 | 14.4 | 14 | 15 | 9.5 | 11.7 | 13.3 | 8.4 | 13.8 | 8.8 | 11.8 | 10.6 | 14.2 | 16.2 | 12.6 | 12 | 12.6 | 12 | 13.1 | 10 | 11.2 | 11.7 | 2.4 |
| Cobalt | 20 | NA | 9.8 | 10.9 | 8.2 | 23.4 | 1.9 | 6.7 | 21.4 | 3.4 | 3.9 | 1.1 | 4.4 | 9.4 | 25.3 | 80.4 | 14.3 | 10.3 | 4.4 | 3.8 | 10.6 | 2.2 | 8.5 | 5.2 | 1.1 |
| Copper | 63 | 300 | 36.25 | 79.63 | 59.41 | 94.72 | 34.3 | 51.91 | 120.37 | 10.69 | 59.76 | 7.98 | 27.09 | 82.09 | 110.55 | 153.34 | 67.49 | 56.91 | 14.51 | 11.95 | 45.34 | 37.51 | 101.37 | 27.61 | 32.46 |
| Gallium | NA | NA | 3.2 | 3.7 | 3.2 | 3.5 | 3.1 | 3.4 | 4 | 2 | 3.4 | 2.6 | 3.3 | 3 | 4 | 3.6 | 3.3 | 3.2 | 3.3 | 3.3 | 3.4 | 2.6 | 3 | 2.5 | 1.1 |
| Germanium | NA | NA | NA | NA | NA | NA | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | NA |
| Gold | NA | NA | 0.278 | 0.2437 | 0.2318 | 0.409 | 2.3423 | 0.3216 | 0.6729 | 1.2832 | 0.5894 | 0.4721 | 0.2237 | 0.3494 | 0.6178 | 0.7489 | 0.207 | 0.2961 | 0.5665 | 0.2349 | 0.2483 | 2.7103 | 0.1364 | 0.0453 | 3.496 |
| Hafnium | NA | NA | NA | NA | NA | NA | 0.24 | 0.2 | 0.2 | 0.11 | 0.23 | 0.22 | 0.23 | 0.18 | 0.27 | 0.07 | 0.25 | 0.25 | 0.26 | 0.23 | 0.13 | 0.15 | 0.3 | 0.11 | NA |
| Indium | NA | NA | NA | NA | NA | NA | 0.05 | <0.02 | 0.03 | 0.03 | 0.06 | 0.02 | 0.02 | 0.03 | 0.04 | 0.08 | 0.02 | 0.02 | 0.05 | 0.03 | 0.02 | 0.04 | <0.02 | <0.02 | NA |
| Iron [a] | NA | NA | 24000 | 31600 | 27100 | 44600 | 60100 | 38800 | 53200 | 36000 | 55000 | 37800 | 41400 | 39000 | 51100 | 75400 | 35600 | 34400 | 53000 | 40800 | 31600 | 35800 | 25400 | 22700 | 10200 |
| Lanthium | NA | NA | 20.6 | 21.6 | 22 | 14.3 | 11.9 | 14 | 18.6 | 7 | 21.7 | 11.5 | 14.9 | 13.2 | 17.2 | 24.8 | 14 | 13.3 | 19.8 | 16 | 19.1 | 14.7 | 19.7 | 15.1 | 6 |
| Lead | 300 | 70 | 10.62 | 26.55 | 24.52 | **107.56** | **193.63** | **70.33** | **153.08** | 67.53 | **129.79** | 64.98 | 66.69 | 57.28 | **109.26** | **257.85** | 49.01 | 41.06 | **89.02** | 67.78 | 37.86 | 51.18 | 45.59 | 13.66 | **356.7** |
| Lithium | NA | NA | NA | NA | NA | NA | 12.3 | 21.4 | 25.7 | 11.9 | 17.2 | 10 | 17.9 | 19.8 | 26.5 | 23.9 | 23.5 | 22 | 16.9 | 17.3 | 21.6 | 11.2 | 21.4 | 18.4 | NA |
| Magnesium [a] | NA | NA | 7400 | 8100 | 7700 | 9700 | 4600 | 7400 | 8000 | 4600 | 7300 | 4800 | 7400 | 7200 | 9900 | 7900 | 8800 | 8300 | 7100 | 7000 | 7800 | 4500 | 7500 | 5700 | 1900 |
| Manganese | NA | NA | 411 | 344 | 316 | 1111 | 131 | 233 | 907 | 149 | 229 | 119 | 220 | 433 | 918 | 2506 | 562 | 374 | 195 | 199 | 370 | 133 | 317 | 232 | 76 |
| Mercury | 12 | NA | 0.45 | 1.512 | 0.703 | 2.861 | 2.328 | 0.909 | 3.146 | 0.499 | 1.648 | 1.153 | 1.05 | 0.917 | 3.164 | 6.559 | 1.188 | 0.778 | 1.086 | 3.416 | 0.656 | 6.23 | 0.751 | 0.484 | 69.953 |
| Molybdenum | 40 | NA | 0.08 | 0.1 | 0.1 | 0.22 | 0.95 | 0.31 | 0.5 | 1.43 | 0.75 | 0.36 | 0.35 | 0.27 | 0.35 | 0.75 | 0.2 | 0.27 | 0.53 | 0.32 | 0.16 | 0.51 | 0.08 | 0.38 | 0.35 |
| Nickel | 50 | 355 | 23.8 | 29.6 | 20.9 | 48.6 | 11.3 | 21.2 | 38.8 | 12.2 | 19.3 | 9.6 | 17.7 | 25.9 | 49 | 71.5 | 37.3 | 29.2 | 18.6 | 15.4 | 25.7 | 9 | 25.7 | 17.2 | 4.1 |
| Niobium | NA | NA | NA | NA | NA | NA | 0.39 | 0.16 | 0.55 | 0.48 | 0.31 | 0.29 | 0.27 | 0.3 | 0.39 | 0.7 | 0.22 | 0.22 | 0.41 | 0.27 | 0.38 | 0.3 | 0.18 | 0.22 | NA |
| Phosphorus [a] | NA | NA | 450 | 520 | 450 | 520 | 410 | 530 | 610 | 500 | 630 | 420 | 490 | 500 | 700 | 890 | 560 | 550 | 570 | 500 | 560 | 440 | 500 | 500 | 220 |
| Potassium [a] | NA | NA | 3200 | 3500 | 3000 | 3200 | 2700 | 3500 | 2500 | 1300 | 2900 | 3000 | 3400 | 2600 | 3400 | 2600 | 3500 | 3400 | 3500 | 3200 | 3100 | 2000 | 2800 | 2200 | 300 |
| Rhenium | NA | NA | NA | NA | NA | NA | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | NA |
| Rubidium | NA | NA | NA | NA | NA | NA | 22.1 | 29.4 | 22.7 | 9.1 | 24.7 | 21.5 | 26.8 | 21 | 26.2 | 20.7 | 25.9 | 26 | 29.1 | 28.2 | 29.5 | 15.2 | 23.5 | 18.1 | NA |
| Scandium | NA | NA | 1.1 | 1.3 | 1.2 | 1.4 | 1.2 | 1.3 | 1.5 | 0.7 | 1.4 | 0.8 | 1.3 | 1.1 | 1.6 | 2 | 1.3 | 1 | 1.2 | 1.1 | 1.2 | 0.9 | 1.1 | 0.8 | 0.2 |
| Selenium | 1 | 4.5 | 0.1 | 0.2 | 0.2 | 0.8 | 2.3 | 0.6 | 0.9 | 0.3 | 1.4 | 0.8 | 0.7 | 0.5 | 1 | 1.9 | 0.6 | 0.4 | 1 | 0.6 | 0.3 | 0.9 | <0.10 | <0.10 | 1.3 |
| Silver | 20 | NA | 0.034 | 0.101 | 0.083 | 0.251 | 0.465 | 0.186 | 0.404 | 0.367 | 0.289 | 0.21 | 0.145 | 0.133 | 0.307 | 0.67 | 0.123 | 0.11 | 0.204 | 0.141 | 0.106 | 0.336 | 0.16 | 0.025 | 0.914 |
| Sodium [a] | NA | NA | 20 | 30 | 30 | 30 | 20 | 20 | 60 | 10 | 20 | 20 | 20 | 70 | 50 | 110 | 20 | 40 | 20 | 20 | 20 | 20 | 20 | 30 | <10 |
| Strontium | NA | NA | 10.7 | 9.1 | 9.3 | 31.4 | 4.2 | 8 | 33.9 | 6.9 | 6.6 | 2.2 | 5.8 | 17.6 | 29.8 | 33.2 | 19.8 | 13.8 | 6.7 | 5.8 | 9.5 | 4.4 | 6.6 | 7.7 | 2.8 |
| Sulfur [a] | NA | NA | 100 | 100 | <100 | 3500 | 1800 | 400 | 1700 | 2000 | 1200 | 1700 | 800 | 2700 | 4100 | 1000 | 1900 | 2400 | 500 | 1000 | 400 | 2200 | 200 | 200 | <200 |
| Tantalum | NA | NA | NA | NA | NA | NA | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | NA |
| Tellurium | NA | NA | 0.14 | 0.37 | 0.33 | 1.68 | 4.31 | 1.37 | 2.35 | 0.56 | 2.6 | 1.88 | 1.62 | 1.27 | 1.99 | 3.63 | 0.96 | 0.93 | 2.27 | 1.37 | 0.71 | 1.61 | 0.13 | 0.1 | 0.04 |
| Thorium | NA | NA | 4.4 | 4.3 | 5 | 4.6 | 3.8 | 3.9 | 5.2 | 3.5 | 6.3 | 3.5 | 4.3 | 4.1 | 5.5 | 5.2 | 4.3 | 4.2 | 5.5 | 4.5 | 4.9 | 4.1 | 5.3 | 3.7 | 1.3 |
| Thallium | 1.4 | 1 | 0.19 | 0.24 | 0.24 | 0.26 | 0.3 | 0.28 | 0.27 | 0.09 | 0.3 | 0.24 | 0.29 | 0.22 | 0.32 | 0.38 | 0.26 | 0.25 | 0.32 | 0.27 | 0.27 | 0.19 | 0.22 | 0.15 | 0.15 |
| Tin | 5 | NA | NA | NA | NA | NA | 0.2 | 0.2 | 0.6 | 0.1 | 0.9 | 0.2 | 0.3 | 0.4 | 0.4 | 1.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.5 | 8.7 | 0.5 | NA |
| Titanium [a] | NA | NA | 560 | 680 | 600 | 610 | 470 | 630 | 680 | 260 | 510 | 500 | 550 | 480 | 680 | 530 | 550 | 530 | 600 | 560 | 610 | 340 | 510 | 390 | 100 |
| Tungsten | NA | NA | <0.1 | 0.4 | 0.2 | 1.1 | 1.6 | 0.5 | 0.9 | 2.1 | 3.3 | 0.3 | 0.1 | 0.6 | 1.8 | 0.8 | 0.7 | 0.9 | 2.2 | 0.4 | 0.3 | 1.4 | 0.1 | 0.2 | 0.5 |
| Uranium | 500 | 33 | 0.4 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.6 | 0.3 | 0.6 | 0.4 | 0.5 | 0.5 | 0.7 | 1.1 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.4 | 0.1 |
| Vanadium | 130 | NA | 13 | 16 | 16 | 18 | 13 | 14 | 21 | 6 | 18 | 13 | 16 | 16 | 21 | 49 | 16 | 15 | 19 | 17 | 20 | 13 | 14 | 12 | 11 |
| Yttrium | NA | NA | NA | NA | NA | NA | 1.7 | 2.84 | 4.08 | 2.51 | 2.74 | 1.03 | 2.15 | 2.48 | 3.64 | 6.14 | 2.7 | 2.25 | 2.39 | 1.99 | 2.7 | 1.59 | 2.61 | 2.1 | NA |
| Zinc | 200 | 640 | 75 | 128.8 | 79.7 | 228.4 | 38 | 68.9 | 207.5 | 39 | 65.6 | 33.4 | 59.4 | 119.2 | 240.7 | 396.5 | 151.2 | 109.3 | 57 | 51.9 | 89.1 | 47.4 | 176.1 | 55.7 | 35.6 |
| Zirconium | NA | NA | NA | NA | NA | NA | 8.1 | 7.7 | 9.7 | 4.1 | 10 | 8.6 | 8.8 | 8.6 | 12.5 | 6 | 9.6 | 9.3 | 9.1 | 9.5 | 7.6 | 8.3 | 12.6 | 5.2 | NA |

Notes:

[a] metal concentration was converted from % dry weight to mg/kg by multiplying by a factor of 10000

Shaded values indicate an exceedance of the Tier 1 soil contact guideline

Bolded values indicate an exceedance of the Tier 1 soil and food ingestion guideline

**Table B-3 Montague Mines - Tier 1 Human Health Soil Screen, Maritime Testing 2009 (mg/kg dw)**

| | | Sampling Location | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Tier 1 Guideline** | **MM-1** | **MM-1** | **MM-1** | **MM-2** | **MM-2** | **MM-2** | **MM-3** | **MM-4** | **MM-5** | **MM-6** | **MM-7** | **MM-7** | **MM-7** | **MM-8** | **MM-9** | **MM-10** | **MM-10** | **MM-10** | **MM-11** | **MM-11** | **MM-11** | **MM-12** | **MM-13** | **MM-14** |
| Arsenic (mg/kg) in <2 mm fraction | 31 | 16 | 18 | 7 | 66 | 34 | 24 | 32 | 3500 | 320 | NA | 220 | 290 | 390 | 4100 | 340 | 45 | 11 | 67 | 130 | 10 | 150 | 12 | 9 | 25 |
| Mercury (mg/kg) in <2 mm fraction | 6.6 | 0.14 | 0.19 | 0.04 | 0.08 | 0.25 | 0.04 | 3.6 | 7.6 | 1.6 | NA | 1.9 | 2.1 | 0.47 | 16 | 0.63 | 0.09 | 0.21 | 0.1 | 0.16 | 0.23 | 0.17 | 0.26 | 0.15 | 0.31 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Tier 1 Guideline** | **MM-15** | **MM-16** | **MM-17** | **MM-18** | **MM-19** | **MM-20** | **MM-21** | **MM-22** | **MM-23** | **MM-23** | **MM-23** | **MM-24** | **MM-25** | **MM-26** | **MM-26** | **MM-26** | **MM-27** | **MM-28** | **MM-28** | **MM-28** | **MM-29** | **MM-30** | **MM-31** | **MM-32** |
| Arsenic (mg/kg) in <2 mm fraction | 31 | 55 | 12 | 14 | 18 | 26 | 23 | 20 | 43 | 98 | 110 | 64 | 98 | 160 | 17 | 22 | 16 | 50 | 2100 | 1100 | 2200 | 77 | 31 | 40 | 270 |
| Mercury (mg/kg) in <2 mm fraction | 6.6 | 0.38 | 0.24 | 0.22 | 0.22 | 0.28 | 0.33 | 0.25 | 0.29 | 0.17 | 0.32 | 0.13 | 0.16 | 0.24 | 0.12 | 0.2 | 0.02 | 0.21 | 0.15 | 0.44 | 0.19 | 0.32 | 0.31 | 0.13 | 0.46 |

| | | Sampling Location | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Tier 1 Guideline** | **MM-33** | **MM-34** | **MM-35** | **MM-36** | **MM-37** | **MM-38** | **MM-39** | **MM-40** | **MM-41** | **MM-42** | **MM-43** | **MM-44** | **MM-45** | **MM-46** | **MM-47** | **MM-48** | **MM-49** | **MM-50** | **MM-51** | **MM-52** | **MM-53** | **MM-54** | **MM-55** | **MM-56** |
| Arsenic (mg/kg) in <2 mm fraction | 31 | 11000 | 220 | 610 | 580 | NA | 780 | 1200 | 330 | 2400 | 890 | 250 | 640 | NA | NA | 63 | 1000 | NA | 2500 | 1800 | 17000 | 2600 | 2600 | 12000 | 16 |
| Mercury (mg/kg) in <2 mm fraction | 6.6 | 1.1 | 0.48 | 0.2 | 0.7 | NA | 2.4 | 3.2 | 0.56 | 1.2 | 2.1 | 0.67 | 0.9 | NA | NA | 25 | 2.8 | NA | 4.4 | 0.94 | 0.58 | 0.3 | 8.1 | 1.1 | 0.16 |

| | | Sampling Location | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Tier 1 Guideline** | **MM-57** | **MM-58** | **MM-59** | **MM-60** | **MM-61** | **MM-62** | **MM-63** | **MM-64** | **MM-64** | **MM-64** | **MW-1** | **MW-1** | **MW-1** | **MW-1** | **MW-1** | **MW-1** | **MW-2** | **MW-2** | **MW-2** | **MW-2** | **MW-2** | **MW-3** | **MW-3** | **MW-3** | **MW-3** |
| Arsenic (mg/kg) in <2 mm fraction | 31 | 140 | 51 | 110 | 48 | 37 | 25 | 17 | 110 | 32 | 120 | 5300 | 1700 | 900 | 190 | 510 | 25 | 8900 | 30 | 290 | 120 | 76 | 2400 | 2800 | 1900 | 78 |
| Mercury (mg/kg) in <2 mm fraction | 6.6 | 0.15 | 0.38 | 0.17 | 0.37 | 0.4 | 0.33 | 0.28 | 0.22 | 0.27 | 0.16 | 0.7 | 4.4 | 0.41 | 0.04 | 0.22 | 0.03 | 3.3 | 0.07 | 0.09 | 0.05 | 0.05 | 0.96 | 1.9 | 0.69 | 0.03 |

Notes:

Shaded values indicate an exceedance of the Tier 1 criteria

**Table B-4 Montague Mines - Ecological Soil Screen, Maritime Testing 2009 (mg/kg dw)**

| | Tier 1 Guideline | | Sampling Location | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Soil Contact** | **Soil and Food Ingestion** | **MM-1** | **MM-1** | **MM-1** | **MM-2** | **MM-2** | **MM-2** | **MM-3** | **MM-4** | **MM-5** | **MM-6** | **MM-7** | **MM-7** | **MM-7** | **MM-8** | **MM-9** | **MM-10** | **MM-10** | **MM-10** |
| Arsenic (mg/kg) in <2 mm fraction | 17 | 380 | 16 | 18 | 7 | 66 | 34 | 24 | 32 | **3500** | 320 | NA | 220 | 290 | **390** | **4100** | 340 | 45 | 11 | 67 |
| Mercury (mg/kg) in <2 mm fraction | 12 | NA | 0.14 | 0.19 | 0.04 | 0.08 | 0.25 | 0.04 | 3.6 | 7.6 | 1.6 | NA | 1.9 | 2.1 | 0.47 | 16 | 0.63 | 0.09 | 0.21 | 0.1 |

| | Tier 1 Guideline | | Sampling Location | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Soil Contact** | **Soil and Food Ingestion** | **MM-11** | **MM-11** | **MM-11** | **MM-12** | **MM-13** | **MM-14** | **MM-15** | **MM-16** | **MM-17** | **MM-18** | **MM-19** | **MM-20** | **MM-21** | **MM-22** | **MM-23** | **MM-23** | **MM-23** | **MM-24** |
| Arsenic (mg/kg) in <2 mm fraction | 17 | 380 | 130 | 10 | 150 | 12 | 9 | 25 | 55 | 12 | 14 | 18 | 26 | 23 | 20 | 43 | 98 | 110 | 64 | 98 |
| Mercury (mg/kg) in <2 mm fraction | 12 | NA | 0.16 | 0.23 | 0.17 | 0.26 | 0.15 | 0.31 | 0.38 | 0.24 | 0.22 | 0.22 | 0.28 | 0.33 | 0.25 | 0.29 | 0.17 | 0.32 | 0.13 | 0.16 |

| | Tier 1 Guideline | | Sampling Location | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Soil Contact** | **Soil and Food Ingestion** | **MM-25** | **MM-26** | **MM-26** | **MM-26** | **MM-27** | **MM-28** | **MM-28** | **MM-28** | **MM-29** | **MM-30** | **MM-31** | **MM-32** | **MM-33** | **MM-34** | **MM-35** |
| Arsenic (mg/kg) in <2 mm fraction | 17 | 380 | 160 | 17 | 22 | 16 | 50 | **2100** | **1100** | **2200** | 77 | 31 | 40 | 270 | **11000** | 220 | **610** |
| Mercury (mg/kg) in <2 mm fraction | 12 | NA | 0.24 | 0.12 | 0.2 | 0.02 | 0.21 | 0.15 | 0.44 | 0.19 | 0.32 | 0.31 | 0.13 | 0.46 | 1.1 | 0.48 | 0.2 |

| | Tier 1 Guideline | | Sampling Location | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Soil Contact** | **Soil and Food Ingestion** | **MM-36** | **MM-37** | **MM-38** | **MM-39** | **MM-40** | **MM-41** | **MM-42** | **MM-43** | **MM-44** | **MM-45** | **MM-46** | **MM-47** | **MM-48** | **MM-49** | **MM-50** | **MM-51** | **MM-52** | **MM-53** |
| Arsenic (mg/kg) in <2 mm fraction | 17 | 380 | **580** | NA | **780** | **1200** | 330 | **2400** | **890** | 250 | **640** | NA | NA | 63 | **1000** | NA | **2500** | **1800** | **17000** | **2600** |
| Mercury (mg/kg) in <2 mm fraction | 12 | NA | 0.7 | NA | 2.4 | 3.2 | 0.56 | 1.2 | 2.1 | 0.67 | 0.9 | NA | NA | 25 | 2.8 | NA | 4.4 | 0.94 | 0.58 | 0.3 |

| | Tier 1 Guideline | | Sampling Location | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Soil Contact** | **Soil and Food Ingestion** | **MM-54** | **MM-55** | **MM-56** | **MM-57** | **MM-58** | **MM-59** | **MM-60** | **MM-61** | **MM-62** | **MM-63** | **MM-64** | **MM-64** | **MM-64** | **MW-1** | **MW-1** | **MW-1** | **MW-1** | **MW-1** |
| Arsenic (mg/kg) in <2 mm fraction | 17 | 380 | **2600** | **12000** | 16 | 140 | 51 | 110 | 48 | 37 | 25 | 17 | 110 | 32 | 120 | **5300** | **1700** | **900** | 190 | **510** |
| Mercury (mg/kg) in <2 mm fraction | 12 | NA | 8.1 | 1.1 | 0.16 | 0.15 | 0.38 | 0.17 | 0.37 | 0.4 | 0.33 | 0.28 | 0.22 | 0.27 | 0.16 | 0.7 | 4.4 | 0.41 | 0.04 | 0.22 |

| | Tier 1 Guideline | | Sampling Location | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Soil Contact** | **Soil and Food Ingestion** | **MW-1** | **MW-2** | **MW-2** | **MW-2** | **MW-2** | **MW-2** | **MW-3** | **MW-3** | **MW-3** | **MW-3** |
| Arsenic (mg/kg) in <2 mm fraction | 17 | 380 | 25 | **8900** | 30 | 290 | 120 | 76 | **2400** | **2800** | **1900** | 78 |
| Mercury (mg/kg) in <2 mm fraction | 12 | NA | 0.03 | 3.3 | 0.07 | 0.09 | 0.05 | 0.05 | 0.96 | 1.9 | 0.69 | 0.03 |

Notes:

Shaded values indicate an exceedance of the Tier 1 soil contact guideline

Bolded values indicate an exceedance of the Tier 1 soil and food ingestion guideline

**Table B-5 Montague Mines – Tier 2 Human Health Soil Screen, Parsons et al. 2012 (mg/kg dw)**

| | | Sampling Location | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Tier 2 Criteria** | **T1** | **T1** | **T2** | **T2** | **T3** | **T3** | **T4** | **T4** | **T5** | **T5** | **T6** | **T6** | **T6** | **T7** | **T7** | **T8** | **T10** | **T10** | **T11** | **T11** | **T11** | **T12** | **T12** |
| Aluminum | NA | 12900 | 15400 | 14200 | 14400 | 9400 | 10400 | 26400 | 11400 | 11000 | 10500 | 10800 | 9400 | 10300 | 10800 | 11300 | 7000 | 10100 | 10000 | 12400 | 12300 | 18300 | 11700 | 12100 |
| Antimony | NA | 21.6 | 19.1 | 21.77 | 21.89 | 7.09 | 14.82 | 2.85 | 3.25 | 23.23 | 6.29 | 23.06 | 22.18 | 8.2 | 16.75 | 1.8 | 102.1 | 37.75 | 32.05 | 12.38 | 3.63 | 5.35 | 2.45 | 2.8 |
| Arsenic | 750 | 20720.3 | 14298.8 | 25482.4 | 13674.2 | 7130.1 | 9580.4 | 5311.6 | 2061.4 | 18167.7 | 4282.1 | 20707.3 | 23681.9 | 6229.2 | 13946.1 | 2139.1 | 41298.8 | 31652.1 | 23249.1 | 9574.2 | 2372.6 | 5704.2 | 2690.8 | 2782.5 |
| Cobalt | NA | 37.4 | 25.4 | 33.8 | 22.1 | 4.3 | 18.8 | 75.6 | 8.6 | 21 | 12.1 | 22.7 | 24.2 | 17.3 | 17.4 | 8 | 2.3 | 3.3 | 3.4 | 9.7 | 16 | 23.1 | 7.6 | 18.3 |
| Iron | NA | 51200 | 44700 | 59800 | 44900 | 28000 | 32700 | 52200 | 26300 | 49100 | 27900 | 45600 | 45900 | 29100 | 36200 | 27200 | 70500 | 53200 | 47800 | 36700 | 29600 | 41600 | 28600 | 30300 |
| Lead | NA | 141.61 | 125.9 | 131.82 | 87.57 | 34.97 | 54.22 | 167.93 | 21.92 | 60.48 | 26.25 | 65.69 | 68.36 | 43.59 | 52.93 | 13.8 | 267.58 | 101.57 | 98.3 | 37.11 | 15.25 | 35.82 | 16.57 | 17.24 |
| Mercury | 29 | 4.034 | 8.392 | 3.537 | 3.177 | 0.245 | 2.243 | 6.684 | 1.916 | 1.243 | 0.873 | 1.392 | 1.585 | 1.498 | 1.058 | 1.029 | 3.224 | 1.388 | 1.573 | 0.454 | 0.746 | 1.807 | 0.166 | 1.584 |
| Vanadium | NA | 26 | 19 | 24 | 17 | 12 | 12 | 146 | 15 | 14 | 12 | 14 | 11 | 12 | 13 | 14 | 14 | 14 | 14 | 17 | 15 | 23 | 17 | 15 |

| | | Sampling Location | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Tier 2 Criteria** | **T13** | **T13** | **T14** | **T15** | **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** | **T5** | **T6** | **T7** | **T8** | **T9** | **T10** | **T11** | **T12** | **T13** | **T14** | **S28** |
| Aluminum | NA | 10400 | 11900 | 11400 | 12200 | 7100 | 11300 | 12700 | 6400 | 11200 | 6900 | 10700 | 10400 | 13700 | 16200 | 11500 | 11200 | 10800 | 10400 | 11300 | 6700 | 10800 | 8400 | 3400 |
| Antimony | NA | 1.52 | 4.11 | 2.86 | 18.23 | 60.36 | 15.61 | 17.9 | 22.73 | 36.5 | 24.14 | 21.46 | 16.69 | 22.87 | 25.4 | 12.34 | 13.11 | 38.36 | 21.39 | 6.57 | 23.67 | 2.56 | 1.72 | 2 |
| Arsenic | 750 | 1718.5 | 3421.6 | 2958.4 | 14736.9 | 40100 | 16900 | 19100 | 18900 | 16000 | 24500 | 17000 | 13900 | 17700 | 20500 | 9116.5 | 9199 | 26600 | 26600 | 5365 | 13000 | 1028.3 | 1001.3 | 1860 |
| Cobalt | NA | 9.8 | 10.9 | 8.2 | 23.4 | 1.9 | 6.7 | 21.4 | 3.4 | 3.9 | 1.1 | 4.4 | 9.4 | 25.3 | 80.4 | 14.3 | 10.3 | 4.4 | 3.8 | 10.6 | 2.2 | 8.5 | 5.2 | 1.1 |
| Iron | NA | 24000 | 31600 | 27100 | 44600 | 60100 | 38800 | 53200 | 36000 | 55000 | 37800 | 41400 | 39000 | 51100 | 75400 | 35600 | 34400 | 53000 | 40800 | 31600 | 35800 | 25400 | 22700 | 10200 |
| Lead | NA | 10.62 | 26.55 | 24.52 | 107.56 | 193.63 | 70.33 | 153.08 | 67.53 | 129.79 | 64.98 | 66.69 | 57.28 | 109.26 | 257.85 | 49.01 | 41.06 | 89.02 | 67.78 | 37.86 | 51.18 | 45.59 | 13.66 | 356.7 |
| Mercury | 29 | 0.45 | 1.512 | 0.703 | 2.861 | 2.328 | 0.909 | 3.146 | 0.499 | 1.648 | 1.153 | 1.05 | 0.917 | 3.164 | 6.559 | 1.188 | 0.778 | 1.086 | 3.416 | 0.656 | 6.23 | 0.751 | 0.484 | 69.953 |
| Vanadium | NA | 13 | 16 | 16 | 18 | 13 | 14 | 21 | 6 | 18 | 13 | 16 | 16 | 21 | 49 | 16 | 15 | 19 | 17 | 20 | 13 | 14 | 12 | 11 |

Notes:

[a] metal concentration was converted from % dry weight to mg/kg by multiplying by a factor of 10000

Shaded values indicate an exceedance of the Tier 2 criteria

**Table B-6 Montague Mines – Tier 2 Ecological Soil Screen, Parsons et al. 2012 (mg/kg dw)**

| Metal | Tier 2 Criteria | Sampling Location | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T1 | T2 | T2 | T3 | T3 | T4 | T4 | T5 | T5 | T6 | T6 | T6 |
| Antimony | NA | 21.6 | 19.1 | 21.77 | 21.89 | 7.09 | 14.82 | 2.85 | 3.25 | 23.23 | 6.29 | 23.06 | 22.18 | 8.2 |
| Arsenic | 139 | 20720.3 | 14298.8 | 25482.4 | 13674.2 | 7130.1 | 9580.4 | 5311.6 | 2061.4 | 18167.7 | 4282.1 | 20707.3 | 23681.9 | 6229.2 |
| Cobalt | NA | 37.4 | 25.4 | 33.8 | 22.1 | 4.3 | 18.8 | 75.6 | 8.6 | 21 | 12.1 | 22.7 | 24.2 | 17.3 |
| Copper | NA | 100.18 | 83.34 | 124.54 | 95.07 | 38.54 | 75.62 | 74.5 | 40.79 | 75.27 | 48.05 | 109.26 | 43.88 | 55.1 |
| Lead | NA | 141.61 | 125.9 | 131.82 | 87.57 | 34.97 | 54.22 | 167.93 | 21.92 | 60.48 | 26.25 | 65.69 | 68.36 | 43.59 |
| Mercury | 12.00 | 4.034 | 8.392 | 3.537 | 3.177 | 0.245 | 2.243 | 6.684 | 1.916 | 1.243 | 0.873 | 1.392 | 1.585 | 1.498 |
| Nickel | NA | 76.7 | 52.6 | 53.7 | 51.4 | 15 | 40 | 51.6 | 21.2 | 50 | 28.9 | 43.2 | 41.6 | 34.6 |
| Selenium | NA | 1 | 0.7 | 0.8 | 0.8 | 0.2 | 0.6 | 4.5 | 0.2 | 0.8 | 0.2 | 0.8 | 0.8 | 0.4 |
| Tin | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Vanadium | NA | 26 | 19 | 24 | 17 | 12 | 12 | 146 | 15 | 14 | 12 | 14 | 11 | 12 |
| Zinc | NA | 348 | 208.3 | 270.6 | 237.3 | 62.7 | 217.8 | 192.2 | 80.6 | 158.3 | 93.3 | 162.4 | 106.4 | 129.2 |

| Metal | Tier 2 Criteria | Sampling Location | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T7 | T7 | T8 | T10 | T10 | T11 | T11 | T11 | T12 | T12 | T13 | T13 | T14 | T15 | T1 | T2 | T3 | T4 |
| Antimony | NA | 16.75 | 1.8 | 102.1 | 37.75 | 32.05 | 12.38 | 3.63 | 5.35 | 2.45 | 2.8 | 1.52 | 4.11 | 2.86 | 18.23 | 60.36 | 15.61 | 17.9 | 22.73 |
| Arsenic | 139 | 13946.1 | 2139.1 | 41298.8 | 31652.1 | 23249.1 | 9574.2 | 2372.6 | 5704.2 | 2690.8 | 2782.5 | 1718.5 | 3421.6 | 2958.4 | 14736.9 | 40100 | 16900 | 19100 | 18900 |
| Cobalt | NA | 17.4 | 8 | 2.3 | 3.3 | 3.4 | 9.7 | 16 | 23.1 | 7.6 | 18.3 | 9.8 | 10.9 | 8.2 | 23.4 | 1.9 | 6.7 | 21.4 | 3.4 |
| Copper | NA | 76.37 | 30.66 | 33.59 | 31.23 | 18.62 | 30.41 | 45.28 | 74.87 | 25.18 | 105.97 | 36.25 | 79.63 | 59.41 | 94.72 | 34.3 | 51.91 | 120.37 | 10.69 |
| Lead | NA | 52.93 | 13.8 | 267.58 | 101.57 | 98.3 | 37.11 | 15.25 | 35.82 | 16.57 | 17.24 | 10.62 | 26.55 | 24.52 | 107.56 | 193.63 | 70.33 | 153.08 | 67.53 |
| Mercury | 12.00 | 1.058 | 1.029 | 3.224 | 1.388 | 1.573 | 0.454 | 0.746 | 1.807 | 0.166 | 1.584 | 0.45 | 1.512 | 0.703 | 2.861 | 2.328 | 0.909 | 3.146 | 0.499 |
| Nickel | NA | 36.2 | 23.8 | 11.4 | 17.1 | 16.9 | 23.2 | 53 | 61.5 | 22.5 | 29.9 | 23.8 | 29.6 | 20.9 | 48.6 | 11.3 | 21.2 | 38.8 | 12.2 |
| Selenium | NA | 0.6 | 0.1 | 3.1 | 1.2 | 1 | 0.3 | 0.1 | 0.3 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.8 | 2.3 | 0.6 | 0.9 | 0.3 |
| Tin | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.2 | 0.2 | 0.6 | 0.1 |
| Vanadium | NA | 13 | 14 | 14 | 14 | 14 | 17 | 15 | 23 | 17 | 15 | 13 | 16 | 16 | 18 | 13 | 14 | 21 | 6 |
| Zinc | NA | 134.1 | 83.5 | 41.1 | 54.1 | 51.9 | 81.5 | 193.4 | 248.1 | 77 | 83.7 | 75 | 128.8 | 79.7 | 228.4 | 38 | 68.9 | 207.5 | 39 |

| Metal | Tier 2 Criteria | Sampling Location | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 | T12 | T13 | T14 | S28 |
| Antimony | NA | 36.5 | 24.14 | 21.46 | 16.69 | 22.87 | 25.4 | 12.34 | 13.11 | 38.36 | 21.39 | 6.57 | 23.67 | 2.56 | 1.72 | 2 |
| Arsenic | 139 | 16000 | 24500 | 17000 | 13900 | 17700 | 20500 | 9116.5 | 9199 | 26600 | 26600 | 5365 | 13000 | 1028.3 | 1001.3 | 1860 |
| Cobalt | NA | 3.9 | 1.1 | 4.4 | 9.4 | 25.3 | 80.4 | 14.3 | 10.3 | 4.4 | 3.8 | 10.6 | 2.2 | 8.5 | 5.2 | 1.1 |
| Copper | NA | 59.76 | 7.98 | 27.09 | 82.09 | 110.55 | 153.34 | 67.49 | 56.91 | 14.51 | 11.95 | 45.34 | 37.51 | 101.37 | 27.61 | 32.46 |
| Lead | NA | 129.79 | 64.98 | 66.69 | 57.28 | 109.26 | 257.85 | 49.01 | 41.06 | 89.02 | 67.78 | 37.86 | 51.18 | 45.59 | 13.66 | 356.7 |
| Mercury | 12.00 | 1.648 | 1.153 | 1.05 | 0.917 | 3.164 | 6.559 | 1.188 | 0.778 | 1.086 | 3.416 | 0.656 | 6.23 | 0.751 | 0.484 | 69.953 |
| Nickel | NA | 19.3 | 9.6 | 17.7 | 25.9 | 49 | 71.5 | 37.3 | 29.2 | 18.6 | 15.4 | 25.7 | 9 | 25.7 | 17.2 | 4.1 |
| Selenium | NA | 1.4 | 0.8 | 0.7 | 0.5 | 1 | 1.9 | 0.6 | 0.4 | 1 | 0.6 | 0.3 | 0.9 | <0.1 | <0.1 | 1.3 |
| Tin | NA | 0.9 | 0.2 | 0.3 | 0.4 | 0.4 | 1.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.5 | 8.7 | 0.5 | NA |
| Vanadium | NA | 18 | 13 | 16 | 16 | 21 | 49 | 16 | 15 | 19 | 17 | 20 | 13 | 14 | 12 | 11 |
| Zinc | NA | 65.6 | 33.4 | 59.4 | 119.2 | 240.7 | 396.5 | 151.2 | 109.3 | 57 | 51.9 | 89.1 | 47.4 | 176.1 | 55.7 | 35.6 |

Notes:

[a] metal concentration was converted from % dry weight to mg/kg by multiplying by a factor of 10000

Shaded values indicate an exceedance of the Tier 2 criteria

**Table B-7 Montague Mines - Tier 2 Human Health Soil Screen, Maritime Testing 2009 (mg/kg dw)**

| | | Sample Location | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metal | Tier 2 Criteria | MM-2 | MM-2 | MM-3 | MM-4 | MM-5 | MM-7 | MM-7 | MM-7 | MM-8 | MM-9 | MM-10 | MM-10 | MM-11 | MM-11 | MM-15 | MM-22 | MM-23 | MM-23 | MM-23 | MM-24 |
| Arsenic (mg/kg) in <2 mm fraction | 750 | 66 | 34 | 32 | 3500 | 320 | 220 | 290 | 390 | 4100 | 340 | 45 | 67 | 130 | 150 | 55 | 43 | 98 | 110 | 64 | 98 |
| Mercury (mg/kg) in <2 mm fraction | 29 | 0.08 | 0.25 | 3.6 | 7.6 | 1.6 | 1.9 | 2.1 | 0.47 | 16 | 0.63 | 0.09 | 0.1 | 0.16 | 0.17 | 0.38 | 0.29 | 0.17 | 0.32 | 0.13 | 0.16 |

| | | Sample Location | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metal | Tier 2 Criteria | MM-25 | MM-27 | MM-28 | MM-28 | MM-28 | MM-29 | MM-31 | MM-32 | MM-33 | MM-34 | MM-35 | MM-36 | MM-38 | MM-39 | MM-40 | MM-41 | MM-42 | MM-43 | MM-44 | MM-47 |
| Arsenic (mg/kg) in <2 mm fraction | 750 | 160 | 50 | 2100 | 1100 | 2200 | 77 | 40 | 270 | 11000 | 220 | 610 | 580 | 780 | 1200 | 330 | 2400 | 890 | 250 | 640 | 63 |
| Mercury (mg/kg) in <2 mm fraction | 29 | 0.24 | 0.21 | 0.15 | 0.44 | 0.19 | 0.32 | 0.13 | 0.46 | 1.1 | 0.48 | 0.2 | 0.7 | 2.4 | 3.2 | 0.56 | 1.2 | 2.1 | 0.67 | 0.9 | 25 |

| | | Sample Location | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metal | Tier 2 Criteria | MM-48 | MM-50 | MM-51 | MM-52 | MM-53 | MM-54 | MM-55 | MM-57 | MM-58 | MM-59 | MM-60 | MM-61 | MM-64 | MM-64 | MM-64 | MW-1 | MW-1 | MW-1 | MW-1 | MW-1 |
| Arsenic (mg/kg) in <2 mm fraction | 750 | 1000 | 2500 | 1800 | 17000 | 2600 | 2600 | 12000 | 140 | 51 | 110 | 48 | 37 | 110 | 32 | 120 | 5300 | 1700 | 900 | 190 | 510 |
| Mercury (mg/kg) in <2 mm fraction | 29 | 2.8 | 4.4 | 0.94 | 0.58 | 0.3 | 8.1 | 1.1 | 0.15 | 0.38 | 0.17 | 0.37 | 0.4 | 0.22 | 0.27 | 0.16 | 0.7 | 4.4 | 0.41 | 0.04 | 0.22 |

| | | Sample Location | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Metal | Tier 2 Criteria | MW-2 | MW-2 | MW-2 | MW-2 | MW-3 | MW-3 | MW-3 | MW-3 |
| Arsenic (mg/kg) in <2 mm fraction | 750 | 8900 | 290 | 120 | 76 | 2400 | 2800 | 1900 | 78 |
| Mercury (mg/kg) in <2 mm fraction | 29 | 3.3 | 0.09 | 0.05 | 0.05 | 0.96 | 1.9 | 0.69 | 0.03 |

Notes:

Shaded values indicate an exceedance of the Tier 2 criteria

Only samples that exceeded Tier 1 guidelines are included in the Tier 2 screening

**Table B-8 Montague Mines - Ecological Soil Screen, Maritime Testing 2009 (mg/kg dw)**

| Metal | Tier 2 Criteria | Sampling Location | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MM-1 | MM-2 | MM-2 | MM-2 | MM-3 | MM-4 | MM-5 | MM-7 | MM-7 | MM-7 | MM-8 | MM-9 | MM-10 | MM-10 | MM-11 | MM-11 | MM-14 | MM-15 | MM-18 | MM-19 |
| Arsenic (mg/kg) in <2 mm fraction | 139 | 18 | 66 | 34 | 24 | 32 | 3500 | 320 | 220 | 290 | 390 | 4100 | 340 | 45 | 67 | 130 | 150 | 25 | 55 | 18 | 26 |
| Mercury (mg/kg) in <2 mm fraction | 12 | 0.19 | 0.08 | 0.25 | 0.04 | 3.6 | 7.6 | 1.6 | 1.9 | 2.1 | 0.47 | 16 | 0.63 | 0.09 | 0.1 | 0.16 | 0.17 | 0.31 | 0.38 | 0.22 | 0.28 |

| Metal | Tier 2 Criteria | Sampling Location | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MM-20 | MM-21 | MM-22 | MM-23 | MM-23 | MM-23 | MM-24 | MM-25 | MM-26 | MM-27 | MM-28 | MM-28 | MM-28 | MM-29 | MM-30 | MM-31 | MM-32 | MM-33 | MM-34 | MM-35 |
| Arsenic (mg/kg) in <2 mm fraction | 139 | 23 | 20 | 43 | 98 | 110 | 64 | 98 | 160 | 22 | 50 | 2100 | 1100 | 2200 | 77 | 31 | 40 | 270 | 11000 | 220 | 610 |
| Mercury (mg/kg) in <2 mm fraction | 12 | 0.33 | 0.25 | 0.29 | 0.17 | 0.32 | 0.13 | 0.16 | 0.24 | 0.2 | 0.21 | 0.15 | 0.44 | 0.19 | 0.32 | 0.31 | 0.13 | 0.46 | 1.1 | 0.48 | 0.2 |

| Metal | Tier 2 Criteria | Sampling Location | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MM-36 | MM-38 | MM-39 | MM-40 | MM-41 | MM-42 | MM-43 | MM-44 | MM-47 | MM-48 | MM-50 | MM-51 | MM-52 | MM-53 | MM-54 | MM-55 | MM-57 | MM-58 | MM-59 | MM-60 |
| Arsenic (mg/kg) in <2 mm fraction | 139 | 580 | 780 | 1200 | 330 | 2400 | 890 | 250 | 640 | 63 | 1000 | 2500 | 1800 | 17000 | 2600 | 2600 | 12000 | 140 | 51 | 110 | 48 |
| Mercury (mg/kg) in <2 mm fraction | 12 | 0.7 | 2.4 | 3.2 | 0.56 | 1.2 | 2.1 | 0.67 | 0.9 | 25 | 2.8 | 4.4 | 0.94 | 0.58 | 0.3 | 8.1 | 1.1 | 0.15 | 0.38 | 0.17 | 0.37 |

| Metal | Tier 2 Criteria | Sampling Location | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MM-61 | MM-62 | MM-64 | MM-64 | MM-64 | MW-1 | MW-1 | MW-1 | MW-1 | MW-1 | MW-1 | MW-2 | MW-2 | MW-2 | MW-2 | MW-2 | MW-3 | MW-3 | MW-3 | MW-3 |
| Arsenic (mg/kg) in <2 mm fraction | 139 | 37 | 25 | 110 | 32 | 120 | 5300 | 1700 | 900 | 190 | 510 | 25 | 8900 | 30 | 290 | 120 | 76 | 2400 | 2800 | 1900 | 78 |
| Mercury (mg/kg) in <2 mm fraction | 12 | 0.4 | 0.33 | 0.22 | 0.27 | 0.16 | 0.7 | 4.4 | 0.41 | 0.04 | 0.22 | 0.03 | 3.3 | 0.07 | 0.09 | 0.05 | 0.05 | 0.96 | 1.9 | 0.69 | 0.03 |

Notes:

Shaded values indicate an exceedance of the Tier 2 criteria

Only samples that exceeded Tier 1 guidelines are included in the Tier 2 screening

**Table B-9 Montague Mines - Tier 1 Human Health Soil Screen, 2018 Data**

| | | Sampling Location | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Tier 1 Criteria** | **M-C1 (0-5cm)** | **M-C2 (0-5cm)** | **M-C3 (0-5cm)** | **M-C4 (0-10cm)** | **M-C5 (2.5-10cm)** | **M-SW9-CORE (0-7.5cm)** | **M-C11 (2.5-10cm)** | **M-C13 (2.5-10cm)** | **M-C17 (2.5-10cm)** | **M-C18 (0-2.5cm)** | **M-C19 (0-5cm)** | **M-SFC-T2** | **M-SFC-T3** | **M-SFC-T7** | **M-SFC-T9** |
| Aluminum | 15400 | 14000 | 12000 | 23000 | 14000 | 15000 | 16000 | 11000 | 9000 | 6900 | 14000 | 12000 | 16000 | 16000 | 14000 | 15000 |
| Antimony | 7.5 | 7.1 | 10 | 3.1 | 15 | 16 | <0.80 | <0.80 | 3.3 | 10 | <0.80 | 3.3 | 6.7 | 4.8 | 18 | 11 |
| Arsenic | 31 | 2100 | 5400 | 5400 | 11000 | 14000 | 56 | 550 | 130 | 6100 | 580 | 3800 | 2500 | 1600 | 12000 | 6600 |
| Barium | 10000 | 81 | 57 | 440 | 470 | 76 | 41 | 85 | 66 | 34 | 93 | 78 | 83 | 82 | 75 | 58 |
| Beryllium | 38 | 0.57 | 0.33 | 1.7 | 0.75 | 0.33 | 1.5 | 0.81 | 0.42 | 0.16 | 0.56 | 0.81 | 0.43 | 0.41 | 0.37 | 0.59 |
| Bismuth | NA | 1.5 | 2 | 1.2 | 2 | 1.9 | 0.54 | 0.25 | 2.9 | 2.2 | 0.29 | 1.7 | 1.1 | 1.2 | 2.5 | 1.7 |
| Cadmium | 14 | 0.93 | 0.33 | 4 | 2.7 | 0.38 | 0.31 | 1.3 | 0.83 | 0.16 | 2.1 | 2.9 | 0.33 | 0.22 | 0.52 | 0.93 |
| Calcium | NA | 3500 | 1900 | 6700 | 2800 | 5600 | 980 | 7700 | 7200 | 1100 | 5200 | 2900 | 3100 | 1800 | 2500 | 2200 |
| Chromium | 220 | 33 | 14 | 18 | 56 | 27 | 77 | 7 | 36 | 8.8 | 26 | 13 | 19 | 35 | 18 | 17 |
| Cobalt | 22 | 32 | 11 | 120 | 88 | 25 | 16 | 39 | 4.2 | 5.8 | 22 | 28 | 21 | 12 | 25 | 25 |
| Copper | 1100 | 130 | 95 | 93 | 130 | 88 | 19 | 25 | 110 | 50 | 46 | 120 | 75 | 79 | 120 | 120 |
| Iron | 11000 | 38000 | 30000 | 77000 | 58000 | 51000 | 21000 | 14000 | 9900 | 31000 | 32000 | 23000 | 38000 | 37000 | 48000 | 41000 |
| Lead | 140 | 83 | 80 | 110 | 120 | 88 | 69 | 37 | 170 | 120 | 78 | 100 | 35 | 40 | 140 | 82 |
| Lithium | NA | 19 | 20 | 15 | 18 | 22 | 16 | 4.5 | <2.00 | 9.5 | 13 | 10 | 25 | 24 | 21 | 21 |
| Magnesium | NA | 7300 | 6600 | 4000 | 6500 | 10000 | 2200 | 1600 | 1100 | 3800 | 4600 | 3300 | 9900 | 9500 | 8600 | 7600 |
| Manganese | NA | 1200 | 480 | 35000 | 21000 | 1200 | 1300 | 860 | 210 | 260 | 670 | 940 | 590 | 390 | 1300 | 700 |
| Mercury | 6.6 | 8.3 | 27 | 4.4 | 4 | 4.5 | 0.42 | 1.1 | 35 | 28 | 0.26 | 15 | 3.8 | 3.3 | 8 | 6 |
| Molybdenum | 110 | 0.46 | 0.47 | 7.3 | 2 | 0.24 | 1.6 | 1.1 | 0.4 | 0.66 | 1.1 | 1.2 | 0.22 | 0.17 | 0.38 | 0.85 |
| Nickel | 330 | 70 | 27 | 130 | 120 | 53 | 16 | 49 | 17 | 14 | 36 | 41 | 52 | 35 | 59 | 47 |
| Potassium | NA | 2600 | 3300 | 2100 | 2800 | 4900 | 850 | 970 | 380 | 1800 | 1400 | 1500 | 6400 | 6400 | 4500 | 4100 |
| Selenium | 80 | 0.91 | 0.72 | 4.3 | 1.6 | <0.70 | 1.8 | 2 | 2.9 | <0.70 | 1.1 | 1.8 | <0.70 | <0.70 | 0.88 | 1.2 |
| Silver | 77 | 0.36 | 0.38 | 0.27 | 0.36 | 0.26 | 0.15 | 0.13 | 0.55 | 0.47 | 0.13 | 0.44 | 0.15 | 0.13 | 0.32 | 0.29 |
| Strontium | 9400 | 16 | 11 | 34 | 21 | 37 | 9.2 | 40 | 34 | 11 | 25 | 16 | 15 | 13 | 18 | 13 |
| Sulphur | NA | 640 | 4200 | 2000 | 4300 | 3000 | 1200 | 7800 | 4000 | 900 | 4500 | 4000 | 1500 | 350 | 5600 | 4400 |
| Thallium | 1 | 0.25 | 0.2 | 0.44 | 0.6 | 0.32 | 0.17 | 0.059 | 0.069 | 0.16 | 0.24 | 0.33 | 0.38 | 0.36 | 0.35 | 0.34 |
| Tin | 9400 | 1.1 | <0.50 | 1.5 | 0.79 | <0.50 | 2.3 | <0.50 | <0.50 | <0.50 | 1 | 1 | 0.51 | 0.52 | 0.54 | 0.65 |
| Titanium | NA | 620 | 410 | 310 | 500 | 750 | 470 | 140 | 71 | 260 | 290 | 240 | 830 | 860 | 740 | 690 |
| Uranium | 23 | 0.6 | 0.48 | 1.5 | 0.67 | 0.44 | 3.5 | 0.76 | 0.82 | 0.35 | 0.71 | 0.85 | 0.65 | 0.69 | 0.48 | 0.68 |
| Vanadium | 39 | 30 | 15 | 140 | 37 | 21 | 61 | 16 | 5.9 | 10 | 120 | 43 | 23 | 22 | 21 | 42 |
| Yttrium | NA | 6 | 4 | 15 | 6.5 | 4.8 | 9.8 | 32 | 8.2 | 1.9 | 10 | 9.1 | 5 | 5.2 | 4 | 6.1 |
| Zinc | 5600 | 350 | 140 | 370 | 430 | 210 | 50 | 87 | 200 | 46 | 280 | 240 | 150 | 120 | 220 | 190 |

Notes:

Shaded values indicate an exceedance of the Tier 1 criteria

**Table B-9 (continued) Montague Mines - Tier 1 Human Health Soil Screen, 2018 Data**

| | | Sampling Location | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metal** | **Tier 1 Criteria** | **M-SFC-12** | **M-SFC-13** | **M-SFC-T14** | **M-SFC-15** | **M-SFC-T17** | **M-SFC-T20** | **M-SFC-T23** | **M-SFC-T25** | **M-SFC-T26** | **M-SFC-T27** | **M-SFC-T28AHP** | **M-SFC-T30** | **M-SFC-T32** | **M-SFC-T35** | **M-SFC SOIL C.MOORE** |
| Aluminum | 15400 | 13000 | 14000 | 14000 | 15000 | 11000 | 14000 | 13000 | 14000 | 10000 | 6300 | 6800 | 13000 | 13000 | 12000 | 11000 |
| Antimony | 7.5 | 19 | 20 | 8.1 | 10 | 11 | 2.4 | 5.3 | 5 | 14 | 67 | 97 | 4 | 22 | 5.8 | 4.1 |
| Arsenic | 31 | 10000 | 12000 | 4200 | 6400 | 5400 | 1500 | 3900 | 3000 | 9400 | 37000 | 54000 | 2300 | 15000 | 4300 | 2900 |
| Barium | 10000 | 100 | 89 | 79 | 74 | 47 | 59 | 55 | 66 | 36 | 37 | 33 | 54 | 61 | 51 | 69 |
| Beryllium | 38 | 0.44 | 0.42 | 0.46 | 0.41 | 0.24 | 0.31 | 0.3 | 0.36 | 0.16 | 0.12 | 0.12 | 0.32 | 0.33 | 0.3 | 0.31 |
| Bismuth | NA | 2 | 2 | 1.6 | 1.4 | 1 | 0.69 | 0.79 | 0.93 | 1 | 4.3 | 6.7 | 0.66 | 2.1 | 0.85 | 1.2 |
| Cadmium | 14 | 0.73 | 0.34 | 0.29 | 0.33 | 0.2 | 0.17 | 0.19 | 0.16 | 0.13 | 0.085 | 0.085 | 0.14 | 0.45 | 0.21 | 0.21 |
| Calcium | NA | 3300 | 4900 | 2300 | 3000 | 1400 | 2400 | 3100 | 2600 | 920 | 99 | 350 | 5600 | 5400 | 5500 | 1400 |
| Chromium | 220 | 48 | 24 | 20 | 23 | 57 | 61 | 52 | 29 | 32 | 44 | 12 | 50 | 37 | 47 | 13 |
| Cobalt | 22 | 30 | 30 | 20 | 25 | 5.8 | 13 | 13 | 17 | 4.6 | 1.3 | 1.7 | 11 | 23 | 20 | 11 |
| Copper | 1100 | 97 | 82 | 70 | 78 | 64 | 62 | 56 | 60 | 17 | 38 | 43 | 42 | 110 | 58 | 44 |
| Iron | 11000 | 43000 | 45000 | 35000 | 41000 | 34000 | 33000 | 35000 | 34000 | 36000 | 60000 | 79000 | 30000 | 51000 | 34000 | 29000 |
| Lead | 140 | 100 | 100 | 90 | 78 | 46 | 21 | 29 | 31 | 49 | 200 | 360 | 18 | 110 | 29 | 120 |
| Lithium | NA | 20 | 23 | 23 | 24 | 18 | 22 | 21 | 24 | 14 | 6.7 | 7.4 | 22 | 22 | 20 | 18 |
| Magnesium | NA | 8300 | 9900 | 8400 | 9600 | 6900 | 8700 | 8500 | 8500 | 6500 | 3500 | 3700 | 9600 | 9300 | 9500 | 5000 |
| Manganese | NA | 2300 | 830 | 490 | 620 | 200 | 440 | 490 | 450 | 190 | 95 | 90 | 660 | 670 | 690 | 440 |
| Mercury | 6.6 | 4.1 | 6.1 | 6.4 | 4.7 | 17 | 0.81 | 0.67 | 2.8 | 0.6 | 5.4 | 3.8 | 0.82 | 4.8 | 0.74 | 46 |
| Molybdenum | 110 | 0.66 | 0.31 | 0.18 | 0.22 | 0.36 | 0.24 | 0.25 | 0.19 | 0.4 | 0.89 | 1.2 | 0.2 | 0.38 | 0.26 | 0.6 |
| Nickel | 330 | 63 | 54 | 39 | 47 | 21 | 34 | 35 | 39 | 16 | 9.3 | 9.7 | 32 | 50 | 45 | 21 |
| Potassium | NA | 3900 | 5400 | 4600 | 5700 | 3600 | 5900 | 5200 | 5400 | 3800 | 3500 | 3600 | 5400 | 4800 | 5000 | 2700 |
| Selenium | 80 | 0.91 | 0.83 | <0.70 | <0.70 | <0.70 | <0.70 | <0.70 | <0.70 | <0.70 | 2.2 | 3 | <0.70 | 0.85 | <0.70 | <0.70 |
| Silver | 77 | 0.29 | 0.29 | 0.23 | 0.23 | 0.24 | 0.084 | 0.093 | 0.096 | 0.11 | 0.53 | 0.95 | 0.06 | 0.3 | 0.1 | 0.36 |
| Strontium | 9400 | 16 | 23 | 14 | 17 | 9.9 | 16 | 18 | 17 | 7.4 | 2.4 | 3.6 | 22 | 26 | 22 | 11 |
| Sulphur | NA | 6400 | 6100 | 2100 | 3100 | 260 | 160 | 95 | 570 | 270 | 1900 | 2800 | 350 | 6100 | 2000 | 250 |
| Thallium | 1 | 0.31 | 0.32 | 0.27 | 0.34 | 0.23 | 0.31 | 0.28 | 0.33 | 0.22 | 0.34 | 0.34 | 0.26 | 0.3 | 0.25 | 0.16 |
| Tin | 9400 | 0.54 | <0.50 | <0.50 | <0.50 | 0.5 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 1.9 |
| Titanium | NA | 600 | 640 | 550 | 730 | 630 | 850 | 740 | 780 | 570 | 600 | 600 | 630 | 680 | 650 | 370 |
| Uranium | 23 | 0.47 | 0.5 | 0.56 | 0.54 | 0.35 | 0.44 | 0.41 | 0.56 | 0.31 | 0.26 | 0.25 | 0.37 | 0.42 | 0.32 | 0.58 |
| Vanadium | 39 | 22 | 20 | 19 | 20 | 16 | 18 | 18 | 19 | 14 | 11 | 11 | 17 | 20 | 16 | 17 |
| Yttrium | NA | 4.7 | 4.7 | 4.1 | 4.8 | 3.2 | 3.7 | 3.9 | 4.4 | 2.8 | 1.1 | 1.1 | 4 | 4 | 3.8 | 3.6 |
| Zinc | 5600 | 240 | 180 | 150 | 180 | 89 | 120 | 120 | 95 | 48 | 31 | 32 | 95 | 220 | 130 | 63 |

Notes:

Shaded values indicate an exceedance of the Tier 1 criteria

**Table B-10 Montague Mines - Tier 1 Ecological Soil Screen, 2018 Data**

| | Tier 1 Criteria | | Sampling Location | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metal | Soil Contact | Soil and Food Ingestion | M-C1 (0-5cm) | M-C2 (0-5cm) | M-C3 (0-5cm) | M-C4 (0-10cm) | M-C5 (2.5-10cm) | M-SW9-CORE (0-7.5cm) | M-C11 (2.5-10cm) | M-C13 (2.5-10cm) | M-C17 (2.5-10cm) | M-C18 (0-2.5cm) | M-C19 (0-5cm) | M-SFC-T2 | M-SFC-T3 | M-SFC-T7 | M-SFC-T9 |
| Aluminum | NA | NA | 14000 | 12000 | 23000 | 14000 | 15000 | 16000 | 11000 | 9000 | 6900 | 14000 | 12000 | 16000 | 16000 | 14000 | 15000 |
| Antimony | 20 | NA | 7.1 | 10 | 3.1 | 15 | 16 | <0.80 | <0.80 | 3.3 | 10 | <0.80 | 3.3 | 6.7 | 4.8 | 18 | 11 |
| Arsenic | 17 | 380 | **2100** | **5400** | **5400** | **11000** | **14000** | 56 | **550** | 130 | **6100** | **580** | **3800** | **2500** | **1600** | **12000** | **6600** |
| Barium | 750 | 400 | 81 | 57 | **440** | **470** | 76 | 41 | 85 | 66 | 34 | 93 | 78 | 83 | 82 | 75 | 58 |
| Beryllium | 5 | NA | 0.57 | 0.33 | 1.7 | 0.75 | 0.33 | 1.5 | 0.81 | 0.42 | 0.16 | 0.56 | 0.81 | 0.43 | 0.41 | 0.37 | 0.59 |
| Bismuth | NA | NA | 1.5 | 2 | 1.2 | 2 | 1.9 | 0.54 | 0.25 | 2.9 | 2.2 | 0.29 | 1.7 | 1.1 | 1.2 | 2.5 | 1.7 |
| Cadmium | 10 | 3.8 | 0.93 | 0.33 | **4** | 2.7 | 0.38 | 0.31 | 1.3 | 0.83 | 0.16 | 2.1 | 2.9 | 0.33 | 0.22 | 0.52 | 0.93 |
| Calcium | NA | NA | 3500 | 1900 | 6700 | 2800 | 5600 | 980 | 7700 | 7200 | 1100 | 5200 | 2900 | 3100 | 1800 | 2500 | 2200 |
| Chromium | 64 | NA | 33 | 14 | 18 | 56 | 27 | 77 | 7 | 36 | 8.8 | 26 | 13 | 19 | 35 | 18 | 17 |
| Cobalt | 20 | NA | 32 | 11 | 120 | 88 | 25 | 16 | 39 | 4.2 | 5.8 | 22 | 28 | 21 | 12 | 25 | 25 |
| Copper | 63 | 300 | 130 | 95 | 93 | 130 | 88 | 19 | 25 | 110 | 50 | 46 | 120 | 75 | 79 | 120 | 120 |
| Iron | NA | NA | 38000 | 30000 | 77000 | 58000 | 51000 | 21000 | 14000 | 9900 | 31000 | 32000 | 23000 | 38000 | 37000 | 48000 | 41000 |
| Lead | 300 | 70 | **83** | **80** | **110** | **120** | **88** | 69 | 37 | **170** | **120** | **78** | **100** | 35 | 40 | **140** | **82** |
| Lithium | NA | NA | 19 | 20 | 15 | 18 | 22 | 16 | 4.5 | <2.00 | 9.5 | 13 | 10 | 25 | 24 | 21 | 21 |
| Magnesium | NA | NA | 7300 | 6600 | 4000 | 6500 | 10000 | 2200 | 1600 | 1100 | 3800 | 4600 | 3300 | 9900 | 9500 | 8600 | 7600 |
| Manganese | NA | NA | 1200 | 480 | 35000 | 21000 | 1200 | 1300 | 860 | 210 | 260 | 670 | 940 | 590 | 390 | 1300 | 700 |
| Mercury | 12 | NA | 8.3 | 27 | 4.4 | 4 | 4.5 | 0.42 | 1.1 | 35 | 28 | 0.26 | 15 | 3.8 | 3.3 | 8 | 6 |
| Molybdenum | 40 | NA | 0.46 | 0.47 | 7.3 | 2 | 0.24 | 1.6 | 1.1 | 0.4 | 0.66 | 1.1 | 1.2 | 0.22 | 0.17 | 0.38 | 0.85 |
| Nickel | 50 | 355 | 70 | 27 | 130 | 120 | 53 | 16 | 49 | 17 | 14 | 36 | 41 | 52 | 35 | 59 | 47 |
| Potassium | NA | NA | 2600 | 3300 | 2100 | 2800 | 4900 | 850 | 970 | 380 | 1800 | 1400 | 1500 | 6400 | 6400 | 4500 | 4100 |
| Selenium | 1 | 4.5 | 0.91 | 0.72 | 4.3 | 1.6 | <0.70 | 1.8 | 2 | 2.9 | <0.70 | 1.1 | 1.8 | <0.70 | <0.70 | 0.88 | 1.2 |
| Silver | 20 | NA | 0.36 | 0.38 | 0.27 | 0.36 | 0.26 | 0.15 | 0.13 | 0.55 | 0.47 | 0.13 | 0.44 | 0.15 | 0.13 | 0.32 | 0.29 |
| Strontium | NA | NA | 16 | 11 | 34 | 21 | 37 | 9.2 | 40 | 34 | 11 | 25 | 16 | 15 | 13 | 18 | 13 |
| Sulphur | NA | NA | 640 | 4200 | 2000 | 4300 | 3000 | 1200 | 7800 | 4000 | 900 | 4500 | 4000 | 1500 | 350 | 5600 | 4400 |
| Thallium | 1.4 | 1 | 0.25 | 0.2 | 0.44 | 0.6 | 0.32 | 0.17 | 0.059 | 0.069 | 0.16 | 0.24 | 0.33 | 0.38 | 0.36 | 0.35 | 0.34 |
| Tin | 5 | NA | 1.1 | <0.50 | 1.5 | 0.79 | <0.50 | 2.3 | <0.50 | <0.50 | <0.50 | 1 | 1 | 0.51 | 0.52 | 0.54 | 0.65 |
| Titanium | NA | NA | 620 | 410 | 310 | 500 | 750 | 470 | 140 | 71 | 260 | 290 | 240 | 830 | 860 | 740 | 690 |
| Uranium | 500 | 33 | 0.6 | 0.48 | 1.5 | 0.67 | 0.44 | 3.5 | 0.76 | 0.82 | 0.35 | 0.71 | 0.85 | 0.65 | 0.69 | 0.48 | 0.68 |
| Vanadium | 130 | NA | 30 | 15 | 140 | 37 | 21 | 61 | 16 | 5.9 | 10 | 120 | 43 | 23 | 22 | 21 | 42 |
| Yttrium | NA | NA | 6 | 4 | 15 | 6.5 | 4.8 | 9.8 | 32 | 8.2 | 1.9 | 10 | 9.1 | 5 | 5.2 | 4 | 6.1 |
| Zinc | 200 | 640 | 350 | 140 | 370 | 430 | 210 | 50 | 87 | 200 | 46 | 280 | 240 | 150 | 120 | 220 | 190 |

Notes:

Shaded values indicate an exceedance of the Tier 1 soil contact guideline

Bolded values indicate an exceedance of the Tier 1 soil and food ingestion guideline

**Table B-10 (continued) Montague Mines - Tier 1 Ecological Soil Screen, 2018 Data**

| | Tier 1 Criteria | | Sampling Location | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metal | Soil Contact | Soil and Food Ingestion | M-SFC-12 | M-SFC-13 | M-SFC-T14 | M-SFC-15 | M-SFC-T17 | M-SFC-T20 | M-SFC-T23 | M-SFC-T25 | M-SFC-T26 | M-SFC-T27 | M-SFC-T28AHP | M-SFC-T30 | M-SFC-T32 | M-SFC-T35 | M-SFC SOIL C.MOORE |
| Aluminum | NA | NA | 13000 | 14000 | 14000 | 15000 | 11000 | 14000 | 13000 | 14000 | 10000 | 6300 | 6800 | 13000 | 13000 | 12000 | 11000 |
| Antimony | 20 | NA | 19 | 20 | 8.1 | 10 | 11 | 2.4 | 5.3 | 5 | 14 | 67 | 97 | 4 | 22 | 5.8 | 4.1 |
| Arsenic | 17 | 380 | **10000** | **12000** | **4200** | **6400** | **5400** | **1500** | **3900** | **3000** | **9400** | **37000** | **54000** | **2300** | **15000** | **4300** | **2900** |
| Barium | 750 | 400 | 100 | 89 | 79 | 74 | 47 | 59 | 55 | 66 | 36 | 37 | 33 | 54 | 61 | 51 | 69 |
| Beryllium | 5 | NA | 0.44 | 0.42 | 0.46 | 0.41 | 0.24 | 0.31 | 0.3 | 0.36 | 0.16 | 0.12 | 0.12 | 0.32 | 0.33 | 0.3 | 0.31 |
| Bismuth | NA | NA | 2 | 2 | 1.6 | 1.4 | 1 | 0.69 | 0.79 | 0.93 | 1 | 4.3 | 6.7 | 0.66 | 2.1 | 0.85 | 1.2 |
| Cadmium | 10 | 3.8 | 0.73 | 0.34 | 0.29 | 0.33 | 0.2 | 0.17 | 0.19 | 0.16 | 0.13 | 0.085 | 0.085 | 0.14 | 0.45 | 0.21 | 0.21 |
| Calcium | NA | NA | 3300 | 4900 | 2300 | 3000 | 1400 | 2400 | 3100 | 2600 | 920 | 99 | 350 | 5600 | 5400 | 5500 | 1400 |
| Chromium | 64 | NA | 48 | 24 | 20 | 23 | 57 | 61 | 52 | 29 | 32 | 44 | 12 | 50 | 37 | 47 | 13 |
| Cobalt | 20 | NA | 30 | 30 | 20 | 25 | 5.8 | 13 | 13 | 17 | 4.6 | 1.3 | 1.7 | 11 | 23 | 20 | 11 |
| Copper | 63 | 300 | 97 | 82 | 70 | 78 | 64 | 62 | 56 | 60 | 17 | 38 | 43 | 42 | 110 | 58 | 44 |
| Iron | NA | NA | 43000 | 45000 | 35000 | 41000 | 34000 | 33000 | 35000 | 34000 | 36000 | 60000 | 79000 | 30000 | 51000 | 34000 | 29000 |
| Lead | 300 | 70 | **100** | **100** | **90** | **78** | 46 | 21 | 29 | 31 | 49 | **200** | **360** | 18 | **110** | 29 | **120** |
| Lithium | NA | NA | 20 | 23 | 23 | 24 | 18 | 22 | 21 | 24 | 14 | 6.7 | 7.4 | 22 | 22 | 20 | 18 |
| Magnesium | NA | NA | 8300 | 9900 | 8400 | 9600 | 6900 | 8700 | 8500 | 8500 | 6500 | 3500 | 3700 | 9600 | 9300 | 9500 | 5000 |
| Manganese | NA | NA | 2300 | 830 | 490 | 620 | 200 | 440 | 490 | 450 | 190 | 95 | 90 | 660 | 670 | 690 | 440 |
| Mercury | 12 | NA | 4.1 | 6.1 | 6.4 | 4.7 | 17 | 0.81 | 0.67 | 2.8 | 0.6 | 5.4 | 3.8 | 0.82 | 4.8 | 0.74 | 46 |
| Molybdenum | 40 | NA | 0.66 | 0.31 | 0.18 | 0.22 | 0.36 | 0.24 | 0.25 | 0.19 | 0.4 | 0.89 | 1.2 | 0.2 | 0.38 | 0.26 | 0.6 |
| Nickel | 50 | 355 | 63 | 54 | 39 | 47 | 21 | 34 | 35 | 39 | 16 | 9.3 | 9.7 | 32 | 50 | 45 | 21 |
| Potassium | NA | NA | 3900 | 5400 | 4600 | 5700 | 3600 | 5900 | 5200 | 5400 | 3800 | 3500 | 3600 | 5400 | 4800 | 5000 | 2700 |
| Selenium | 1 | 4.5 | 0.91 | 0.83 | <0.70 | <0.70 | <0.70 | <0.70 | <0.70 | <0.70 | <0.70 | 2.2 | 3 | <0.70 | 0.85 | <0.70 | <0.70 |
| Silver | 20 | NA | 0.29 | 0.29 | 0.23 | 0.23 | 0.24 | 0.084 | 0.093 | 0.096 | 0.11 | 0.53 | 0.95 | 0.06 | 0.3 | 0.1 | 0.36 |
| Strontium | NA | NA | 16 | 23 | 14 | 17 | 9.9 | 16 | 18 | 17 | 7.4 | 2.4 | 3.6 | 22 | 26 | 22 | 11 |
| Sulphur | NA | NA | 6400 | 6100 | 2100 | 3100 | 260 | 160 | 95 | 570 | 270 | 1900 | 2800 | 350 | 6100 | 2000 | 250 |
| Thallium | 1.4 | 1 | 0.31 | 0.32 | 0.27 | 0.34 | 0.23 | 0.31 | 0.28 | 0.33 | 0.22 | 0.34 | 0.34 | 0.26 | 0.3 | 0.25 | 0.16 |
| Tin | 5 | NA | 0.54 | <0.50 | <0.50 | <0.50 | 0.5 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 1.9 |
| Titanium | NA | NA | 600 | 640 | 550 | 730 | 630 | 850 | 740 | 780 | 570 | 600 | 600 | 630 | 680 | 650 | 370 |
| Uranium | 500 | 33 | 0.47 | 0.5 | 0.56 | 0.54 | 0.35 | 0.44 | 0.41 | 0.56 | 0.31 | 0.26 | 0.25 | 0.37 | 0.42 | 0.32 | 0.58 |
| Vanadium | 130 | NA | 22 | 20 | 19 | 20 | 16 | 18 | 18 | 19 | 14 | 11 | 11 | 17 | 20 | 16 | 17 |
| Yttrium | NA | NA | 4.7 | 4.7 | 4.1 | 4.8 | 3.2 | 3.7 | 3.9 | 4.4 | 2.8 | 1.1 | 1.1 | 4 | 4 | 3.8 | 3.6 |
| Zinc | 200 | 640 | 240 | 180 | 150 | 180 | 89 | 120 | 120 | 95 | 48 | 31 | 32 | 95 | 220 | 130 | 63 |

Notes:

Shaded values indicate an exceedance of the Tier 1 soil contact guideline

Bolded values indicate an exceedance of the Tier 1 soil and food ingestion guideline

**Table B-11 Montague Mines - Tier 2 Human Health Soil Screen, 2018 Data**

| | | Sampling Location | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metal | Tier 2 Criteria | M-C1 (0-5cm) | M-C2 (0-5cm) | M-C3 (0-5cm) | M-C4 (0-10cm) | M-C5 (2.5-10cm) | M-SW9-CORE (0-7.5cm) | M-C11 (2.5-10cm) | M-C13 (2.5-10cm) | M-C17 (2.5-10cm) | M-C18 (0-2.5cm) | M-C19 (0-5cm) | M-SFC-T2 | M-SFC-T3 | M-SFC-T7 | M-SFC-T9 |
| Aluminum | NA | 14000 | 12000 | 23000 | 14000 | 15000 | 16000 | 11000 | 9000 | 6900 | 14000 | 12000 | 16000 | 16000 | 14000 | 15000 |
| Antimony | NA | 7.1 | 10 | 3.1 | 15 | 16 | <0.80 | <0.80 | 3.3 | 10 | <0.80 | 3.3 | 6.7 | 4.8 | 18 | 11 |
| Arsenic | 750 | 2100 | 5400 | 5400 | 11000 | 14000 | 56 | 550 | 130 | 6100 | 580 | 3800 | 2500 | 1600 | 12000 | 6600 |
| Cobalt | NA | 32 | 11 | 120 | 88 | 25 | 16 | 39 | 4.2 | 5.8 | 22 | 28 | 21 | 12 | 25 | 25 |
| Iron | NA | 38000 | 30000 | 77000 | 58000 | 51000 | 21000 | 14000 | 9900 | 31000 | 32000 | 23000 | 38000 | 37000 | 48000 | 41000 |
| Lead | NA | 83 | 80 | 110 | 120 | 88 | 69 | 37 | 170 | 120 | 78 | 100 | 35 | 40 | 140 | 82 |
| Mercury | 29 | 8.3 | 27 | 4.4 | 4 | 4.5 | 0.42 | 1.1 | 35 | 28 | 0.26 | 15 | 3.8 | 3.3 | 8 | 6 |
| Vanadium | NA | 30 | 15 | 140 | 37 | 21 | 61 | 16 | 5.9 | 10 | 120 | 43 | 23 | 22 | 21 | 42 |

| | | Sampling Location | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metal | Tier 2 Criteria | M-SFC-12 | M-SFC-13 | M-SFC-T14 | M-SFC-15 | M-SFC-T17 | M-SFC-T20 | M-SFC-T23 | M-SFC-T25 | M-SFC-T26 | M-SFC-T27 | M-SFC-T28AHP | M-SFC-T30 | M-SFC-T32 | M-SFC-T35 | M-SFC SOIL C.MOORE |
| Aluminum | NA | 13000 | 14000 | 14000 | 15000 | 11000 | 14000 | 13000 | 14000 | 10000 | 6300 | 6800 | 13000 | 13000 | 12000 | 11000 |
| Antimony | NA | 19 | 20 | 8.1 | 10 | 11 | 2.4 | 5.3 | 5 | 14 | 67 | 97 | 4 | 22 | 5.8 | 4.1 |
| Arsenic | 750 | 10000 | 12000 | 4200 | 6400 | 5400 | 1500 | 3900 | 3000 | 9400 | 37000 | 54000 | 2300 | 15000 | 4300 | 2900 |
| Cobalt | NA | 30 | 30 | 20 | 25 | 5.8 | 13 | 13 | 17 | 4.6 | 1.3 | 1.7 | 11 | 23 | 20 | 11 |
| Iron | NA | 43000 | 45000 | 35000 | 41000 | 34000 | 33000 | 35000 | 34000 | 36000 | 60000 | 79000 | 30000 | 51000 | 34000 | 29000 |
| Lead | NA | 100 | 100 | 90 | 78 | 46 | 21 | 29 | 31 | 49 | 200 | 360 | 18 | 110 | 29 | 120 |
| Mercury | 29 | 4.1 | 6.1 | 6.4 | 4.7 | 17 | 0.81 | 0.67 | 2.8 | 0.6 | 5.4 | 3.8 | 0.82 | 4.8 | 0.74 | 46 |
| Vanadium | NA | 22 | 20 | 19 | 20 | 16 | 18 | 18 | 19 | 14 | 11 | 11 | 17 | 20 | 16 | 17 |

Notes:

Shaded values indicate an exceedance of the Tier 2 criteria

**Table B-12 Montague Mines - Tier 2 Ecological Soil Screen, 2018 Data**

| | | Sampling Location | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metal | Tier 2 Criteria | M-C1 (0-5cm) | M-C2 (0-5cm) | M-C3 (0-5cm) | M-C4 (0-10cm) | M-C5 (2.5-10cm) | M-SW9-CORE (0-7.5cm) | M-C11 (2.5-10cm) | M-C13 (2.5-10cm) | M-C17 (2.5-10cm) | M-C18 (0-2.5cm) | M-C19 (0-5cm) | M-SFC-T2 | M-SFC-T3 | M-SFC-T7 | M-SFC-T9 |
| Antimony | NA | 7.1 | 10 | 3.1 | 15 | 16 | <0.80 | <0.80 | 3.3 | 10 | <0.80 | 3.3 | 6.7 | 4.8 | 18 | 11 |
| Arsenic | 139 | 2100 | 5400 | 5400 | 11000 | 14000 | 56 | 550 | 130 | 6100 | 580 | 3800 | 2500 | 1600 | 12000 | 6600 |
| Barium | NA | 81 | 57 | 440 | 470 | 76 | 41 | 85 | 66 | 34 | 93 | 78 | 83 | 82 | 75 | 58 |
| Cadmium | NA | 0.93 | 0.33 | 4 | 2.7 | 0.38 | 0.31 | 1.3 | 0.83 | 0.16 | 2.1 | 2.9 | 0.33 | 0.22 | 0.52 | 0.93 |
| Chromium | NA | 33 | 14 | 18 | 56 | 27 | 77 | 7 | 36 | 8.8 | 26 | 13 | 19 | 35 | 18 | 17 |
| Cobalt | NA | 32 | 11 | 120 | 88 | 25 | 16 | 39 | 4.2 | 5.8 | 22 | 28 | 21 | 12 | 25 | 25 |
| Copper | NA | 130 | 95 | 93 | 130 | 88 | 19 | 25 | 110 | 50 | 46 | 120 | 75 | 79 | 120 | 120 |
| Lead | NA | 83 | 80 | 110 | 120 | 88 | 69 | 37 | 170 | 120 | 78 | 100 | 35 | 40 | 140 | 82 |
| Mercury | 12 | 8.3 | 27 | 4.4 | 4 | 4.5 | 0.42 | 1.1 | 35 | 28 | 0.26 | 15 | 3.8 | 3.3 | 8 | 6 |
| Nickel | NA | 70 | 27 | 130 | 120 | 53 | 16 | 49 | 17 | 14 | 36 | 41 | 52 | 35 | 59 | 47 |
| Selenium | NA | 0.91 | 0.72 | 4.3 | 1.6 | <0.70 | 1.8 | 2 | 2.9 | <0.70 | 1.1 | 1.8 | <0.70 | <0.70 | 0.88 | 1.2 |
| Vanadium | NA | 30 | 15 | 140 | 37 | 21 | 61 | 16 | 5.9 | 10 | 120 | 43 | 23 | 22 | 21 | 42 |
| Zinc | NA | 350 | 140 | 370 | 430 | 210 | 50 | 87 | 200 | 46 | 280 | 240 | 150 | 120 | 220 | 190 |

| | | Sampling Location | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metal | Tier 2 Criteria | M-SFC-12 | M-SFC-13 | M-SFC-T14 | M-SFC-15 | M-SFC-T17 | M-SFC-T20 | M-SFC-T23 | M-SFC-T25 | M-SFC-T26 | M-SFC-T27 | M-SFC-T28AHP | M-SFC-T30 | M-SFC-T32 | M-SFC-T35 | M-SFC SOIL C.MOORE |
| Antimony | NA | 19 | 20 | 8.1 | 10 | 11 | 2.4 | 5.3 | 5 | 14 | 67 | 97 | 4 | 22 | 5.8 | 4.1 |
| Arsenic | 139 | 10000 | 12000 | 4200 | 6400 | 5400 | 1500 | 3900 | 3000 | 9400 | 37000 | 54000 | 2300 | 15000 | 4300 | 2900 |
| Barium | NA | 100 | 89 | 79 | 74 | 47 | 59 | 55 | 66 | 36 | 37 | 33 | 54 | 61 | 51 | 69 |
| Cadmium | NA | 0.73 | 0.34 | 0.29 | 0.33 | 0.2 | 0.17 | 0.19 | 0.16 | 0.13 | 0.085 | 0.085 | 0.14 | 0.45 | 0.21 | 0.21 |
| Chromium | NA | 48 | 24 | 20 | 23 | 57 | 61 | 52 | 29 | 32 | 44 | 12 | 50 | 37 | 47 | 13 |
| Cobalt | NA | 30 | 30 | 20 | 25 | 5.8 | 13 | 13 | 17 | 4.6 | 1.3 | 1.7 | 11 | 23 | 20 | 11 |
| Copper | NA | 97 | 82 | 70 | 78 | 64 | 62 | 56 | 60 | 17 | 38 | 43 | 42 | 110 | 58 | 44 |
| Lead | NA | 100 | 100 | 90 | 78 | 46 | 21 | 29 | 31 | 49 | 200 | 360 | 18 | 110 | 29 | 120 |
| Mercury | 12 | 4.1 | 6.1 | 6.4 | 4.7 | 17 | 0.81 | 0.67 | 2.8 | 0.6 | 5.4 | 3.8 | 0.82 | 4.8 | 0.74 | 46 |
| Nickel | NA | 63 | 54 | 39 | 47 | 21 | 34 | 35 | 39 | 16 | 9.3 | 9.7 | 32 | 50 | 45 | 21 |
| Selenium | NA | 0.91 | 0.83 | <0.70 | <0.70 | <0.70 | <0.70 | <0.70 | <0.70 | <0.70 | 2.2 | 3 | <0.70 | 0.85 | <0.70 | <0.70 |
| Vanadium | NA | 22 | 20 | 19 | 20 | 16 | 18 | 18 | 19 | 14 | 11 | 11 | 17 | 20 | 16 | 17 |
| Zinc | NA | 240 | 180 | 150 | 180 | 89 | 120 | 120 | 95 | 48 | 31 | 32 | 95 | 220 | 130 | 63 |

Notes:

Shaded values indicate an exceedance of the Tier 2 criteria

**Table B-13 Montague Mines - Tier 1 Ecological Sediment Screen, 2018 Data**

| Metal | Tier 1 Criteria (Freshwater Sediment Values in mg/kg) | Sampling Location | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | M-C1 (0-5cm) | M-C2 (0-5cm) | M-C3 (0-5cm) | M-C4 (0-10cm) | M-C5 (2.5-10cm) | M-SW9-CORE (0-7.5cm) | M-SW10-CORE (0-5cm) | M-C11 (2.5-10cm) | M-SW12-CORE (2.5-10cm) | M-C13 (2.5-10cm) | M-C17 (2.5-10cm) | M-C18 (0-2.5cm) |
| Aluminum | NA | 14000 | 12000 | 23000 | 14000 | 15000 | 16000 | 19000 | 11000 | 26000 | 9000 | 6900 | 14000 |
| Antimony | 25 | 7.1 | 10 | 3.1 | 15 | 16 | <0.80 | 1.8 | <0.80 | 1.2 | 3.3 | 10 | <0.80 |
| Arsenic | 17 | 2100 | 5400 | 5400 | 11000 | 14000 | 56 | 750 | 550 | 140 | 130 | 6100 | 580 |
| Barium | NA | 81 | 57 | 440 | 470 | 76 | 41 | 190 | 85 | 160 | 66 | 34 | 93 |
| Beryllium | NA | 0.57 | 0.33 | 1.7 | 0.75 | 0.33 | 1.5 | 1.2 | 0.81 | 1.4 | 0.42 | 0.16 | 0.56 |
| Bismuth | NA | 1.5 | 2 | 1.2 | 2 | 1.9 | 0.54 | 0.78 | 0.25 | 0.63 | 2.9 | 2.2 | 0.29 |
| Cadmium | 3.5 | 0.93 | 0.33 | 4 | 2.7 | 0.38 | 0.31 | 1.6 | 1.3 | 2.1 | 0.83 | 0.16 | 2.1 |
| Calcium | NA | 3500 | 1900 | 6700 | 2800 | 5600 | 980 | 3700 | 7700 | 2800 | 7200 | 1100 | 5200 |
| Chromium | 90 | 33 | 14 | 18 | 56 | 27 | 77 | 50 | 7 | 31 | 36 | 8.8 | 26 |
| Cobalt | NA | 32 | 11 | 120 | 88 | 25 | 16 | 52 | 39 | 37 | 4.2 | 5.8 | 22 |
| Copper | 197 | 130 | 95 | 93 | 130 | 88 | 19 | 60 | 25 | 60 | 110 | 50 | 46 |
| Iron | 43766 | 38000 | 30000 | 77000 | 58000 | 51000 | 21000 | 39000 | 14000 | 53000 | 9900 | 31000 | 32000 |
| Lead | 91.3 | 83 | 80 | 110 | 120 | 88 | 69 | 98 | 37 | 120 | 170 | 120 | 78 |
| Lithium | NA | 19 | 20 | 15 | 18 | 22 | 16 | 22 | 4.5 | 23 | <2.00 | 9.5 | 13 |
| Magnesium | NA | 7300 | 6600 | 4000 | 6500 | 10000 | 2200 | 5900 | 1600 | 4000 | 1100 | 3800 | 4600 |
| Manganese | 1100 | 1200 | 480 | 35000 | 21000 | 1200 | 1300 | 5900 | 860 | 2400 | 210 | 260 | 670 |
| Mercury | 0.486 | 8.3 | 27 | 4.4 | 4 | 4.5 | 0.42 | 2.4 | 1.1 | 0.3 | 35 | 28 | 0.26 |
| Molybdenum | NA | 0.46 | 0.47 | 7.3 | 2 | 0.24 | 1.6 | 2.4 | 1.1 | 3 | 0.4 | 0.66 | 1.1 |
| Nickel | 75 | 70 | 27 | 130 | 120 | 53 | 16 | 63 | 49 | 82 | 17 | 14 | 36 |
| Potassium | NA | 2600 | 3300 | 2100 | 2800 | 4900 | 850 | 2700 | 970 | 2200 | 380 | 1800 | 1400 |
| Selenium | 2 | 0.91 | 0.72 | 4.3 | 1.6 | <0.70 | 1.8 | 1.3 | 2 | 2 | 2.9 | <0.70 | 1.1 |
| Silver | 1 | 0.36 | 0.38 | 0.27 | 0.36 | 0.26 | 0.15 | 0.21 | 0.13 | 0.27 | 0.55 | 0.47 | 0.13 |
| Strontium | NA | 16 | 11 | 34 | 21 | 37 | 9.2 | 23 | 40 | 17 | 34 | 11 | 25 |
| Sulphur | NA | 640 | 4200 | 2000 | 4300 | 3000 | 1200 | 1300 | 7800 | 6100 | 4000 | 900 | 4500 |
| Thallium | NA | 0.25 | 0.2 | 0.44 | 0.6 | 0.32 | 0.17 | 0.28 | 0.059 | 0.27 | 0.069 | 0.16 | 0.24 |
| Tin | NA | 1.1 | <0.50 | 1.5 | 0.79 | <0.50 | 2.3 | 2.7 | <0.50 | 3.4 | <0.50 | <0.50 | 1 |
| Titanium | NA | 620 | 410 | 310 | 500 | 750 | 470 | 370 | 140 | 270 | 71 | 260 | 290 |
| Uranium | NA | 0.6 | 0.48 | 1.5 | 0.67 | 0.44 | 3.5 | 2.6 | 0.76 | 1.5 | 0.82 | 0.35 | 0.71 |
| Vanadium | NA | 30 | 15 | 140 | 37 | 21 | 61 | 77 | 16 | 96 | 5.9 | 10 | 120 |
| Yttrium | NA | 6 | 4 | 15 | 6.5 | 4.8 | 9.8 | 24 | 32 | 20 | 8.2 | 1.9 | 10 |
| Zinc | 315 | 350 | 140 | 370 | 430 | 210 | 50 | 300 | 87 | 390 | 200 | 46 | 280 |

Notes:

Shaded values indicate an exceedance of the Tier 1 criteria

**Table B-13 (continued) Montague Mines - Tier 1 Ecological Sediment Screen, 2018 Data**

| Metal | Tier 1 Criteria (Freshwater Sediment Values in mg/kg) | Sampling Location | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | M-C19 (0-5cm) | M-SFC-T2 | M-SFC-T3 | M-SFC-T7 | M-SFC-T9 | M-SFC-12 | M-SFC-13 | M-SFC-T14 | M-SFC-15 | M-SFC-T20 | M-SFC SOIL C.MOORE |
| Aluminum | NA | 12000 | 16000 | 16000 | 14000 | 15000 | 13000 | 14000 | 14000 | 15000 | 14000 | 11000 |
| Antimony | 25 | 3.3 | 6.7 | 4.8 | 18 | 11 | 19 | 20 | 8.1 | 10 | 2.4 | 4.1 |
| Arsenic | 17 | 3800 | 2500 | 1600 | 12000 | 6600 | 10000 | 12000 | 4200 | 6400 | 1500 | 2900 |
| Barium | NA | 78 | 83 | 82 | 75 | 58 | 100 | 89 | 79 | 74 | 59 | 69 |
| Beryllium | NA | 0.81 | 0.43 | 0.41 | 0.37 | 0.59 | 0.44 | 0.42 | 0.46 | 0.41 | 0.31 | 0.31 |
| Bismuth | NA | 1.7 | 1.1 | 1.2 | 2.5 | 1.7 | 2 | 2 | 1.6 | 1.4 | 0.69 | 1.2 |
| Cadmium | 3.5 | 2.9 | 0.33 | 0.22 | 0.52 | 0.93 | 0.73 | 0.34 | 0.29 | 0.33 | 0.17 | 0.21 |
| Calcium | NA | 2900 | 3100 | 1800 | 2500 | 2200 | 3300 | 4900 | 2300 | 3000 | 2400 | 1400 |
| Chromium | 90 | 13 | 19 | 35 | 18 | 17 | 48 | 24 | 20 | 23 | 61 | 13 |
| Cobalt | NA | 28 | 21 | 12 | 25 | 25 | 30 | 30 | 20 | 25 | 13 | 11 |
| Copper | 197 | 120 | 75 | 79 | 120 | 120 | 97 | 82 | 70 | 78 | 62 | 44 |
| Iron | 43766 | 23000 | 38000 | 37000 | 48000 | 41000 | 43000 | 45000 | 35000 | 41000 | 33000 | 29000 |
| Lead | 91.3 | 100 | 35 | 40 | 140 | 82 | 100 | 100 | 90 | 78 | 21 | 120 |
| Lithium | NA | 10 | 25 | 24 | 21 | 21 | 20 | 23 | 23 | 24 | 22 | 18 |
| Magnesium | NA | 3300 | 9900 | 9500 | 8600 | 7600 | 8300 | 9900 | 8400 | 9600 | 8700 | 5000 |
| Manganese | 1100 | 940 | 590 | 390 | 1300 | 700 | 2300 | 830 | 490 | 620 | 440 | 440 |
| Mercury | 0.486 | 15 | 3.8 | 3.3 | 8 | 6 | 4.1 | 6.1 | 6.4 | 4.7 | 0.81 | 46 |
| Molybdenum | NA | 1.2 | 0.22 | 0.17 | 0.38 | 0.85 | 0.66 | 0.31 | 0.18 | 0.22 | 0.24 | 0.6 |
| Nickel | 75 | 41 | 52 | 35 | 59 | 47 | 63 | 54 | 39 | 47 | 34 | 21 |
| Potassium | NA | 1500 | 6400 | 6400 | 4500 | 4100 | 3900 | 5400 | 4600 | 5700 | 5900 | 2700 |
| Selenium | 2 | 1.8 | <0.70 | <0.70 | 0.88 | 1.2 | 0.91 | 0.83 | <0.70 | <0.70 | <0.70 | <0.70 |
| Silver | 1 | 0.44 | 0.15 | 0.13 | 0.32 | 0.29 | 0.29 | 0.29 | 0.23 | 0.23 | 0.084 | 0.36 |
| Strontium | NA | 16 | 15 | 13 | 18 | 13 | 16 | 23 | 14 | 17 | 16 | 11 |
| Sulphur | NA | 4000 | 1500 | 350 | 5600 | 4400 | 6400 | 6100 | 2100 | 3100 | 160 | 250 |
| Thallium | NA | 0.33 | 0.38 | 0.36 | 0.35 | 0.34 | 0.31 | 0.32 | 0.27 | 0.34 | 0.31 | 0.16 |
| Tin | NA | 1 | 0.51 | 0.52 | 0.54 | 0.65 | 0.54 | <0.50 | <0.50 | <0.50 | <0.50 | 1.9 |
| Titanium | NA | 240 | 830 | 860 | 740 | 690 | 600 | 640 | 550 | 730 | 850 | 370 |
| Uranium | NA | 0.85 | 0.65 | 0.69 | 0.48 | 0.68 | 0.47 | 0.5 | 0.56 | 0.54 | 0.44 | 0.58 |
| Vanadium | NA | 43 | 23 | 22 | 21 | 42 | 22 | 20 | 19 | 20 | 18 | 17 |
| Yttrium | NA | 9.1 | 5 | 5.2 | 4 | 6.1 | 4.7 | 4.7 | 4.1 | 4.8 | 3.7 | 3.6 |
| Zinc | 315 | 240 | 150 | 120 | 220 | 190 | 240 | 180 | 150 | 180 | 120 | 63 |

Notes:

Shaded values indicate an exceedance of the Tier 1 criteria

**Table B-14 Total Metals Screening Against NS Tier 1 Guidelines - Montague Mines 2018 data**

| Montague | ERA Surface Water Tier 1 Screening Criteria (Freshwater Surface Water Values in mg/L ) | | COPC? | Surface Water - Loon Lake to Lake Charles (Upstream to Downstream) | | | | | | | | | | Ponds Atop Main Tailings (Upstream to Downstream) | | | Gold Lane (17); Vaughan Lane (18) | | Extension to Gold Lane Tailings | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | -- | | | M-SW12 | M-SW13 | M-SWMB | M-Pz1 | M-Pz2 | M-Pz3 | M-Pz4 | M-SW5 | M-SW11 | M-SW10 | M-SW14 | M-SW15 | M-SW16 | M-SW17 | M-SW18 | M-SW19 | M-SW9 |
| **Notes** | | | | | | | | | | | | | | | | | | | | |
| Note 1 - Sample Type | -- | -- | | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water |
| Note 2 - Location Context | -- | -- | | Loon Lake | Marsh upstrea | Mitchell Brook | Nearest Brook | S/SE of lower | Southwest of c | Furthest from | Rock field area | Barrys Run | Lake Charles | Artesian Pond | Pond at Upper | Pond at Lower | Pond (Potentia | Surface water | Surface water | In Lake Major |
| **Field Data** | | | | | | | | | | | | | | | | | | | | |
| Field pH | -- | -- | | 5.98 | 5.69 | 7.12 | 7.33 | 6.31 | 6.06 | 7.67 | 7.17 | 4.62 | 6.37 | 6.99 | 7.08 | 7.83 | 7.37 | N/A | 7.2 | 5.32 |
| Field EC | uS/cm | -- | | 255 | 60 | 241 | 91 | 218 | 241 | 226 | 202 | 239 | 224 | 74 | 22 | 678 | 246 | N/A | 149 | 32 |
| Field Temp | Celsius | -- | | 0.9 | 3 | 1.2 | 1.1 | 1.1 | 0.8 | 1.3 | 0.7 | 4.7 | 4.1 | 4.2 | 3.9 | 4.1 | 4.3 | N/A | 3 | 6.3 |
| **Lab Results** | | | | | | | | | | | | | | | | | | | | |
| Total Hardness (CaCO3) | mg/L | NG | | 26.6 | 9.21 | 24.4 | 25.6 | 23.5 | 25.5 | 23.1 | 29.8 | 21.6 | 28.3 | 20.3 | 6.01 | 347 | 26.1 | 71.7 | 18.5 | 4.10 |
| Total Mercury (Hg) | mg/L | 0.000026 | Yes | 0.000002 | 0.000505 | 0.000002 | 0.000487 | 0.0000034 | 0.0000024 | 0.00004 | 0.0000194 | 0.0000023 | 0.000002 | 0.0000373 | 0.0000028 | 0.0000491 | 0.000003 | 0.000084 | 0.0000072 | 0.000002 |
| Total Aluminum (Al) | mg/L | 0.005 | Yes | 0.033 | 0.174 | 0.041 | 0.153 | 0.0147 | 0.0357 | 0.326 | 0.142 | 0.561 | 0.0301 | 0.0509 | 0.149 | 0.246 | 0.0646 | 24.8 | 0.0528 | 0.206 |
| Total Antimony (Sb) | mg/L | 0.02 | | 0.000071 | 0.000144 | 0.000082 | 0.00156 | 0.000492 | 0.000119 | 0.000346 | 0.000908 | 0.000101 | 0.000122 | 0.00121 | 0.00426 | 0.0147 | 0.000094 | 0.0012 | 0.000135 | 0.000028 |
| Total Arsenic (As) | mg/L | 0.005 | Yes | 0.000537 | 0.456 | 0.0124 | 0.79 | 0.18 | 0.0367 | 0.297 | 0.289 | 0.026 | 0.0171 | 0.326 | 1.37 | 2.84 | 0.0216 | 2.65 | 0.056 | 0.00076 |
| Total Barium (Ba) | mg/L | 1 | | 0.00928 | 0.00575 | 0.00659 | 0.0131 | 0.00348 | 0.00499 | 0.0172 | 0.00464 | 0.0187 | 0.00682 | 0.00659 | 0.00162 | 0.0003 | 0.00878 | 0.338 | 0.00485 | 0.0231 |
| Total Beryllium (Be) | mg/L | 0.0053 | | 0.00001 | 0.000015 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.000035 | 0.00001 | 0.000092 | 0.00001 | 0.00001 | 0.00005 | 0.00005 | 0.00001 | 0.0015 | 0.00001 | 0.000079 |
| Total Bismuth (Bi) | mg/L | NG | | 0.00001 | 0.000077 | 0.00001 | 0.000073 | 0.000005 | 0.00001 | 0.000033 | 0.00002 | 0.00001 | 0.000005 | 0.00001 | 0.000065 | 0.000025 | 0.00001 | 0.000391 | 0.00001 | 0.00001 |
| Total Boron (B) | mg/L | 1.2 | | 0.018 | 0.01 | 0.014 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.01 | 0.05 | 0.05 | 0.01 | 0.05 | 0.01 | 0.046 |
| Total Cadmium (Cd) | mg/L | 0.00001 | Yes | 0.000005 | 0.0000711 | 0.000005 | 0.0000779 | 0.000005 | 0.000005 | 0.00013 | 0.0000158 | 0.000133 | 0.000006 | 0.0000224 | 0.000025 | 0.000042 | 0.0000085 | 0.00246 | 0.000005 | 0.0000173 |
| Total Chromium (Cr) | mg/L | NG | | 0.00011 | 0.00014 | 0.00013 | 0.00028 | 0.0001 | 0.0001 | 0.00047 | 0.0002 | 0.00016 | 0.0002 | 0.00013 | 0.00122 | 0.00309 | 0.00011 | 0.0246 | 0.00013 | 0.00019 |
| Total Cobalt (Co) | mg/L | 0.01 | Yes | 0.000042 | 0.00158 | 0.000061 | 0.00164 | 0.0000971 | 0.000142 | 0.00299 | 0.00123 | 0.00392 | 0.0000953 | 0.000367 | 0.000583 | 0.00946 | 0.000145 | 0.0788 | 0.000134 | 0.000176 |
| Total Copper (Cu) | mg/L | 0.002 | Yes | 0.00097 | 0.0131 | 0.00097 | 0.0112 | 0.00127 | 0.00085 | 0.00482 | 0.0046 | 0.00072 | 0.000877 | 0.00553 | 0.00421 | 0.0201 | 0.00094 | 0.0746 | 0.00077 | 0.00032 |
| Total Iron (Fe) | mg/L | 0.3 | Yes | 0.0548 | 1.35 | 0.0755 | 1.26 | 0.0114 | 0.0831 | 1.31 | 0.442 | 0.0911 | 0.0425 | 0.0774 | 0.997 | 0.0505 | 0.0905 | 156 | 0.183 | 0.14 |
| Total Lead (Pb) | mg/L | 0.001 | Yes | 0.000075 | 0.00791 | 0.00012 | 0.00365 | 0.0000138 | 0.000096 | 0.00259 | 0.00119 | 0.000347 | 0.000049 | 0.000138 | 0.00335 | 0.000131 | 0.000077 | 0.151 | 0.000087 | 0.000243 |
| Total Lithium (Li) | mg/L | NG | | 0.00072 | 0.00084 | 0.00053 | 0.00058 | 0.0005 | 0.0005 | 0.00091 | 0.00107 | 0.0015 | 0.00055 | 0.0005 | 0.0025 | 0.0239 | 0.0005 | 0.0158 | 0.0005 | 0.00137 |
| Total Manganese (Mn) | mg/L | 0.82 | Yes | 0.0131 | 0.0746 | 0.0112 | 0.152 | 0.0111 | 0.0161 | 0.823 | 0.0734 | 0.124 | 0.0808 | 0.0166 | 0.0235 | 0.764 | 0.0217 | 14.6 | 0.0138 | 0.0707 |
| Total Molybdenum (Mo) | mg/L | 0.073 | | 0.000102 | 0.00005 | 0.000093 | 0.000089 | 0.00005 | 0.000055 | 0.000148 | 0.000063 | 0.00005 | 0.000445 | 0.00005 | 0.00025 | 0.00047 | 0.00005 | 0.00192 | 0.00005 | 0.00005 |
| Total Nickel (Ni) | mg/L | 0.025 | Yes | 0.00043 | 0.00302 | 0.00049 | 0.00495 | 0.000802 | 0.00053 | 0.00662 | 0.00335 | 0.0107 | 0.000551 | 0.0031 | 0.00334 | 0.0513 | 0.00136 | 0.072 | 0.00078 | 0.00051 |
| Total Selenium (Se) | mg/L | 0.001 | Yes | 0.000059 | 0.000064 | 0.000059 | 0.000127 | 0.000047 | 0.000048 | 0.000083 | 0.000067 | 0.000049 | 0.000056 | 0.000085 | 0.0002 | 0.00026 | 0.000061 | 0.00277 | 0.00004 | 0.000051 |
| Total Silicon (Si) | mg/L | NG | | 0.775 | 2.02 | 0.743 | 2.28 | 1.16 | 0.843 | 1.06 | 1.43 | 1.59 | 1.15 | 1.88 | 0.35 | 6.32 | 1.51 | 17.1 | 1.63 | 1.25 |
| Total Silver (Ag) | mg/L | 0.0001 | Yes | 0.00001 | 0.00001 | 0.00001 | 0.000043 | 0.000005 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.000005 | 0.00001 | 0.000025 | 0.000025 | 0.00001 | 0.000232 | 0.00001 | 0.00001 |
| Total Strontium (Sr) | mg/L | 21 | | 0.0317 | 0.0097 | 0.0275 | 0.0198 | 0.0237 | 0.0274 | 0.0249 | 0.0273 | 0.0223 | 0.041 | 0.0159 | 0.00249 | 0.129 | 0.0262 | 0.078 | 0.0182 | 0.00654 |
| Total Thallium (Tl) | mg/L | 0.0008 | | 0.000002 | 0.0000063 | 0.000002 | 0.0000103 | 0.000002 | 0.000002 | 0.000011 | 0.0000043 | 0.0000027 | 0.000002 | 0.0000036 | 0.00001 | 0.00001 | 0.0000032 | 0.000459 | 0.000002 | 0.0000066 |
| Total Tin (Sn) | mg/L | NG | | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.00024 | 0.0002 | 0.0002 | 0.00022 | 0.001 | 0.001 | 0.0002 | 0.0042 | 0.0002 | 0.0002 |
| Total Titanium (Ti) | mg/L | NG | | 0.002 | 0.002 | 0.002 | 0.0049 | 0.0005 | 0.002 | 0.008 | 0.005 | 0.002 | 0.0005 | 0.002 | 0.0067 | 0.0025 | 0.002 | 0.493 | 0.002 | 0.002 |
| Total Uranium (U) | mg/L | 0.3 | | 0.0000077 | 0.000018 | 0.0000063 | 0.0000207 | 0.000002 | 0.0000052 | 0.0000218 | 0.0000083 | 0.0000064 | 0.0000646 | 0.0000093 | 0.00001 | 0.000359 | 0.0000081 | 0.00222 | 0.0000059 | 0.0000818 |
| Total Vanadium (V) | mg/L | 0.006 | Yes | 0.0002 | 0.00139 | 0.0002 | 0.00072 | 0.0002 | 0.0002 | 0.00113 | 0.00032 | 0.00038 | 0.0002 | 0.00024 | 0.001 | 0.001 | 0.0002 | 0.269 | 0.0002 | 0.00051 |
| Total Zinc (Zn) | mg/L | 0.03 | Yes | 0.001 | 0.0299 | 0.0011 | 0.0217 | 0.00312 | 0.0013 | 0.0251 | 0.0126 | 0.0138 | 0.00116 | 0.0129 | 0.0113 | 0.0561 | 0.0033 | 0.54 | 0.0023 | 0.0025 |
| Total Zirconium (Zr) | mg/L | NG | | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0005 | 0.0005 | 0.0001 | 0.00153 | 0.0001 | 0.0001 |
| Total Calcium (Ca) | mg/L | NG | | 8.49 | 1.9 | 7.72 | 6.33 | 6.81 | 7.92 | 6.98 | 8.5 | 6.45 | 9.07 | 5.12 | 1.03 | 78.2 | 7.14 | 17.3 | 4.6 | 0.95 |
| Total Magnesium (Mg) | mg/L | NG | | 1.32 | 1.08 | 1.26 | 2.39 | 1.58 | 1.4 | 1.39 | 2.07 | 1.33 | 1.37 | 1.82 | 0.83 | 36.9 | 1.99 | 6.9 | 1.69 | 0.42 |
| Total Potassium (K) | mg/L | NG | | 1.23 | 0.44 | 1.12 | 1.6 | 1 | 1.01 | 1.08 | 1.14 | 0.71 | 1.34 | 1.38 | 0.88 | 4.93 | 1.03 | 2.3 | 0.77 | 0.27 |
| Total Sodium (Na) | mg/L | NG | | 38.8 | 4.71 | 36.1 | 6.09 | 28.7 | 35 | 32 | 26.2 | 19.6 | 30.7 | 5.03 | 1.22 | 10.9 | 30.8 | 64.7 | 19.5 | 4.01 |
| Total Phosphorus | mg/L | NG | | | | | | 0.0038 | | | | | 0.0068 | | 0.01 | 0.01 | | | | |
| Total Sulphur | mg/L | NG | | | | | | 2.92 | | | | | 3.57 | | <3 | 79.1 | | | | |

**Table B-15 Total Metals Screening Against Adjusted NS Tier 1 Guidelines and Background - Montague Mines**

| Montague | ERA Surface Water Tier 1 Screening Criteria (Freshwater Surface Water Values in mg/L ) | | COPC? | Max background (Loon Lake or Lake Major) (mg/L) | Above Background? | Exceeds CCME adjusted guideline? | 95th Percentile (main surface water excluding background) | Surface Water - Loon Lake to Lake Charles (Upstream to Downstream) | | | | | | | | | Ponds Atop Main Tailings (Upstream to Downstream) | | | Gold Lane (17); Vaughan Lane (18) | | Extension of Gold Lane | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | -- | | -- | | | | | M-SW12 | M-SW13 | M-SWMB | M-Pz1 | M-Pz2 | M-Pz3 | M-Pz4 | M-SW5 | M-SW11 | M-SW10 | M-SW14 | M-SW15 | M-SW16 | M-SW17 | M-SW18 | M-SW19 | M-SW9 |
| **Notes** | | | | | | | | | | | | | | | | | | | | | | | | |
| Note 1 - Sample Type | -- | | -- | | | | | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water |
| Note 2 - Location Context | -- | | -- | | | | | Loon Lake | Marsh upstream of Main Tailings | Mitchell Brook at entrance to tailings area | Nearest Brook Entrance. S/SE of upper tailings. | S/SE of lower tailings | Southwest of central lower tailings. | Furthest from Brook Entrance. Far lower tailings | Rock field area. NW of main tailings. | Creek to Lake Charles. Approx. 200m upstream of roadway | In Lake Charles | Artesian Ponded Area at Upper Tailings | Pond at Upper Tailings | Pond at Lower Tailings | Pond (Potential Skating Pond) at Off-Site Tailings | Surface water at off-site tailings (near road) | Surface water at far-field location near hydro ROW. In a wetland. | In Lake Major |
| **Field Data** | | | | | | | | | | | | | | | | | | | | | | | | |
| Field pH | -- | -- | | -- | | | | 5.98 | 5.69 | 7.12 | 7.33 | 6.31 | 6.06 | 7.67 | 7.17 | 4.62 | 6.37 | 6.99 | 7.08 | 7.83 | 7.37 | N/A | 7.2 | 5.32 |
| Field EC | uS/cm | -- | | -- | | | | 255 | 60 | 241 | 91 | 218 | 241 | 226 | 202 | 239 | 224 | 74 | 22 | 678 | 246 | N/A | 149 | 32 |
| Field Temp | Celsius | -- | | -- | | | | 0.9 | 3 | 1.2 | 1.1 | 1.1 | 0.8 | 1.3 | 0.7 | 4.7 | 4.1 | 4.2 | 3.9 | 4.1 | 4.3 | N/A | 3 | 6.3 |
| **Lab Results** | | | | | | | 95th Percentile | | | | | | | | | | | | | | | | | |
| Total Hardness (CaCO3) | mg/L | NG | | 26.6 | Yes | | | 26.6 | 9.21 | 24.4 | 25.6 | 23.5 | 25.5 | 23.1 | **29.8** | 21.6 | **28.3** | 20.3 | 6.01 | **347** | 26.1 | **71.7** | 18.5 | 4.1 |
| Total Mercury (Hg) | mg/L | 0.000026 | Yes | 0.000002 | Yes | | **0.0004978** | 0.000002 | **0.000505** | 0.000002 | **0.000487** | **0.0000034** | **0.0000024** | **0.00004** | **0.0000194** | **0.0000023** | 0.000002 | **0.0000373** | **0.0000028** | **0.0000491** | **0.000003** | **0.000084** | **0.0000072** | 0.000002 |
| Total Aluminum (Al) | mg/L | 0.005 | Yes | 0.206 | Yes | Yes | **0.467** | 0.033 | 0.174 | 0.041 | 0.153 | 0.0147 | 0.0357 | **0.326** | 0.142 | **0.561** | 0.0301 | 0.0509 | 0.149 | **0.246** | 0.0646 | **24.8** | 0.0528 | 0.206 |
| Aluminum (CCME FAL guideline) mg/L | mg/L | | | | | | | 0.005 | 0.005 | 0.1 | 0.1 | 0.005 | 0.005 | 0.1 | 0.1 | 0.005 | 0.005 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.005 |
| Total Arsenic (As) | mg/L | 0.005 | Yes | 0.00076 | Yes | | **0.6564** | 0.000537 | **0.456** | **0.0124** | **0.79** | **0.18** | **0.0367** | **0.297** | **0.289** | **0.026** | **0.0171** | **0.326** | **1.37** | **2.84** | **0.0216** | **2.65** | **0.056** | 0.00076 |
| Total Cadmium (Cd) | mg/L | 0.00001 | Yes | 0.0000173 | Yes | Yes | **0.0001318** | 0.000005 | **0.0000711** | 0.000005 | **0.0000779** | 0.000005 | 0.000005 | **0.00013** | 0.0000158 | **0.000133** | 0.000006 | **0.0000224** | **0.000025** | **0.000042** | 0.0000085 | **0.00246** | 0.000005 | 0.0000173 |
| Cadmium (CCME calcuated long-term guideline) mg/L | | | | | | | | 0.00005 | 0.00004 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00006 | 0.00004 | 0.00006 | 0.00004 | 0.00004 | 0.00037 | 0.00005 | 0.00012 | 0.00004 | 0.00004 |
| Total Cobalt (Co) | mg/L | 0.01 | Yes | 0.000176 | Yes | | 0.003548 | 0.000042 | **0.00158** | 0.000061 | **0.00164** | 0.0000971 | 0.000142 | **0.00299** | **0.00123** | **0.00392** | 0.0000953 | **0.000367** | **0.000583** | **0.00946** | 0.000145 | **0.0788** | 0.000134 | 0.000176 |
| Total Copper (Cu) | mg/L | 0.002 | Yes | 0.00097 | Yes | Yes | **0.01234** | 0.00097 | **0.0131** | 0.00097 | **0.0112** | **0.00127** | 0.00085 | **0.00482** | **0.0046** | 0.00072 | 0.000877 | **0.00553** | **0.00421** | **0.0201** | 0.00094 | **0.0746** | 0.00077 | 0.00032 |
| Copper (CCME calculating long-term guideline) mg/L | | | | | | | | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.004 | 0.002 | 0.002 | 0.002 | 0.002 |
| Total Iron (Fe) | mg/L | 0.3 | Yes | 0.14 | Yes | | **1.334** | 0.0548 | **1.35** | 0.0755 | **1.26** | 0.0114 | 0.0831 | **1.31** | **0.442** | 0.0911 | 0.0425 | 0.0774 | **0.997** | 0.0505 | 0.0905 | **156** | **0.183** | 0.14 |
| Total Lead (Pb) | mg/L | 0.001 | Yes | 0.000243 | Yes | Yes | **0.006206** | 0.000075 | **0.00791** | 0.00012 | **0.00365** | 0.0000138 | 0.000096 | **0.00259** | **0.00119** | **0.000347** | 0.000049 | 0.000138 | **0.00335** | 0.000131 | 0.000077 | **0.151** | 0.000087 | 0.000243 |
| Lead (CCME calculated guideline) mg/L | mg/L | | | | | | | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.007 | 0.001 | 0.00208 | 0.001 | 0.001 |
| Total Manganese (Mn) | mg/L | 0.82 | Yes | 0.0707 | Yes | | 0.5546 | 0.0131 | **0.0746** | 0.0112 | **0.152** | 0.0111 | 0.0161 | **0.823** | **0.0734** | **0.124** | **0.0808** | 0.0166 | 0.0235 | **0.764** | 0.0217 | **14.6** | 0.0138 | 0.0707 |
| Total Nickel (Ni) | mg/L | 0.025 | Yes | 0.00051 | Yes | No | 0.009068 | 0.00043 | **0.00302** | 0.00049 | **0.00495** | **0.000802** | **0.00053** | **0.00662** | **0.00335** | **0.0107** | **0.000551** | **0.0031** | **0.00334** | **0.0513** | **0.00136** | **0.072** | **0.00078** | 0.00051 |
| Nickel (CCME FAL guideline) mg/L | mg/L | | | | | | | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.15 | 0.025 | 0.07422 | 0.025 | 0.025 |
| Total Selenium (Se) | mg/L | 0.001 | Yes | 0.000059 | Yes | | 0.0001094 | 0.000059 | **0.000064** | 0.000059 | **0.000127** | 0.000047 | 0.000048 | **0.000083** | **0.000067** | 0.000049 | 0.000056 | **0.000085** | **0.0002** | **0.00026** | **0.000061** | **0.00277** | 0.00004 | 0.000051 |
| Total Silver (Ag) | mg/L | 0.0001 | Yes | 0.00001 | Yes | | 0.0000298 | 0.00001 | 0.00001 | 0.00001 | **0.000043** | 0.000005 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.000005 | 0.00001 | **0.000025** | **0.000025** | 0.00001 | **0.000232** | 0.00001 | 0.00001 |
| Total Vanadium (V) | mg/L | 0.006 | Yes | 0.00051 | Yes | | 0.001286 | 0.0002 | **0.00139** | 0.0002 | **0.00072** | 0.0002 | 0.0002 | **0.00113** | 0.00032 | 0.00038 | 0.0002 | 0.00024 | **0.001** | **0.001** | 0.0002 | **0.269** | 0.0002 | 0.00051 |
| Total Zinc (Zn) | mg/L | 0.03 | Yes | 0.0025 | Yes | | 0.02798 | 0.001 | **0.0299** | 0.0011 | **0.0217** | **0.00312** | 0.0013 | **0.0251** | **0.0126** | **0.0138** | 0.00116 | **0.0129** | **0.0113** | **0.0561** | **0.0033** | **0.54** | 0.0023 | 0.0025 |

Exceeds Tier 1 Screen
**Exceeds Background**
**Exceeds Tier 1 & Background**

CCME adjusted guideline
Adjusted CCME Guideline Exceeded

**95th percentile exceeds Tier 1**
95th percentile exceeds background

# APPENDIX C

## Detailed Data Assessment

# MONTAGUE MINES TAILINGS AREAS – FIELD REPORT

Report prepared for:

Nova Scotia Lands
Harbourside Place
Harbourside Commercial Park
45 Wabana Court
Sydney, Nova Scotia
B1P 0B9

Report prepared by:

ECOMETRIX INCORPORATED
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18-2525
July 2019

# MONTAGUE MINES TAILINGS AREAS – FIELD REPORT


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# 1.0 INTRODUCTION

This report presents a summary of the field plan, observations, and geochemical results of an investigation of historical tailings at the former Montague Mine site.

The Montague Mine was an historic gold mining operation that involved several different mines with a variety of mine openings and a number of tailings disposal areas. The collective of former mines and tailings disposal areas is referred to as "the Site" in this report.

Gold was discovered at Montague in 1862. Mining was carried out continuously from 1865 to 1928 and then intermittently until 1940 (Parsons et al., 2012). The Site has a storied past producing over 120,000 ounces of gold from the Montague Mine, which is one of 64 abandoned historic gold mining districts across Nova Scotia (Drage, 2015). There are significant environmental legacies associated with past mining activities at the Site, largely related to the presence of elevated levels of arsenic and mercury in the tailings.

The Montague Mines tailings locations are close to residential areas and have been used, and in some cases, continue to be used for recreational purposes, despite prominent warning signs indicating the presence of high arsenic concentrations.

This report describes the Site, the objectives of this field investigation, the results of the field program, and brief discussion of the results.

## 1.1 Site Background and Historical Tailings and Groundwater Characterization

The Montague gold district is located in the community of Montague Gold Mines, within the Halifax Regional Municipality (HRM), Nova Scotia. **Figure 1-1** provides the location of Montague Mines, while **Figure 1-2** provides a closer view of the Montague Mines site with Crown lands identified. In **Figure 1-2**, the main tailings area is clearly identified, as well as more distant tailings areas that are also part of the current project scope.

This report focuses on the main tailings area at Montague Mines, since all previous studies in this historic mining district have been conducted only in this area. The main tailings area appears as an open wetland, with tailings distributed throughout the wetland. The wetland is largely submerged during high flow periods, but also has open dry areas which can generate dust.

There has been considerable geochemical characterization of the main tailings area and surrounding soils at the Site, with historical arsenic concentrations reaching up to 41,000 mg/kg. The arsenic concentrations are elevated over a wide area throughout the tailings, relative to the NS Environment (2014) human health soil quality guideline of 31 mg/kg. Mercury contents in the tailings reach up to 8.4 mg/kg in the main tailings with three samples exhibiting higher mercury concentrations of 16 mg/kg, 25 mg/kg, to the highest concentrations (70 mg/kg) observed at the former Stamp Mill location (Parsons et al., 2012).

The mercury contents across the main tailings area generally meet the human health and ecological soil quality guidelines established for inorganic mercury (6.6 mg/kg, CCME, 1999; NS Environment, 2014), with some elevated mercury results being reported in locations of the former Stamp Mill and central tailings areas, whereas wooded and soils near residential areas were generally less than 1 mg/kg (Maritime Testing, 2009).

Groundwater data collected as part of the Maritime Testing (2009) study within the main tailings area found that all samples collected from the three groundwater wells were less than the applicable mercury drinking water guideline of 1 µg/L, but all arsenic values exceeded the drinking water quality guideline of 10 µg/L, and ranged up to 3,100 µg/L.

**Figure 1-1: Location of Montague Mines**

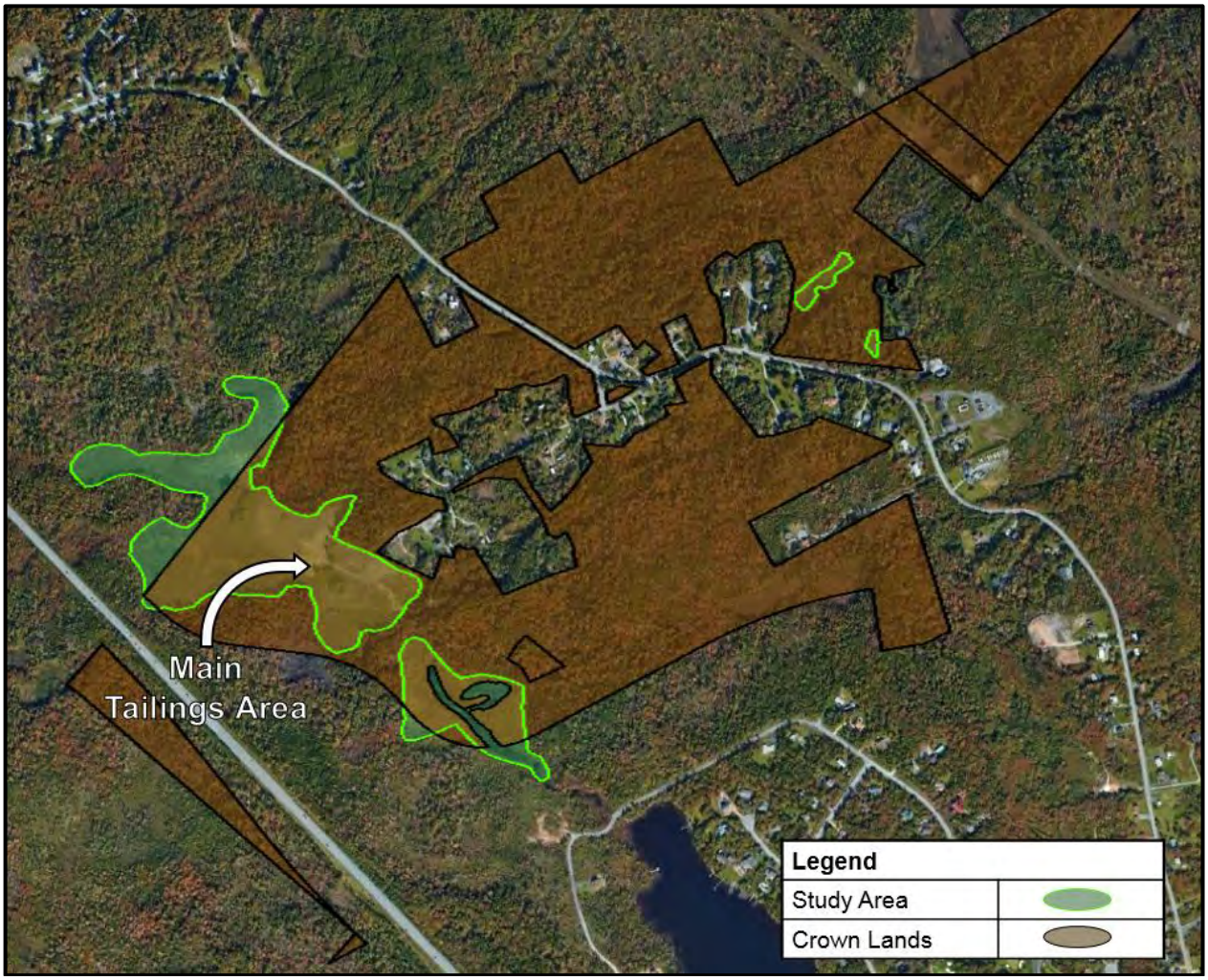


**Figure 1-2: Montague Gold Mines – Study Area**

### 1.1.1 Mining and Tailings Production

The historical mining strategies employed involved extraction and milling of ore on site and treatment with mercury to extract gold at a variety of Stamp mills, with the subsequent release of “tailings”, the residual processed ore, to the environment. At Montague Mines, the tailings were directly deposited into Mitchell Brook and adjacent wetland areas. The abandoned mine area contains considerable volumes of tailings covering many hectares of the surrounding environment, including areas which have been characterized and studied quite extensively (e.g., Parsons et al., 2012) in addition to tailings areas that have never undergone any sampling and chemical analysis, or volume quantification.

The primary issues of concern at Montague Mines relate to arsenic and mercury in the receiving environment. Arsenic is naturally enriched in the rocks, soil, sediment, surface water and groundwater of many areas of Nova Scotia, due to the natural geology of this province, which are underlain by bedrock of the Meguma Supergroup (see Parsons and Little, 2015). The gold deposits contain naturally occurring arsenopyrite (FeAsS), an iron arsenic

sulphide mineral. The presence of mercury in the tailings is related to the extraction process used at the time, which involve use of a mercury amalgamation to collect the gold. This process resulted in the release of mercury at levels that are elevated relative to current soil and sediment quality guidelines.

## 1.2 Objectives and Scope of Work

Nova Scotia Lands (NS Lands) is interested in building on the previous work and determining the possible costs and schedule for closing the tailings at the Site. To that end, NS Lands issued a request for proposal in 2018 that called for the development of a conceptual closure plan for the Site with a focus on the portions of the property that are owned by the Crown. The objectives of this broader project were as follows:

i) Identify gaps in the available information.

ii) Conduct additional field investigations to address the information gaps.

iii) Develop criteria for closure.

iv) Develop a conceptual closure plan for the Site with a Class D cost estimate and level 1 schedule, recognizing that there may be more than one option available to close the site.

This report details the results of a field program undertaken in 2018 to satisfy objective ii) of the broader project. Discussion within this report is largely focused on arsenic and mercury as these two constituents are known to be elevated due to the enviromental legacy of tailings deposition at the Site.

The areas that were investigated in this field program are shown in **Figure 1-3** as regions shaded green. These areas include the main tailings area that has been the focus of several previous investigations, as well as several additional tailings areas that have not previously been characterized.

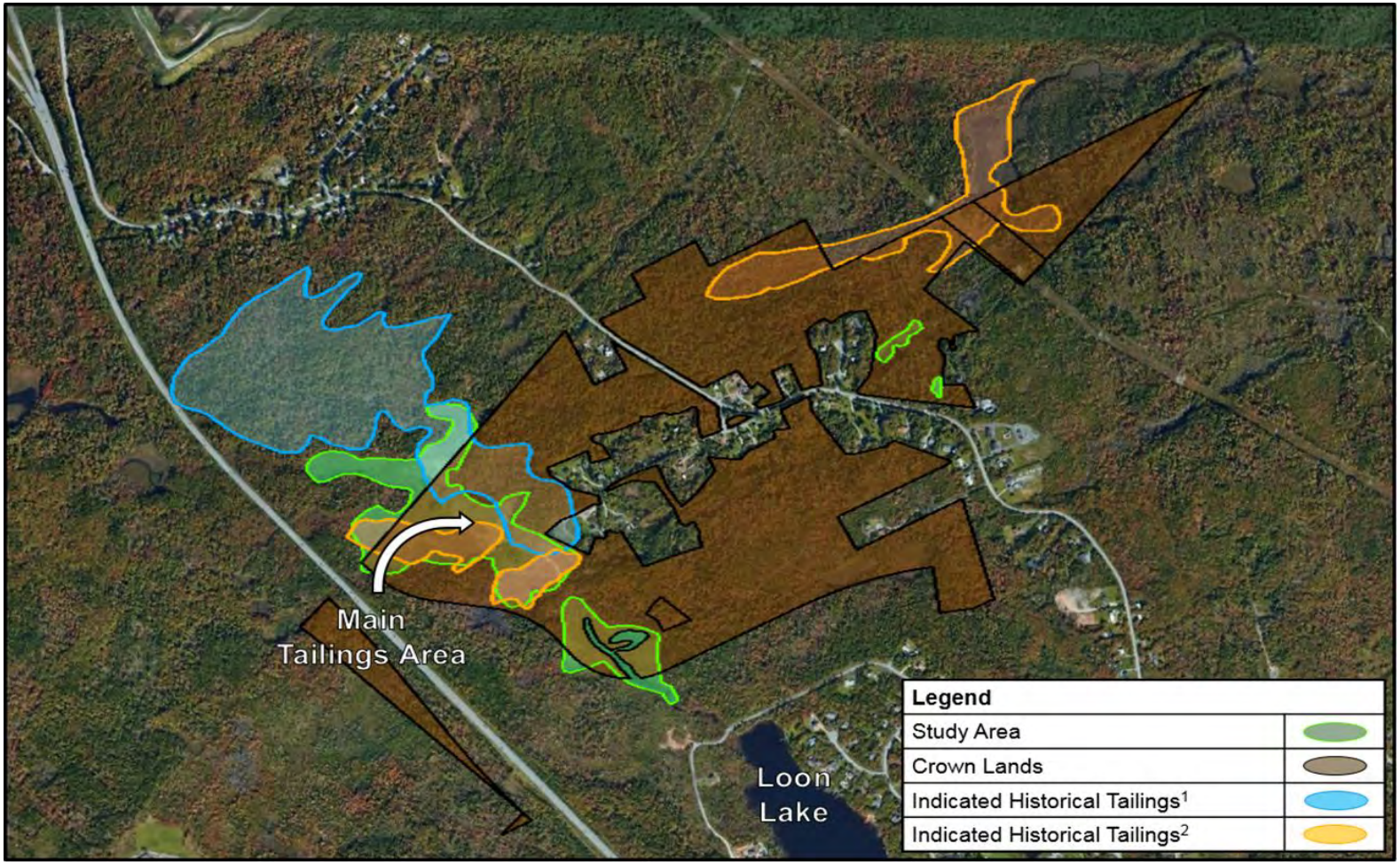


**Figure 1-3: Montague Gold Mines – Study Area and Historical Tailings**

**Notes:**
1) Blue shaded areas from Messervey (1938).
2) Orange shaded areas from Smith and Goodwin (2009).

# 2.0 FIELD PROGRAM AND METHODS

The field sampling campaign involved the collection of samples from locations upgradient, near-field, and downgradient of the historical Montague Gold Mine tailings area. The field program was completed by EcoMetrix and Wood personnel, over the period November 22nd to 30th, 2018.

A brief summary of the media sampled in this field program is as follows:

- Surface water;
  - Field measurements were recorded and samples were collected for total and dissolved contents analysis;
- Shallow subsurface water;
  - Piezometers were installed at locations downgradient of the exposed surficial tailings;
  - Piezometer installations were nested to determine vertical gradients and chemical composition differences within the tailings and within the natural ground below the tailings;
  - Samples were collected for dissolved contents analysis;
- Surficial solids;
  - Surficial solids samples were collected from the exposed surficial tailings pad and its surrounding area;
  - Samples were collected for rinse pH and rinse conductivity measurements, solids content analysis, and porewater extraction testing; and
- Core samples;
  - Tailings and sediment core samples were collected for solids content analysis and porewater extraction testing.

## 2.1 Surface Water Sampling

Surface water characterization was performed in consideration of the known pathways from the tailings to the receiving environment, which are represented by surface runoff and surface water flow as well as subsurface flow that discharges locally to the surface water.

Previous investigations have shown that the subsurface effects on water are relatively shallow and it is clear that subsurface water affected by the tailings will emerge and discharge to surface water at or in close proximity to the tailings source areas. Therefore, the assessment of surface water is key to understanding the current condition of the receiving environment as a baseline prior to potential remediation.

**Figure 2-1** presents the 13 sites where standing/surface water samples were taken in the vicinity of Montague mine, while **Table 2-1** describes the i*n situ* surface water quality measurements that were taken at the time of sampling. All standing/surface water samples were sent to Maxxam Analytics for the analysis of total and dissolved metals. Note that not

all water samples are representative of permanent water courses and some standing/surface water samples are from temporary shallow pools of standing water that were selected to be near coring locations.

**Table 2-1: Surface Water Quality Measurements**

| Site | pH | EC (uS/cm) | Temp (C) |
|---|---|---|---|
| M-SW5 | 7.17 | 202 | 0.7 |
| M-SW9 | 5.32 | 32 | 6.3 |
| M-SW10 | 6.37 | 224 | 4.1 |
| M-SW11 | 4.62 | 239 | 4.7 |
| M-SW12 | 5.98 | 255 | 0.9 |
| M-SW13 | 5.69 | 60 | 3 |
| M-SW14 | 6.99 | 74 | 4.2 |
| M-SW15 | 7.08 | 22 | 3.9 |
| M-SW16 | 7.83 | 678 | 4.1 |
| M-SW17 | 7.37 | 246 | 4.3 |
| M-SW18 | N/A | N/A | N/A |
| M-SW19 | 7.2 | 149 | 3 |
| M-SWMB | 7.12 | 241 | 1.2 |

**Note:**
Surface water quality parameters not recorded at M-SW18.

**Figure 2-1: Montague Gold Mines – Surface Water Sampling Locations**

## 2.2 Shallow Subsurface Water Sampling

The characterization of subsurface water is important due to the potential local discharge from subsurface into surface water. Nested drive point piezometers were installed at selected stations at the Montague study area.

**Figure 2-2** presents the four piezometer installation locations. Each piezometer nest included a shallow and deep piezometer, as summarized in **Table 2-2**.

Subsurface water samples were recovered from each piezometer using a peristaltic pump and samples were submitted to Maxxam analytics for dissolved metals analysis.

**Figure 2-2: Montague Gold Mines – Piezometer Locations**

**Table 2-2: Montague Mines – Piezometer Installation Details**

| Location | Install Type | Screened Depth (from) (cm) | Screened Depth (to) (cm) | Stick-up Height (cm) |
|---|---|---|---|---|
| M-Pz1 | Deep | 177 | 190 | 108 |
| M-Pz1 | Shallow | 47 | 60 | 37.5 |
| M-Pz2 | Deep | 87 | 100 | 99.2 |
| M-Pz2 | Shallow | 47 | 60 | 42.1 |
| M-Pz3 | Deep | 167 | 180 | 135 |
| M-Pz3 | SHallow | 47 | 60 | 47.2 |
| M-Pz4 | Deep | 87 | 100 | 131 |
| M-Pz4 | Shallow | 47 | 60 | 56.4 |

## 2.3 Surficial Solids Sampling

Surficial solids samples were collected from the uppermost 20 cm of the exposed tailings and nearby wetland areas with a trowel and hand auger. This sampling was performed to identify the chemical gradients and potential surficial loadings resulting from surface oxidation and weathering relative to deeper regions.

**Figure 2-3** presents the locations of the 35 surficial sample sites. At each surficial sampling location an upper (0 - 10cm) and a lower (10-20cm) depth sample were taken. **Table 2-3** presents the rinse pH and rinse conductivity measurements at each sample location. **Figure 2-4** displays all sample sites with a visual depiction of the rinse pH measurements. Rinse pH values were obtained in order to review the potential for acidic conditions and the presence of hardpan materials. In **Figure 2-4** green symbols indicates pH values that are greater than 6, yellow symbols indicates pH values between 4 and 6, and red symbols indicates pH values that are less than 4. The lowest rinse pH values of 3.2 and 3.7, were observed to be within the hardpan portion of the lower Montague tailings.

The hardpan refers to tailings that have been cemented by the formation of chemical precipitates. This condition is typically attributed to sulphide tailings that are highly oxidized and have formed iron hydroxide solids that has acted to cement the tailings particles together. The hardpan area tailings were also observed to be coarser grained, sand-like particles that would be expected to be well drained and therefore be exposed to oxygen in the air, resulting in oxidation of the sulphide minerals.

A subset of the surficial solids samples was submitted to SGS Lakefield to determine the total solids contents, moisture content, and the species of carbon and sulphur present.

Additionally, a subset of the surficial solids samples was selected for porewater extraction tests.

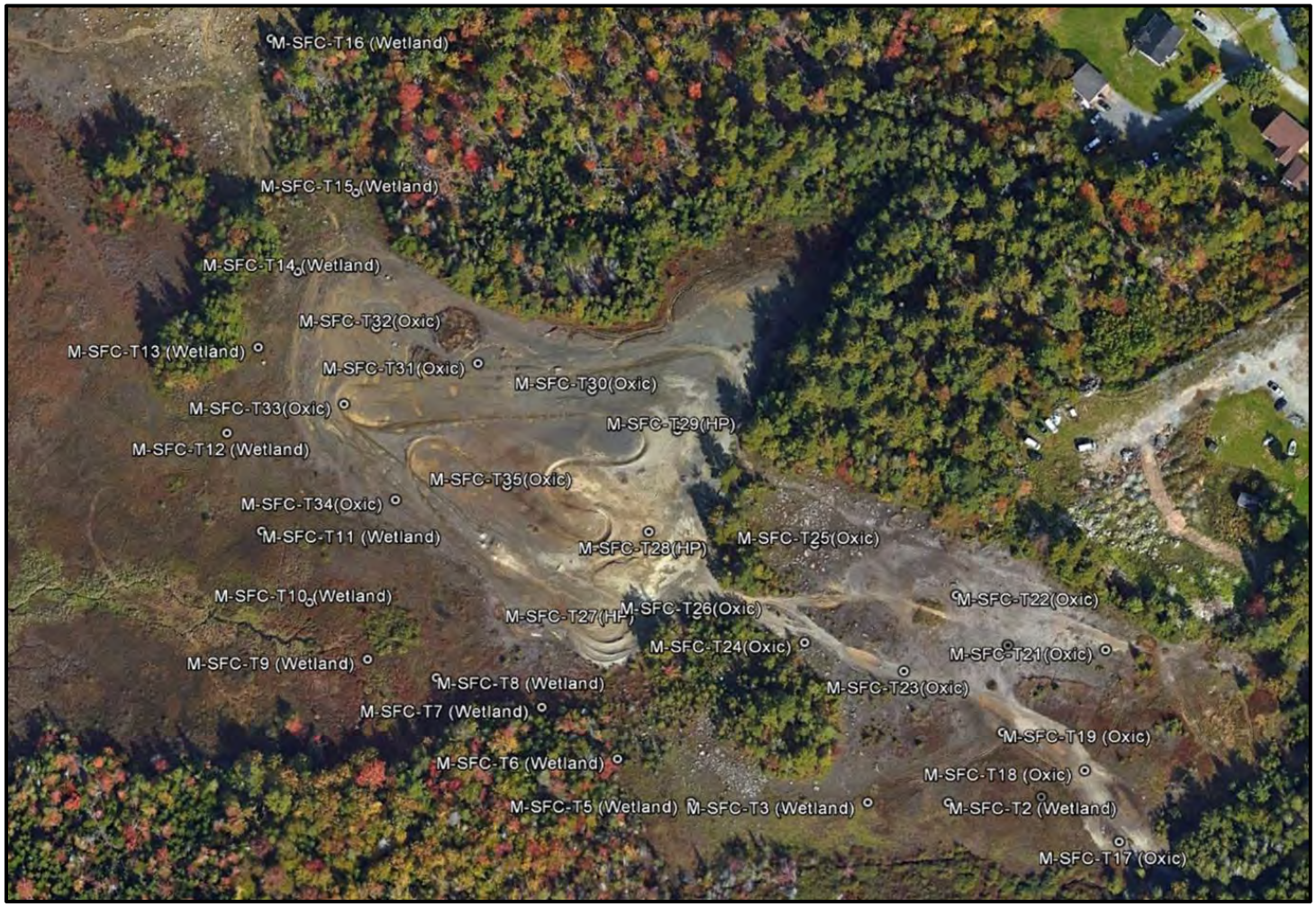


**Figure 2-3: Montague Gold Mines – Surficial Solids Sampling Locations**

**Table 2-3: Rinse pH and Conductivity (EC) in Surficial Solids Samples**

| Surficial Tailings ID | | A (0-10 cm) | | B (10-20cm) | |
|---|---|---|---|---|---|
| 0-10cm | 10-20cm | Rinse pH | Rinse Ec (µ S/cm) | Rinse pH | Rinse EC (µ S/cm) |
| M-SFC-T1A | M-SFC-T1B | 5.52 | 16.49 | 5.86 | 17.53 |
| M-SFC-T2A | M-SFC-T2B | 6.16 | 73.5 | 6.31 | 40.7 |
| M-SFC-T3A | M-SFC-T3B | 6.36 | 15.27 | 5.56 | 37.5 |
| M-SFC-T4A | M-SFC-T4B | 6.58 | 8.48 | 6.59 | 7.16 |
| M-SFC-T5A | M-SFC-T5B | 6.11 | 12.6 | 6.22 | 11.45 |
| M-SFC-T6A | M-SFC-T6B | 6.41 | 16.25 | 6.32 | 14.69 |
| M-SFC-T7A | M-SFC-T7B | 6.25 | 25.39 | 5.94 | 62.1 |
| M-SFC-T8A | M-SFC-T8B | 5.97 | 70.3 | 6.29 | 80.2 |
| M-SFC-T9A | M-SFC-T9B | 6.11 | 56.7 | 5.2 | 96.4 |
| M-SFC-T10A | M-SFC-T10B | 5.75 | 91 | 5.81 | 91.5 |
| M-SFC-T11A | M-SFC-T11B | 5.86 | 73 | 5.9 | 83.4 |
| M-SFC-T12A | M-SFC-T12B | 5.92 | 31 | 5.84 | 127.7 |
| M-SFC-T13A | M-SFC-T13B | 5.81 | 130.8 | 6.09 | 60.3 |
| M-SFC-T14A | M-SFC-T14B | 5.54 | 51.1 | 5.71 | 59.9 |
| M-SFC-T15A | M-SFC-T15B | 5.73 | 58.9 | 6.04 | 57.9 |
| M-SFC-T16A | M-SFC-T16B | 6.34 | 23.45 | 6.01 | 33.7 |
| M-SFC-T17A | M-SFC-T17B | 5.38 | 25.71 | 5.48 | 12.16 |
| M-SFC-T18A | M-SFC-T18B | 5.83 | 8.48 | 5.75 | 10.47 |
| M-SFC-T19A | M-SFC-T19B | 5.86 | 10.63 | 5.98 | 17.35 |
| M-SFC-T20A | M-SFC-T20B | 6.28 | 10.79 | 6.36 | 11.68 |
| M-SFC-T21A | M-SFC-T21B | 5.36 | 5.44 | 5.71 | 3.24 |
| M-SFC-T22A | M-SFC-T22B | 5.58 | 6.85 | 5.81 | 9.43 |
| M-SFC-T23A | M-SFC-T23B | 6.65 | 23.05 | 6.73 | 16.7 |
| M-SFC-T24A | M-SFC-T24B | 5.95 | 4.61 | 5.49 | 6.27 |
| M-SFC-T25A | M-SFC-T25B | 5.9 | 40.8 | 5.74 | 25.3 |
| M-SFC-T26A | M-SFC-T26B | 5.24 | 16.36 | 4.66 | 15.66 |
| M-SFC-T27A | M-SFC-T27B | 3.21 | 268.9 | 3.16 | 309 |
| M-SFC-T28AHP | -- | 3.73 | 117.2 | -- | -- |
| M-SFC-T29A | M-SFC-T29B | 4.67 | 21.21 | 3.98 | 64.5 |
| M-SFC-T30A | M-SFC-T30B | 5.95 | 20.32 | 5.94 | 40.7 |
| M-SFC-T31A | M-SFC-T31B | 5.97 | 78.4 | 6.14 | 66.7 |
| M-SFC-T32A | M-SFC-T32B | 5.54 | 248 | 6.02 | 145.7 |
| M-SFC-T33A | M-SFC-T33B | 5.36 | 205.6 | 5.55 | 127.9 |
| M-SFC-T34A | M-SFC-T34B | 5.6 | 100.1 | 5.89 | 52.8 |
| M-SFC-T35A | M-SFC-T35B | 6.16 | 51.1 | 6.04 | 73.2 |

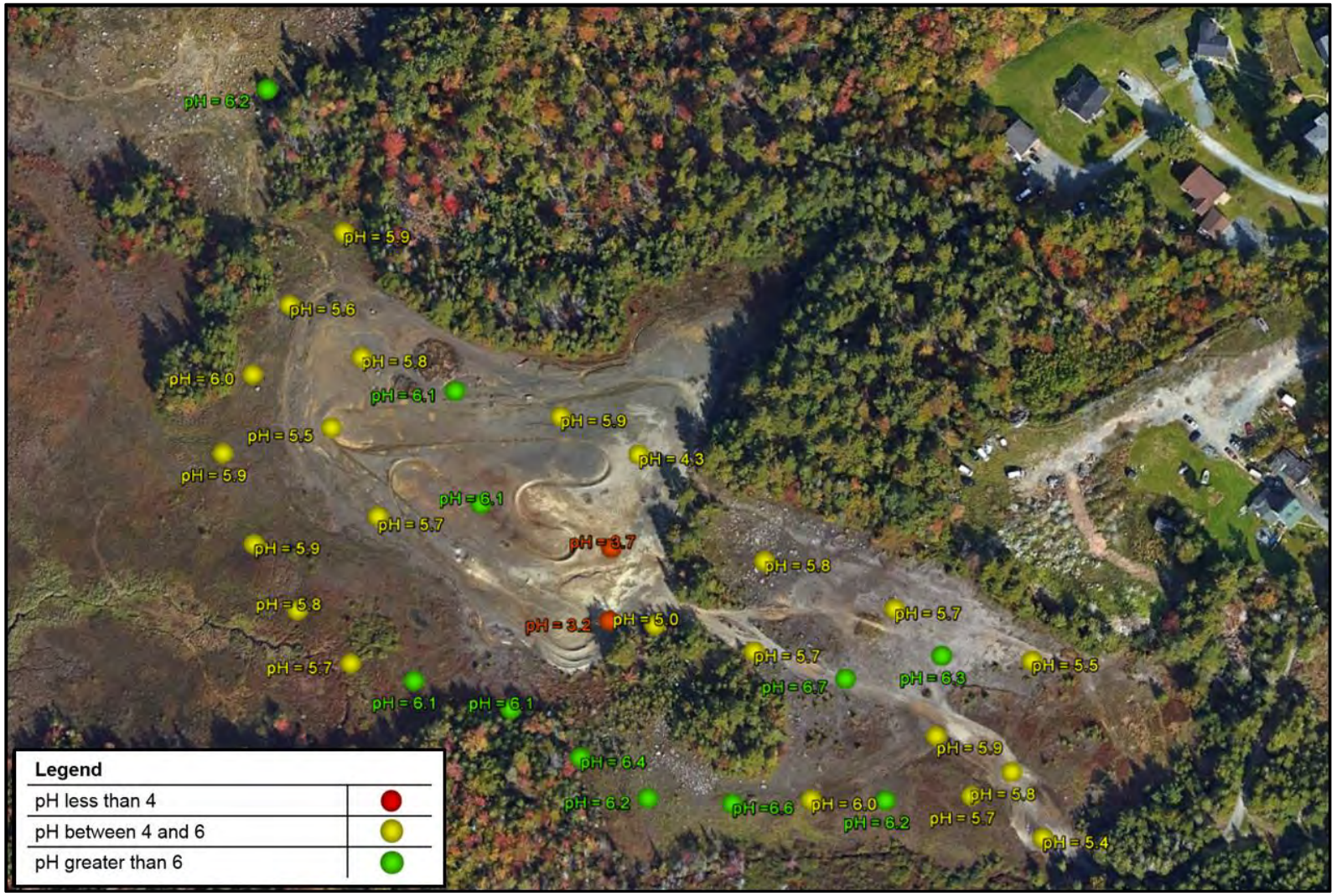


**Figure 2-4: Montague Gold Mines – Surficial Solids Rinse pH**

## 2.4 Core Sampling

Core samples were collected at near and far-field locations to identify the chemical gradients with depth. The chemical profiles within each core can be used to identify the presence and/or extent of site-related effects, identify if tailings have been translocated from source areas, identify if the area is recovering and/or continuing to receive loadings.

Sediment cores at the lakes were collected with a K-B corer with gravity insertion and retrieval. Coring in streams and creeks was achieved by manually pushing the core tubes and coring within wetland areas was performed using a hand auger. **Table 2-4** summarizes the maximum core depth at each location and **Figure 2-5** presents the locations of all 13 coring locations.

All core samples were immediately sectioned in the field and partitioned into discrete intervals. A subset of the sectioned samples were submitted to SGS Lakefield to determine total solids contents, moisture content, and carbon and sulphur species contents.

Further, a subset of the sectioned samples was also selected for porewater extraction tests.

**Table 2-4: Montague Mines – Core Sample Depths**

| Core ID | Core Depth (cm) |
|---|---|
| M-C1 | 200 |
| M-C2 | 100 |
| M-C3 | 200 |
| M-C4 | 100 |
| M-C5 | 50 |
| M-C9 | 40 |
| M-C10 | 50 |
| M-C11 | 40 |
| M-C12 | 40 |
| M-C13 | 40 |
| M-C17 | 40 |
| M-C18 | 30 |
| M-C19 | 30 |

**Figure 2-5: Montague Gold Mines – Core Sampling Locations**

## 2.5 Porewater

A portion of the surficial solids and core samples were selected for porewater analysis. The porewater extraction tests were performed at the EcoMetrix laboratory. These tests involve the addition of a measured quantity of deionized water to a known solids mass followed by shaking and centrifuging to extract the water quantify the concentrations of the resident porewater in a sample.

The results from the porewater extraction can be used to identify transport pathways within the subsurface, identify potential 'hot-spot' regions with elevated concentrations, and can be used to identify concentration gradients within the subsurface that can be interpreted to identify if certain regions are continuing act as a sink or are recovering and are instead releasing historically accumulated loads,.

Extracted porewater samples submitted to the laboratory for acidity/alkalinity analysis, dissolved metals analysis, with a subset of samples for cyanide and arsenic speciation.

# 3.0 RESULTS

Full laboratory results from the field program are included in the Appendices to this report. Solids contents results are included in **Appendix A**, surface water and groundwater results are included in **Appendix B**, porewater results included in **Appendix C**, and the compiled laboratory Certificates of Analysis for all analyses are included in **Appendix D**.

This Section of the report will discuss the acid base accounting (ABA) characteristics of the solids samples and the results of the arsenic and mercury characterization in all media.

## 3.1 Solids Contents

### 3.1.1 Acid Base Accounting

The solid samples were analysed for ABA characteristics, including total sulphur and sulphide-sulphur, modified Sobek neutralization potential (Sobek-NP) and carbonate content. The ABA results provide information on the potential for acid generation as a result of sulphide mineral oxidation. The acid potential (AP) is derived from the sulphide-sulphur content and is expressed in units of kilograms of $CaCO_3$ per tonne of tailings (kg-$CaCO_3$/t). The neutralization potential (NP) was measured with a modified Sobek method (Lawrence, 1991) as well as calculated from the carbonate content and expressed in the same units as those of AP. The ratio of NP/AP is used to determine the potential for acid generation if all of the sulphide is oxidized at some time in the future.

Sulphide oxidation creates sulphuric acid that can lower the pH of any contact water if there is insufficient NP to neutralize the acid produced. The NP/AP ratio is also referred to as the neutralization potential ratio (NPR). When materials contain sulphide and have NPR values less than one, the material would be expected to generate free acidity at some time in the future if oxidation is not mitigated. These materials are referred to as potentially acid generating (PAG). Materials with NPR values greater than 2 and that have NP that is effective at neutralizing water to pH values of 6 and greater would not be expected to generate free acidity. These materials would remain neutral into the indefinite future and are referred to as non-potentially acid generating (non-PAG). Materials with NPR values greater than one and less than two may or may not produce free acid and therefore are characterized as uncertain with respect to the potential for acid generation. These uncertain materials are typically conservatively assumed to be PAG for interpretive purposes.

The Sobek-NP was analysed on a subset of samples and carbonate was measured on all samples. The Sobek-NP results were compared to the carbonate-NP (Carb-NP) results and the results are displayed graphically in **Figure 3-1**. The results show that the Sobek NP values ranged from about -30 to +10 kg-$CaCO_3$/t and the Carb-NP values ranged from about 0 to 4 kg-$CaCO_3$/t. The negative Sobek NP values are the result of materials that have already generated free acidity and have pH values less than 6. It was assumed that the Carb-NP values represented the effective NP in the tailings samples. Therefore, all NPR values were calculated using the Carb-NP.

The Carb-NP/AP ratios were plotted with the sulphide-sulphur contents in **Figure 3-2**. This figure also shows the NPR criteria for PAG and non-PAG materials. These results indicate that the majority of samples will be characterized as PAG with insufficient NP to maintain neutral conditions. It is also evident from the results that the lower Carb-NP/AP values are associated with the higher sulphide-sulphur contents. These results imply that although only a few samples exhibited acidic rinse pH values, the majority of the tailings are likely PAG as summarized in **Table 3-1** and are expected to generate acid at some time in the future in the absence of any mitigating factors.

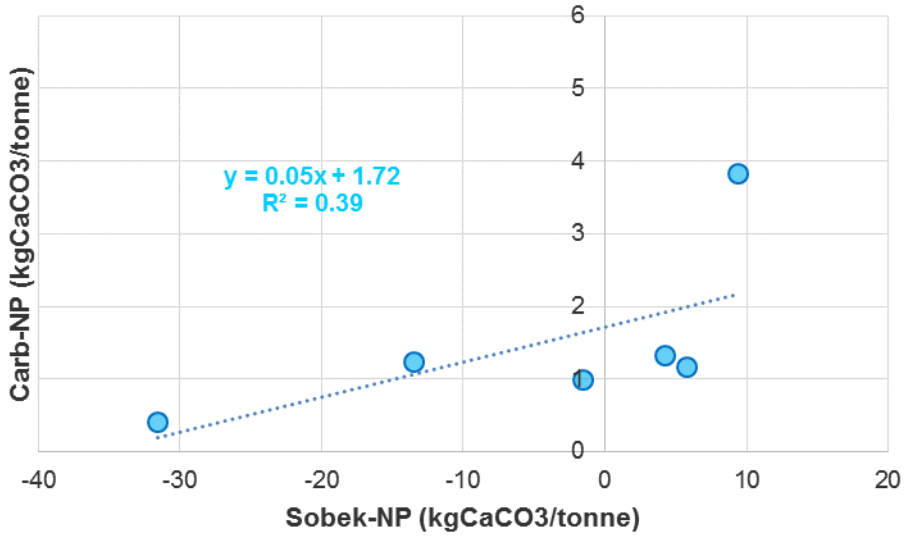


**Figure 3-1: Montague Gold Mines – Carb-NP vs. Modified Sobek-NP**

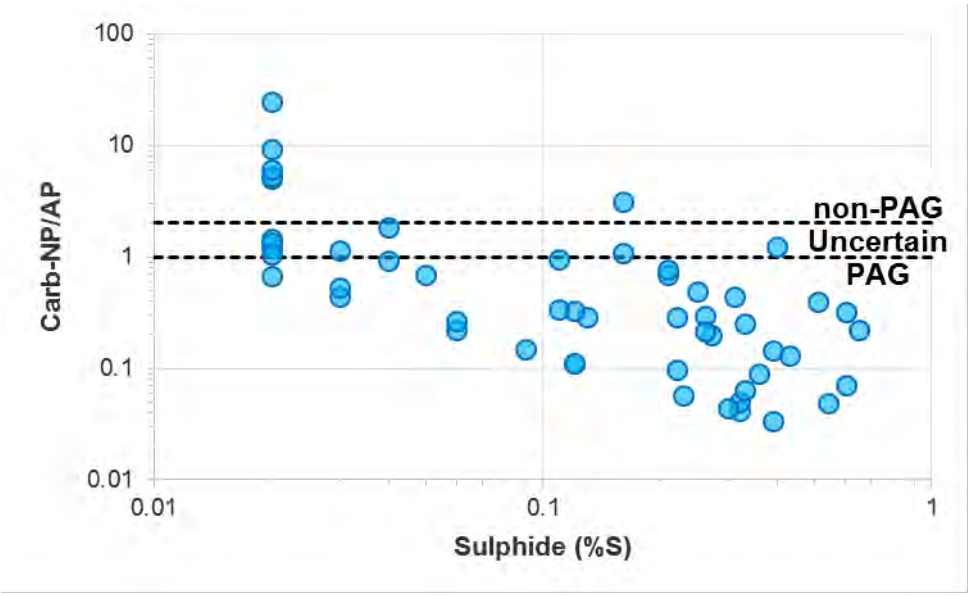


**Figure 3-2: Montague Gold Mines – Carb-NP/AP vs. Sulphide**

**Table 3-1: Montague Mines – Classification of Acid Generation Status**

| Location | Carb-NPR | | | |
|---|---|---|---|---|
| | Count | PAG<br>Carb-NPR < 1 | Uncertain<br>1 ≤ Carb-NPR < 2 | Non-PAG<br>Carb-NPR ≥ 2 |
| Montague | 52 | 38 | 8 | 6 |
| | | 73% | 15% | 12% |

The sample locations and the Carb-NPR results are displayed in **Figure 3-3**. The red symbols represent PAG material, green symbols represent non-PAG materials, and orange symbols represent materials with an uncertain potential for acid generation. It is evident from this distribution that PAG materials occur at all areas that were sampled, including the upstream sediments at Loon Lake, and those downstream in Barry's Run, Lake Charles and Lake Major. Even though the lake sediments have not been identified as tailings, the presence of sulphide-sulphur and the low Carb-NP values result in characterization of these sediments as PAG. Overall, these results imply that the PAG characteristics of the tailings require consideration for any proposed mitigation strategies.

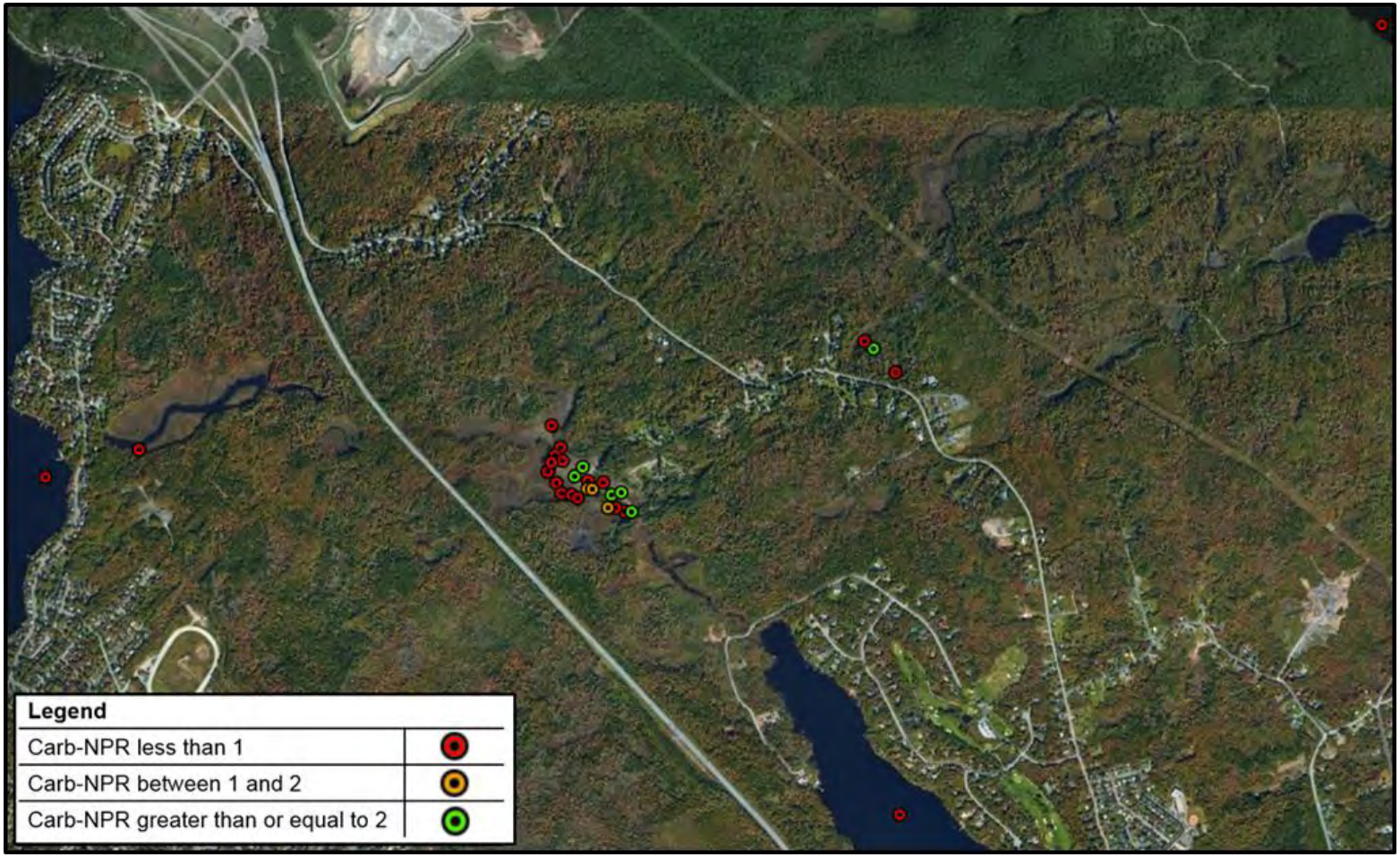


**Figure 3-3: Montague Gold Mines – Carb-NP/AP Overview**

### 3.1.2 Arsenic and Mercury Contents in the Tailings Solids

The results for the solids samples are summarized in a series of images of the site that show the concentrations of arsenic and mercury relative to the Tier 1 and Tier 2 risk criteria for human health as presented in Intrinsik (2019). The results from this study that are shown represent the surface-most solids contents measured at each sampling station. Full detailed results are shown in **Appendix A**. The results from historical surface sampling, completed between 2003 and 2008, were included in the figures to complement the results from this study (i.e., Parsons et al, 2012, Maritime Testing, 2009, Parsons and Little, 2015 datasets are included in the figures).

The results for arsenic in the surface solids across the entire site are shown in **Figure 3-4**, including the sediments in Loon Lake, Lake Charles and Lake Major and those for the central area of the site are shown in **Figure 3-5**. In these figures, the red symbols represent concentrations of arsenic that are greater than 10 times the Tier 2 criterion, orange symbols represent arsenic values between the Tier 2 criterion and 10 times the tier 2 value, yellow symbol represents values between the Tier 1 and Tier 2 criteria, and green symbols represent arsenic concentrations that are less than the Tier 1 criterion. Diamond symbols represent samples from this study and circle symbols represent results from historical studies.

These results indicate that there is a clustering of samples with the highest arsenic contents within the central area of the main tailings deposition area. There are a few additional locations that have arsenic contents greater than the Tier 2 criterion (i.e. in the vicinity of Gold Lane road and beyond the Hydro corridor to the northeast) and several locations that have levels between the Tier 1 and Tier 2 criteria. These results provide an indication of the priority tailings areas and also indicate the areas adjacent to the highest concentrations that could be considered for further assessment.

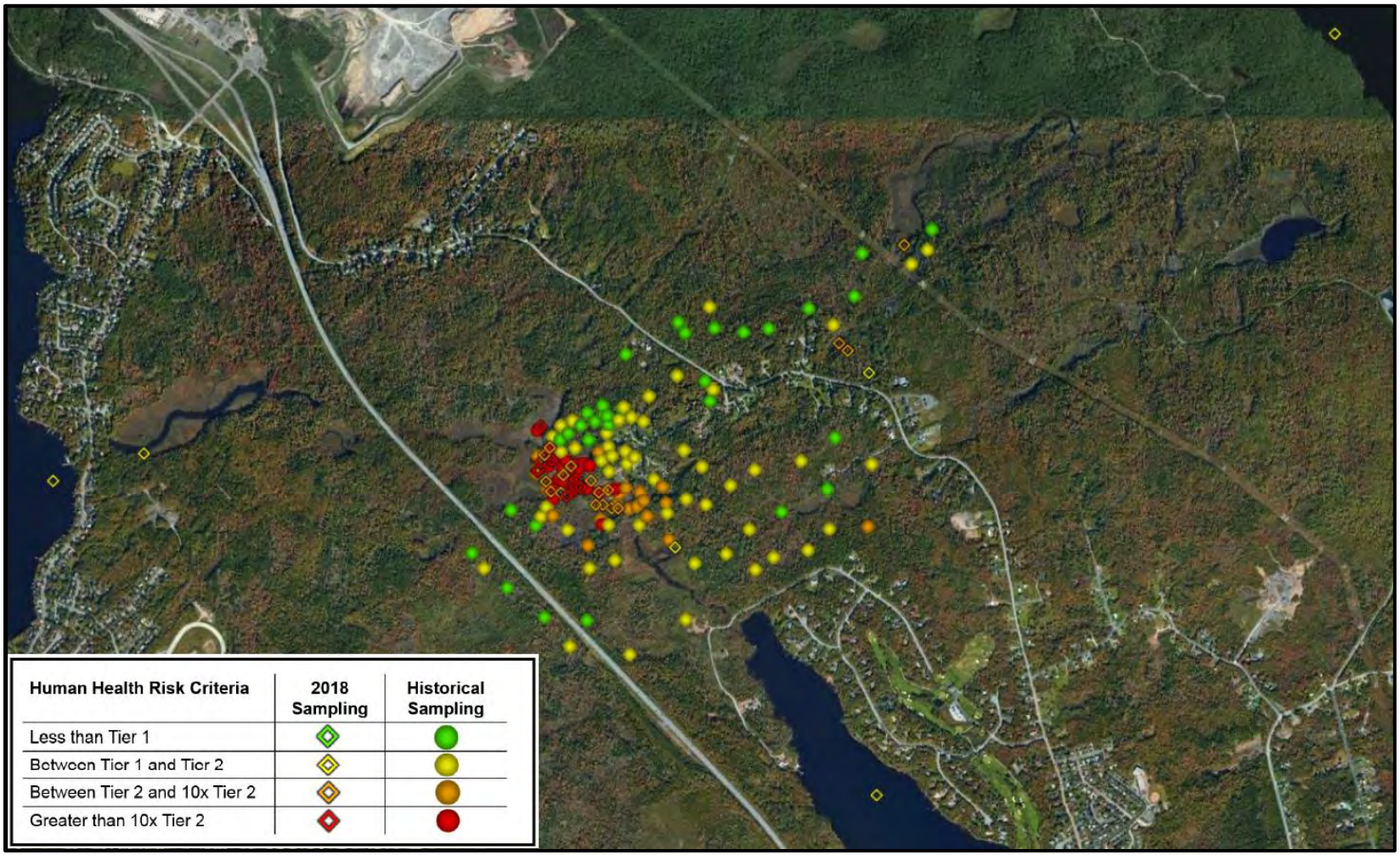


**Figure 3-4: Montague Gold Mines – Near-Surface Arsenic Contents – All Locations**

**Note:**
Tier 1 Arsenic Criteria = 31 mg/kg
Tier 2 Arsenic Criteria = 750 mg/kg

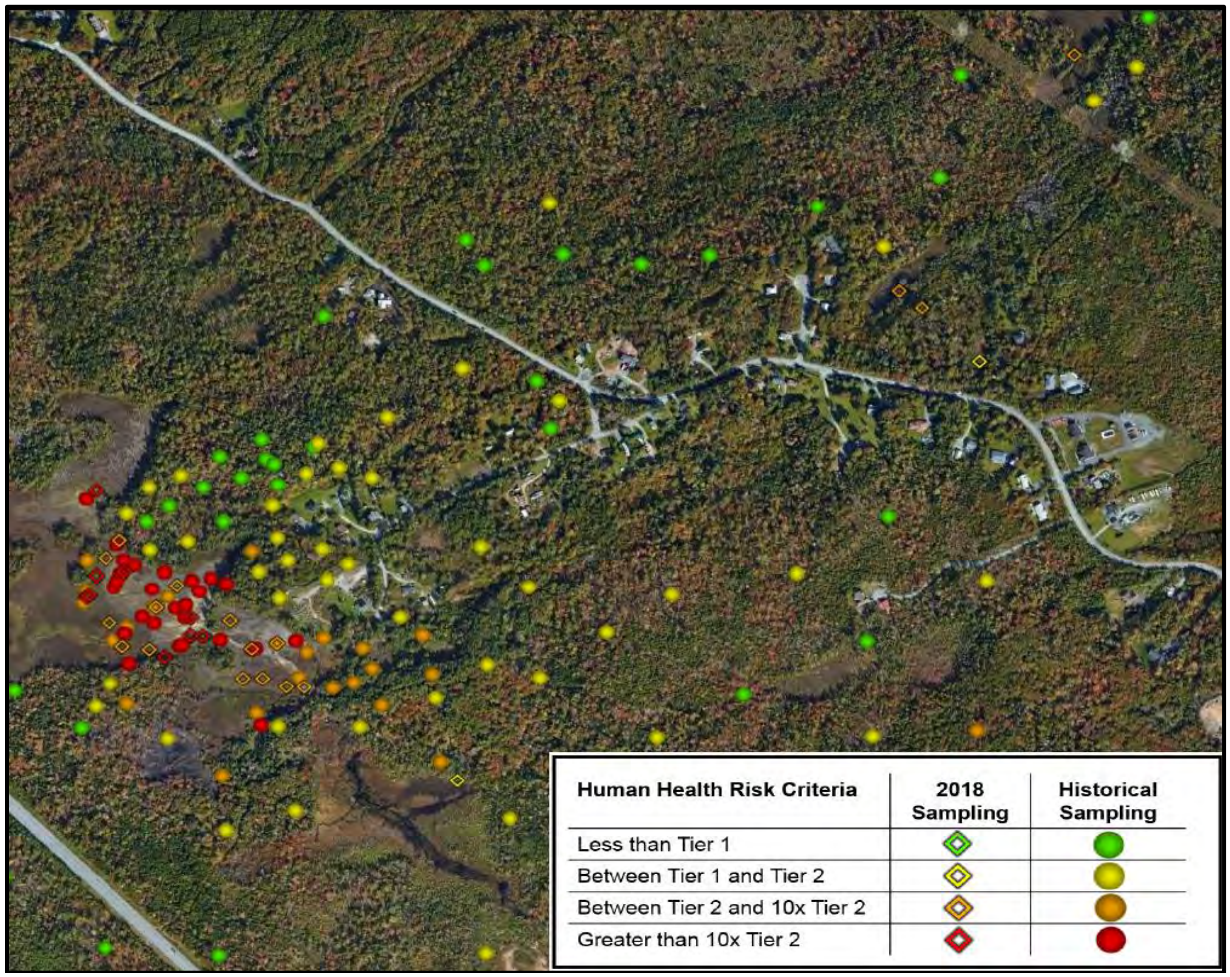


**Figure 3-5: Montague Gold Mines – Near-Surface Arsenic Contents – Central Region**

**Note:**
Tier 1 Arsenic Criteria = 31 mg/kg
Tier 2 Arsenic Criteria = 750 mg/kg

The results for mercury contents in the solids are summarized for the entire site and focused on the central tailings area in **Figure 3-6** and **Figure 3-7**, respectively. The results are presented in a similar manner to those of arsenic with colour schemes relating to the Tier 1 and Tier 2 human health risk criteria for mercury in soils. In contrast to the results for arsenic, the majority of samples have mercury contents that are lower than the Tier 1 criterion. Though a few samples had concentrations greater than the Tier 2 criterion, the majority of the samples that exceeded the Tier 1 criterion were less than the Tier 2 value. The samples with mercury contents greater than the Tier 2 criterion were found at locations that are in close proximity to historical mills. Based on the mercury results in solids, it is evident that mitigation of areas or zones of risk defined by the arsenic levels will also incorporate those areas with risks related to mercury.

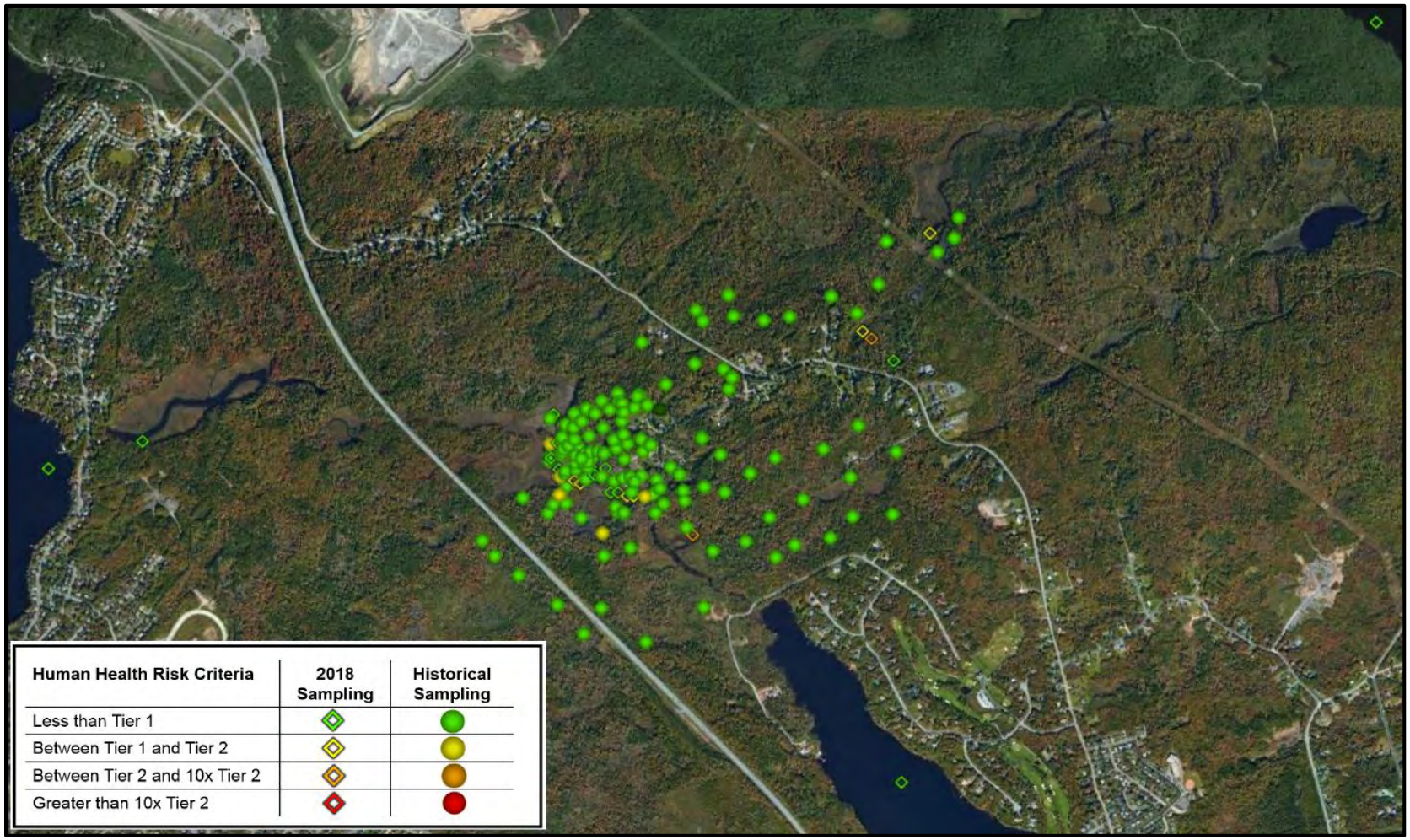


**Figure 3-6: Montague Gold Mines – Near-Surface Mercury Contents – All Locations**

**Note:**
Tier 1 Mercury Criteria = 6.6 mg/kg
Tier 2 Mercury Criteria = 29 mg/kg

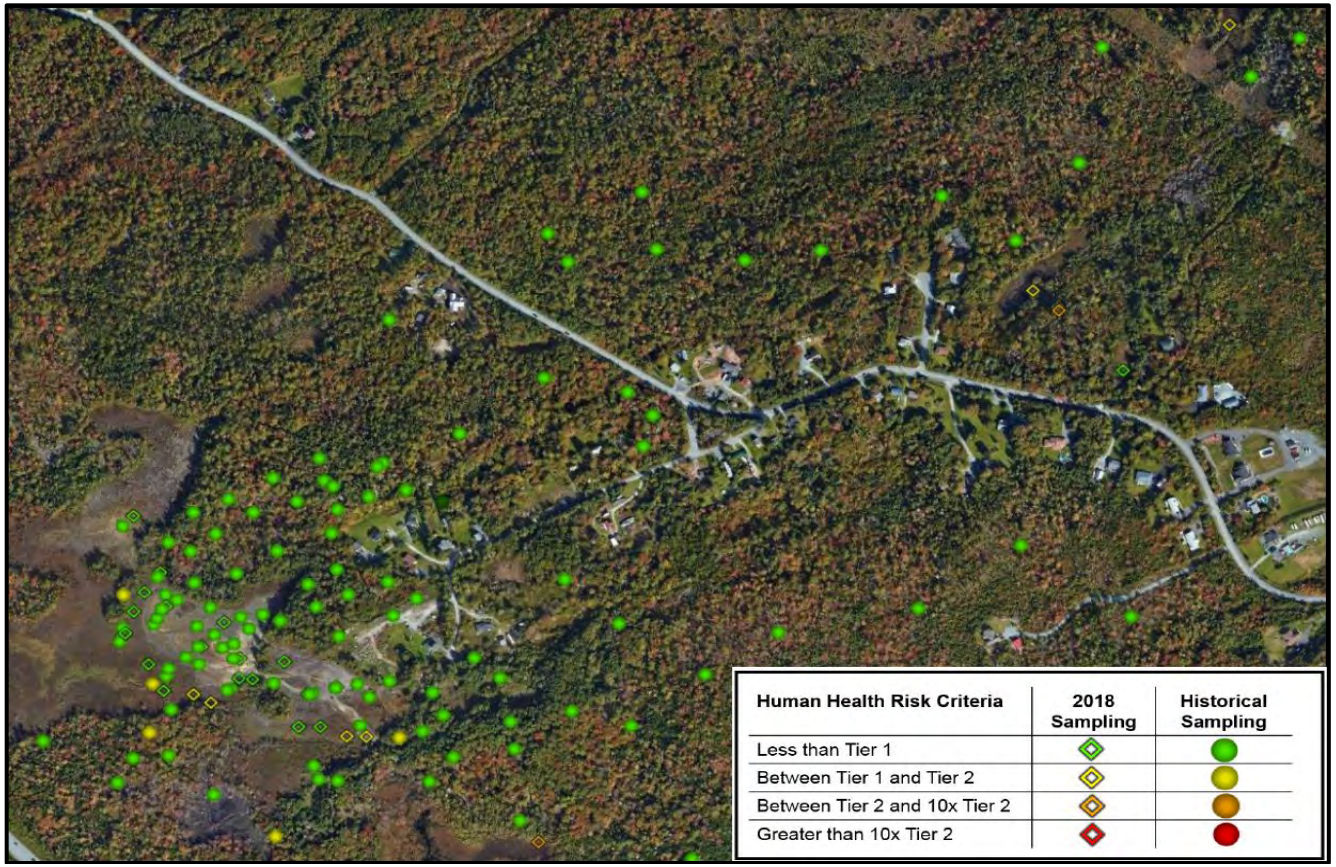


**Figure 3-7: Montague Gold Mines – Near-Surface Mercury Contents – Central Region**

**Note:**
Tier 1 Mercury Criteria = 6.6 mg/kg
Tier 2 Mercury Criteria = 29 mg/kg

### 3.1.3 Surface Water – Arsenic and Mercury

The results for total arsenic concentrations in surface water are summarized in **Figure 3-8**. Locations included in the surface water analysis are: Loon Lake, Mitchell Brook, Barry's Run, Lake Charles, the Gold Lane road pond, and Lake Major as these locations represent permanent water bodies in the study area. The colour scheme for the symbols are based on the Tier 1 and Tier 2 criteria for risk to aquatic organisms in water. The concentrations for total and dissolved arsenic are also summarized in **Table 3-2**. The concentrations of total arsenic were less than the Tier 1 criterion in Loon Lake and Lake Major. Arsenic concentrations in the other surface water samples exceeded the Tier 1 value and were less than the Tier 2 criterion.

The results for total mercury concentrations in surface water are summarized in **Figure 3-9** and the total and dissolved concentrations are provided in **Table 3-2**. All surface water samples had mercury concentrations less than the Tier 1 criterion.

The total and dissolved concentrations of arsenic and mercury were analysed in order to distinguish concentrations that may be associated with suspended solids that can implicate erosion for migration of these constituents. Assessment of the values shown in **Table 3-2** indicates that the concentrations of total and dissolved constituents are similar in all but one location, Mitchell Brook. The total arsenic concentration in Mitchell Brook was about four times higher than the dissolved concentration. The Brook had a high flow rate at the time of sampling and would be expected to include suspended solids. The Gold Lane road pond sample analyses indicated that the total arsenic and mercury concentrations were marginally lesser than their measured dissolved contents; however, this QA/QC discrepancy does not affect the Tier 1 and Tier 2 criteria classification for this sample.

**Table 3-2: Surface Water: Total and Dissolved Arsenic and Mercury**

| Location | Sample ID | Arsenic (mg/L) | | Mercury (mg/L) | |
|---|---|---|---|---|---|
| | | Total | Dissolved | Total | Dissolved |
| Loon Lake | M-SW12 | 0.000537 | 0.000505 | <0.000002 | <0.00002 |
| Mitchell Brook | M-SWMB | 0.0124 | 0.00289 | <0.000002 | <0.000002 |
| Barry's Run | M-SW11 | 0.026 | 0.0215 | 0.0000023 | <0.00002 |
| Lake Charles | M-SW10 | 0.0171 | 0.0153 | <0.000002 | <0.00002 |
| Gold Lane Road Pond | M-SW17 | 0.0216 | 0.024 | 0.000003 | 0.000004 |
| Lake Major | M-SW9 | 0.00076 | 0.000626 | <0.000002 | <0.00002 |

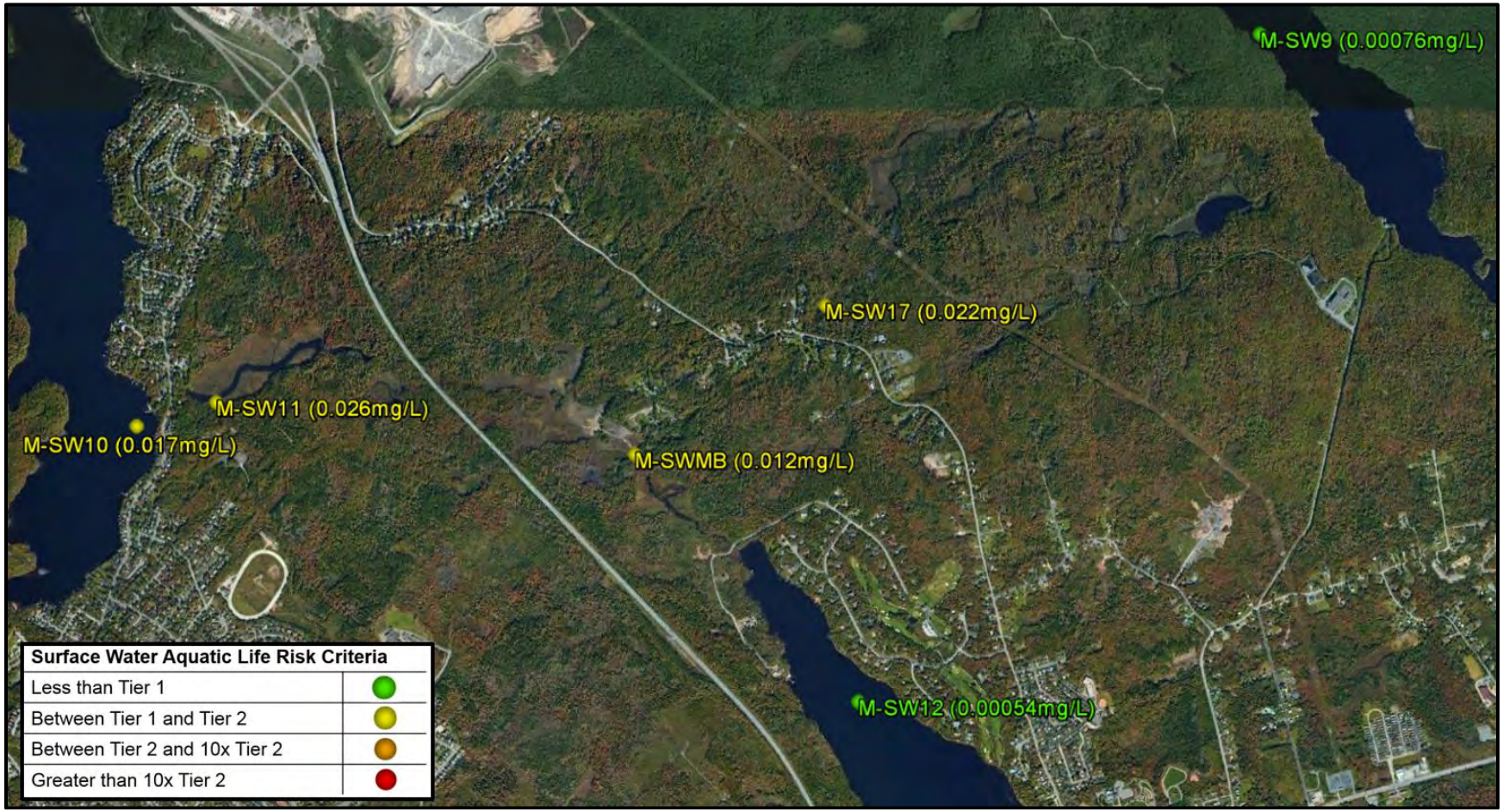


**Figure 3-8: Montague Gold Mines – Surface Water Total Arsenic Concentrations**

**Note:**
Tier 1 Arsenic Criteria = 0.005 mg/L
Tier 2 Arsenic Criteria = 0.03 mg/L

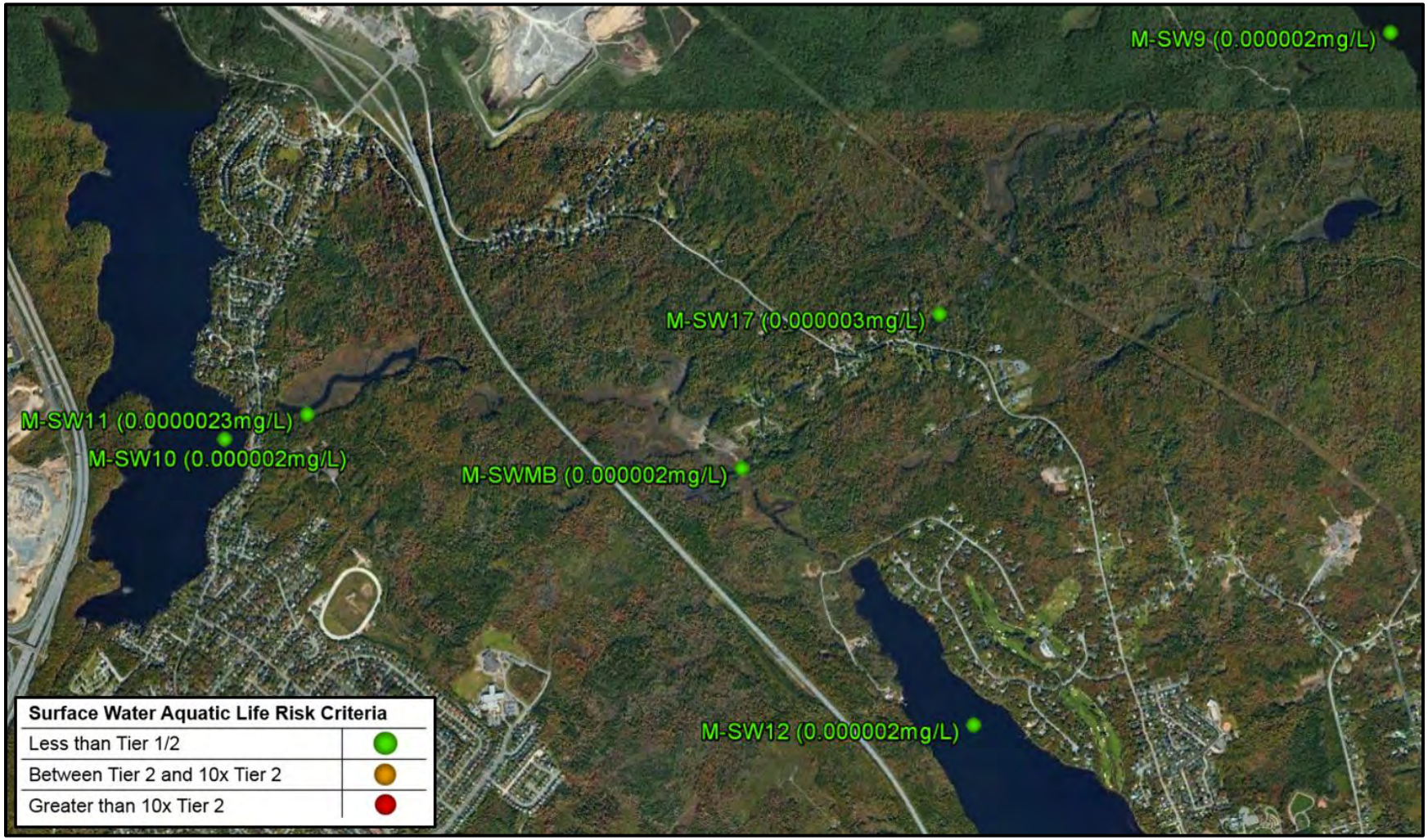


**Figure 3-9: Montague Gold Mines – Surface Water Total Mercury Concentrations**

**Note:**
Tier 1 and Tier 2 Criteria = 0.000026 mg/L

### 3.1.4 Porewater – Arsenic and Mercury Concentrations in Porewater

The maximum concentrations of dissolved arsenic in porewater, from any sample depth collected at each sampling location, are summarized for the entire site and with a focus on the main tailings area in **Figure 3-10** and **Figure 3-11**. There are no established risk criteria for arsenic and mercury in porewater. However, the arsenic Tier 2 criterion for protection of aquatic life in surface water was used for illustrative purposes. The colour scheme in the figures shows green symbols for concentrations less than the Tier 2 criterion, yellow for values between Tier 2 and 10 times the Tier 2 criterion, orange for values between 10 times and 100 times the Tier 2 value and red for concentrations greater than 100 times the Tier 2 criterion. The maximum arsenic concentrations in porewater were typically in the range of 1 to 10 mg/L with one value as high as 62 mg/L. In general, elevated porewater concentrations occur in similar locations having elevated solids contents.

Porewater concentrations from sediment core samples from surface water locations including Loon Lake, Barry's Run, Lake Charles, the Gold Lane road pond, and Lake Major are also shown in these figures. Porewater in the Loon Lake and Lake Major sediments had arsenic concentrations that were less than the Tier 2 criterion whereas the arsenic concentration in the Lake Charles sediment porewater was greater than the Tier 2 criterion. The porewater at the Barry's Run sample was between 10 times the Tier 2 value and 100 times the Tier 2 value whereas the porewater at the Gold Lane road pond was greater than 100 times the Tier 2 value.

The maximum concentrations of dissolved mercury in porewater, from any sample depth collected at each sampling location, are summarized for the entire site and with a focus on the main tailings area in **Figure 3-12** and **Figure 3-13**, respectively. The colour scheme for the symbols in the figures is the same as that used for arsenic and is based on the mercury Tier 2 surface water criterion for risk to aquatic organisms (Intrinsik 2019). The dissolved mercury concentrations in porewater have similar relative concentrations to the Tier 2 criterion as those for arsenic.

Porewater concentrations from sediment core samples from surface water locations including Loon Lake, Barry's Run, Lake Charles, the Gold Lane road pond, and Lake Major are also shown in these figures. The mercury porewater concentrations in the sediments were less than the surface water Tier 2 criteria for Loon Lake, Barry's Run, and Lake Charles. At Lake Major the mercury porewater concentration was between the Tier 2 value and 10 times the Tier 2 value. The Gold Lane road pond sediment mercury porewater concentration was between 10 times the Tier 2 value and 100 times the Tier 2 value.

#### 3.1.4.1 Porewater – Organoarsenic Compounds

A supplemental investigation was undertaken to identify if organoarsenic compounds are present in sample porewater to identify if potential closure options would have to accommodate treatment for these parameters, see **Table 3-3**. All eight samples, representing a range of measured arsenic concentrations in porewater varying between 0.02 mg/L and 5.5 mg/L, all had organoarsenic concentrations measured below their respective detection limit. The absence of organic arsenic

species suggests that typical water treatment methods to remove arsenic can be used during reclamation, if required.

**Table 3-3: Inorganic and Organic Arsenic in Porewater**

| Analyte | Units | M-2018-C1 (0-5cm) | M-2018-SFC-T9 | M-2018-C13 (2.5-10cm) | M-2018-C5 (2.5-10cm) | M-2018-SFC-T23 | M-2018-SFC-T35 | M-2018-C4 (0-10cm) | M-2018-C18 (0-2.5cm) |
|---|---|---|---|---|---|---|---|---|---|
| Dissolved As(III) | mg/L | 5.2 | 0.085 | 0.006 | 0.045 | 0.004 | 0.001 | 0.002 | 0.018 |
| Dissolved As(V) | mg/L | 0.326 | 0.299 | 0.0362 | 1.17 | 3.47 | 0.489 | 0.279 | 0.00597 |
| Dissolved Dimethylarsinic Acids | mg/L | ≤0.005 | ≤0.0001 | ≤0.0001 | ≤0.005 | ≤5.0 | ≤0.0001 | ≤0.0001 | ≤0.0001 |
| Dissolved Monomethylarsonic Acid | mg/L | ≤0.009 | ≤0.0002 | ≤0.0002 | ≤0.009 | ≤0.009 | ≤0.0002 | ≤0.0002 | ≤0.0002 |

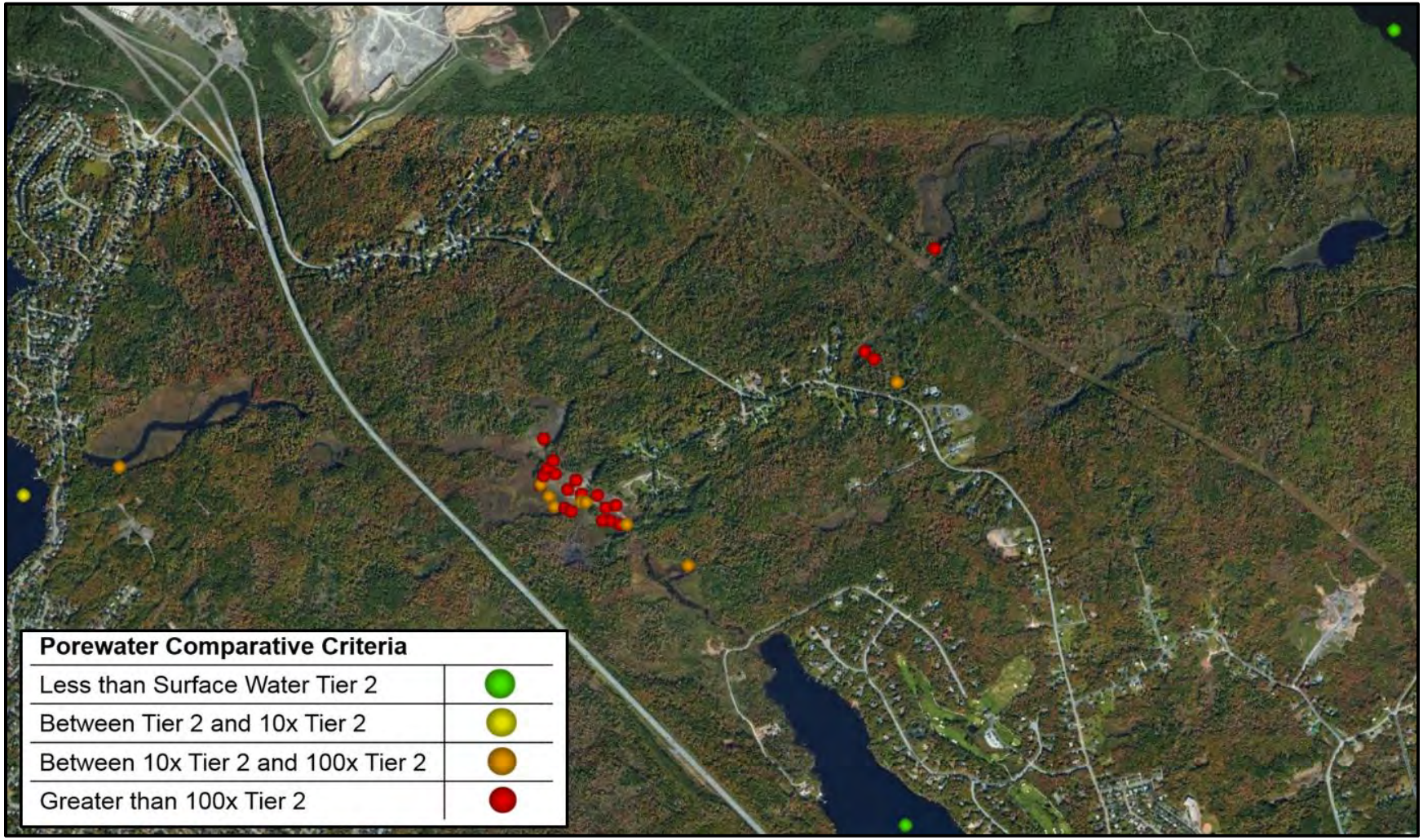


**Figure 3-10: Montague Gold Mines – Maximum Porewater Arsenic Concentrations – All Locations**

**Note:**
Presented in comparison to Tier 2 Surface Water Criteria of 0.03 mg/L (e.g. 10x Tier 2 = 0.3 mg/L, 100x Tier 2 = 3 mg/L).

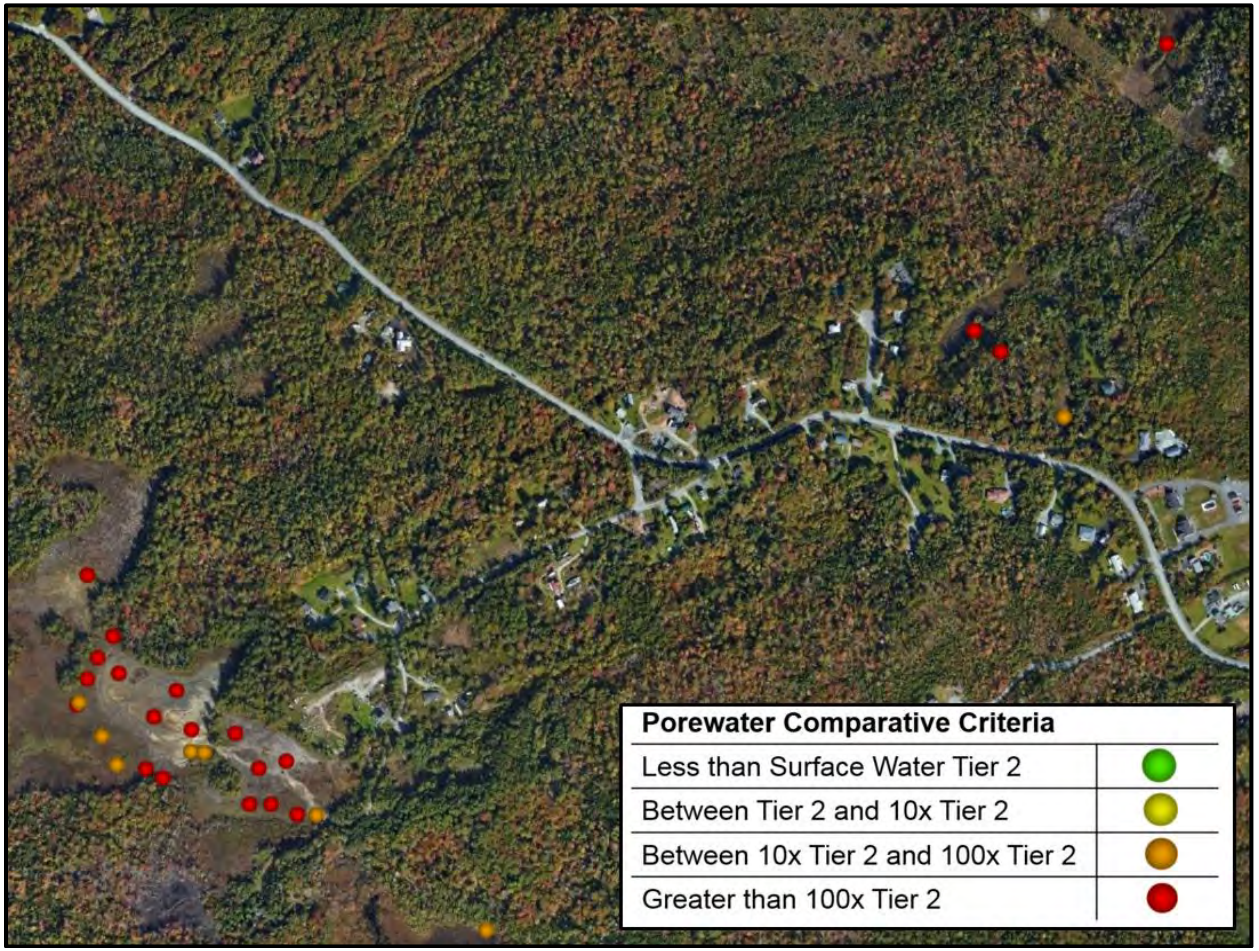


**Figure 3-11: Montague Gold Mines – Maximum Porewater Arsenic Concentrations – Central Region**

**Note:**
Presented in comparison to Tier 2 Surface Water Criteria of 0.03 mg/L (e.g. 10x Tier 2 = 0.3 mg/L, 100x Tier 2 = 3 mg/L).

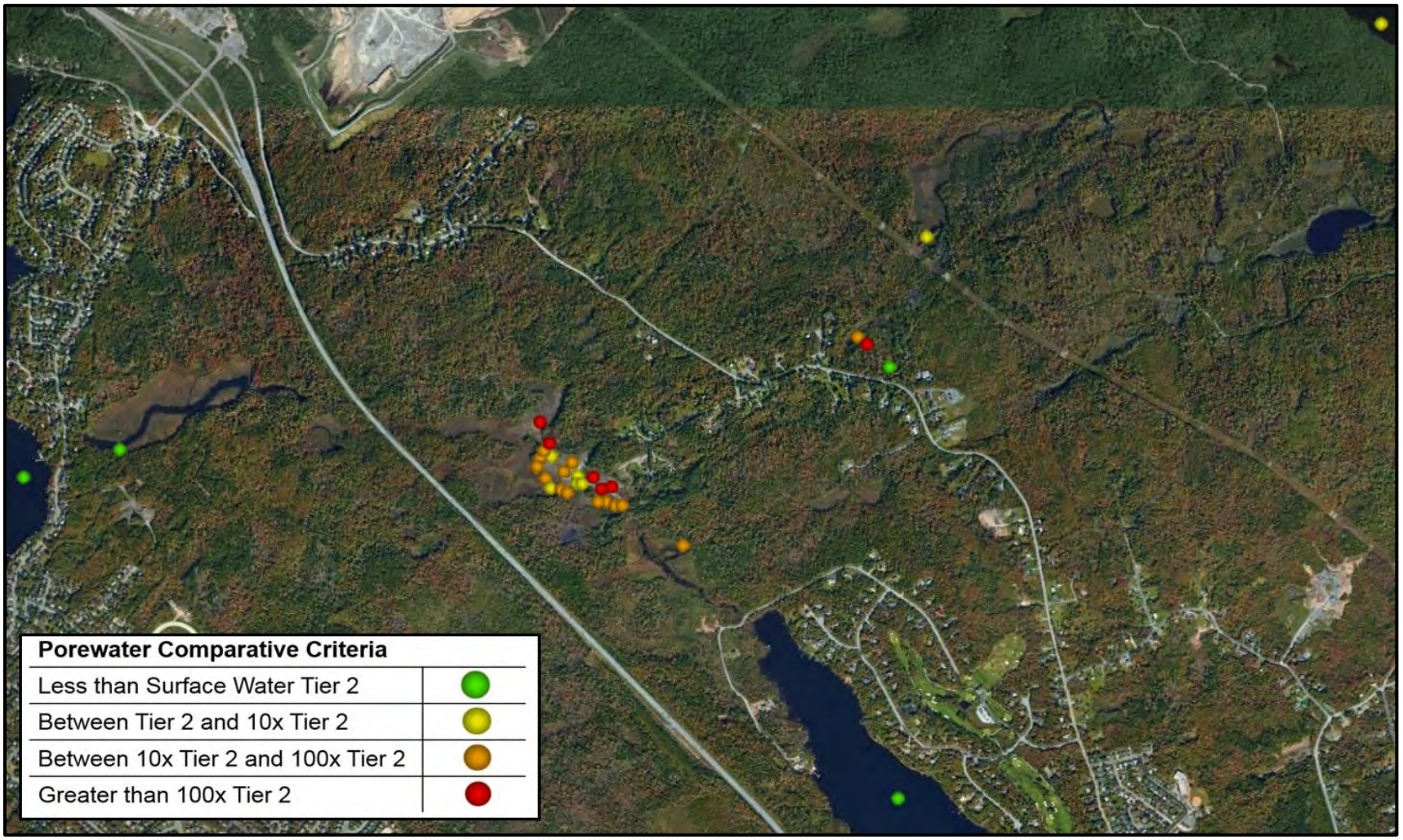


**Figure 3-12: Montague Gold Mines – Maximum Porewater Mercury Concentrations – All Locations**

**Note:**
Presented in comparison to Tier 2 Surface Water Criteria of 0.000026 mg/L (e.g. 10x Tier 2 = 0.00026 mg/L, 100x Tier 2 = 0.0026 mg/L).

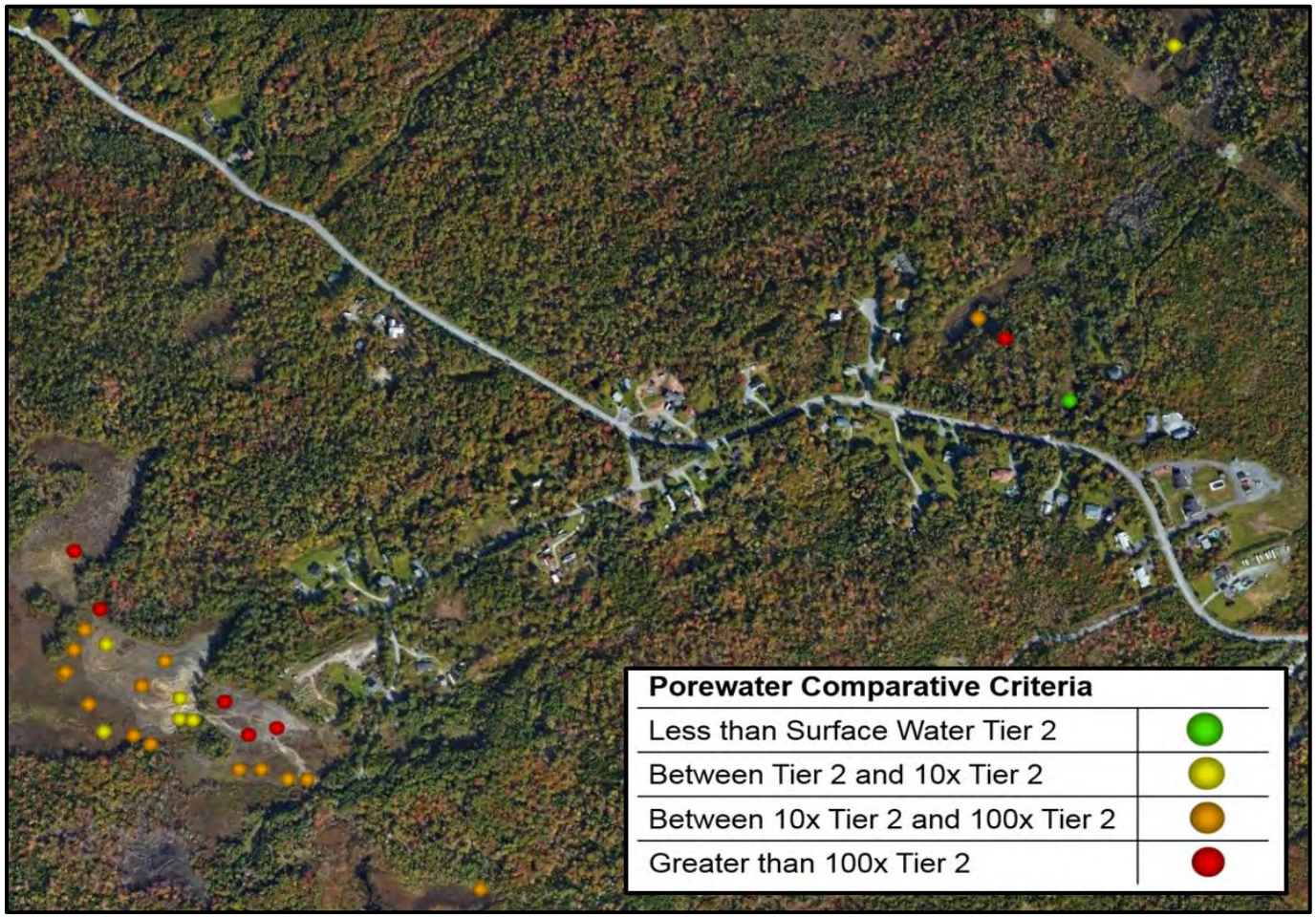


**Figure 3-13: Montague Gold Mines – Maximum Porewater Mercury Concentrations – Central Region**

**Note:**
Presented in comparison to Tier 2 Surface Water Criteria of 0.000026 mg/L (e.g. 10x Tier 2 = 0.00026 mg/L, 100x Tier 2 = 0.0026 mg/L).

### 3.1.5 Piezometers - Shallow Subsurface Water

Eight mini piezometers were installed at four stations across the site as shown in **Figure 3-14**. The mini piezometers provide samples of shallow groundwater near the water table and somewhat below the water table at each of the locations. The results from the subsurface piezometer samples were also compared to the water chemistry associated with porewater and surface water at similar locations. The dissolved arsenic and mercury results as well as the installation depths of each piezometer are summarized in **Table 3-4**. The concentrations of dissolved arsenic and mercury were in ranges similar to those observed in tailings porewater across the site.

**Figure 3-14: Montague Gold Mines – Mini Piezometer Locations**

**Table 3-4: Shallow Subsurface Water: Dissolved Arsenic and Mercury**

| Sample ID | | Screened Depth Range (cm-bgs) | Dissolved Arsenic | Dissolved Mercury |
|---|---|---|---|---|
| | | | mg/L | |
| M-Pz1 | Shallow | 47 to 60 | N/A[1] | <0.00002 |
| | Deep | 177 to 190 | 19.8 | 0.000029 |
| M-Pz2 | Shallow | 47 to 60 | 0.985 | <0.00002 |
| | Deep | 87 to 100 | 12.5 | 0.000238 |
| M-Pz3 | Shallow | 47 to 60 | 0.127 | <0.00002 |
| | Deep | 167 to 180 | 0.0436 | <0.00002 |
| M-Pz4 | Shallow | 47 to 60 | 0.178 | 0.00003 |
| | Deep | 87 to 100 | 0.0968 | 0.000048 |

**Note:**

1) No arsenic results available, sample was destroyed in transit.

The dissolved arsenic concentrations in surface water, porewater, and subsurface piezometer samples at each station are summarized in **Figure 3-15** to **Figure 3-18**. For reference, the water concentrations were also compared to the solids arsenic contents at each depth at all mini piezometer stations.

The results for M-Pz1, located southeast of upper main tailings area, are presented in **Figure 3-15**. At this station, the dissolved arsenic concentration in the water at surface was less than 1 mg/L while the porewater concentrations ranged from about 11 mg/L in the near-surface to less than 1 mg/L at a depth of almost 2 m below ground surface. The concentration of dissolved arsenic in the subsurface piezometer sample at the 2 m depth was on the order of 20 mg/L. The arsenic contents in the solids varied from a low of about 700 mg/kg to 2100 mg/kg. At this station, the dissolved arsenic concentrations in porewater were highest at the surface and lowest at depth. In contrast, the piezometer subsurface water sample exhibited a concentration of 20 mg/L for dissolved arsenic that was not in good agreement with the concentration in the porewater at the same depth. Additional samples from this piezometer are warranted to determine the potential causes of this discrepancy.

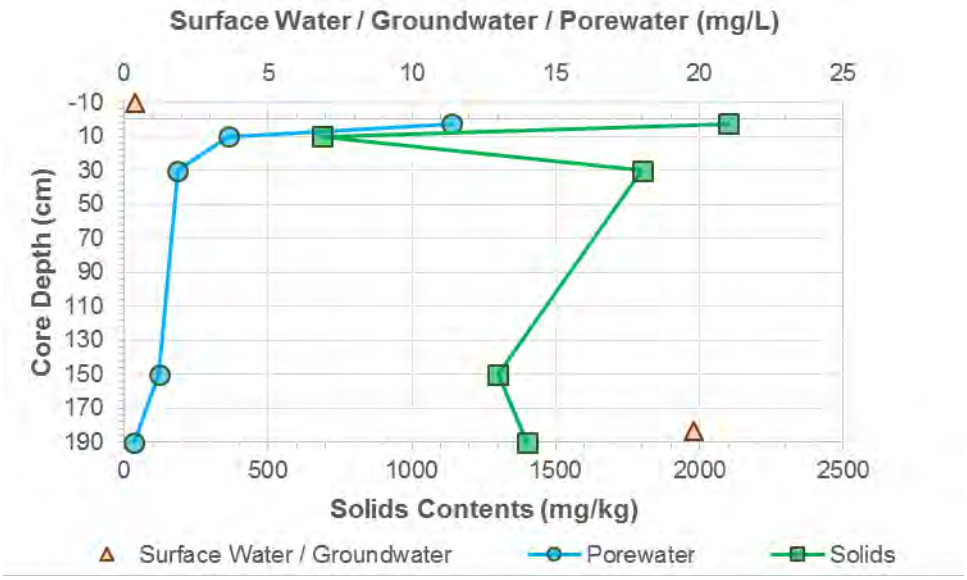


**Figure 3-15: Montague Gold Mines – M-Pz1 Arsenic Chemistry**

The results from the core at piezometer station M-Pz2 are shown in **Figure 3-16**. Results trends at this station were similar to those at station M-Pz1. The concentration of dissolved arsenic in nearby surface water was less than 1 mg/L while porewater concentrations ranged from about 13 mg/L in the shallow subsurface to about 1 mg/L in porewater at a depth of 90 cm. The two piezometer samples exhibited dissolved arsenic concentrations of about 1 mg/L at a depth of 50 cm and 12.5 mg/L at a depth of 90 cm below ground surface, respectively. While the concentration of arsenic in the porewater agrees reasonably well with the piezometer sample at a depth of 50 cm, there is a discrepancy between the concentrations in the porewater at 90 cm depth and the piezometer sample at the same depth. As with M-Pz1, additional sampling of the piezometers is warranted to evaluate the discrepancy between these results.

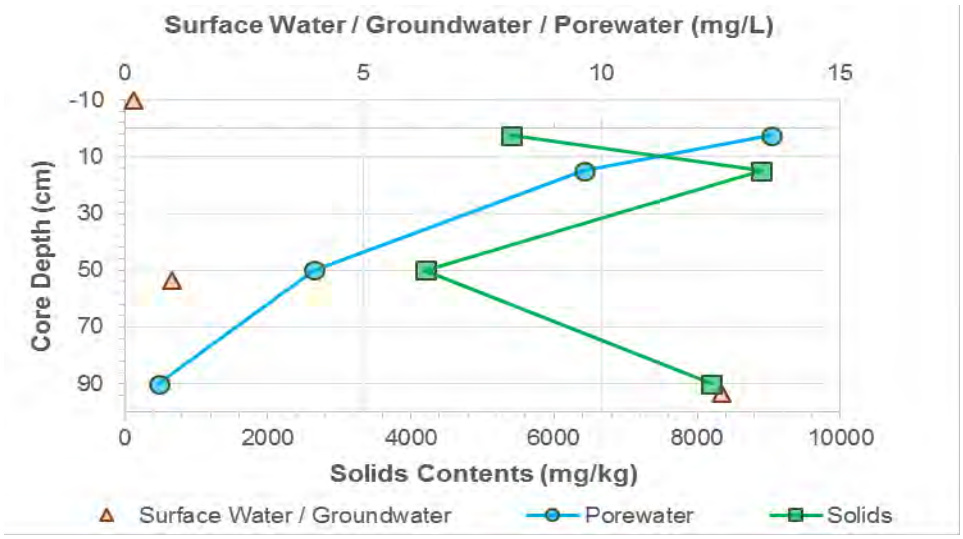


**Figure 3-16: Montague Gold Mines – M-Pz2 Arsenic Chemistry**

The results from piezometer monitoring station M-Pz3 are presented in **Figure 3-17**. While the concentrations of dissolved arsenic in the porewater and in the piezometer samples are typically much lower than those at stations M-Pz1 and M-Pz2, the arsenic contents in the solids were in a similar range to those at the other stations, varying between about 2000 and 5,500 mg/kg. The dissolved arsenic concentration in surface water near station M-Pz3 was on the order of 0.03 mg/L, while porewater concentrations ranged from about 0.27 mg/L in the shallow subsurface to a high of about 0.9 mg/L at a depth of about 60 cm below ground surface. At this station, the concentrations from the piezometer samples were lower than those exhibited by the porewaters. Again, further sampling of this piezometer is warranted to address potential discrepancies.

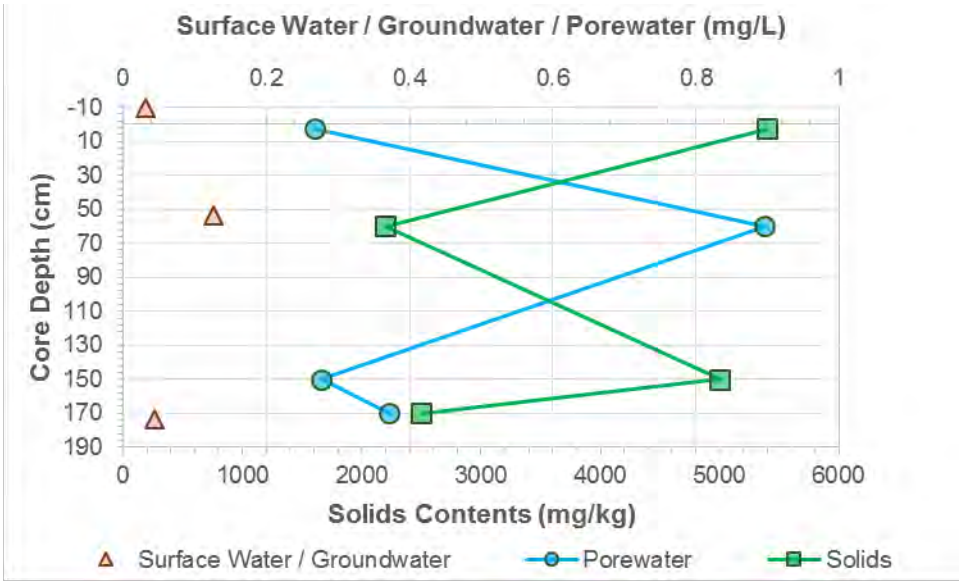


**Figure 3-17: Montague Gold Mines – M-Pz3 Arsenic Chemistry**

The arsenic results at piezometer station M-Pz4 are shown in **Figure 3-18**. Consistent with other sampling stations, the dissolved arsenic concentration water at the surface was less than 1 mg/L while porewater concentrations ranged from approximately 0.7 mg/L to 11.5 mg/L. The porewater concentrations increased from the shallow subsurface to a depth of about 80 cm below ground surface. At this station, the concentrations in the piezometer samples were less than 0.2 mg/L and exhibited concentrations that were lower than those in the porewaters at the corresponding depths. Arsenic contents in the solids were similar to those at the other piezometer stations and ranged from about 500 mg/kg to 11,000 mg/kg with the highest arsenic content in the shallow subsurface sample. Additional piezometer sampling appears warranted to further evaluate these potential discrepancies.

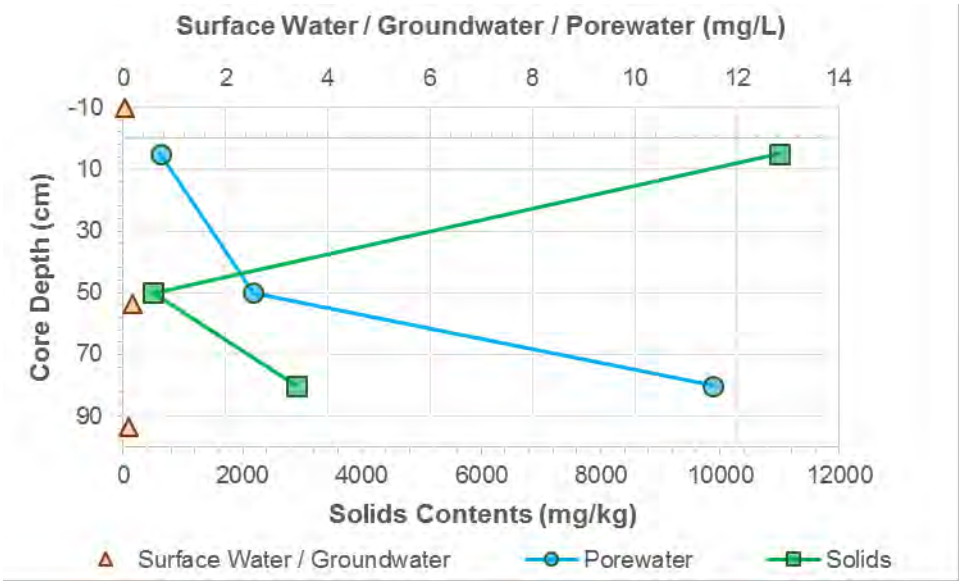


**Figure 3-18: Montague Gold Mines – M-Pz4 Arsenic Chemistry**

These core-profile results show that, at all stations, there are samples with solids arsenic contents that are consistent with those expected for tailings materials. Additionally, the dissolved arsenic concentrations in the porewater and in the piezometer samples are consistently higher than those in water at surface. The higher concentrations in the shallow subsurface waters compared to those in the overlying water indicate that dissolved arsenic can be transported by diffusion from the shallow subsurface into the water column. This indicates that concentrations of arsenic above background levels in the water at surface are likely to occur as a result of arsenic transport from the shallow tailings materials. This represents a potential transport pathway for dissolved arsenic from the tailings into the surface water environment.

With water overlying the tailings at these locations, it is very likely that the subsurface water is moving upward to discharge into the overlying water as well. Upward movement of subsurface water occurs as a result of higher hydraulic heads at depth and a lower hydraulic head in the overlying water. This is typical of lake bottoms, wetlands, and shorelines along rivers and streams where groundwater originates in higher ground with higher hydraulic heads and discharges in lower topographic areas where water occurs on surface. This combination of upward diffusion and upward flow of subsurface water would further contribute to arsenic loadings into the overlying water.

At locations M-Pz3 and M-Pz4 the porewater arsenic concentrations increase from the shallowest sample to the next sample at depth. In these cases, the arsenic concentration gradient is upward, in that the diffusive flux occurs from the higher concentration to the lower concentration, in these cases upward. At the other stations, M-Pz1 and M-Pz2, the higher concentration is near the water tailings interface followed by a lower concentration at depth. At these stations, the arsenic concentration gradient is downward, in that the diffusive flux occurs from the high concentration near the water tailings interface down to the lower

concentration at the deeper locations. These two piezometer stations represent arsenic fluxes both up into the water column above the sample and downward into the deeper porewater below the highest concentration porewater.

At the locations with high concentrations near the water tailings interface it is likely that arsenic leaching may be occurring in the shallow tailings, closest to the tailings surface. The arsenic leaching may be occurring at periods when there is no water above the tailings during the dryer summer season. Drying out of the tailings surface will likely result in seasonal oxidation and release of arsenic prior to development of a water cover above the tailings during the wetter seasons. This could reasonably explain the occurrence of the highest concentrations in porewaters nearest to the tailings surface.

# 4.0 DISCUSSION

The results of the water and solids characterization on samples from the field program allowed further interpretation of the potential sources and forms of arsenic that are associated with tailings and downstream sediments. A comparison between arsenic and sulphide contents in the solid samples is summarized graphically in Figure 4-1. Although the correlations are not strong between sulphide and arsenic contents, it is evident that they do correlate for tailings-containing samples (e.g. 'Main Tailings Surface' and 'Main Site Core' in **Figure 4-1**). The correlation would be expected if the primary source of arsenic was related to the common iron arsenic sulfide mineral, arsenopyrite (FeAsS).

Arsenopyrite was positively identified as an abundant sulphide mineral in the Montague tailings by DeSisto (2014). Therefore, the correlation between arsenic content and sulphide content is expected in these tailings. The arsenic leaching occurs when the sulphide mineral is oxidized, releasing arsenic and other oxidation products including sulphate and iron.

The sulphate is moderately soluble and will leach into water whereas iron has variable solubility depending upon the pH and the oxidation conditions. At neutral pH, iron will oxidize further and precipitate as ferric hydroxide ($Fe(OH)_3$) that visually presents as the rusty colour of oxidized tailings. In the absence of oxygen, below the oxidation zone in tailings, some iron can remain as ferrous ($Fe^{2+}$) in solution and can be mobile. Under acidic conditions, iron in ferrous and ferric ($Fe^{3+}$) forms can remain in solution and be transported by the subsurface porewater.

These findings indicate that mitigation of arsenic release from the tailings will require consideration of oxidation of the primary and reduced form of arsenic, arsenopyrite. Eliminating or limiting the oxidation of arsenopyrite will be required to limit the ongoing production of soluble arsenic that can be transported by water.

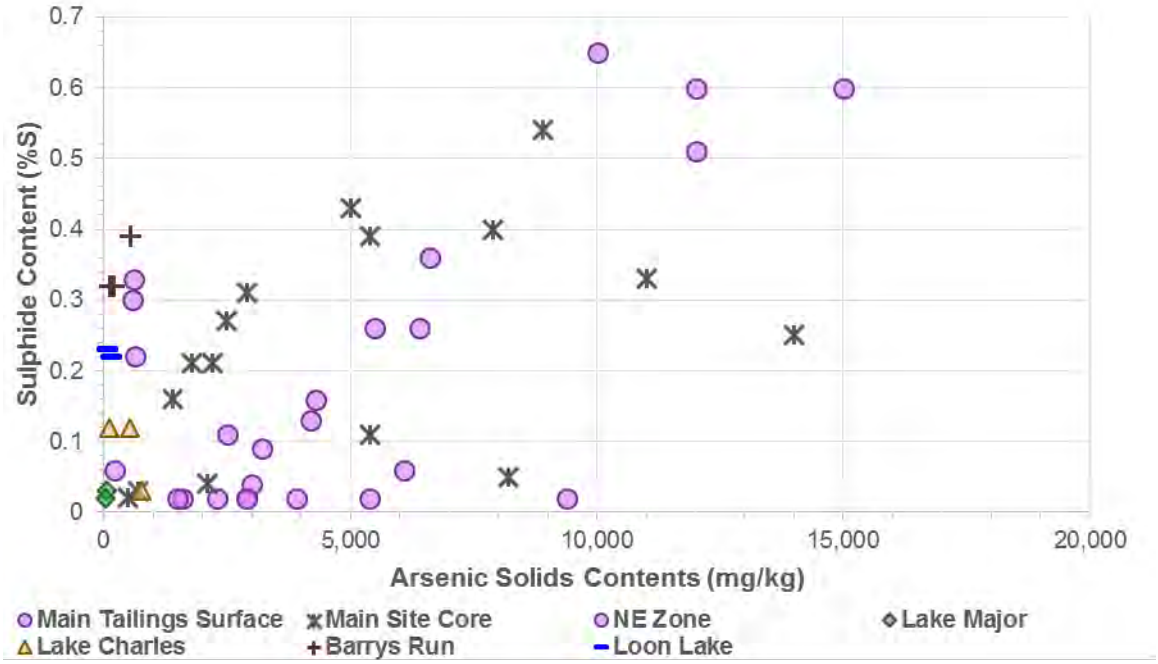


**Figure 4-1: Montague Gold Mines – Sulphide vs. Arsenic Contents in Tailings and Sediments**

Additional assessment of elemental correlations show that arsenic and iron are associated in the tailings solids as shown in **Figure 4-2** (e.g. As seen in the 'Main Tailings Surface' and 'Main Site Core' samples). This correlation is partly the result of the iron and arsenic together in the primary form of arsenopyrite. However, it is well known that arsenic in water will be taken up by the precipitation of ferric hydroxide solids that are relatively stable but can still be coincident with arsenic water concentrations that are on the order of a few to tens of mg/L. Arsenic can therefore be strongly correlated with iron because of the uptake during the formation of secondary solids such as ferric hydroxide after the iron is released from the primary arsenopyrite and other iron sulphide minerals such as pyrite ($FeS_2$). These arsenic rich ferric hydroxide solids were also positively identified by DeSisto (2014).

These results indicate that mitigation of arsenic leaching from the tailings will also need to consider the oxidized form of arsenic in the solids. The mitigation strategies should avoid measures that could potentially reduce the ferric hydroxide solids and release arsenic in the process. For example, an organic-rich substance should not be used for a cover to be in direct contact with oxidized tailings. Such an application of organic materials could act as a reductant that may transform ferric hydroxide into soluble ferrous iron and release arsenic in the solids.

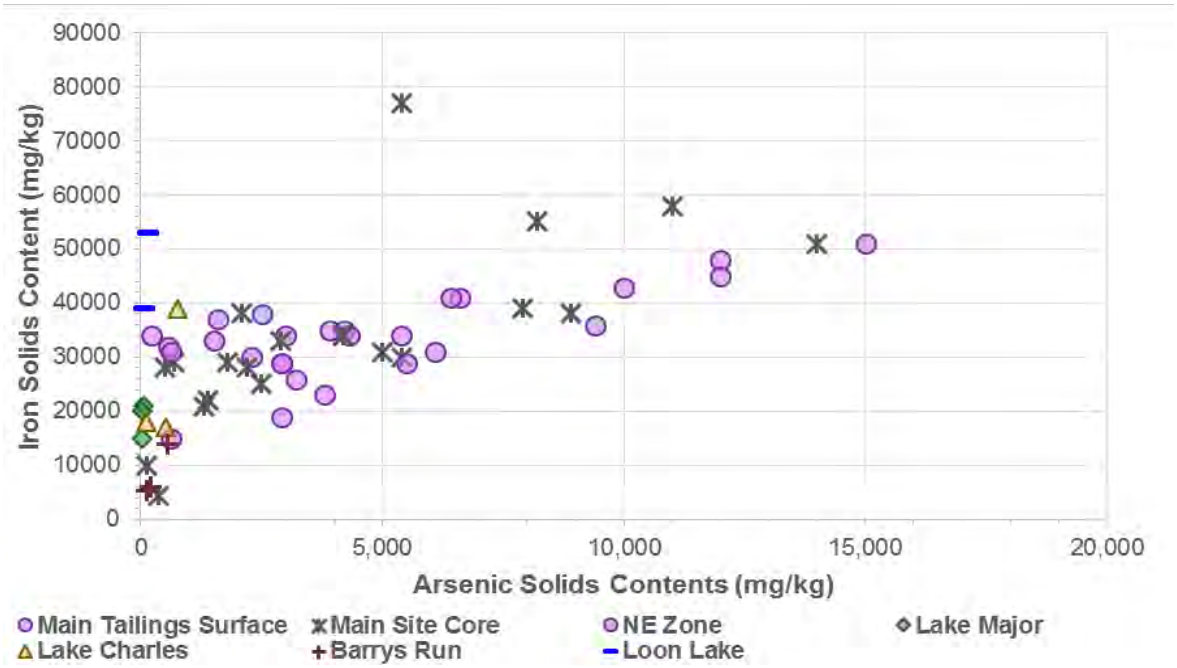


**Figure 4-2: Montague Gold Mines – Iron vs. Arsenic Contents in Tailings and Sediments**

The results of this field program provide a basis to refine the conceptual site model for arsenic and mercury migration from the primary tailings deposition area into the receiving environment. The arsenic originates from the primary mineral form, arsenopyrite, and can be transformed to a secondary solid form incorporated into ferric hydroxide solids. The arsenic concentrations in the porewaters associated with the tailings are typically highest near the surface, whether on land or underwater. Tailings with no overlying water can represent a source of arsenic to the runoff during rainfall and snowmelt events. This transport of dissolved arsenic results in loadings to the downstream environment. In addition, runoff events can also lead to erosion of solids and the transport of solid particulates containing arsenic downstream.

Tailings that are seasonally or permanently under water cover can also represent a source of arsenic to the water column. Evidence from this field investigation suggests that arsenic transport into the water column can occur as a diffusion process, transporting arsenic from shallow depths containing high arsenic concentrations to portions of the water column with lower concentrations. In addition, tailings that are permanently or are seasonally underwater will likely represent discharge zones for subsurface waters and there can be transport of arsenic with the upward flow of the subsurface water into the water column. These transport pathways will need to be considered for any mitigation strategies.

Evidence from the field program indicates that mercury occurs at higher contents in solids near the historical mills where it would have been used in the processing of the gold ores. The origin of mercury in the tailings is related to the processing of the ores and does not occur naturally as it does for arsenic.

Detectable mercury concentrations in water were also observed to be in close proximity to the former mill locations. Mercury concentrations in water are typically very limited and therefore the loadings of mercury from the tailings to the environment are also limited. Mercury tends to accumulate in organic materials and therefore small concentrations in water can become magnified into larger concentrations in solid organic material such as sediments in lakes, wetlands and ponds.

# 5.0 CONCLUSIONS

Arsenic is a naturally occurring chemical constituent within the residual rock material that was milled and then released as a non-economic by-product of the gold extraction process. Whereas mercury was used as an amalgam in the gold extraction process. Although the mercury is typically collected to recover the gold, some release of mercury typically occurs during the extraction process.

This field investigation has identified that arsenic solids contents and water concentrations are the primary driver for reclamation at the Montague site. Areas with elevated mercury are typically limited in extent and are located in close proximity to historical mill locations, whereas arsenic is elevated in both solids and in water across much of the Site.

The data acquired in this investigation will be used to address information gaps for the Site and will be applied in support of the development of a conceptual closure plan for the Site.

# 6.0 REFERENCES

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# Appendix A **Solid Results**

**Montague - Solids**

| Sample ID | | M-2018-C1 (0-5cm) | M-2018-C1 (10-20cm) | M-2018-C1 (40-60cm) | M-2018-C1 (140-160cm) | M-2018-C1 (180-200cm) | M-2018-SFC-T3 | M-2018-SFC-T7 | M-2018-SFC-T2 | M-2018-SFC-T9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Latitude | | 44.71439897 | 44.71439897 | 44.71439897 | 44.71439897 | 44.71439897 | 44.714519 | 44.71482201 | 44.71451799 | 44.71497003 |
| Longitude | | -63.52030003 | -63.52030003 | -63.52030003 | -63.52030003 | -63.52030003 | -63.52106103 | -63.52244597 | -63.52071804 | -63.52319397 |
| **Analysis** | **Units** | | | | | | | | | |
| Moisture | % | 63.4 | 26.4 | 27.0 | 18.7 | 29.1 | 29.6 | 40.1 | 34.2 | 50.7 |
| Mercury | mg/kg | 8.3 | 2.1 | 1.4 | 26 | 32 | 3.3 | 8.0 | 3.8 | 6.0 |
| Silver | mg/kg | 0.36 | 0.15 | 0.091 | 0.29 | 0.65 | 0.13 | 0.32 | 0.15 | 0.29 |
| Arsenic | mg/kg | 2100.0 | 690.0 | 1800.0 | 1300 | 1400 | 1600.0 | 12000.0 | 2500.0 | 6600.0 |
| Aluminum | mg/kg | 14000 | 13000 | 12000 | 8800 | 9000 | 16000 | 14000 | 16000 | 15000 |
| Barium | mg/kg | 81 | 52 | 44 | 38 | 43 | 82 | 75 | 83 | 58 |
| Beryllium | mg/kg | 0.57 | 0.30 | 0.26 | 0.23 | 0.23 | 0.41 | 0.37 | 0.43 | 0.59 |
| Bismuth | mg/kg | 1.5 | 0.84 | 0.83 | 2.0 | 2.2 | 1.2 | 2.5 | 1.1 | 1.7 |
| Calcium | mg/kg | 3500 | 1500 | 2300 | 2800 | 3300 | 1800 | 2500 | 3100 | 2200 |
| Cadmium | mg/kg | 0.93 | 0.18 | 0.22 | 0.29 | 0.38 | 0.22 | 0.52 | 0.33 | 0.93 |
| Cobalt | mg/kg | 32 | 6.8 | 13 | 8.6 | 9.0 | 12 | 25 | 21 | 25 |
| Chromium | mg/kg | 33 | 40 | 32 | 54 | 42 | 35 | 18 | 19 | 17 |
| Copper | mg/kg | 130 | 97 | 78 | 100 | 120 | 79 | 120 | 75 | 120 |
| Iron | mg/kg | 38000 | 29000 | 29000 | 21000 | 22000 | 37000 | 48000 | 38000 | 41000 |
| Potassium | mg/kg | 2600 | 4700 | 4500 | 3500 | 3100 | 6400 | 4500 | 6400 | 4100 |
| Lithium | mg/kg | 19 | 20 | 19 | 14 | 14 | 24 | 21 | 25 | 21 |
| Magnesium | mg/kg | 7300 | 8100 | 8000 | 5900 | 5900 | 9500 | 8600 | 9900 | 7600 |
| Manganese | mg/kg | 1200 | 260 | 260 | 280 | 320 | 390 | 1300 | 590 | 700 |
| Molybdenum | mg/kg | 0.46 | 0.19 | 0.24 | 0.29 | 0.43 | 0.17 | 0.38 | 0.22 | 0.85 |
| Nickel | mg/kg | 70 | 28 | 36 | 22 | 23 | 35 | 59 | 52 | 47 |
| Lead | mg/kg | 83 | 31 | 22 | 68 | 87 | 40 | 140 | 35 | 82 |
| Sulphur | mg/kg | 640 | 360 | 2400 | 1400 | 1800 | 350 | 5600 | 1500 | 4400 |
| Antimony | mg/kg | 7.1 | 4.2 | 4.8 | 2.2 | 2.7 | 4.8 | 18 | 6.7 | 11 |
| Selenium | mg/kg | 0.91 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | 0.88 | < 0.7 | 1.2 |
| Tin | mg/kg | 1.1 | 0.51 | < 0.5 | < 0.5 | < 0.5 | 0.52 | 0.54 | 0.51 | 0.65 |
| Strontium | mg/kg | 16 | 9.7 | 9.0 | 10 | 13 | 13 | 18 | 15 | 13 |
| Titanium | mg/kg | 620 | 760 | 710 | 420 | 450 | 860 | 740 | 830 | 690 |
| Thallium | mg/kg | 0.25 | 0.29 | 0.28 | 0.18 | 0.19 | 0.36 | 0.35 | 0.38 | 0.34 |
| Uranium | mg/kg | 0.60 | 0.50 | 0.43 | 0.36 | 0.35 | 0.69 | 0.48 | 0.65 | 0.68 |
| Vanadium | mg/kg | 30 | 18 | 16 | 12 | 12 | 22 | 21 | 23 | 42 |
| Yttrium | mg/kg | 6.0 | 4.0 | 3.4 | 2.5 | 3.1 | 5.2 | 4.0 | 5.0 | 6.1 |
| Zinc | mg/kg | 350 | 110 | 120 | 130 | 150 | 120 | 220 | 150 | 190 |

**Montague - Solids**

| Sample ID | | M-2018-C1 (0-5cm) | M-2018-C1 (10-20cm) | M-2018-C1 (40-60cm) | M-2018-C1 (140-160cm) | M-2018-C1 (180-200cm) | M-2018-SFC-T3 | M-2018-SFC-T7 | M-2018-SFC-T2 | M-2018-SFC-T9 |
|---|---|---|---|---|---|---|---|---|---|---|
| **ABA** | | | | | | | | | | |
| Paste pH | | -- | -- | -- | -- | -- | -- | 5.94 | -- | 5.5 |
| Fizz Rate | --- | -- | -- | -- | -- | -- | -- | 1 | -- | 1 |
| Sample weight | g | -- | -- | -- | -- | -- | -- | 1.98 | -- | 2.04 |
| HCl Added | mL | -- | -- | -- | -- | -- | -- | 20 | -- | 20 |
| HCl | Normality | -- | -- | -- | -- | -- | -- | 0.1 | -- | 0.1 |
| NaOH | Normality | -- | -- | -- | -- | -- | -- | 0.1 | -- | 0.1 |
| NaOH to pH=8.3 | mL | -- | -- | -- | -- | -- | -- | 18.35 | -- | 20.66 |
| Final pH | no unit | -- | -- | -- | -- | -- | -- | 1.35 | -- | 1.34 |
| NP | t CaCO3/1000 t | -- | -- | -- | -- | -- | -- | 4.2 | -- | -1.6 |
| AP | t CaCO3/1000 t | -- | -- | -- | -- | -- | -- | 18.8 | -- | 11.2 |
| Net NP | t CaCO3/1000 t | -- | -- | -- | -- | -- | -- | -14.55 | -- | -12.85 |
| NP/AP | ratio | -- | -- | -- | -- | -- | -- | 0.22 | -- | -0.14 |
| Sulphur (total) | %S | 0.044 | 0.014 | 0.23 | -- | 0.17 | 0.021 | 0.588 | 0.152 | 0.414 |
| Acid Leachable SO4-S | %S | <0.02 | <0.02 | 0.02 | -- | <0.02 | <0.02 | <0.02 | 0.04 | 0.05 |
| Sulphide | %S | 0.04 | 0.03 | 0.21 | -- | 0.16 | 0.02 | 0.6 | 0.11 | 0.36 |
| Carbon (total) | %C | 5.36 | 0.905 | 0.153 | -- | 2.33 | 0.449 | 1.99 | 0.775 | 3.74 |
| Carbonate | %CO3 | 0.14 | 0.065 | 0.27 | -- | 0.325 | 0.045 | 0.08 | 0.195 | 0.06 |

**Montague - Solids**

| Sample ID | | M-2018-SFC-T14 | M-2018-SFC-T28A | M-2018-SFC-12 | M-2018-SFC-13 | M-2018-SFC-15 | M-2018-C12 (2.5-10cm) | M-2018-C12 (30-40cm) | M-2018-C13 (2.5-10cm) | M-2018-C13 (20-30cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Latitude | | 44.71620401 | 44.71537597 | 44.71569004 | 44.71596303 | 44.71645396 | 44.70468904 | 44.70468904 | 44.71307396 | 44.71307396 |
| Longitude | | -63.52349496 | -63.52199301 | -63.52379797 | -63.52366403 | -63.52324401 | -63.50767999 | -63.50767999 | -63.51727299 | -63.51727299 |
| **Analysis** | **Units** | | | | | | | | | |
| Moisture | % | 35.4 | 14.8 | 36.8 | 34.8 | 29.8 | 89.4 | 92.1 | 87.8 | 90.0 |
| Mercury | mg/kg | 6.4 | 3.8 | 4.1 | 6.1 | 4.7 | 0.30 | 0.13 | 35 | 30 |
| Silver | mg/kg | 0.23 | 0.95 | 0.29 | 0.29 | 0.23 | 0.27 | 0.20 | 0.55 | 0.48 |
| Arsenic | mg/kg | 4200.0 | 54000.0 | 10000.0 | 12000.0 | 6400.0 | 140.00 | 64.00 | 130 | 360 |
| Aluminum | mg/kg | 14000 | 6800 | 13000 | 14000 | 15000 | 26000 | 25000 | 9000 | 9100 |
| Barium | mg/kg | 79 | 33 | 100 | 89 | 74 | 160 | 67 | 66 | 49 |
| Beryllium | mg/kg | 0.46 | 0.12 | 0.44 | 0.42 | 0.41 | 1.4 | 1.1 | 0.42 | 0.46 |
| Bismuth | mg/kg | 1.6 | 6.7 | 2.0 | 2.0 | 1.4 | 0.63 | 0.22 | 2.9 | 2.0 |
| Calcium | mg/kg | 2300 | 350 | 3300 | 4900 | 3000 | 2800 | 3200 | 7200 | 5400 |
| Cadmium | mg/kg | 0.29 | 0.085 | 0.73 | 0.34 | 0.33 | 2.1 | 1.2 | 0.83 | 0.62 |
| Cobalt | mg/kg | 20 | 1.7 | 30 | 30 | 25 | 37 | 13 | 4.2 | 3.0 |
| Chromium | mg/kg | 20 | 12 | 48 | 24 | 23 | 31 | 35 | 36 | 4.1 |
| Copper | mg/kg | 70 | 43 | 97 | 82 | 78 | 60 | 23 | 110 | 92 |
| Iron | mg/kg | 35000 | 79000 | 43000 | 45000 | 41000 | 53000 | 39000 | 9900 | 4400 |
| Potassium | mg/kg | 4600 | 3600 | 3900 | 5400 | 5700 | 2200 | 640 | 380 | 340 |
| Lithium | mg/kg | 23 | 7.4 | 20 | 23 | 24 | 23 | 6.9 | < 2 | < 2 |
| Magnesium | mg/kg | 8400 | 3700 | 8300 | 9900 | 9600 | 4000 | 1400 | 1100 | 930 |
| Manganese | mg/kg | 490 | 90 | 2300 | 830 | 620 | 2400 | 1200 | 210 | 180 |
| Molybdenum | mg/kg | 0.18 | 1.2 | 0.66 | 0.31 | 0.22 | 3.0 | 3.9 | 0.40 | 0.48 |
| Nickel | mg/kg | 39 | 9.7 | 63 | 54 | 47 | 82 | 29 | 17 | 12 |
| Lead | mg/kg | 90 | 360 | 100 | 100 | 78 | 120 | 20 | 170 | 130 |
| Sulphur | mg/kg | 2100 | 2800 | 6400 | 6100 | 3100 | 6100 | 6200 | 4000 | 4800 |
| Antimony | mg/kg | 8.1 | 97 | 19 | 20 | 10 | 1.2 | < 0.8 | 3.3 | 2.4 |
| Selenium | mg/kg | < 0.7 | 3.0 | 0.91 | 0.83 | < 0.7 | 2.0 | 2.5 | 2.9 | 3.1 |
| Tin | mg/kg | < 0.5 | < 0.5 | 0.54 | < 0.5 | < 0.5 | 3.4 | < 0.5 | < 0.5 | < 0.5 |
| Strontium | mg/kg | 14 | 3.6 | 16 | 23 | 17 | 17 | 14 | 34 | 24 |
| Titanium | mg/kg | 550 | 600 | 600 | 640 | 730 | 270 | 260 | 71 | 62 |
| Thallium | mg/kg | 0.27 | 0.34 | 0.31 | 0.32 | 0.34 | 0.27 | 0.12 | 0.069 | 0.051 |
| Uranium | mg/kg | 0.56 | 0.25 | 0.47 | 0.50 | 0.54 | 1.5 | 1.2 | 0.82 | 0.97 |
| Vanadium | mg/kg | 19 | 11 | 22 | 20 | 20 | 96 | 21 | 5.9 | 4.8 |
| Yttrium | mg/kg | 4.1 | 1.1 | 4.7 | 4.7 | 4.8 | 20 | 24 | 8.2 | 9.5 |
| Zinc | mg/kg | 150 | 32 | 240 | 180 | 180 | 390 | 150 | 200 | 110 |

**Montague - Solids**

| Sample ID | | M-2018-SFC-T14 | M-2018-SFC-T28A | M-2018-SFC-12 | M-2018-SFC-13 | M-2018-SFC-15 | M-2018-C12 (2.5-10cm) | M-2018-C12 (30-40cm) | M-2018-C13 (2.5-10cm) | M-2018-C13 (20-30cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| **ABA** | | | | | | | | | | |
| Paste pH | | -- | 4.03 | -- | -- | -- | -- | -- | -- | -- |
| Fizz Rate | --- | -- | 1 | -- | -- | -- | -- | -- | -- | -- |
| Sample weight | g | -- | 2.03 | -- | -- | -- | -- | -- | -- | -- |
| HCl Added | mL | -- | 20 | -- | -- | -- | -- | -- | -- | -- |
| HCl | Normality | -- | 0.1 | -- | -- | -- | -- | -- | -- | -- |
| NaOH | Normality | -- | 0.1 | -- | -- | -- | -- | -- | -- | -- |
| NaOH to pH=8.3 | mL | -- | 25.47 | -- | -- | -- | -- | -- | -- | -- |
| Final pH | no unit | -- | 1.12 | -- | -- | -- | -- | -- | -- | -- |
| NP | t CaCO3/1000 t | -- | -13.5 | -- | -- | -- | -- | -- | -- | -- |
| AP | t CaCO3/1000 t | -- | 3.75 | -- | -- | -- | -- | -- | -- | -- |
| Net NP | t CaCO3/1000 t | -- | -17.25 | -- | -- | -- | -- | -- | -- | -- |
| NP/AP | ratio | -- | -3.6 | -- | -- | -- | -- | -- | -- | -- |
| Sulphur (total) | %S | 0.22 | 0.318 | 0.73 | 0.714 | 0.32 | 0.68 | 0.644 | -- | -- |
| Acid Leachable SO4-S | %S | 0.09 | 0.2 | 0.08 | 0.2 | 0.06 | 0.46 | 0.41 | -- | -- |
| Sulphide | %S | 0.13 | 0.12 | 0.65 | 0.51 | 0.26 | 0.22 | 0.23 | -- | -- |
| Carbon (total) | %C | 1.63 | 0.092 | 1.55 | 0.6 | 0.262 | 7.83 | 12.1 | -- | -- |
| Carbonate | %CO3 | 0.07 | 0.075 | 0.27 | 0.38 | 0.145 | 0.12 | <0.025 | -- | -- |

**Montague - Solids**

| Sample ID | | M-2018-C5 (2.5-10cm) | M-2018-C5 (30-50cm) | M-2018-SFC-T25 | M-2018-SFC-T26 | M-2018-SFC-T27 | M-2018-SFC-T32 | M-2018-SFC-T17 | M-2018-SFC-T20 | M-2018-SFC-T23 |
|---|---|---|---|---|---|---|---|---|---|---|
| Latitude | | 44.71715896 | 44.71715896 | 44.71533598 | 44.71511303 | 44.71512602 | 44.71602598 | 44.71439503 | 44.71501697 | 44.71493499 |
| Longitude | | -63.52366897 | -63.52366897 | -63.521287 | -63.52178799 | -63.52199896 | -63.52315902 | -63.51999301 | -63.520466 | -63.52090797 |
| **Analysis** | **Units** | | | | | | | | | |
| Moisture | % | 38.6 | 29.0 | 26.9 | 22.5 | 22.6 | 21.6 | 19.4 | 16.5 | 18.2 |
| Mercury | mg/kg | 4.5 | 7.2 | 2.8 | 0.60 | 5.4 | 4.8 | 17 | 0.81 | 0.67 |
| Silver | mg/kg | 0.26 | 0.19 | 0.096 | 0.11 | 0.53 | 0.30 | 0.24 | 0.084 | 0.093 |
| Arsenic | mg/kg | 14000.0 | 7900.0 | 3000.0 | 9400.00 | 37000.0 | 15000.0 | 5400 | 1500.00 | 3900.00 |
| Aluminum | mg/kg | 15000 | 14000 | 14000 | 10000 | 6300 | 13000 | 11000 | 14000 | 13000 |
| Barium | mg/kg | 76 | 63 | 66 | 36 | 37 | 61 | 47 | 59 | 55 |
| Beryllium | mg/kg | 0.33 | 0.40 | 0.36 | 0.16 | 0.12 | 0.33 | 0.24 | 0.31 | 0.30 |
| Bismuth | mg/kg | 1.9 | 1.4 | 0.93 | 1.0 | 4.3 | 2.1 | 1.0 | 0.69 | 0.79 |
| Calcium | mg/kg | 5600 | 5700 | 2600 | 920 | 99 | 5400 | 1400 | 2400 | 3100 |
| Cadmium | mg/kg | 0.38 | 0.20 | 0.16 | 0.13 | 0.085 | 0.45 | 0.20 | 0.17 | 0.19 |
| Cobalt | mg/kg | 25 | 19 | 17 | 4.6 | 1.3 | 23 | 5.8 | 13 | 13 |
| Chromium | mg/kg | 27 | 21 | 29 | 32 | 44 | 37 | 57 | 61 | 52 |
| Copper | mg/kg | 88 | 60 | 60 | 17 | 38 | 110 | 64 | 62 | 56 |
| Iron | mg/kg | 51000 | 39000 | 34000 | 36000 | 60000 | 51000 | 34000 | 33000 | 35000 |
| Potassium | mg/kg | 4900 | 5600 | 5400 | 3800 | 3500 | 4800 | 3600 | 5900 | 5200 |
| Lithium | mg/kg | 22 | 23 | 24 | 14 | 6.7 | 22 | 18 | 22 | 21 |
| Magnesium | mg/kg | 10000 | 11000 | 8500 | 6500 | 3500 | 9300 | 6900 | 8700 | 8500 |
| Manganese | mg/kg | 1200 | 500 | 450 | 190 | 95 | 670 | 200 | 440 | 490 |
| Molybdenum | mg/kg | 0.24 | 0.25 | 0.19 | 0.40 | 0.89 | 0.38 | 0.36 | 0.24 | 0.25 |
| Nickel | mg/kg | 53 | 42 | 39 | 16 | 9.3 | 50 | 21 | 34 | 35 |
| Lead | mg/kg | 88 | 62 | 31 | 49 | 200 | 110 | 46 | 21 | 29 |
| Sulphur | mg/kg | 3000 | 4700 | 570 | 270 | 1900 | 6100 | 260 | 160 | 95 |
| Antimony | mg/kg | 16 | 13 | 5.0 | 14 | 67 | 22 | 11 | 2.4 | 5.3 |
| Selenium | mg/kg | < 0.7 | < 0.7 | < 0.7 | < 0.7 | 2.2 | 0.85 | < 0.7 | < 0.7 | < 0.7 |
| Tin | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 0.50 | < 0.5 | < 0.5 |
| Strontium | mg/kg | 37 | 24 | 17 | 7.4 | 2.4 | 26 | 9.9 | 16 | 18 |
| Titanium | mg/kg | 750 | 640 | 780 | 570 | 600 | 680 | 630 | 850 | 740 |
| Thallium | mg/kg | 0.32 | 0.30 | 0.33 | 0.22 | 0.34 | 0.30 | 0.23 | 0.31 | 0.28 |
| Uranium | mg/kg | 0.44 | 0.60 | 0.56 | 0.31 | 0.26 | 0.42 | 0.35 | 0.44 | 0.41 |
| Vanadium | mg/kg | 21 | 19 | 19 | 14 | 11 | 20 | 16 | 18 | 18 |
| Yttrium | mg/kg | 4.8 | 4.3 | 4.4 | 2.8 | 1.1 | 4.0 | 3.2 | 3.7 | 3.9 |
| Zinc | mg/kg | 210 | 140 | 95 | 48 | 31 | 220 | 89 | 120 | 120 |

**Montague - Solids**

| Sample ID | | M-2018-C5 (2.5-10cm) | M-2018-C5 (30-50cm) | M-2018-SFC-T25 | M-2018-SFC-T26 | M-2018-SFC-T27 | M-2018-SFC-T32 | M-2018-SFC-T17 | M-2018-SFC-T20 | M-2018-SFC-T23 |
|---|---|---|---|---|---|---|---|---|---|---|
| **ABA** | | | | | | | | | | |
| Paste pH | | 6.83 | -- | 6.94 | -- | -- | -- | -- | -- | -- |
| Fizz Rate | --- | 1 | -- | 1 | -- | -- | -- | -- | -- | -- |
| Sample weight | g | 2.01 | -- | 2 | -- | -- | -- | -- | -- | -- |
| HCl Added | mL | 20 | -- | 20 | -- | -- | -- | -- | -- | -- |
| HCl | Normality | 0.1 | -- | 0.1 | -- | -- | -- | -- | -- | -- |
| NaOH | Normality | 0.1 | -- | 0.1 | -- | -- | -- | -- | -- | -- |
| NaOH to pH=8.3 | mL | 16.24 | -- | 17.71 | -- | -- | -- | -- | -- | -- |
| Final pH | no unit | 1.37 | -- | 1.12 | -- | -- | -- | -- | -- | -- |
| NP | t CaCO3/1000 t | 9.4 | -- | 5.7 | -- | -- | -- | -- | -- | -- |
| AP | t CaCO3/1000 t | 7.81 | -- | 1.25 | -- | -- | -- | -- | -- | -- |
| Net NP | t CaCO3/1000 t | 1.59 | -- | 4.45 | -- | -- | -- | -- | -- | -- |
| NP/AP | ratio | 1.2 | -- | 4.56 | -- | -- | -- | -- | -- | -- |
| Sulphur (total) | %S | 0.315 | 0.518 | 0.054 | 0.032 | 0.226 | 0.749 | 0.029 | 0.015 | 0.011 |
| Acid Leachable SO4-S | %S | 0.06 | 0.12 | <0.02 | 0.03 | 0.21 | 0.15 | <0.02 | <0.02 | <0.02 |
| Sulphide | %S | 0.25 | 0.4 | 0.04 | <0.02 | 0.02 | 0.6 | 0.02 | <0.02 | <0.02 |
| Carbon (total) | %C | 0.614 | 0.414 | 0.213 | 0.134 | 0.055 | 0.353 | 0.491 | 0.098 | 0.112 |
| Carbonate | %CO3 | 0.23 | 0.929 | 0.07 | 0.055 | 0.05 | 0.365 | 0.19 | 0.2 | 0.23 |

**Montague - Solids**

| Sample ID | | M-2018-SFC-T30 | M-2018-SFC-T35 | M-2018-C19 (0-5cm) | M-2018-C19 (20-30cm) | M-2018-C11 (2.5-10cm) | M-2018-C11 (10-20cm) | M-2018-C11 (30-40cm) | M-2018-C2 (0-5cm) | M-2018-C2 (10-20cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Latitude | | 44.715827 | 44.71552198 | 44.72331396 | 44.72331396 | 44.71625003 | 44.71625003 | 44.71625003 | 44.7149246 | 44.7149246 |
| Longitude | | -63.522236 | -63.52260003 | -63.50636202 | -63.50636202 | -63.54258399 | -63.54258399 | -63.54258399 | -63.52272031 | -63.52272031 |
| **Analysis** | **Units** | | | | | | | | | |
| Moisture | % | 21.1 | 19.0 | 79.0 | 24.6 | 92.6 | 92.7 | 89.9 | 36.0 | 30.4 |
| Mercury | mg/kg | 0.82 | 0.74 | 15 | 7.0 | 1.1 | 0.22 | 0.52 | 27 | 1.2 |
| Silver | mg/kg | 0.060 | 0.10 | 0.44 | 0.24 | 0.13 | 0.11 | 0.12 | 0.38 | 0.14 |
| Arsenic | mg/kg | 2300.00 | 4300.00 | 3800 | 2900.0 | 550.0 | 120.00 | 210.00 | 5400 | 8900.0 |
| Aluminum | mg/kg | 13000 | 12000 | 12000 | 8300 | 11000 | 6700 | 6900 | 12000 | 12000 |
| Barium | mg/kg | 54 | 51 | 78 | 42 | 85 | 56 | 57 | 57 | 49 |
| Beryllium | mg/kg | 0.32 | 0.30 | 0.81 | 0.22 | 0.81 | 0.37 | 0.41 | 0.33 | 0.34 |
| Bismuth | mg/kg | 0.66 | 0.85 | 1.7 | 1.3 | 0.25 | < 0.09 | 0.15 | 2.0 | 1.4 |
| Calcium | mg/kg | 5600 | 5500 | 2900 | 960 | 7700 | 7300 | 7600 | 1900 | 1500 |
| Cadmium | mg/kg | 0.14 | 0.21 | 2.9 | 0.56 | 1.3 | 0.53 | 0.62 | 0.33 | 0.27 |
| Cobalt | mg/kg | 11 | 20 | 28 | 9.6 | 39 | 10 | 4.0 | 11 | 13 |
| Chromium | mg/kg | 50 | 47 | 13 | 9.2 | 7.0 | 4.2 | 4.9 | 14 | 14 |
| Copper | mg/kg | 42 | 58 | 120 | 72 | 25 | 15 | 21 | 95 | 97 |
| Iron | mg/kg | 30000 | 34000 | 23000 | 19000 | 14000 | 5300 | 6100 | 30000 | 38000 |
| Potassium | mg/kg | 5400 | 5000 | 1500 | 2600 | 970 | 230 | 630 | 3300 | 4100 |
| Lithium | mg/kg | 22 | 20 | 10 | 14 | 4.5 | < 2 | < 2 | 20 | 21 |
| Magnesium | mg/kg | 9600 | 9500 | 3300 | 4300 | 1600 | 1000 | 1200 | 6600 | 7600 |
| Manganese | mg/kg | 660 | 690 | 940 | 180 | 860 | 420 | 290 | 480 | 240 |
| Molybdenum | mg/kg | 0.20 | 0.26 | 1.2 | 0.63 | 1.1 | 0.71 | 0.76 | 0.47 | 0.36 |
| Nickel | mg/kg | 32 | 45 | 41 | 19 | 49 | 16 | 13 | 27 | 37 |
| Lead | mg/kg | 18 | 29 | 100 | 56 | 37 | 22 | 26 | 80 | 57 |
| Sulphur | mg/kg | 350 | 2000 | 4000 | 2400 | 7800 | 5400 | 4800 | 4200 | 5400 |
| Antimony | mg/kg | 4.0 | 5.8 | 3.3 | 3.7 | < 0.8 | < 0.8 | < 0.8 | 10 | 17 |
| Selenium | mg/kg | < 0.7 | < 0.7 | 1.8 | < 0.7 | 2.0 | 2.1 | 2.3 | 0.72 | < 0.7 |
| Tin | mg/kg | < 0.5 | < 0.5 | 1.0 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Strontium | mg/kg | 22 | 22 | 16 | 9.2 | 40 | 39 | 36 | 11 | 10 |
| Titanium | mg/kg | 630 | 650 | 240 | 250 | 140 | 73 | 91 | 410 | 530 |
| Thallium | mg/kg | 0.26 | 0.25 | 0.33 | 0.14 | 0.059 | < 0.02 | < 0.02 | 0.20 | 0.26 |
| Uranium | mg/kg | 0.37 | 0.32 | 0.85 | 0.34 | 0.76 | 0.70 | 1.3 | 0.48 | 0.35 |
| Vanadium | mg/kg | 17 | 16 | 43 | 9.9 | 16 | 5.8 | 4.9 | 15 | 15 |
| Yttrium | mg/kg | 4.0 | 3.8 | 9.1 | 2.4 | 32 | 13 | 16 | 4.0 | 4.0 |
| Zinc | mg/kg | 95 | 130 | 240 | 120 | 87 | 25 | 19 | 140 | 160 |

**Montague - Solids**

| Sample ID | | M-2018-SFC-T30 | M-2018-SFC-T35 | M-2018-C19 (0-5cm) | M-2018-C19 (20-30cm) | M-2018-C11 (2.5-10cm) | M-2018-C11 (10-20cm) | M-2018-C11 (30-40cm) | M-2018-C2 (0-5cm) | M-2018-C2 (10-20cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| **ABA** | | | | | | | | | | |
| Paste pH | | -- | -- | -- | -- | NSS | -- | -- | -- | -- |
| Fizz Rate | --- | -- | -- | -- | -- | 1 | -- | -- | -- | -- |
| Sample weight | g | -- | -- | -- | -- | 1.89 | -- | -- | -- | -- |
| HCl Added | mL | -- | -- | -- | -- | 27 | -- | -- | -- | -- |
| HCl | Normality | -- | -- | -- | -- | 0.1 | -- | -- | -- | -- |
| NaOH | Normality | -- | -- | -- | -- | 0.1 | -- | -- | -- | -- |
| NaOH to pH=8.3 | mL | -- | -- | -- | -- | 38.94 | -- | -- | -- | -- |
| Final pH | no unit | -- | -- | -- | -- | 1.56 | -- | -- | -- | -- |
| NP | t CaCO3/1000 t | -- | -- | -- | -- | -31.6 | -- | -- | -- | -- |
| AP | t CaCO3/1000 t | -- | -- | -- | -- | 12.2 | -- | -- | -- | -- |
| Net NP | t CaCO3/1000 t | -- | -- | -- | -- | -43.79 | -- | -- | -- | -- |
| NP/AP | ratio | -- | -- | -- | -- | -2.59 | -- | -- | -- | -- |
| Sulphur (total) | %S | 0.031 | 0.206 | -- | -- | 0.979 | 0.75 | 0.701 | 0.464 | 0.656 |
| Acid Leachable SO4-S | %S | <0.02 | 0.05 | -- | -- | 0.59 | 0.43 | 0.38 | 0.07 | 0.12 |
| Sulphide | %S | 0.02 | 0.16 | -- | -- | 0.39 | 0.32 | 0.32 | 0.39 | 0.54 |
| Carbon (total) | %C | 0.256 | 0.252 | -- | -- | 38 | 45.8 | 45.8 | 2.47 | 0.384 |
| Carbonate | %CO3 | 0.924 | 0.944 | -- | -- | <0.025 | <0.025 | 0.03 | 0.105 | 0.05 |

**Montague - Solids**

| Sample ID | | M-2018-C2 (40-60cm) | M-2018-C2 (80-100cm) | M-2018-C3 (0-5cm) | M-2018-C3 (40-80cm) | M-2018-C3 (140-160cm) | M-2018-C3 (160-180cm) | M-2018-C4 (0-10cm) | M-2018-C4 (40-60cm) | M-2018-C4 (60-100cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Latitude | | 44.7149246 | 44.7149246 | 44.71530204 | 44.71530204 | 44.71530204 | 44.71530204 | 44.71566296 | 44.71566296 | 44.71566296 |
| Longitude | | -63.52272031 | -63.52272031 | -63.52343 | -63.52343 | -63.52343 | -63.52343 | -63.52383401 | -63.52383401 | -63.52383401 |
| **Analysis** | **Units** | | | | | | | | | |
| Moisture | % | 29.7 | 60.1 | 84.7 | 35.0 | 61.5 | 73.9 | 59.0 | 23.2 | 44.0 |
| Mercury | mg/kg | 2.1 | 2.1 | 4.4 | 9.0 | 17 | 7.8 | 4.0 | 0.20 | 3.5 |
| Silver | mg/kg | 0.11 | 0.19 | 0.27 | 0.22 | 0.44 | 0.32 | 0.36 | 0.013 | 0.13 |
| Arsenic | mg/kg | 4200.0 | 8200.0 | 5400.0 | 2200.0 | 5000 | 2500.0 | 11000.0 | 500.00 | 2900.0 |
| Aluminum | mg/kg | 13000 | 12000 | 23000 | 12000 | 13000 | 12000 | 14000 | 16000 | 15000 |
| Barium | mg/kg | 64 | 110 | 440 | 50 | 76 | 65 | 470 | 35 | 96 |
| Beryllium | mg/kg | 0.35 | 0.41 | 1.7 | 0.33 | 0.42 | 0.46 | 0.75 | 0.26 | 0.48 |
| Bismuth | mg/kg | 1.1 | 1.1 | 1.2 | 1.2 | 1.6 | 0.94 | 2.0 | 0.35 | 0.97 |
| Calcium | mg/kg | 3400 | 4000 | 6700 | 3000 | 4100 | 5600 | 2800 | 900 | 4200 |
| Cadmium | mg/kg | 0.21 | 0.89 | 4.0 | 0.27 | 0.58 | 0.52 | 2.7 | 0.032 | 0.23 |
| Cobalt | mg/kg | 14 | 37 | 120 | 13 | 15 | 11 | 88 | 3.7 | 16 |
| Chromium | mg/kg | 15 | 14 | 18 | 57 | 13 | 12 | 56 | 18 | 18 |
| Copper | mg/kg | 73 | 120 | 93 | 73 | 93 | 63 | 130 | 9.9 | 60 |
| Iron | mg/kg | 34000 | 55000 | 77000 | 28000 | 31000 | 25000 | 58000 | 28000 | 33000 |
| Potassium | mg/kg | 5100 | 3200 | 2100 | 3900 | 3400 | 2700 | 2800 | 1300 | 7000 |
| Lithium | mg/kg | 22 | 17 | 15 | 21 | 20 | 14 | 18 | 17 | 24 |
| Magnesium | mg/kg | 8500 | 6900 | 4000 | 7600 | 6700 | 5300 | 6500 | 3800 | 8800 |
| Manganese | mg/kg | 520 | 2900 | 35000 | 350 | 450 | 620 | 21000 | 330 | 500 |
| Molybdenum | mg/kg | 0.32 | 0.79 | 7.3 | 0.42 | 0.51 | 0.75 | 2.0 | 0.52 | 0.31 |
| Nickel | mg/kg | 35 | 63 | 130 | 30 | 32 | 24 | 120 | 13 | 35 |
| Lead | mg/kg | 40 | 58 | 110 | 43 | 74 | 42 | 120 | 8.6 | 35 |
| Sulphur | mg/kg | 3200 | 710 | 2000 | 2500 | 5100 | 4100 | 4300 | 530 | 4200 |
| Antimony | mg/kg | 7.8 | 12 | 3.1 | 3.9 | 8.1 | 3.9 | 15 | < 0.8 | 4.7 |
| Selenium | mg/kg | < 0.7 | 0.89 | 4.3 | < 0.7 | 1.4 | 2.1 | 1.6 | < 0.7 | < 0.7 |
| Tin | mg/kg | < 0.5 | < 0.5 | 1.5 | < 0.5 | < 0.5 | < 0.5 | 0.79 | < 0.5 | < 0.5 |
| Strontium | mg/kg | 14 | 24 | 34 | 11 | 19 | 21 | 21 | 5.8 | 18 |
| Titanium | mg/kg | 610 | 490 | 310 | 550 | 370 | 360 | 500 | 460 | 650 |
| Thallium | mg/kg | 0.28 | 0.32 | 0.44 | 0.23 | 0.17 | 0.13 | 0.60 | 0.11 | 0.31 |
| Uranium | mg/kg | 0.48 | 0.37 | 1.5 | 0.55 | 0.93 | 1.1 | 0.67 | 0.33 | 0.58 |
| Vanadium | mg/kg | 17 | 27 | 140 | 16 | 15 | 13 | 37 | 21 | 20 |
| Yttrium | mg/kg | 4.0 | 5.0 | 15 | 4.3 | 5.9 | 8.3 | 6.5 | 1.8 | 4.3 |
| Zinc | mg/kg | 130 | 230 | 370 | 110 | 190 | 100 | 430 | 31 | 99 |

**Montague - Solids**

| Sample ID | | M-2018-C2 (40-60cm) | M-2018-C2 (80-100cm) | M-2018-C3 (0-5cm) | M-2018-C3 (40-80cm) | M-2018-C3 (140-160cm) | M-2018-C3 (160-180cm) | M-2018-C4 (0-10cm) | M-2018-C4 (40-60cm) | M-2018-C4 (60-100cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| **ABA** | | | | | | | | | | |
| Paste pH | | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fizz Rate | --- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sample weight | g | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| HCl Added | mL | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| HCl | Normality | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NaOH | Normality | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NaOH to pH=8.3 | mL | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Final pH | no unit | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NP | t CaCO3/1000 t | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| AP | t CaCO3/1000 t | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Net NP | t CaCO3/1000 t | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NP/AP | ratio | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sulphur (total) | %S | -- | 0.084 | 0.21 | 0.261 | 0.532 | 0.501 | 0.491 | 0.054 | 0.452 |
| Acid Leachable SO4-S | %S | -- | 0.03 | 0.1 | 0.05 | 0.1 | 0.23 | 0.16 | 0.03 | 0.14 |
| Sulphide | %S | -- | 0.05 | 0.11 | 0.21 | 0.43 | 0.27 | 0.33 | 0.02 | 0.31 |
| Carbon (total) | %C | -- | 5.4 | 16.8 | 1.5 | 9.44 | 18.5 | 4.13 | 0.677 | 2.94 |
| Carbonate | %CO3 | -- | 0.065 | 0.07 | 0.305 | 0.105 | 0.1 | 0.04 | 0.04 | 0.255 |

**Montague - Solids**

| Sample ID | | M-2018-C18 (0-2.5cm) | M-2018-C18 (2.5-10cm) | M-2018-C18 (10-20cm) | M-2018-C18 (20-30cm) | M-2018-SFC-OLD MILL | M-2018-C9 (0-7.5cm) | M-2018-C9 (15-20cm) | M-2018-C9 (20-40cm) | M-2018-C10 (0-5cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Latitude | | 44.71898387 | 44.71898387 | 44.71898387 | 44.71898387 | 44.71973422 | 44.73045903 | 44.73045903 | 44.73045903 | 44.71532299 |
| Longitude | | -63.50804284 | -63.50804284 | -63.50804284 | -63.50804284 | -63.50905588 | -63.48584002 | -63.48584002 | -63.48584002 | -63.54691199 |
| **Analysis** | **Units** | | | | | | | | | |
| Moisture | % | 89.5 | 54.6 | 69.8 | 79.1 | 24.6 | 88.2 | 66.9 | 60.0 | 84.0 |
| Mercury | mg/kg | 0.26 | 0.14 | 0.70 | 2.2 | 46 | 0.42 | 0.09 | 0.10 | 2.4 |
| Silver | mg/kg | 0.13 | 0.058 | 0.14 | 0.46 | 0.36 | 0.15 | 0.059 | 0.054 | 0.21 |
| Arsenic | mg/kg | 580.00 | 210.00 | 620.00 | 610.0 | 2900 | 56.00 | 26.00 | 18.00 | 750.0 |
| Aluminum | mg/kg | 14000 | 19000 | 18000 | 14000 | 11000 | 16000 | 10000 | 12000 | 19000 |
| Barium | mg/kg | 93 | 85 | 90 | 70 | 69 | 41 | 35 | 45 | 190 |
| Beryllium | mg/kg | 0.56 | 0.46 | 0.53 | 0.62 | 0.31 | 1.5 | 1.4 | 1.8 | 1.2 |
| Bismuth | mg/kg | 0.29 | 0.31 | 0.36 | 0.48 | 1.2 | 0.54 | 0.18 | 0.21 | 0.78 |
| Calcium | mg/kg | 5200 | 2200 | 2600 | 5000 | 1400 | 980 | 890 | 1100 | 3700 |
| Cadmium | mg/kg | 2.1 | 0.46 | 0.44 | 0.87 | 0.21 | 0.31 | 0.40 | 0.54 | 1.6 |
| Cobalt | mg/kg | 22 | 17 | 19 | 12 | 11 | 16 | 8.9 | 10 | 52 |
| Chromium | mg/kg | 26 | 34 | 24 | 210 | 13 | 77 | 92 | 14 | 50 |
| Copper | mg/kg | 46 | 39 | 37 | 40 | 44 | 19 | 9.4 | 13 | 60 |
| Iron | mg/kg | 32000 | 34000 | 31000 | 15000 | 29000 | 21000 | 15000 | 20000 | 39000 |
| Potassium | mg/kg | 1400 | 2700 | 2500 | 770 | 2700 | 850 | 1100 | 1800 | 2700 |
| Lithium | mg/kg | 13 | 25 | 22 | 10 | 18 | 16 | 19 | 25 | 22 |
| Magnesium | mg/kg | 4600 | 9800 | 7500 | 2500 | 5000 | 2200 | 3000 | 3700 | 5900 |
| Manganese | mg/kg | 670 | 610 | 580 | 670 | 440 | 1300 | 340 | 410 | 5900 |
| Molybdenum | mg/kg | 1.1 | 0.56 | 0.84 | 1.4 | 0.60 | 1.6 | 0.90 | 1.2 | 2.4 |
| Nickel | mg/kg | 36 | 40 | 32 | 23 | 21 | 16 | 14 | 16 | 63 |
| Lead | mg/kg | 78 | 77 | 60 | 43 | 120 | 69 | 10 | 8.8 | 98 |
| Sulphur | mg/kg | 4500 | 1800 | 5200 | 5900 | 250 | 1200 | 680 | 500 | 1300 |
| Antimony | mg/kg | < 0.8 | < 0.8 | < 0.8 | 1.7 | 4.1 | < 0.8 | < 0.8 | < 0.8 | 1.8 |
| Selenium | mg/kg | 1.1 | < 0.7 | 1.2 | 3.9 | < 0.7 | 1.8 | 0.81 | 0.77 | 1.3 |
| Tin | mg/kg | 1.0 | 0.83 | 0.98 | 0.78 | 1.9 | 2.3 | 0.68 | 0.79 | 2.7 |
| Strontium | mg/kg | 25 | 15 | 16 | 23 | 11 | 9.2 | 7.6 | 8.9 | 23 |
| Titanium | mg/kg | 290 | 500 | 350 | 290 | 370 | 470 | 420 | 530 | 370 |
| Thallium | mg/kg | 0.24 | 0.17 | 0.18 | 0.25 | 0.16 | 0.17 | 0.29 | 0.37 | 0.28 |
| Uranium | mg/kg | 0.71 | 0.64 | 0.84 | 1.7 | 0.58 | 3.5 | 2.5 | 3.7 | 2.6 |
| Vanadium | mg/kg | 120 | 48 | 28 | 16 | 17 | 61 | 15 | 16 | 77 |
| Yttrium | mg/kg | 10 | 7.7 | 7.9 | 7.1 | 3.6 | 9.8 | 7.0 | 9.5 | 24 |
| Zinc | mg/kg | 280 | 140 | 100 | 71 | 63 | 50 | 97 | 110 | 300 |

**Montague - Solids**

| Sample ID | | M-2018-C18 (0-2.5cm) | M-2018-C18 (2.5-10cm) | M-2018-C18 (10-20cm) | M-2018-C18 (20-30cm) | M-2018-SFC-OLD MILL | M-2018-C9 (0-7.5cm) | M-2018-C9 (15-20cm) | M-2018-C9 (20-40cm) | M-2018-C10 (0-5cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| **ABA** | | | | | | | | | | |
| Paste pH | | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fizz Rate | --- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sample weight | g | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| HCl Added | mL | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| HCl | Normality | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NaOH | Normality | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NaOH to pH=8.3 | mL | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Final pH | no unit | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NP | t CaCO3/1000 t | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| AP | t CaCO3/1000 t | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Net NP | t CaCO3/1000 t | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NP/AP | ratio | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sulphur (total) | %S | 0.557 | 0.198 | 0.61 | 0.733 | 0.029 | 0.165 | 0.085 | -- | 0.16 |
| Acid Leachable SO4-S | %S | 0.26 | 0.14 | 0.39 | 0.4 | <0.02 | 0.14 | 0.06 | -- | 0.13 |
| Sulphide | %S | 0.3 | 0.06 | 0.22 | 0.33 | 0.02 | 0.03 | 0.02 | -- | 0.03 |
| Carbon (total) | %C | 23.5 | 4.31 | 9.96 | 27.1 | 2.02 | 8.29 | 4.68 | -- | 7.11 |
| Carbonate | %CO3 | <0.025 | <0.025 | 0.04 | 0.155 | 0.345 | <0.025 | <0.025 | -- | 0.03 |

**Montague - Solids**

| Sample ID | | M-2018-C10 (15-20cm) | M-2018-C10 (30-40cm) | M-2018-C17 (2.5-10cm) | M-2018-C17 (15-20cm) | M-2018-C17 (30-40cm) |
|---|---|---|---|---|---|---|
| Latitude | | 44.71532299 | 44.71532299 | 44.71998501 | 44.71998501 | 44.71998501 |
| Longitude | | -63.54691199 | -63.54691199 | -63.50946601 | -63.50946601 | -63.50946601 |
| **Analysis** | **Units** | | | | | |
| Moisture | % | 89.5 | 91.0 | 25.2 | 21.3 | 21.4 |
| Mercury | mg/kg | 0.50 | 0.17 | 28 | 14 | 11 |
| Silver | mg/kg | 0.22 | 0.25 | 0.47 | 0.37 | 0.54 |
| Arsenic | mg/kg | 520.00 | 110.00 | 6100 | 3200 | 5500 |
| Aluminum | mg/kg | 17000 | 23000 | 6900 | 7500 | 7100 |
| Barium | mg/kg | 84 | 63 | 34 | 30 | 29 |
| Beryllium | mg/kg | 0.83 | 1.0 | 0.16 | 0.16 | 0.17 |
| Bismuth | mg/kg | 0.25 | 0.24 | 2.2 | 1.6 | 2.4 |
| Calcium | mg/kg | 4100 | 3700 | 1100 | 1000 | 1500 |
| Cadmium | mg/kg | 1.1 | 1.1 | 0.16 | 0.23 | 0.21 |
| Cobalt | mg/kg | 11 | 9.3 | 5.8 | 6.5 | 12 |
| Chromium | mg/kg | 16 | 21 | 8.8 | 69 | 73 |
| Copper | mg/kg | 25 | 28 | 50 | 66 | 54 |
| Iron | mg/kg | 17000 | 18000 | 31000 | 26000 | 29000 |
| Potassium | mg/kg | 1000 | 1100 | 1800 | 1800 | 1900 |
| Lithium | mg/kg | 9.2 | 9.9 | 9.5 | 12 | 12 |
| Magnesium | mg/kg | 2300 | 2900 | 3800 | 4500 | 4600 |
| Manganese | mg/kg | 1600 | 1500 | 260 | 230 | 250 |
| Molybdenum | mg/kg | 2.1 | 2.5 | 0.66 | 0.50 | 0.59 |
| Nickel | mg/kg | 17 | 22 | 14 | 21 | 30 |
| Lead | mg/kg | 31 | 24 | 120 | 85 | 150 |
| Sulphur | mg/kg | 3400 | 2600 | 900 | 1100 | 3000 |
| Antimony | mg/kg | < 0.8 | < 0.8 | 10 | 6.7 | 7.3 |
| Selenium | mg/kg | 2.5 | 3.5 | < 0.7 | < 0.7 | < 0.7 |
| Tin | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Strontium | mg/kg | 21 | 19 | 11 | 12 | 11 |
| Titanium | mg/kg | 260 | 280 | 260 | 220 | 200 |
| Thallium | mg/kg | 0.14 | 0.17 | 0.16 | 0.12 | 0.14 |
| Uranium | mg/kg | 1.2 | 1.5 | 0.35 | 0.31 | 0.33 |
| Vanadium | mg/kg | 18 | 16 | 10 | 9.7 | 8.9 |
| Yttrium | mg/kg | 22 | 30 | 1.9 | 2.4 | 2.2 |
| Zinc | mg/kg | 110 | 120 | 46 | 61 | 70 |

**Montague - Solids**

| Sample ID | | M-2018-C10 (15-20cm) | M-2018-C10 (30-40cm) | M-2018-C17 (2.5-10cm) | M-2018-C17 (15-20cm) | M-2018-C17 (30-40cm) |
|---|---|---|---|---|---|---|
| **ABA** | | | | | | |
| Paste pH | | -- | -- | -- | -- | -- |
| Fizz Rate | --- | -- | -- | -- | -- | -- |
| Sample weight | g | -- | -- | -- | -- | -- |
| HCl Added | mL | -- | -- | -- | -- | -- |
| HCl | Normality | -- | -- | -- | -- | -- |
| NaOH | Normality | -- | -- | -- | -- | -- |
| NaOH to pH=8.3 | mL | -- | -- | -- | -- | -- |
| Final pH | no unit | -- | -- | -- | -- | -- |
| NP | t CaCO3/1000 t | -- | -- | -- | -- | -- |
| AP | t CaCO3/1000 t | -- | -- | -- | -- | -- |
| Net NP | t CaCO3/1000 t | -- | -- | -- | -- | -- |
| NP/AP | ratio | -- | -- | -- | -- | -- |
| Sulphur (total) | %S | 0.434 | 0.282 | 0.106 | 0.116 | 0.358 |
| Acid Leachable SO4-S | %S | 0.31 | 0.16 | 0.05 | 0.03 | 0.1 |
| Sulphide | %S | 0.12 | 0.12 | 0.06 | 0.09 | 0.26 |
| Carbon (total) | %C | 17.2 | 13.5 | 0.459 | 0.17 | 0.183 |
| Carbonate | %CO3 | <0.025 | <0.025 | 0.03 | <0.025 | 0.105 |

# Appendix B **Surface Water/Standing Water Results**

**Montague - Surface/Standing Water - Total**

| Sample ID | | M-SW12 | M-SW13 | M-SWMB | M-Pz1 | M-Pz2 | M-Pz3 | M-Pz4 | M-SW5 | M-SW11 | M-SW10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Field Data** | | | | | | | | | | | |
| Field pH | -- | 5.98 | 5.69 | 7.12 | 7.33 | 6.31 | 6.06 | 7.67 | 7.17 | 4.62 | 6.37 |
| Field EC | uS/cm | 255 | 60 | 241 | 91 | 218 | 241 | 226 | 202 | 239 | 224 |
| Field Temp | Celsius | 0.9 | 3 | 1.2 | 1.1 | 1.1 | 0.8 | 1.3 | 0.7 | 4.7 | 4.1 |
| Latitude | -- | 44.70468904 | 44.71307396 | 44.71423603 | 44.71439897 | 44.7149246 | 44.71530204 | 44.71566296 | 44.71715896 | 44.71625003 | 44.71532299 |
| Longitude | -- | -63.50767999 | -63.51727299 | -63.51982897 | -63.52030003 | -63.52272031 | -63.52343 | -63.52383401 | -63.52366897 | -63.54258399 | -63.54691199 |
| **Lab Results** | | | | | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 26.6 | 9.21 | 24.4 | 25.6 | 23.5 | 25.5 | 23.1 | 29.8 | 21.6 | 28.3 |
| Total Mercury (Hg) | mg/L | <0.000002 | 0.000505 | <0.000002 | 0.000487 | 0.0000034 | 0.0000024 | 0.0000400 | 0.0000194 | 0.0000023 | <0.000002 |
| Total Aluminum (Al) | mg/L | 0.0330 | 0.174 | 0.0410 | 0.153 | 0.0147 | 0.0357 | 0.326 | 0.142 | 0.561 | 0.0301 |
| Total Antimony (Sb) | mg/L | 0.000071 | 0.000144 | 0.000082 | 0.00156 | 0.000492 | 0.000119 | 0.000346 | 0.000908 | 0.000101 | 0.000122 |
| Total Arsenic (As) | mg/L | 0.000537 | 0.456 | 0.0124 | 0.790 | 0.180 | 0.0367 | 0.297 | 0.289 | 0.0260 | 0.0171 |
| Total Barium (Ba) | mg/L | 0.00928 | 0.00575 | 0.00659 | 0.0131 | 0.00348 | 0.00499 | 0.0172 | 0.00464 | 0.0187 | 0.00682 |
| Total Beryllium (Be) | mg/L | <0.00001 | 0.000015 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | 0.000035 | <0.00001 | 0.000092 | <0.00001 |
| Total Bismuth (Bi) | mg/L | <0.00001 | 0.000077 | <0.00001 | 0.000073 | <0.000005 | <0.00001 | 0.000033 | 0.000020 | <0.00001 | <0.000005 |
| Total Boron (B) | mg/L | 0.018 | <0.01 | 0.014 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.030 | <0.01 |
| Total Cadmium (Cd) | mg/L | <0.000005 | 0.0000711 | <0.000005 | 0.0000779 | <0.000005 | <0.000005 | 0.000130 | 0.0000158 | 0.000133 | 0.0000060 |
| Total Chromium (Cr) | mg/L | 0.00011 | 0.00014 | 0.00013 | 0.00028 | 0.00010 | <0.0001 | 0.00047 | 0.00020 | 0.00016 | 0.00020 |
| Total Cobalt (Co) | mg/L | 0.000042 | 0.00158 | 0.000061 | 0.00164 | 0.0000971 | 0.000142 | 0.00299 | 0.00123 | 0.00392 | 0.0000953 |
| Total Copper (Cu) | mg/L | 0.00097 | 0.0131 | 0.00097 | 0.0112 | 0.00127 | 0.00085 | 0.00482 | 0.00460 | 0.00072 | 0.000877 |
| Total Iron (Fe) | mg/L | 0.0548 | 1.35 | 0.0755 | 1.26 | 0.0114 | 0.0831 | 1.31 | 0.442 | 0.0911 | 0.0425 |
| Total Lead (Pb) | mg/L | 0.000075 | 0.00791 | 0.000120 | 0.00365 | 0.0000138 | 0.000096 | 0.00259 | 0.00119 | 0.000347 | 0.0000490 |
| Total Lithium (Li) | mg/L | 0.00072 | 0.00084 | 0.00053 | 0.00058 | <0.0005 | 0.00050 | 0.00091 | 0.00107 | 0.00150 | 0.00055 |
| Total Manganese (Mn) | mg/L | 0.0131 | 0.0746 | 0.0112 | 0.152 | 0.0111 | 0.0161 | 0.823 | 0.0734 | 0.124 | 0.0808 |
| Total Molybdenum (Mo) | mg/L | 0.000102 | <0.00005 | 0.000093 | 0.000089 | <0.00005 | 0.000055 | 0.000148 | 0.000063 | <0.00005 | 0.000445 |
| Total Nickel (Ni) | mg/L | 0.00043 | 0.00302 | 0.00049 | 0.00495 | 0.000802 | 0.00053 | 0.00662 | 0.00335 | 0.0107 | 0.000551 |
| Total Selenium (Se) | mg/L | 0.000059 | 0.000064 | 0.000059 | 0.000127 | 0.000047 | 0.000048 | 0.000083 | 0.000067 | 0.000049 | 0.000056 |
| Total Silicon (Si) | mg/L | 0.775 | 2.02 | 0.743 | 2.28 | 1.16 | 0.843 | 1.06 | 1.43 | 1.59 | 1.15 |
| Total Silver (Ag) | mg/L | <0.00001 | <0.00001 | <0.00001 | 0.000043 | <0.000005 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.000005 |
| Total Strontium (Sr) | mg/L | 0.0317 | 0.00970 | 0.0275 | 0.0198 | 0.0237 | 0.0274 | 0.0249 | 0.0273 | 0.0223 | 0.0410 |
| Total Thallium (Tl) | mg/L | <0.000002 | 0.0000063 | <0.000002 | 0.0000103 | <0.000002 | <0.000002 | 0.0000110 | 0.0000043 | 0.0000027 | <0.000002 |
| Total Tin (Sn) | mg/L | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.00024 | <0.0002 | <0.0002 |
| Total Titanium (Ti) | mg/L | <0.002 | <0.002 | <0.002 | 0.0049 | <0.0005 | <0.002 | 0.0080 | 0.0050 | <0.002 | <0.0005 |
| Total Uranium (U) | mg/L | 0.0000077 | 0.0000180 | 0.0000063 | 0.0000207 | 0.0000020 | 0.0000052 | 0.0000218 | 0.0000083 | 0.0000064 | 0.0000646 |
| Total Vanadium (V) | mg/L | <0.0002 | 0.00139 | <0.0002 | 0.00072 | <0.0002 | <0.0002 | 0.00113 | 0.00032 | 0.00038 | <0.0002 |
| Total Zinc (Zn) | mg/L | <0.001 | 0.0299 | 0.0011 | 0.0217 | 0.00312 | 0.0013 | 0.0251 | 0.0126 | 0.0138 | 0.00116 |
| Total Zirconium (Zr) | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Total Calcium (Ca) | mg/L | 8.49 | 1.90 | 7.72 | 6.33 | 6.81 | 7.92 | 6.98 | 8.50 | 6.45 | 9.07 |
| Total Magnesium (Mg) | mg/L | 1.32 | 1.08 | 1.26 | 2.39 | 1.58 | 1.40 | 1.39 | 2.07 | 1.33 | 1.37 |
| Total Potassium (K) | mg/L | 1.23 | 0.44 | 1.12 | 1.60 | 1.00 | 1.01 | 1.08 | 1.14 | 0.71 | 1.34 |
| Total Sodium (Na) | mg/L | 38.8 | 4.71 | 36.1 | 6.09 | 28.7 | 35.0 | 32.0 | 26.2 | 19.6 | 30.7 |
| Total Phosphorus | mg/L | | | | | 0.0038 | | | | | 0.0068 |
| Total Sulphur | mg/L | 3.07 | 0.91 | 2.72 | 2.94 | 2.92 | 3.12 | 3.42 | 4.72 | 5.36 | 3.57 |

**Montague - Surface/Standing Water - Total**

| Sample ID | | M-SW14 | M-SW15 | M-SW16 | M-SW17 | M-SW18 | M-SW19 | M-SW9 |
|---|---|---|---|---|---|---|---|---|
| **Field Data** | | | | | | | | |
| Field pH | -- | 6.99 | 7.08 | 7.83 | 7.37 | N/A | 7.2 | 5.32 |
| Field EC | uS/cm | 74 | 22 | 678 | 246 | N/A | 149 | 32 |
| Field Temp | Celsius | 4.2 | 3.9 | 4.1 | 4.3 | N/A | 3 | 6.3 |
| Latitude | -- | 44.71453174 | 44.71503901 | 44.71587804 | 44.71998501 | 44.71898387 | 44.72331396 | 44.73045903 |
| Longitude | -- | -63.52001203 | -63.52109003 | -63.52297001 | -63.50946601 | -63.50804284 | -63.50636202 | -63.48584002 |
| **Lab Results** | | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 20.3 | 6.01 | 347 | 26.1 | 71.7 | 18.5 | 4.10 |
| Total Mercury (Hg) | mg/L | 0.0000373 | 0.0000028 | 0.0000491 | 0.0000030 | 0.000084 | 0.0000072 | <0.000002 |
| Total Aluminum (Al) | mg/L | 0.0509 | 0.149 | 0.246 | 0.0646 | 24.8 | 0.0528 | 0.206 |
| Total Antimony (Sb) | mg/L | 0.00121 | 0.00426 | 0.0147 | 0.000094 | 0.00120 | 0.000135 | 0.000028 |
| Total Arsenic (As) | mg/L | 0.326 | 1.37 | 2.84 | 0.0216 | 2.65 | 0.0560 | 0.000760 |
| Total Barium (Ba) | mg/L | 0.00659 | 0.00162 | 0.00030 | 0.00878 | 0.338 | 0.00485 | 0.0231 |
| Total Beryllium (Be) | mg/L | <0.00001 | <0.00005 | <0.00005 | <0.00001 | 0.00150 | <0.00001 | 0.000079 |
| Total Bismuth (Bi) | mg/L | <0.00001 | 0.000065 | <0.000025 | <0.00001 | 0.000391 | <0.00001 | <0.00001 |
| Total Boron (B) | mg/L | <0.01 | <0.05 | <0.05 | <0.01 | <0.05 | <0.01 | 0.046 |
| Total Cadmium (Cd) | mg/L | 0.0000224 | <0.000025 | 0.000042 | 0.0000085 | 0.00246 | <0.000005 | 0.0000173 |
| Total Chromium (Cr) | mg/L | 0.00013 | 0.00122 | 0.00309 | 0.00011 | 0.0246 | 0.00013 | 0.00019 |
| Total Cobalt (Co) | mg/L | 0.000367 | 0.000583 | 0.00946 | 0.000145 | 0.0788 | 0.000134 | 0.000176 |
| Total Copper (Cu) | mg/L | 0.00553 | 0.00421 | 0.0201 | 0.00094 | 0.0746 | 0.00077 | 0.00032 |
| Total Iron (Fe) | mg/L | 0.0774 | 0.997 | 0.0505 | 0.0905 | 156 | 0.183 | 0.140 |
| Total Lead (Pb) | mg/L | 0.000138 | 0.00335 | 0.000131 | 0.000077 | 0.151 | 0.000087 | 0.000243 |
| Total Lithium (Li) | mg/L | <0.0005 | <0.0025 | 0.0239 | <0.0005 | 0.0158 | <0.0005 | 0.00137 |
| Total Manganese (Mn) | mg/L | 0.0166 | 0.0235 | 0.764 | 0.0217 | 14.6 | 0.0138 | 0.0707 |
| Total Molybdenum (Mo) | mg/L | <0.00005 | <0.00025 | 0.00047 | <0.00005 | 0.00192 | <0.00005 | <0.00005 |
| Total Nickel (Ni) | mg/L | 0.00310 | 0.00334 | 0.0513 | 0.00136 | 0.0720 | 0.00078 | 0.00051 |
| Total Selenium (Se) | mg/L | 0.000085 | <0.0002 | 0.00026 | 0.000061 | 0.00277 | 0.000040 | 0.000051 |
| Total Silicon (Si) | mg/L | 1.88 | 0.35 | 6.32 | 1.51 | 17.1 | 1.63 | 1.25 |
| Total Silver (Ag) | mg/L | <0.00001 | <0.000025 | <0.000025 | <0.00001 | 0.000232 | <0.00001 | <0.00001 |
| Total Strontium (Sr) | mg/L | 0.0159 | 0.00249 | 0.129 | 0.0262 | 0.0780 | 0.0182 | 0.00654 |
| Total Thallium (Tl) | mg/L | 0.0000036 | <0.00001 | <0.00001 | 0.0000032 | 0.000459 | <0.000002 | 0.0000066 |
| Total Tin (Sn) | mg/L | 0.00022 | <0.001 | <0.001 | <0.0002 | 0.0042 | <0.0002 | <0.0002 |
| Total Titanium (Ti) | mg/L | <0.002 | 0.0067 | <0.0025 | <0.002 | 0.493 | <0.002 | <0.002 |
| Total Uranium (U) | mg/L | 0.0000093 | <0.00001 | 0.000359 | 0.0000081 | 0.00222 | 0.0000059 | 0.0000818 |
| Total Vanadium (V) | mg/L | 0.00024 | <0.001 | <0.001 | <0.0002 | 0.269 | <0.0002 | 0.00051 |
| Total Zinc (Zn) | mg/L | 0.0129 | 0.0113 | 0.0561 | 0.0033 | 0.540 | 0.0023 | 0.0025 |
| Total Zirconium (Zr) | mg/L | <0.0001 | <0.0005 | <0.0005 | <0.0001 | 0.00153 | <0.0001 | <0.0001 |
| Total Calcium (Ca) | mg/L | 5.12 | 1.03 | 78.2 | 7.14 | 17.3 | 4.60 | 0.95 |
| Total Magnesium (Mg) | mg/L | 1.82 | 0.83 | 36.9 | 1.99 | 6.9 | 1.69 | 0.42 |
| Total Potassium (K) | mg/L | 1.38 | 0.88 | 4.93 | 1.03 | 2.3 | 0.77 | 0.27 |
| Total Sodium (Na) | mg/L | 5.03 | 1.22 | 10.9 | 30.8 | 64.7 | 19.5 | 4.01 |
| Total Phosphorus | mg/L | | <0.01 | <0.01 | | | | |
| Total Sulphur | mg/L | 2.37 | <3 | 79.1 | 2.93 | 8.4 | 1.91 | 0.76 |

## Montague - Surface/Standing Water - Dissolved

| Sample ID | | M-SW12 | M-SW13 | M-SWMB | M-Pz1 | M-Pz2 | M-Pz3 | M-Pz4 | M-SW5 | M-SW11 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Field Data** | | | | | | | | | | |
| Field pH | -- | 5.98 | 5.69 | 7.12 | 7.33 | 6.31 | 6.06 | 7.67 | 7.17 | 4.62 |
| Field EC | uS/cm | 255 | 60 | 241 | 91 | 218 | 241 | 226 | 202 | 239 |
| Field Temp | Celsius | 0.9 | 3 | 1.2 | 1.1 | 1.1 | 0.8 | 1.3 | 0.7 | 4.7 |
| Latitude | -- | 44.70468904 | 44.71307396 | 44.71423603 | 44.71439897 | 44.7149246 | 44.71530204 | 44.71566296 | 44.71715896 | 44.71625003 |
| Longitude | -- | -63.50767999 | -63.51727299 | -63.51982897 | -63.52030003 | -63.52272031 | -63.52343 | -63.52383401 | -63.52366897 | -63.54258399 |
| **Lab Results** | | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 26.8 | 8.86 | 24.5 | 26.0 | 25.6 | 26.4 | 23.2 | 30.0 | 21.3 |
| Dissolved Mercury (Hg) | mg/L | <0.00002 | 0.000111 | <0.000002 | 0.000079 | <0.00002 | <0.00002 | <0.00002 | <0.00002 | <0.00002 |
| Dissolved Aluminum (Al) | mg/L | 0.0209 | 0.106 | 0.0293 | 0.0471 | 0.0169 | 0.0173 | 0.0295 | 0.0369 | 0.395 |
| Dissolved Antimony (Sb) | mg/L | 0.000055 | 0.000107 | 0.000071 | 0.00124 | 0.000488 | 0.000085 | 0.000090 | 0.000727 | 0.000086 |
| Dissolved Arsenic (As) | mg/L | 0.000505 | 0.123 | 0.00289 | 0.398 | 0.190 | 0.0321 | 0.0360 | 0.121 | 0.0215 |
| Dissolved Barium (Ba) | mg/L | 0.00495 | 0.00493 | 0.00477 | 0.00603 | 0.00343 | 0.00439 | 0.00463 | 0.00283 | 0.00903 |
| Dissolved Beryllium (Be) | mg/L | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | 0.000069 |
| Dissolved Bismuth (Bi) | mg/L | <0.000005 | 0.0000287 | <0.000005 | 0.0000151 | <0.000005 | <0.000005 | <0.000005 | <0.000005 | <0.000005 |
| Dissolved Boron (B) | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Dissolved Cadmium (Cd) | mg/L | <0.000005 | 0.0000592 | <0.000005 | 0.0000270 | <0.000005 | <0.000005 | 0.0000337 | 0.0000122 | 0.000126 |
| Dissolved Chromium (Cr) | mg/L | 0.00014 | 0.00016 | 0.00012 | 0.00031 | <0.0001 | <0.0001 | 0.00012 | 0.00012 | 0.00015 |
| Dissolved Cobalt (Co) | mg/L | 0.0000362 | 0.00114 | 0.0000443 | 0.000229 | 0.0000911 | 0.0000425 | 0.000141 | 0.000785 | 0.00337 |
| Dissolved Copper (Cu) | mg/L | 0.000865 | 0.00941 | 0.000814 | 0.00620 | 0.00126 | 0.000737 | 0.00135 | 0.00299 | 0.000575 |
| Dissolved Iron (Fe) | mg/L | 0.0318 | 0.257 | 0.0373 | 0.208 | 0.0198 | 0.0279 | 0.0218 | 0.0671 | 0.0628 |
| Dissolved Lead (Pb) | mg/L | 0.0000323 | 0.00163 | 0.0000722 | 0.000678 | 0.0000355 | 0.0000322 | 0.0000298 | 0.000119 | 0.000239 |
| Dissolved Lithium (Li) | mg/L | <0.0005 | 0.00058 | <0.0005 | 0.00059 | <0.0005 | <0.0005 | 0.00060 | 0.00089 | 0.00133 |
| Dissolved Manganese (Mn) | mg/L | 0.0105 | 0.0570 | 0.00828 | 0.0175 | 0.0114 | 0.00354 | 0.0339 | 0.0548 | 0.113 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000099 | 0.000084 | 0.000088 | <0.00005 | <0.00005 | <0.00005 | 0.000052 | 0.000055 | <0.00005 |
| Dissolved Nickel (Ni) | mg/L | 0.000407 | 0.00250 | 0.000432 | 0.00299 | 0.000791 | 0.000450 | 0.00226 | 0.00283 | 0.00944 |
| Dissolved Selenium (Se) | mg/L | 0.000048 | <0.00004 | 0.000048 | 0.000086 | 0.000048 | 0.000050 | 0.000047 | 0.000057 | 0.000051 |
| Dissolved Silicon (Si) | mg/L | 0.700 | 1.86 | 0.713 | 2.27 | 1.24 | 0.853 | 0.842 | 1.34 | 1.60 |
| Dissolved Silver (Ag) | mg/L | <0.000005 | 0.0000076 | <0.000005 | 0.0000062 | <0.000005 | <0.000005 | <0.000005 | <0.000005 | <0.000005 |
| Dissolved Strontium (Sr) | mg/L | 0.0297 | 0.00849 | 0.0274 | 0.0190 | 0.0245 | 0.0273 | 0.0239 | 0.0264 | 0.0217 |
| Dissolved Thallium (Tl) | mg/L | <0.000002 | 0.0000049 | <0.000002 | 0.0000038 | <0.000002 | <0.000002 | <0.000002 | <0.000002 | <0.000002 |
| Dissolved Tin (Sn) | mg/L | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dissolved Titanium (Ti) | mg/L | <0.0005 | 0.00085 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.00059 |
| Dissolved Uranium (U) | mg/L | 0.0000062 | 0.0000090 | 0.0000056 | 0.0000082 | 0.0000021 | 0.0000035 | 0.0000035 | 0.0000041 | 0.0000053 |
| Dissolved Vanadium (V) | mg/L | <0.0002 | 0.00066 | <0.0002 | 0.00025 | <0.0002 | <0.0002 | <0.0002 | 0.00020 | 0.00038 |
| Dissolved Zinc (Zn) | mg/L | 0.00062 | 0.0305 | 0.00076 | 0.0178 | 0.00269 | 0.00116 | 0.00954 | 0.0100 | 0.0120 |
| Dissolved Zirconium (Zr) | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Dissolved Calcium (Ca) | mg/L | 8.51 | 1.82 | 7.72 | 6.57 | 7.51 | 8.17 | 7.08 | 8.61 | 6.33 |
| Dissolved Magnesium (Mg) | mg/L | 1.34 | 1.05 | 1.26 | 2.32 | 1.67 | 1.47 | 1.34 | 2.07 | 1.34 |
| Dissolved Potassium (K) | mg/L | 1.21 | 0.414 | 1.12 | 1.58 | 1.04 | 1.03 | 1.06 | 1.12 | 0.702 |
| Dissolved Sodium (Na) | mg/L | 39.0 | 4.63 | 35.4 | 6.04 | 29.8 | 35.9 | 33.3 | 26.6 | 19.4 |
| Dissolved Sulphur (S) | mg/L | 3.18 | 1.03 | 2.80 | 2.97 | 3.48 | 3.08 | 3.34 | 5.10 | 5.41 |

## Montague - Surface/Standing Water - Dissolved

| Sample ID | | M-SW10 | M-SW14 | M-SW15 | M-SW16 | M-SW17 | M-SW18 | M-SW19 | M-SW9 |
|---|---|---|---|---|---|---|---|---|---|
| **Field Data** | | | | | | | | | |
| Field pH | -- | 6.37 | 6.99 | 7.08 | 7.83 | 7.37 | N/A | 7.2 | 5.32 |
| Field EC | uS/cm | 224 | 74 | 22 | 678 | 246 | N/A | 149 | 32 |
| Field Temp | Celsius | 4.1 | 4.2 | 3.9 | 4.1 | 4.3 | N/A | 3 | 6.3 |
| Latitude | -- | 44.71532299 | 44.71453174 | 44.71503901 | 44.71587804 | 44.71998501 | 44.71898387 | 44.72331396 | 44.73045903 |
| Longitude | -- | -63.54691199 | -63.52001203 | -63.52109003 | -63.52297001 | -63.50946601 | -63.50804284 | -63.50636202 | -63.48584002 |
| **Lab Results** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 30.5 | 20.5 | 6.54 | 358 | 25.5 | 22.0 | 18.3 | 4.15 |
| Dissolved Mercury (Hg) | mg/L | <0.00002 | 0.00003 | 0.000023 | 0.0000258 | 0.0000040 | 0.0000031 | 0.0000090 | <0.00002 |
| Dissolved Aluminum (Al) | mg/L | 0.0230 | 0.0703 | 0.0383 | 0.0388 | 0.0548 | 0.0552 | 0.0422 | 0.187 |
| Dissolved Antimony (Sb) | mg/L | 0.000111 | 0.00130 | 0.00388 | 0.0152 | 0.000097 | 0.000089 | 0.000130 | <0.00002 |
| Dissolved Arsenic (As) | mg/L | 0.0153 | 0.366 | 0.940 | 2.94 | 0.0240 | 0.00966 | 0.0429 | 0.000626 |
| Dissolved Barium (Ba) | mg/L | 0.00615 | 0.00641 | 0.00219 | 0.00209 | 0.00947 | 0.0248 | 0.0144 | 0.00433 |
| Dissolved Beryllium (Be) | mg/L | <0.00001 | <0.00001 | <0.00001 | <0.00005 | <0.00001 | <0.00001 | <0.00001 | 0.000076 |
| Dissolved Bismuth (Bi) | mg/L | <0.000005 | <0.000005 | 0.0000136 | <0.000025 | <0.000005 | <0.000005 | <0.000005 | <0.000005 |
| Dissolved Boron (B) | mg/L | <0.01 | <0.01 | <0.01 | <0.05 | 0.014 | <0.01 | <0.01 | <0.01 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000067 | 0.0000265 | 0.0000158 | 0.000076 | 0.0000102 | 0.0000346 | <0.000005 | 0.0000181 |
| Dissolved Chromium (Cr) | mg/L | 0.00014 | 0.00028 | 0.00024 | <0.0005 | 0.00014 | 0.00014 | 0.00019 | 0.00012 |
| Dissolved Cobalt (Co) | mg/L | 0.0000650 | 0.000407 | 0.000145 | 0.00895 | 0.000145 | 0.000493 | 0.0000789 | 0.000154 |
| Dissolved Copper (Cu) | mg/L | 0.000768 | 0.0153 | 0.00206 | 0.00794 | 0.00329 | 0.00474 | 0.00467 | 0.000230 |
| Dissolved Iron (Fe) | mg/L | 0.0219 | 0.135 | 0.214 | 0.0130 | 0.0758 | 0.316 | 0.0946 | 0.0976 |
| Dissolved Lead (Pb) | mg/L | 0.0000186 | 0.000546 | 0.000762 | 0.000040 | 0.000193 | 0.000330 | 0.000178 | 0.000161 |
| Dissolved Lithium (Li) | mg/L | 0.00052 | <0.0005 | <0.0005 | 0.0239 | <0.0005 | <0.0005 | <0.0005 | 0.00101 |
| Dissolved Manganese (Mn) | mg/L | 0.0616 | 0.0180 | 0.00576 | 0.762 | 0.0225 | 0.0784 | 0.00414 | 0.0684 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000450 | 0.000140 | 0.000095 | 0.00046 | 0.000098 | 0.000063 | 0.000100 | <0.00005 |
| Dissolved Nickel (Ni) | mg/L | 0.000506 | 0.00318 | 0.000818 | 0.0472 | 0.000953 | 0.00120 | 0.000718 | 0.000485 |
| Dissolved Selenium (Se) | mg/L | 0.000053 | 0.000081 | 0.000056 | 0.00032 | 0.000057 | 0.000042 | <0.00004 | 0.000047 |
| Dissolved Silicon (Si) | mg/L | 1.24 | 2.04 | 0.313 | 6.67 | 1.48 | 1.83 | 1.68 | 1.25 |
| Dissolved Silver (Ag) | mg/L | <0.000005 | <0.000005 | <0.000005 | <0.000025 | <0.000005 | <0.000005 | <0.000005 | <0.000005 |
| Dissolved Strontium (Sr) | mg/L | 0.0424 | 0.0159 | 0.00255 | 0.138 | 0.0259 | 0.0230 | 0.0181 | 0.00632 |
| Dissolved Thallium (Tl) | mg/L | <0.000002 | 0.0000038 | <0.000002 | <0.00001 | 0.0000027 | 0.0000054 | <0.000002 | 0.0000057 |
| Dissolved Tin (Sn) | mg/L | <0.0002 | <0.0002 | <0.0002 | <0.001 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dissolved Titanium (Ti) | mg/L | <0.0005 | 0.00250 | 0.00144 | <0.0025 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Dissolved Uranium (U) | mg/L | 0.0000610 | 0.0000082 | 0.0000031 | 0.000348 | 0.0000061 | 0.0000084 | 0.0000035 | 0.0000759 |
| Dissolved Vanadium (V) | mg/L | <0.0002 | 0.00031 | 0.00022 | <0.001 | <0.0002 | 0.00056 | <0.0002 | 0.00045 |
| Dissolved Zinc (Zn) | mg/L | 0.00077 | 0.0235 | 0.0100 | 0.0459 | 0.0130 | 0.0217 | 0.0112 | 0.00218 |
| Dissolved Zirconium (Zr) | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Dissolved Calcium (Ca) | mg/L | 9.91 | 5.21 | 1.85 | 83.6 | 6.99 | 5.92 | 4.60 | 0.972 |
| Dissolved Magnesium (Mg) | mg/L | 1.40 | 1.80 | 0.464 | 36.2 | 1.94 | 1.75 | 1.67 | 0.417 |
| Dissolved Potassium (K) | mg/L | 1.36 | 1.41 | 0.874 | 5.11 | 1.04 | 1.22 | 0.752 | 0.257 |
| Dissolved Sodium (Na) | mg/L | 31.2 | 5.08 | 1.28 | 10.7 | 31.0 | 62.9 | 19.5 | 3.89 |
| Dissolved Sulphur (S) | mg/L | 3.87 | 2.56 | 0.60 | 84.6 | 2.75 | 5.86 | 1.77 | 0.87 |

## Montague - Piezometers

| Sample ID | | M-Pz1 | M-Pz1 | M-Pz2 | M-Pz2 | M-Pz3 | M-Pz3 | M-Pz4 | M-Pz4 |
|---|---|---|---|---|---|---|---|---|---|
| **Piezometer Installation Information** | | | | | | | | | |
| Screened Depth (from) | cm | 177 | 47 | 87 | 47 | 167 | 47 | 87 | 47 |
| Screened Depth (to) | cm | 190 | 60 | 100 | 60 | 180 | 60 | 100 | 60 |
| Stick-up Height | cm | 108 | 37.5 | 99.2 | 42.1 | 135 | 47.2 | 131 | 56.4 |
| **Field Data** | | | | | | | | | |
| Field pH | -- | 6.46 | 6.26 | 6 | 6.63 | 6.24 | 6.47 | 6.58 | 6.57 |
| Field EC | uS/cm | 419 | 526 | 545 | 524 | 318 | 603 | 535 | 655 |
| Field Temp | Celsius | 7.4 | 6.5 | 3.9 | 3.8 | 4.5 | 3.4 | 2.9 | 3.9 |
| Latitude | -- | 44.71439897 | 44.71439897 | 44.7149246 | 44.7149246 | 44.71530204 | 44.71530204 | 44.71566296 | 44.71566296 |
| Longitude | -- | -63.52030003 | -63.52030003 | -63.52272031 | -63.52272031 | -63.52343 | -63.52343 | -63.52383401 | -63.52383401 |
| **Lab Results** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 159 | #N/A | 96.9 | 155 | 121 | 234 | 173 | 210 |
| Dissolved Mercury (Hg) | mg/L | 0.000029 | <0.00002 | 0.000238 | <0.00002 | <0.00002 | <0.00002 | 0.000048 | 0.00003 |
| Dissolved Aluminum (Al) | mg/L | <0.025 | #N/A | 0.093 | 0.0162 | 0.0552 | 0.0170 | 0.0373 | 0.0302 |
| Dissolved Antimony (Sb) | mg/L | <0.001 | #N/A | 0.0012 | 0.00221 | 0.000367 | 0.000542 | 0.00164 | 0.00159 |
| Dissolved Arsenic (As) | mg/L | 19.8 | #N/A | 12.5 | 0.985 | 0.0436 | 0.127 | 0.0968 | 0.178 |
| Dissolved Barium (Ba) | mg/L | 0.0391 | #N/A | 0.111 | 0.0379 | 0.0388 | 0.0520 | 0.0167 | 0.0235 |
| Dissolved Beryllium (Be) | mg/L | <0.0005 | #N/A | <0.0005 | <0.00005 | <0.00001 | 0.000035 | <0.00001 | 0.000024 |
| Dissolved Bismuth (Bi) | mg/L | <0.00025 | #N/A | <0.00025 | <0.000025 | <0.000005 | <0.000005 | 0.0000061 | 0.0000063 |
| Dissolved Boron (B) | mg/L | <0.5 | #N/A | <0.5 | 0.144 | 0.034 | 0.029 | 0.297 | 0.253 |
| Dissolved Cadmium (Cd) | mg/L | <0.00025 | #N/A | <0.00025 | <0.000025 | 0.0000057 | <0.000005 | 0.000242 | 0.0000147 |
| Dissolved Chromium (Cr) | mg/L | <0.005 | #N/A | <0.005 | 0.00110 | 0.00916 | 0.00160 | 0.00233 | 0.00271 |
| Dissolved Cobalt (Co) | mg/L | 0.00111 | #N/A | 0.0320 | 0.0159 | 0.00270 | 0.00691 | 0.0207 | 0.0191 |
| Dissolved Copper (Cu) | mg/L | <0.0025 | #N/A | <0.0025 | 0.00027 | 0.000395 | 0.000114 | 0.00211 | 0.000652 |
| Dissolved Iron (Fe) | mg/L | 26.5 | #N/A | 99.7 | 16.6 | 4.77 | 22.3 | 1.45 | 8.58 |
| Dissolved Lead (Pb) | mg/L | <0.00025 | #N/A | 0.00187 | 0.000251 | 0.000343 | 0.000106 | 0.000331 | 0.000485 |
| Dissolved Lithium (Li) | mg/L | <0.025 | #N/A | <0.025 | 0.0033 | <0.0005 | 0.00333 | 0.00739 | 0.00717 |
| Dissolved Manganese (Mn) | mg/L | 2.98 | #N/A | 22.3 | 12.8 | 1.15 | 5.07 | 6.16 | 6.13 |
| Dissolved Molybdenum (Mo) | mg/L | <0.0025 | #N/A | <0.0025 | 0.00301 | 0.00117 | 0.000985 | 0.00294 | 0.00200 |
| Dissolved Nickel (Ni) | mg/L | 0.0132 | #N/A | 0.0320 | 0.0810 | 0.0498 | 0.0296 | 0.124 | 0.0980 |
| Dissolved Selenium (Se) | mg/L | <0.002 | #N/A | <0.002 | <0.0002 | 0.000062 | 0.000117 | 0.000095 | 0.000079 |
| Dissolved Silicon (Si) | mg/L | 7.8 | #N/A | 8.8 | 4.94 | 8.63 | 10.3 | 6.57 | 5.69 |
| Dissolved Silver (Ag) | mg/L | <0.00025 | #N/A | <0.00025 | <0.000025 | 0.0000062 | <0.000005 | <0.000005 | <0.000005 |
| Dissolved Strontium (Sr) | mg/L | 0.138 | #N/A | 0.120 | 0.111 | 0.126 | 0.169 | 0.130 | 0.141 |
| Dissolved Thallium (Tl) | mg/L | <0.0001 | #N/A | <0.0001 | <0.00001 | <0.000002 | <0.000002 | 0.0000130 | 0.0000050 |
| Dissolved Tin (Sn) | mg/L | <0.01 | #N/A | <0.01 | <0.001 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dissolved Titanium (Ti) | mg/L | <0.025 | #N/A | <0.025 | <0.0025 | <0.0005 | 0.00070 | 0.00275 | 0.00052 |
| Dissolved Uranium (U) | mg/L | <0.0001 | #N/A | <0.0001 | 0.000070 | 0.0000158 | 0.0000821 | 0.0000361 | 0.0000570 |
| Dissolved Vanadium (V) | mg/L | <0.01 | #N/A | <0.01 | <0.001 | 0.00028 | <0.0002 | <0.0002 | <0.0002 |
| Dissolved Zinc (Zn) | mg/L | 0.0121 | #N/A | 0.0823 | 0.0357 | 0.0234 | 0.0119 | 0.115 | 0.0948 |
| Dissolved Zirconium (Zr) | mg/L | <0.005 | #N/A | <0.005 | <0.0005 | <0.0001 | 0.00044 | 0.00012 | 0.00022 |
| Dissolved Calcium (Ca) | mg/L | 52.9 | #N/A | 26.0 | 47.8 | 31.2 | 77.8 | 45.1 | 53.1 |
| Dissolved Magnesium (Mg) | mg/L | 6.7 | #N/A | 7.8 | 8.53 | 10.5 | 9.58 | 14.6 | 18.8 |
| Dissolved Potassium (K) | mg/L | 5.1 | #N/A | 12.5 | 11.1 | 3.14 | 4.91 | 10.1 | 9.65 |
| Dissolved Sodium (Na) | mg/L | 7.5 | #N/A | 20.4 | 27.9 | 14.4 | 23.9 | 39.7 | 40.1 |
| Dissolved Sulphur (S) | mg/L | <30.0 | #N/A | <30.0 | 3.1 | <0.6 | 1.49 | 37.0 | 57.4 |

# Appendix C **Porewater Results**

**Montague - Porewater**

| Sample ID | | M-2018-SFC-T2 | M-2018-SFC-T3 | M-2018-SFC-T7 | M-2018-SFC-T9 | M-2018-SFC-12 | M-2018-SFC-13 | M-2018-SFC-T14 | M-2018-SFC-15 |
|---|---|---|---|---|---|---|---|---|---|
| **Sample Coordinates** | | | | | | | | | |
| Latitude | | 44.71451799 | 44.714519 | 44.71482201 | 44.71497003 | 44.71569004 | 44.71596303 | 44.71620401 | 44.71645396 |
| Longitude | | -63.52071804 | -63.52106103 | -63.52244597 | -63.52319397 | -63.52379797 | -63.52366403 | -63.52349496 | -63.52324401 |
| **EcoMetrix Porewater Test Data** | | | | | | | | | |
| Mass Sample (wet weight) | g-wet | 286.48 | 295.57 | 286.40 | 300.14 | 298.50 | 276.47 | 295.02 | 295.75 |
| Mass Water Added | g | 286.17 | 293.83 | 285.68 | 302.24 | 300.53 | 276.21 | 295.73 | 297.40 |
| Water-to-Solids Ratio | - | 1.00 | 0.99 | 1.00 | 1.01 | 1.01 | 1.00 | 1.00 | 1.01 |
| Lab pH | - | 6.50 | 5.72 | 5.50 | 5.43 | 5.77 | 6.20 | 5.71 | 5.97 |
| Lab Electrical Conductivity | µS/cm | 165.70 | 139.70 | 445.00 | 371.10 | 487.20 | 746.60 | 325.90 | 452.00 |
| Environmental Moisture Content | % | 34.2% | 29.6% | 40.1% | 50.7% | 36.8% | 34.8% | 35.4% | 29.8% |
| PW Volume | mL (g) | 97.98 | 87.49 | 114.85 | 152.17 | 109.85 | 96.21 | 104.44 | 88.13 |
| Total Water Mass | g | 384.15 | 381.32 | 400.53 | 454.41 | 410.38 | 372.42 | 400.17 | 385.53 |
| Total Water Volume | L | 0.384 | 0.381 | 0.401 | 0.454 | 0.410 | 0.372 | 0.400 | 0.386 |
| Sample Solids Mass (dry weight) | g | 188.50 | 208.08 | 171.55 | 147.97 | 188.65 | 180.26 | 190.58 | 207.62 |
| **Lab-Measured Constituent Concentration (mg/L)** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | <5.0 | <6.3 | 5 | 32 | 8.4 | <5.0 | <5.0 | <5.0 |
| Total Cyanide (CN) | mg/L | | | | | | | | |
| WAD Cyanide (Free) | mg/L | | | | | | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | | | | | | |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | µg/L | 0.48 | 0.57 | 0.72 | 0.05 | 0.16 | 0.33 | 0.3 | 0.72 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 46.3 | 32.6 | 110 | 86.6 | 130 | 275 | 104 | 172 |

**Montague - Porewater**

| Sample ID | | M-2018-SFC-T2 | M-2018-SFC-T3 | M-2018-SFC-T7 | M-2018-SFC-T9 | M-2018-SFC-12 | M-2018-SFC-13 | M-2018-SFC-T14 | M-2018-SFC-15 |
|---|---|---|---|---|---|---|---|---|---|
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.366 | 0.41 | 0.119 | 0.482 | 0.085 | 0.0413 | 0.171 | 0.125 |
| Dissolved Antimony (Sb) | mg/L | 0.00945 | 0.00669 | 0.0147 | 0.00855 | 0.0101 | 0.0131 | 0.00907 | 0.0196 |
| Dissolved Arsenic (As) | mg/L | 1.49 | 2.8 | 1.76 | 0.45 | 0.47 | 1.66 | 1.16 | 1.46 |
| Dissolved Barium (Ba) | mg/L | 0.0169 | 0.00219 | 0.000571 | 0.0502 | 0.0236 | 0.0183 | 0.0107 | 0.0164 |
| Dissolved Beryllium (Be) | mg/L | 0.000022 | 0.000023 | <0.00002 | 0.00007 | <0.00005 | <0.00005 | <0.00002 | <0.00002 |
| Dissolved Bismuth (Bi) | mg/L | 0.000181 | 0.000322 | 0.000063 | 0.000066 | 0.000029 | 0.000033 | 0.00006 | 0.000034 |
| Dissolved Boron (B) | mg/L | <0.02 | <0.02 | <0.02 | <0.01 | <0.05 | <0.05 | <0.02 | <0.02 |
| Dissolved Cadmium (Cd) | mg/L | 0.000058 | 0.000262 | 0.000376 | 0.000299 | 0.000348 | <0.000025 | 0.000184 | 0.000087 |
| Dissolved Chromium (Cr) | mg/L | 0.00062 | 0.00064 | 0.00021 | 0.00043 | <0.0005 | <0.0005 | 0.00029 | 0.00026 |
| Dissolved Cobalt (Co) | mg/L | 0.01 | 0.0138 | 0.0204 | 0.0329 | 0.0318 | 0.0557 | 0.0298 | 0.031 |
| Dissolved Copper (Cu) | mg/L | 0.00629 | 0.0196 | 0.00701 | 0.00671 | 0.00122 | 0.0008 | 0.00185 | 0.00168 |
| Dissolved Iron (Fe) | mg/L | 0.834 | 1.68 | 0.224 | 0.351 | 0.0939 | 0.225 | 0.338 | 0.148 |
| Dissolved Lead (Pb) | mg/L | 0.00655 | 0.0114 | 0.00336 | 0.00452 | 0.00264 | 0.00255 | 0.00379 | 0.00171 |
| Dissolved Lithium (Li) | mg/L | 0.0027 | 0.0024 | 0.0037 | 0.0023 | 0.0026 | 0.0042 | 0.0032 | 0.0068 |
| Dissolved Manganese (Mn) | mg/L | 2.49 | 2.42 | 6.46 | 5.44 | 18.7 | 17.4 | 4.06 | 3.17 |
| Dissolved Molybdenum (Mo) | mg/L | 0.0006 | 0.00011 | 0.00013 | 0.000192 | <0.00025 | 0.00045 | 0.00011 | 0.0004 |
| Dissolved Nickel (Ni) | mg/L | 0.0276 | 0.0234 | 0.0793 | 0.0361 | 0.0855 | 0.0602 | 0.0352 | 0.087 |
| Dissolved Selenium (Se) | mg/L | 0.000102 | 0.000105 | 0.000253 | 0.000176 | <0.0002 | <0.0002 | 0.000097 | 0.000203 |
| Dissolved Silicon (Si) | mg/L | 1.41 | 1.42 | 1.37 | 1.78 | 2.03 | 1.67 | 1.17 | 2.1 |
| Dissolved Silver (Ag) | mg/L | <0.00001 | 0.000022 | 0.000019 | 0.0000237 | <0.000025 | <0.000025 | <0.00001 | 0.000012 |
| Dissolved Strontium (Sr) | mg/L | 0.0421 | 0.0316 | 0.132 | 0.0913 | 0.0978 | 0.142 | 0.0566 | 0.0887 |
| Dissolved Thallium (Tl) | mg/L | 0.0000201 | 0.000035 | 0.0000218 | 0.0000485 | 0.00005 | 0.00002 | 0.0000445 | 0.000026 |
| Dissolved Tin (Sn) | mg/L | <0.0004 | <0.0004 | <0.0004 | <0.0002 | <0.001 | <0.001 | <0.0004 | <0.0004 |
| Dissolved Titanium (Ti) | mg/L | 0.0116 | 0.013 | 0.003 | 0.00351 | <0.0025 | <0.0025 | 0.0053 | 0.0027 |
| Dissolved Uranium (U) | mg/L | 0.0000768 | 0.0000545 | 0.0000114 | 0.0000465 | 0.000013 | 0.000026 | 0.0000216 | 0.0000328 |
| Dissolved Vanadium (V) | mg/L | 0.00068 | 0.00104 | <0.0004 | 0.0051 | <0.001 | <0.001 | 0.00049 | 0.00062 |
| Dissolved Zinc (Zn) | mg/L | 0.0186 | 0.0454 | 0.122 | 0.136 | 0.17 | 0.0363 | 0.051 | 0.075 |
| Dissolved Zirconium (Zr) | mg/L | 0.00057 | 0.00054 | 0.00023 | 0.00016 | <0.0005 | <0.0005 | 0.00034 | 0.00027 |
| Dissolved Calcium (Ca) | mg/L | 11.9 | 8.75 | 29.8 | 25 | 33.3 | 61.3 | 22.8 | 40.4 |
| Dissolved Magnesium (Mg) | mg/L | 4.04 | 2.6 | 8.62 | 5.86 | 11.5 | 29.5 | 11.5 | 17.3 |
| Dissolved Potassium (K) | mg/L | 5.94 | 4.59 | 7.49 | 3.07 | 3.86 | 9.49 | 4.25 | 7.67 |
| Dissolved Sodium (Na) | mg/L | 3.35 | 4.37 | 22.8 | 24.5 | 17.8 | 16 | 6.78 | 2.97 |
| Dissolved Sulphur (S) | mg/L | 13.3 | 14.2 | 53.7 | 42.7 | 58.6 | 109 | 40.5 | 62.7 |
| Dissolved Sulphate (SO4) | mg/L | 39.9 | 42.6 | 161.1 | 128.1 | 175.8 | 327 | 121.5 | 188.1 |

**Montague - Porewater**

| Sample ID | | M-2018-SFC-T2 | M-2018-SFC-T3 | M-2018-SFC-T7 | M-2018-SFC-T9 | M-2018-SFC-12 | M-2018-SFC-13 | M-2018-SFC-T14 | M-2018-SFC-15 |
|---|---|---|---|---|---|---|---|---|---|
| **Porewater Concentrations ($mg/L_{PW}$)** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/Lpw | 19.60 | 27.46 | 17.44 | 95.56 | 31.38 | 19.35 | 19.16 | 21.87 |
| Total Cyanide (CN) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| WAD Cyanide (Free) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Alkalinity (Total as CaCO3) | mg/Lpw | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | mg/Lpw | 0.0019 | 0.0025 | 0.0025 | 0.0001 | 0.0006 | 0.0013 | 0.0011 | 0.0031 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/Lpw | 181.53 | 142.09 | 383.62 | 258.60 | 485.66 | 1064.49 | 398.49 | 752.40 |
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/Lpw | 1.4350 | 1.7870 | 0.4150 | 1.4393 | 0.3175 | 0.1599 | 0.6552 | 0.5468 |
| Dissolved Antimony (Sb) | mg/Lpw | 0.0371 | 0.0292 | 0.0513 | 0.0255 | 0.0377 | 0.0507 | 0.0348 | 0.0857 |
| Dissolved Arsenic (As) | mg/Lpw | 5.8420 | 12.2038 | 6.1380 | 1.3438 | 1.7559 | 6.4256 | 4.4447 | 6.3867 |
| Dissolved Barium (Ba) | mg/Lpw | 0.0663 | 0.0095 | 0.0020 | 0.1499 | 0.0882 | 0.0708 | 0.0410 | 0.0717 |
| Dissolved Beryllium (Be) | mg/Lpw | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0001 |
| Dissolved Bismuth (Bi) | mg/Lpw | 0.0007 | 0.0014 | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0002 | 0.0001 |
| Dissolved Boron (B) | mg/Lpw | 0.0784 | 0.0872 | 0.0697 | 0.0299 | 0.1868 | 0.1935 | 0.0766 | 0.0875 |
| Dissolved Cadmium (Cd) | mg/Lpw | 0.0002 | 0.0011 | 0.0013 | 0.0009 | 0.0013 | 0.0001 | 0.0007 | 0.0004 |
| Dissolved Chromium (Cr) | mg/Lpw | 0.0024 | 0.0028 | 0.0007 | 0.0013 | 0.0019 | 0.0019 | 0.0011 | 0.0011 |
| Dissolved Cobalt (Co) | mg/Lpw | 0.0392 | 0.0601 | 0.0711 | 0.0982 | 0.1188 | 0.2156 | 0.1142 | 0.1356 |
| Dissolved Copper (Cu) | mg/Lpw | 0.0247 | 0.0854 | 0.0244 | 0.0200 | 0.0046 | 0.0031 | 0.0071 | 0.0073 |
| Dissolved Iron (Fe) | mg/Lpw | 3.2700 | 7.3223 | 0.7812 | 1.0482 | 0.3508 | 0.8709 | 1.2951 | 0.6474 |
| Dissolved Lead (Pb) | mg/Lpw | 0.0257 | 0.0497 | 0.0117 | 0.0135 | 0.0099 | 0.0099 | 0.0145 | 0.0075 |
| Dissolved Lithium (Li) | mg/Lpw | 0.0106 | 0.0105 | 0.0129 | 0.0069 | 0.0097 | 0.0163 | 0.0123 | 0.0297 |
| Dissolved Manganese (Mn) | mg/Lpw | 9.7628 | 10.5475 | 22.5292 | 16.2449 | 69.8608 | 67.3530 | 15.5565 | 13.8669 |
| Dissolved Molybdenum (Mo) | mg/Lpw | 0.0024 | 0.0005 | 0.0005 | 0.0006 | 0.0009 | 0.0017 | 0.0004 | 0.0017 |
| Dissolved Nickel (Ni) | mg/Lpw | 0.1082 | 0.1020 | 0.2766 | 0.1078 | 0.3194 | 0.2330 | 0.1349 | 0.3806 |
| Dissolved Selenium (Se) | mg/Lpw | 0.0004 | 0.0005 | 0.0009 | 0.0005 | 0.0007 | 0.0008 | 0.0004 | 0.0009 |
| Dissolved Silicon (Si) | mg/Lpw | 5.5283 | 6.1891 | 4.7779 | 5.3154 | 7.5838 | 6.4643 | 4.4830 | 9.1863 |
| Dissolved Silver (Ag) | mg/Lpw | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0001 |
| Dissolved Strontium (Sr) | mg/Lpw | 0.1651 | 0.1377 | 0.4603 | 0.2726 | 0.3654 | 0.5497 | 0.2169 | 0.3880 |
| Dissolved Thallium (Tl) | mg/Lpw | 0.0001 | 0.0002 | 0.0001 | 0.0001 | 0.0002 | 0.0001 | 0.0002 | 0.0001 |
| Dissolved Tin (Sn) | mg/Lpw | 0.0016 | 0.0017 | 0.0014 | 0.0006 | 0.0037 | 0.0039 | 0.0015 | 0.0017 |
| Dissolved Titanium (Ti) | mg/Lpw | 0.0455 | 0.0567 | 0.0105 | 0.0105 | 0.0093 | 0.0097 | 0.0203 | 0.0118 |
| Dissolved Uranium (U) | mg/Lpw | 0.0003 | 0.0002 | 0.0000 | 0.0001 | 0.0000 | 0.0001 | 0.0001 | 0.0001 |
| Dissolved Vanadium (V) | mg/Lpw | 0.0027 | 0.0045 | 0.0014 | 0.0152 | 0.0037 | 0.0039 | 0.0019 | 0.0027 |
| Dissolved Zinc (Zn) | mg/Lpw | 0.0729 | 0.1979 | 0.4255 | 0.4061 | 0.6351 | 0.1405 | 0.1954 | 0.3281 |
| Dissolved Zirconium (Zr) | mg/Lpw | 0.0022 | 0.0024 | 0.0008 | 0.0005 | 0.0019 | 0.0019 | 0.0013 | 0.0012 |
| Dissolved Calcium (Ca) | mg/Lpw | 46.66 | 38.14 | 103.93 | 74.65 | 124.40 | 237.28 | 87.36 | 176.73 |
| Dissolved Magnesium (Mg) | mg/Lpw | 15.84 | 11.33 | 30.06 | 17.50 | 42.96 | 114.19 | 44.06 | 75.68 |
| Dissolved Potassium (K) | mg/Lpw | 23.29 | 20.01 | 26.12 | 9.17 | 14.42 | 36.73 | 16.28 | 33.55 |
| Dissolved Sodium (Na) | mg/Lpw | 13.13 | 19.05 | 79.51 | 73.16 | 66.50 | 61.93 | 25.98 | 12.99 |
| Dissolved Sulphur (S) | mg/Lpw | 52.15 | 61.89 | 187.28 | 127.51 | 218.92 | 421.92 | 155.18 | 274.28 |
| Dissolved Sulphate (SO4) | mg/Lpw | 156.44 | 185.67 | 561.84 | 382.53 | 656.77 | 1265.77 | 465.55 | 822.83 |

**Montague - Porewater**

| Sample ID | | M-2018-SFC-T17 | M-2018-SFC-T20 | M-2018-SFC-T23 | M-2018-SFC-T25 | M-2018-SFC-T26 | M-2018-SFC-T27 | M-2018-SFC-T28A | M-2018-SFC-T30 |
|---|---|---|---|---|---|---|---|---|---|
| **Sample Coordinates** | | | | | | | | | |
| Latitude | | 44.71439503 | 44.71501697 | 44.71493499 | 44.71533598 | 44.71511303 | 44.71512602 | 44.71537597 | 44.715827 |
| Longitude | | -63.51999301 | -63.520466 | -63.52090797 | -63.521287 | -63.52178799 | -63.52199896 | -63.52199301 | -63.522236 |
| **EcoMetrix Porewater Test Data** | | | | | | | | | |
| Mass Sample (wet weight) | g-wet | 301.94 | 302.10 | 299.65 | 298.32 | 295.81 | 218.05 | 185.39 | 301.73 |
| Mass Water Added | g | 303.60 | 304.68 | 299.91 | 298.98 | 297.82 | 218.20 | 184.26 | 313.75 |
| Water-to-Solids Ratio | - | 1.01 | 1.01 | 1.00 | 1.00 | 1.01 | 1.00 | 0.99 | 1.04 |
| Lab pH | - | 5.10 | 7.29 | 7.49 | 6.58 | 4.31 | 2.96 | 3.13 | 7.45 |
| Lab Electrical Conductivity | µS/cm | 73.06 | 37.04 | 67.73 | 108.60 | 46.29 | 595.40 | 435.10 | 114.40 |
| Environmental Moisture Content | % | 19.4% | 16.5% | 18.2% | 26.9% | 22.5% | 22.6% | 14.8% | 21.1% |
| PW Volume | mL (g) | 58.58 | 49.85 | 54.54 | 80.25 | 66.56 | 49.28 | 27.44 | 63.67 |
| Total Water Mass | g | 362.18 | 354.53 | 354.45 | 379.23 | 364.38 | 267.48 | 211.70 | 377.42 |
| Total Water Volume | L | 0.362 | 0.355 | 0.354 | 0.379 | 0.364 | 0.267 | 0.212 | 0.377 |
| Sample Solids Mass (dry weight) | g | 243.36 | 252.25 | 245.11 | 218.07 | 229.25 | 168.77 | 157.95 | 238.06 |
| **Lab-Measured Constituent Concentration** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | <5.0 | | | | 6.6 | 110 | 53 | |
| Total Cyanide (CN) | mg/L | | | | | | | | |
| WAD Cyanide (Free) | mg/L | | | | | | | | |
| Alkalinity (Total as CaCO3) | mg/L | | 11 | 25 | 6.3 | | | | 22 |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | µg/L | 0.24 | 0.53 | 0.62 | 0.94 | <0.01 | 0.01 | 0.02 | 0.06 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 13.5 | 11.3 | 18.9 | 22.9 | 4.76 | 17.2 | 24.1 | 38.3 |

**Montague - Porewater**

| Sample ID | | M-2018-SFC-T17 | M-2018-SFC-T20 | M-2018-SFC-T23 | M-2018-SFC-T25 | M-2018-SFC-T26 | M-2018-SFC-T27 | M-2018-SFC-T28A | M-2018-SFC-T30 |
|---|---|---|---|---|---|---|---|---|---|
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.016 | 0.16 | 0.0943 | 0.424 | 0.0856 | 8.11 | 1.69 | 0.0508 |
| Dissolved Antimony (Sb) | mg/L | 0.00541 | 0.00186 | 0.0145 | 0.0053 | 0.00258 | 0.00173 | 0.00244 | 0.0114 |
| Dissolved Arsenic (As) | mg/L | 0.0757 | 1.48 | 2.93 | 1.61 | 0.131 | 0.386 | 0.416 | 0.955 |
| Dissolved Barium (Ba) | mg/L | 0.000256 | 0.00177 | 0.00124 | 0.00484 | 0.00317 | 0.000203 | 0.00368 | 0.000463 |
| Dissolved Beryllium (Be) | mg/L | <0.00001 | <0.00005 | <0.00005 | <0.00005 | 0.000013 | 0.000136 | 0.000075 | <0.00002 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000173 | 0.000147 | 0.000055 | 0.000221 | <0.000005 | <0.000005 | <0.000005 | 0.000018 |
| Dissolved Boron (B) | mg/L | 0.01 | <0.05 | <0.05 | <0.05 | <0.01 | <0.01 | <0.01 | <0.02 |
| Dissolved Cadmium (Cd) | mg/L | 0.000107 | <0.000025 | <0.000025 | 0.000036 | 0.0000424 | 0.000168 | 0.000298 | <0.00001 |
| Dissolved Chromium (Cr) | mg/L | 0.00024 | 0.00076 | 0.00067 | 0.00118 | 0.00014 | 0.00132 | 0.00024 | 0.00047 |
| Dissolved Cobalt (Co) | mg/L | 0.0144 | 0.00116 | 0.000324 | 0.00193 | 0.00396 | 0.0168 | 0.0126 | 0.000402 |
| Dissolved Copper (Cu) | mg/L | 0.0168 | 0.00893 | 0.00382 | 0.0125 | 0.0162 | 0.184 | 0.141 | 0.00212 |
| Dissolved Iron (Fe) | mg/L | 0.0984 | 0.906 | 0.432 | 1.83 | 0.0326 | 0.744 | 0.233 | 0.0987 |
| Dissolved Lead (Pb) | mg/L | 0.000907 | 0.00362 | 0.00167 | 0.00949 | 0.000113 | 0.00126 | 0.000925 | 0.000585 |
| Dissolved Lithium (Li) | mg/L | 0.00606 | <0.0025 | <0.0025 | 0.0038 | 0.00225 | 0.00965 | 0.00396 | 0.0051 |
| Dissolved Manganese (Mn) | mg/L | 0.162 | 0.0217 | 0.00943 | 0.121 | 0.0916 | 0.508 | 0.922 | 0.00983 |
| Dissolved Molybdenum (Mo) | mg/L | <0.00005 | <0.00025 | 0.00033 | <0.00025 | <0.00005 | <0.00005 | <0.00005 | 0.0004 |
| Dissolved Nickel (Ni) | mg/L | 0.0183 | 0.00287 | 0.00201 | 0.00634 | 0.00582 | 0.0424 | 0.0259 | 0.00143 |
| Dissolved Selenium (Se) | mg/L | 0.000063 | <0.0002 | 0.00027 | <0.0002 | 0.000048 | 0.000556 | 0.000569 | 0.000263 |
| Dissolved Silicon (Si) | mg/L | 0.975 | 0.4 | 0.51 | 1.12 | 1.29 | 4.2 | 2.95 | 0.62 |
| Dissolved Silver (Ag) | mg/L | <0.000005 | <0.000025 | <0.000025 | <0.000025 | <0.000005 | <0.000005 | <0.000005 | <0.00001 |
| Dissolved Strontium (Sr) | mg/L | 0.0112 | 0.00995 | 0.00463 | 0.0135 | 0.00482 | 0.0124 | 0.0236 | 0.0151 |
| Dissolved Thallium (Tl) | mg/L | 0.000011 | <0.00001 | <0.00001 | <0.00001 | 0.0000069 | 0.000042 | 0.000046 | 0.0000051 |
| Dissolved Tin (Sn) | mg/L | <0.0002 | <0.001 | <0.001 | <0.001 | <0.0002 | <0.0002 | <0.0002 | <0.0004 |
| Dissolved Titanium (Ti) | mg/L | 0.00075 | 0.0075 | <0.0025 | 0.0119 | <0.0005 | 0.00113 | <0.0005 | <0.001 |
| Dissolved Uranium (U) | mg/L | 0.0000021 | 0.000024 | <0.00001 | 0.000047 | 0.0000051 | 0.0000723 | 0.0000309 | 0.000004 |
| Dissolved Vanadium (V) | mg/L | <0.0002 | <0.001 | <0.001 | <0.001 | <0.0002 | 0.00026 | <0.0002 | <0.0004 |
| Dissolved Zinc (Zn) | mg/L | 0.0807 | 0.0199 | 0.00967 | 0.0164 | 0.0202 | 0.265 | 0.129 | 0.00571 |
| Dissolved Zirconium (Zr) | mg/L | <0.0001 | <0.0005 | <0.0005 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0002 |
| Dissolved Calcium (Ca) | mg/L | 3.88 | 2.51 | 3.43 | 5.42 | 0.98 | 3.26 | 6.57 | 7.84 |
| Dissolved Magnesium (Mg) | mg/L | 0.918 | 1.21 | 2.51 | 2.28 | 0.563 | 2.21 | 1.87 | 4.55 |
| Dissolved Potassium (K) | mg/L | 1.73 | 2.37 | 3.11 | 3.62 | 0.874 | 2.16 | 1.11 | 2.75 |
| Dissolved Sodium (Na) | mg/L | 4.03 | 0.94 | 3.28 | 6.63 | 1.44 | 1.13 | 3.06 | 1.71 |
| Dissolved Sulphur (S) | mg/L | 7.09 | <3.0 | <3.0 | 8.7 | 3.05 | 38.3 | 21.6 | 8.5 |
| Dissolved Sulphate (SO4) | mg/L | 21.27 | <9.0 | <9.0 | 26.1 | 9.15 | 114.9 | 64.8 | 25.5 |

**Montague - Porewater**

| Sample ID | | M-2018-SFC-T17 | M-2018-SFC-T20 | M-2018-SFC-T23 | M-2018-SFC-T25 | M-2018-SFC-T26 | M-2018-SFC-T27 | M-2018-SFC-T28A | M-2018-SFC-T30 |
|---|---|---|---|---|---|---|---|---|---|
| **Porewater Concentrations ($mg/L_{PW}$)** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/Lpw | 30.91 | 0.00 | 0.00 | 0.00 | 36.13 | 597.06 | 408.93 | 0.00 |
| Total Cyanide (CN) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| WAD Cyanide (Free) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Alkalinity (Total as CaCO3) | mg/Lpw | 0.00 | 78.24 | 162.48 | 29.77 | 0.00 | 0.00 | 0.00 | 130.42 |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | mg/Lpw | 0.0015 | 0.0038 | 0.0040 | 0.0044 | 0.0001 | 0.0001 | 0.0002 | 0.0004 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/Lpw | 83.47 | 80.37 | 122.84 | 108.22 | 26.06 | 93.36 | 185.95 | 227.05 |
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/Lpw | 0.0989 | 1.1380 | 0.6129 | 2.0037 | 0.4686 | 44.0196 | 13.0393 | 0.3011 |
| Dissolved Antimony (Sb) | mg/Lpw | 0.0334 | 0.0132 | 0.0942 | 0.0250 | 0.0141 | 0.0094 | 0.0188 | 0.0676 |
| Dissolved Arsenic (As) | mg/Lpw | 0.4681 | 10.5263 | 19.0429 | 7.6084 | 0.7172 | 2.0951 | 3.2097 | 5.6614 |
| Dissolved Barium (Ba) | mg/Lpw | 0.0016 | 0.0126 | 0.0081 | 0.0229 | 0.0174 | 0.0011 | 0.0284 | 0.0027 |
| Dissolved Beryllium (Be) | mg/Lpw | 0.0001 | 0.0004 | 0.0003 | 0.0002 | 0.0001 | 0.0007 | 0.0006 | 0.0001 |
| Dissolved Bismuth (Bi) | mg/Lpw | 0.0001 | 0.0010 | 0.0004 | 0.0010 | 0.0000 | 0.0000 | 0.0000 | 0.0001 |
| Dissolved Boron (B) | mg/Lpw | 0.0618 | 0.3556 | 0.3250 | 0.2363 | 0.0547 | 0.0543 | 0.0772 | 0.1186 |
| Dissolved Cadmium (Cd) | mg/Lpw | 0.0007 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0009 | 0.0023 | 0.0001 |
| Dissolved Chromium (Cr) | mg/Lpw | 0.0015 | 0.0054 | 0.0044 | 0.0056 | 0.0008 | 0.0072 | 0.0019 | 0.0028 |
| Dissolved Cobalt (Co) | mg/Lpw | 0.0890 | 0.0083 | 0.0021 | 0.0091 | 0.0217 | 0.0912 | 0.0972 | 0.0024 |
| Dissolved Copper (Cu) | mg/Lpw | 0.1039 | 0.0635 | 0.0248 | 0.0591 | 0.0887 | 0.9987 | 1.0879 | 0.0126 |
| Dissolved Iron (Fe) | mg/Lpw | 0.6084 | 6.4438 | 2.8077 | 8.6480 | 0.1785 | 4.0383 | 1.7977 | 0.5851 |
| Dissolved Lead (Pb) | mg/Lpw | 0.0056 | 0.0257 | 0.0109 | 0.0448 | 0.0006 | 0.0068 | 0.0071 | 0.0035 |
| Dissolved Lithium (Li) | mg/Lpw | 0.0375 | 0.0178 | 0.0162 | 0.0180 | 0.0123 | 0.0524 | 0.0306 | 0.0302 |
| Dissolved Manganese (Mn) | mg/Lpw | 1.0016 | 0.1543 | 0.0613 | 0.5718 | 0.5015 | 2.7573 | 7.1138 | 0.0583 |
| Dissolved Molybdenum (Mo) | mg/Lpw | 0.0003 | 0.0018 | 0.0021 | 0.0012 | 0.0003 | 0.0003 | 0.0004 | 0.0024 |
| Dissolved Nickel (Ni) | mg/Lpw | 0.1131 | 0.0204 | 0.0131 | 0.0300 | 0.0319 | 0.2301 | 0.1998 | 0.0085 |
| Dissolved Selenium (Se) | mg/Lpw | 0.0004 | 0.0014 | 0.0018 | 0.0009 | 0.0003 | 0.0030 | 0.0044 | 0.0016 |
| Dissolved Silicon (Si) | mg/Lpw | 6.0284 | 2.8449 | 3.3146 | 5.2928 | 7.0623 | 22.7969 | 22.7609 | 3.6754 |
| Dissolved Silver (Ag) | mg/Lpw | 0.0000 | 0.0002 | 0.0002 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0001 |
| Dissolved Strontium (Sr) | mg/Lpw | 0.0692 | 0.0708 | 0.0301 | 0.0638 | 0.0264 | 0.0673 | 0.1821 | 0.0895 |
| Dissolved Thallium (Tl) | mg/Lpw | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0000 | 0.0002 | 0.0004 | 0.0000 |
| Dissolved Tin (Sn) | mg/Lpw | 0.0012 | 0.0071 | 0.0065 | 0.0047 | 0.0011 | 0.0011 | 0.0015 | 0.0024 |
| Dissolved Titanium (Ti) | mg/Lpw | 0.0046 | 0.0533 | 0.0162 | 0.0562 | 0.0027 | 0.0061 | 0.0039 | 0.0059 |
| Dissolved Uranium (U) | mg/Lpw | 0.0000 | 0.0002 | 0.0001 | 0.0002 | 0.0000 | 0.0004 | 0.0002 | 0.0000 |
| Dissolved Vanadium (V) | mg/Lpw | 0.0012 | 0.0071 | 0.0065 | 0.0047 | 0.0011 | 0.0014 | 0.0015 | 0.0024 |
| Dissolved Zinc (Zn) | mg/Lpw | 0.4990 | 0.1415 | 0.0628 | 0.0775 | 0.1106 | 1.4384 | 0.9953 | 0.0338 |
| Dissolved Zirconium (Zr) | mg/Lpw | 0.0006 | 0.0036 | 0.0032 | 0.0024 | 0.0005 | 0.0005 | 0.0008 | 0.0012 |
| Dissolved Calcium (Ca) | mg/Lpw | 23.99 | 17.85 | 22.29 | 25.61 | 5.37 | 17.69 | 50.69 | 46.48 |
| Dissolved Magnesium (Mg) | mg/Lpw | 5.68 | 8.61 | 16.31 | 10.77 | 3.08 | 12.00 | 14.43 | 26.97 |
| Dissolved Potassium (K) | mg/Lpw | 10.70 | 16.86 | 20.21 | 17.11 | 4.78 | 11.72 | 8.56 | 16.30 |
| Dissolved Sodium (Na) | mg/Lpw | 24.92 | 6.69 | 21.32 | 31.33 | 7.88 | 6.13 | 23.61 | 10.14 |
| Dissolved Sulphur (S) | mg/Lpw | 43.84 | 21.34 | 19.50 | 41.11 | 16.70 | 207.89 | 166.66 | 50.39 |
| Dissolved Sulphate (SO4) | mg/Lpw | 131.51 | 64.01 | 58.49 | 123.34 | 50.09 | 623.66 | 499.97 | 151.17 |

**Montague - Porewater**

| Sample ID | | M-2018-SFC-T32 | M-2018-SFC-T35 | M-2018-SFC OLD MILL | M-2018-C1 (0-5cm) | M-2018-C1 (10-20cm) | M-2018-C1 (40-60cm) | M-2018-C1 (140-160cm) | M-2018-C1 (180-200cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Sample Coordinates** | | | | | | | | | |
| Latitude | | 44.71602598 | 44.71552198 | 44.71973422 | 44.71439897 | 44.71439897 | 44.71439897 | 44.71439897 | 44.71439897 |
| Longitude | | -63.52315902 | -63.52260003 | -63.50905588 | -63.52030003 | -63.52030003 | -63.52030003 | -63.52030003 | -63.52030003 |
| **EcoMetrix Porewater Test Data** | | | | | | | | | |
| Mass Sample (wet weight) | g-wet | 300.20 | 299.70 | 301.45 | 300.85 | 301.05 | 299.26 | 299.91 | 302.24 |
| Mass Water Added | g | 299.90 | 303.15 | 300.35 | 304.29 | 301.04 | 300.54 | 303.97 | 302.84 |
| Water-to-Solids Ratio | - | 1.00 | 1.01 | 1.00 | 1.01 | 1.00 | 1.00 | 1.01 | 1.00 |
| Lab pH | - | 5.69 | 7.04 | 5.84 | 6.79 | 5.54 | 6.45 | 6.88 | 6.40 |
| Lab Electrical Conductivity | µS/cm | 1140.00 | 289.40 | 24.20 | 179.90 | 71.94 | 224.80 | 180.00 | 220.80 |
| Environmental Moisture Content | % | 21.6% | 19.0% | 24.6% | 63.4% | 26.4% | 27.0% | 18.7% | 29.1% |
| PW Volume | mL (g) | 64.84 | 56.94 | 74.16 | 190.74 | 79.48 | 80.80 | 56.08 | 87.95 |
| Total Water Mass | g | 364.74 | 360.09 | 374.51 | 495.03 | 380.52 | 381.34 | 360.05 | 390.79 |
| Total Water Volume | L | 0.365 | 0.360 | 0.375 | 0.495 | 0.381 | 0.381 | 0.360 | 0.391 |
| Sample Solids Mass (dry weight) | g | 235.36 | 242.76 | 227.29 | 110.11 | 221.57 | 218.46 | 243.83 | 214.29 |
| **Lab-Measured Constituent Concentration** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | 8.4 | | 11 | | <5.0 | <6.3 | | <5.0 |
| Total Cyanide (CN) | mg/L | | | | | | | | |
| WAD Cyanide (Free) | mg/L | | | | | | | | |
| Alkalinity (Total as CaCO3) | mg/L | | 9.5 | | 56 | | | 12 | |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | µg/L | 0.03 | 0.11 | 130 | 0.22 | 0.12 | 0.16 | 3.5 | 1.91 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 506 | 106 | 3.78 | 52.4 | 15.5 | 77.3 | 60.7 | 74.7 |

**Montague - Porewater**

| Sample ID | | M-2018-SFC-T32 | M-2018-SFC-T35 | M-2018-SFC OLD MILL | M-2018-C1 (0-5cm) | M-2018-C1 (10-20cm) | M-2018-C1 (40-60cm) | M-2018-C1 (140-160cm) | M-2018-C1 (180-200cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0146 | 0.0634 | 1.21 | 0.0513 | 0.0381 | 0.102 | 0.134 | 0.0962 |
| Dissolved Antimony (Sb) | mg/L | 0.0269 | 0.003 | 0.00433 | 0.00264 | 0.00738 | 0.0293 | 0.00572 | 0.00496 |
| Dissolved Arsenic (As) | mg/L | 0.87 | 0.523 | 2.13 | 4.39 | 0.754 | 0.395 | 0.19 | 0.0788 |
| Dissolved Barium (Ba) | mg/L | 0.003 | 0.000839 | 0.0117 | 0.0331 | 0.0145 | 0.0176 | 0.0222 | 0.0352 |
| Dissolved Beryllium (Be) | mg/L | <0.00002 | <0.00001 | <0.00005 | <0.00005 | <0.00001 | <0.00001 | <0.00001 | <0.00001 |
| Dissolved Bismuth (Bi) | mg/L | <0.00001 | 0.0000272 | 0.000542 | <0.000025 | 0.000116 | 0.0000892 | 0.000189 | 0.0000631 |
| Dissolved Boron (B) | mg/L | <0.02 | <0.01 | <0.05 | <0.05 | <0.01 | <0.01 | <0.01 | 0.013 |
| Dissolved Cadmium (Cd) | mg/L | 0.000311 | 0.0000096 | 0.000154 | 0.000265 | 0.000218 | 0.0000742 | 0.0000113 | 0.0000131 |
| Dissolved Chromium (Cr) | mg/L | 0.00027 | <0.0001 | 0.00484 | 0.00281 | 0.0001 | 0.00018 | 0.0002 | <0.0001 |
| Dissolved Cobalt (Co) | mg/L | 0.191 | 0.00284 | 0.00399 | 0.0123 | 0.0047 | 0.0157 | 0.00164 | 0.00143 |
| Dissolved Copper (Cu) | mg/L | 0.00825 | 0.00111 | 0.0377 | 0.0159 | 0.011 | 0.00239 | 0.00285 | 0.0013 |
| Dissolved Iron (Fe) | mg/L | 0.0245 | 0.178 | 4.04 | 0.187 | 0.35 | 0.173 | 0.244 | 0.143 |
| Dissolved Lead (Pb) | mg/L | 0.000115 | 0.000872 | 0.0651 | 0.00114 | 0.00518 | 0.0025 | 0.00755 | 0.00266 |
| Dissolved Lithium (Li) | mg/L | 0.0096 | 0.0241 | <0.0025 | <0.0025 | 0.00127 | 0.00147 | 0.0007 | 0.00102 |
| Dissolved Manganese (Mn) | mg/L | 4.18 | 0.207 | 0.209 | 3.25 | 0.572 | 0.602 | 0.296 | 0.233 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00019 | 0.000292 | <0.00025 | 0.0005 | <0.00005 | 0.000238 | 0.000674 | 0.0002 |
| Dissolved Nickel (Ni) | mg/L | 0.301 | 0.0151 | 0.00728 | 0.0152 | 0.0103 | 0.103 | 0.00537 | 0.00276 |
| Dissolved Selenium (Se) | mg/L | 0.00212 | 0.000333 | <0.0002 | <0.0002 | 0.000113 | 0.000135 | 0.000063 | <0.00004 |
| Dissolved Silicon (Si) | mg/L | 2.02 | 1.03 | 1.12 | 1.16 | 0.692 | 0.884 | 0.823 | 1.05 |
| Dissolved Silver (Ag) | mg/L | <0.00001 | <0.000005 | <0.000025 | <0.000025 | 0.0000165 | 0.0000062 | 0.0000121 | 0.0000079 |
| Dissolved Strontium (Sr) | mg/L | 0.285 | 0.0424 | 0.00429 | 0.0463 | 0.0145 | 0.0339 | 0.0336 | 0.0529 |
| Dissolved Thallium (Tl) | mg/L | 0.0000199 | 0.0000067 | 0.000017 | <0.00001 | 0.0000461 | 0.0000496 | 0.0000199 | 0.0000165 |
| Dissolved Tin (Sn) | mg/L | <0.0004 | <0.0002 | <0.001 | <0.001 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dissolved Titanium (Ti) | mg/L | <0.001 | 0.00128 | 0.0227 | <0.0025 | 0.0012 | 0.00291 | 0.00333 | 0.00201 |
| Dissolved Uranium (U) | mg/L | <0.000004 | <0.000002 | 0.0002 | 0.000016 | 0.0000114 | 0.0000181 | 0.0000183 | 0.0000109 |
| Dissolved Vanadium (V) | mg/L | <0.0004 | <0.0002 | 0.0036 | <0.001 | 0.00049 | 0.00052 | 0.0005 | <0.0002 |
| Dissolved Zinc (Zn) | mg/L | 0.498 | 0.00331 | 0.0334 | 0.0369 | 0.0309 | 0.0191 | 0.00398 | 0.00451 |
| Dissolved Zirconium (Zr) | mg/L | <0.0002 | <0.0001 | 0.00108 | <0.0005 | <0.0001 | 0.00042 | 0.00022 | 0.00022 |
| Dissolved Calcium (Ca) | mg/L | 152 | 17.4 | 1.03 | 13.3 | 4.04 | 16.4 | 19.9 | 22.2 |
| Dissolved Magnesium (Mg) | mg/L | 30.5 | 15.1 | 0.29 | 4.62 | 1.32 | 8.79 | 2.66 | 4.69 |
| Dissolved Potassium (K) | mg/L | 10.7 | 4.62 | 0.37 | 5.25 | 2.85 | 5.18 | 4.78 | 6.1 |
| Dissolved Sodium (Na) | mg/L | 5.06 | 4.06 | 5.86 | 7.53 | 2.74 | 2.77 | 1.64 | 2.46 |
| Dissolved Sulphur (S) | mg/L | 193 | 36.8 | <3.0 | <3.0 | 6.55 | 24.4 | 17.5 | 24.1 |
| Dissolved Sulphate (SO4) | mg/L | 579 | 110.4 | <9.0 | <9.0 | 19.65 | 73.2 | 52.5 | 72.3 |

**Montague - Porewater**

| Sample ID | | M-2018-SFC-T32 | M-2018-SFC-T35 | M-2018-SFC OLD MILL | M-2018-C1 (0-5cm) | M-2018-C1 (10-20cm) | M-2018-C1 (40-60cm) | M-2018-C1 (140-160cm) | M-2018-C1 (180-200cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Porewater Concentrations ($mg/L_{PW}$)** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/Lpw | 47.25 | 0.00 | 55.55 | 0.00 | 23.94 | 29.73 | 0.00 | 22.22 |
| Total Cyanide (CN) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| WAD Cyanide (Free) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Alkalinity (Total as CaCO3) | mg/Lpw | 0.00 | 60.08 | 0.00 | 145.34 | 0.00 | 0.00 | 77.04 | 0.00 |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | mg/Lpw | 0.0002 | 0.0007 | 0.6565 | 0.0006 | 0.0006 | 0.0008 | 0.0225 | 0.0085 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/Lpw | 2846.25 | 670.32 | 19.09 | 135.99 | 74.21 | 364.82 | 389.69 | 331.91 |
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/Lpw | 0.0821 | 0.4009 | 6.1108 | 0.1331 | 0.1824 | 0.4814 | 0.8603 | 0.4274 |
| Dissolved Antimony (Sb) | mg/Lpw | 0.1513 | 0.0190 | 0.0219 | 0.0069 | 0.0353 | 0.1383 | 0.0367 | 0.0220 |
| Dissolved Arsenic (As) | mg/Lpw | 4.8938 | 3.3073 | 10.7569 | 11.3935 | 3.6100 | 1.8642 | 1.2198 | 0.3501 |
| Dissolved Barium (Ba) | mg/Lpw | 0.0169 | 0.0053 | 0.0591 | 0.0859 | 0.0694 | 0.0831 | 0.1425 | 0.1564 |
| Dissolved Beryllium (Be) | mg/Lpw | 0.0001 | 0.0001 | 0.0003 | 0.0001 | 0.0000 | 0.0000 | 0.0001 | 0.0000 |
| Dissolved Bismuth (Bi) | mg/Lpw | 0.0001 | 0.0002 | 0.0027 | 0.0001 | 0.0006 | 0.0004 | 0.0012 | 0.0003 |
| Dissolved Boron (B) | mg/Lpw | 0.1125 | 0.0632 | 0.2525 | 0.1298 | 0.0479 | 0.0472 | 0.0642 | 0.0578 |
| Dissolved Cadmium (Cd) | mg/Lpw | 0.0017 | 0.0001 | 0.0008 | 0.0007 | 0.0010 | 0.0004 | 0.0001 | 0.0001 |
| Dissolved Chromium (Cr) | mg/Lpw | 0.0015 | 0.0006 | 0.0244 | 0.0073 | 0.0005 | 0.0008 | 0.0013 | 0.0004 |
| Dissolved Cobalt (Co) | mg/Lpw | 1.0744 | 0.0180 | 0.0202 | 0.0319 | 0.0225 | 0.0741 | 0.0105 | 0.0064 |
| Dissolved Copper (Cu) | mg/Lpw | 0.0464 | 0.0070 | 0.1904 | 0.0413 | 0.0527 | 0.0113 | 0.0183 | 0.0058 |
| Dissolved Iron (Fe) | mg/Lpw | 0.1378 | 1.1256 | 20.4028 | 0.4853 | 1.6757 | 0.8165 | 1.5665 | 0.6354 |
| Dissolved Lead (Pb) | mg/Lpw | 0.0006 | 0.0055 | 0.3288 | 0.0030 | 0.0248 | 0.0118 | 0.0485 | 0.0118 |
| Dissolved Lithium (Li) | mg/Lpw | 0.0540 | 0.1524 | 0.0126 | 0.0065 | 0.0061 | 0.0069 | 0.0045 | 0.0045 |
| Dissolved Manganese (Mn) | mg/Lpw | 23.5125 | 1.3090 | 1.0555 | 8.4348 | 2.7386 | 2.8412 | 1.9003 | 1.0353 |
| Dissolved Molybdenum (Mo) | mg/Lpw | 0.0011 | 0.0018 | 0.0013 | 0.0013 | 0.0002 | 0.0011 | 0.0043 | 0.0009 |
| Dissolved Nickel (Ni) | mg/Lpw | 1.6931 | 0.0955 | 0.0368 | 0.0394 | 0.0493 | 0.4861 | 0.0345 | 0.0123 |
| Dissolved Selenium (Se) | mg/Lpw | 0.0119 | 0.0021 | 0.0010 | 0.0005 | 0.0005 | 0.0006 | 0.0004 | 0.0002 |
| Dissolved Silicon (Si) | mg/Lpw | 11.3625 | 6.5135 | 5.6562 | 3.0106 | 3.3131 | 4.1721 | 5.2836 | 4.6654 |
| Dissolved Silver (Ag) | mg/Lpw | 0.0001 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0001 | 0.0000 |
| Dissolved Strontium (Sr) | mg/Lpw | 1.6031 | 0.2681 | 0.0217 | 0.1202 | 0.0694 | 0.1600 | 0.2157 | 0.2350 |
| Dissolved Thallium (Tl) | mg/Lpw | 0.0001 | 0.0000 | 0.0001 | 0.0000 | 0.0002 | 0.0002 | 0.0001 | 0.0001 |
| Dissolved Tin (Sn) | mg/Lpw | 0.0023 | 0.0013 | 0.0051 | 0.0026 | 0.0010 | 0.0009 | 0.0013 | 0.0009 |
| Dissolved Titanium (Ti) | mg/Lpw | 0.0056 | 0.0081 | 0.1146 | 0.0065 | 0.0057 | 0.0137 | 0.0214 | 0.0089 |
| Dissolved Uranium (U) | mg/Lpw | 0.0000 | 0.0000 | 0.0010 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0000 |
| Dissolved Vanadium (V) | mg/Lpw | 0.0023 | 0.0013 | 0.0182 | 0.0026 | 0.0023 | 0.0025 | 0.0032 | 0.0009 |
| Dissolved Zinc (Zn) | mg/Lpw | 2.8013 | 0.0209 | 0.1687 | 0.0958 | 0.1479 | 0.0901 | 0.0256 | 0.0200 |
| Dissolved Zirconium (Zr) | mg/Lpw | 0.0011 | 0.0006 | 0.0055 | 0.0013 | 0.0005 | 0.0020 | 0.0014 | 0.0010 |
| Dissolved Calcium (Ca) | mg/Lpw | 855.00 | 110.03 | 5.20 | 34.52 | 19.34 | 77.40 | 127.76 | 98.64 |
| Dissolved Magnesium (Mg) | mg/Lpw | 171.56 | 95.49 | 1.46 | 11.99 | 6.32 | 41.48 | 17.08 | 20.84 |
| Dissolved Potassium (K) | mg/Lpw | 60.19 | 29.22 | 1.87 | 13.63 | 13.65 | 24.45 | 30.69 | 27.10 |
| Dissolved Sodium (Na) | mg/Lpw | 28.46 | 25.67 | 29.59 | 19.54 | 13.12 | 13.07 | 10.53 | 10.93 |
| Dissolved Sulphur (S) | mg/Lpw | 1085.63 | 232.71 | 15.15 | 7.79 | 31.36 | 115.16 | 112.35 | 107.08 |
| Dissolved Sulphate (SO4) | mg/Lpw | 3256.88 | 698.14 | 45.45 | 23.36 | 94.08 | 345.47 | 337.05 | 321.25 |

**Montague - Porewater**

| Sample ID | | M-2018-C2 (0-5cm) | M-2018-C2 (10-20cm) | M-2018-C2 (40-60cm) | M-2018-C2 (80-100cm) | M-2018-C3 (0-5cm) | M-2018-C3 (40-80cm) | M-2018-C3 (140-160cm) | M-2018-C3 (160-180cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Sample Coordinates** | | | | | | | | | |
| Latitude | | 44.7149246 | 44.7149246 | 44.7149246 | 44.7149246 | 44.71530204 | 44.71530204 | 44.71530204 | 44.71530204 |
| Longitude | | -63.52272031 | -63.52272031 | -63.52272031 | -63.52272031 | -63.52343 | -63.52343 | -63.52343 | -63.52343 |
| **EcoMetrix Porewater Test Data** | | | | | | | | | |
| Mass Sample (wet weight) | g-wet | 274.16 | 275.95 | 295.78 | 296.41 | 185.30 | 313.85 | 309.47 | 301.05 |
| Mass Water Added | g | 276.80 | 273.64 | 293.27 | 296.02 | 187.39 | 312.60 | 316.21 | 301.07 |
| Water-to-Solids Ratio | - | 1.01 | 0.99 | 0.99 | 1.00 | 1.01 | 1.00 | 1.02 | 1.00 |
| Lab pH | - | 6.69 | 5.29 | 6.23 | 5.40 | 6.67 | 6.13 | 5.25 | 5.51 |
| Lab Electrical Conductivity | µS/cm | 169.00 | 434.90 | 284.00 | 203.20 | 231.10 | 472.80 | 319.90 | 427.20 |
| Environmental Moisture Content | % | 36.0% | 30.4% | 29.7% | 60.1% | 84.7% | 35.0% | 61.5% | 73.9% |
| PW Volume | mL (g) | 98.70 | 83.89 | 87.85 | 178.14 | 156.95 | 109.85 | 190.32 | 222.48 |
| Total Water Mass | g | 375.50 | 357.53 | 381.12 | 474.16 | 344.34 | 422.45 | 506.53 | 523.55 |
| Total Water Volume | L | 0.375 | 0.358 | 0.381 | 0.474 | 0.344 | 0.422 | 0.507 | 0.524 |
| Sample Solids Mass (dry weight) | g | 175.46 | 192.06 | 207.93 | 118.27 | 28.35 | 204.00 | 119.15 | 78.57 |
| **Lab-Measured Constituent Concentration** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | | 7.2 | 8.2 | 9 | | <5.0 | 9.4 | 9.8 |
| Total Cyanide (CN) | mg/L | | <0.005 | <0.005 | <0.005 | | | | |
| WAD Cyanide (Free) | mg/L | | <0.001 | <0.001 | <0.001 | | | | |
| Alkalinity (Total as CaCO3) | mg/L | 52 | | | | 43 | | | |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | µg/L | 0.24 | <0.01 | 0.19 | 0.97 | 0.09 | 0.13 | 0.77 | 0.14 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 25 | 145 | 82 | 49.4 | 25.8 | 164 | 83.1 | 124 |

**Montague - Porewater**

| Sample ID | | M-2018-C2 (0-5cm) | M-2018-C2 (10-20cm) | M-2018-C2 (40-60cm) | M-2018-C2 (80-100cm) | M-2018-C3 (0-5cm) | M-2018-C3 (40-80cm) | M-2018-C3 (140-160cm) | M-2018-C3 (160-180cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0667 | 0.0127 | 0.117 | 0.0791 | 0.141 | 0.0691 | 0.0469 | 0.158 |
| Dissolved Antimony (Sb) | mg/L | 0.00349 | 0.0225 | 0.00913 | 0.0156 | 0.000284 | 0.0137 | 0.0043 | 0.00645 |
| Dissolved Arsenic (As) | mg/L | 3.56 | 2.26 | 0.915 | 0.269 | 0.122 | 0.233 | 0.104 | 0.158 |
| Dissolved Barium (Ba) | mg/L | 0.00993 | 0.0147 | 0.0146 | 0.0301 | 0.0199 | 0.0196 | 0.0477 | 0.0568 |
| Dissolved Beryllium (Be) | mg/L | <0.00005 | <0.00005 | <0.00002 | <0.00001 | <0.00001 | <0.00001 | 0.000012 | <0.00001 |
| Dissolved Bismuth (Bi) | mg/L | 0.000061 | <0.000025 | 0.000026 | 0.000108 | 0.0000385 | 0.0000148 | 0.0000155 | 0.0000689 |
| Dissolved Boron (B) | mg/L | <0.05 | <0.05 | <0.02 | <0.01 | <0.01 | <0.01 | 0.021 | <0.01 |
| Dissolved Cadmium (Cd) | mg/L | 0.000097 | 0.000215 | 0.000022 | 0.000135 | 0.000164 | 0.0000193 | 0.0000661 | 0.0000608 |
| Dissolved Chromium (Cr) | mg/L | <0.0005 | <0.0005 | 0.00085 | 0.00195 | 0.00211 | <0.0001 | 0.00207 | 0.00138 |
| Dissolved Cobalt (Co) | mg/L | 0.00257 | 0.081 | 0.0118 | 0.00699 | 0.00228 | 0.00885 | 0.00416 | 0.00477 |
| Dissolved Copper (Cu) | mg/L | 0.0173 | 0.0013 | 0.00371 | 0.0118 | 0.0117 | 0.000367 | 0.0105 | 0.00859 |
| Dissolved Iron (Fe) | mg/L | 1.11 | 1 | 0.265 | 1.1 | 0.308 | 0.057 | 0.0506 | 0.53 |
| Dissolved Lead (Pb) | mg/L | 0.00303 | 0.000401 | 0.00104 | 0.0141 | 0.00159 | 0.00113 | 0.00114 | 0.00313 |
| Dissolved Lithium (Li) | mg/L | <0.0025 | 0.0028 | 0.0019 | 0.001 | <0.0005 | 0.00109 | 0.00158 | 0.00119 |
| Dissolved Manganese (Mn) | mg/L | 0.515 | 3.55 | 4.15 | 4.67 | 2.19 | 2.26 | 1.84 | 2.42 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00102 | <0.00025 | 0.00046 | 0.000082 | 0.000614 | 0.000563 | 0.000104 | 0.000184 |
| Dissolved Nickel (Ni) | mg/L | 0.00837 | 0.128 | 0.0283 | 0.0085 | 0.00649 | 0.0154 | 0.00532 | 0.0049 |
| Dissolved Selenium (Se) | mg/L | 0.00023 | <0.0002 | <0.00008 | 0.000042 | 0.000231 | <0.00004 | 0.000059 | 0.000091 |
| Dissolved Silicon (Si) | mg/L | 3.12 | 1.05 | 0.96 | 1.04 | 1.3 | 1.4 | 2.4 | 1.94 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | <0.000025 | <0.00001 | 0.0000137 | 0.000007 | <0.000005 | 0.0000078 | 0.0000231 |
| Dissolved Strontium (Sr) | mg/L | 0.0259 | 0.102 | 0.0457 | 0.0368 | 0.033 | 0.0757 | 0.0757 | 0.105 |
| Dissolved Thallium (Tl) | mg/L | 0.000038 | 0.000036 | 0.0000172 | 0.0000163 | 0.0000181 | 0.0000173 | 0.0000103 | 0.000012 |
| Dissolved Tin (Sn) | mg/L | <0.001 | <0.001 | <0.0004 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | <0.0025 | 0.0029 | 0.00203 | 0.00178 | 0.0009 | 0.00104 | 0.0041 |
| Dissolved Uranium (U) | mg/L | 0.000013 | <0.00001 | 0.0000149 | 0.0000179 | 0.0000173 | 0.0000099 | 0.0000105 | 0.0000364 |
| Dissolved Vanadium (V) | mg/L | <0.001 | <0.001 | <0.0004 | <0.0002 | 0.00156 | 0.00082 | 0.0002 | 0.00037 |
| Dissolved Zinc (Zn) | mg/L | 0.00982 | 0.516 | 0.0143 | 0.0232 | 0.0146 | 0.00642 | 0.0269 | 0.0194 |
| Dissolved Zirconium (Zr) | mg/L | <0.0005 | <0.0005 | 0.0003 | 0.00016 | <0.0001 | <0.0001 | <0.0001 | 0.00011 |
| Dissolved Calcium (Ca) | mg/L | 7.01 | 31.6 | 18.1 | 12.6 | 7.91 | 36.9 | 23.8 | 32 |
| Dissolved Magnesium (Mg) | mg/L | 1.83 | 16 | 8.9 | 4.32 | 1.47 | 17.4 | 5.77 | 10.7 |
| Dissolved Potassium (K) | mg/L | 5.38 | 3.82 | 4.79 | 3.75 | 6.7 | 4.98 | 2.53 | 3.91 |
| Dissolved Sodium (Na) | mg/L | 18.4 | 9.88 | 6.69 | 7.25 | 23.5 | 10.8 | 18.2 | 18 |
| Dissolved Sulphur (S) | mg/L | <3.0 | 56.6 | 32.5 | 23.4 | 4.22 | 60.2 | 34 | 47.5 |
| Dissolved Sulphate (SO4) | mg/L | <9.0 | 169.8 | 97.5 | 70.2 | 12.66 | 180.6 | 102 | 142.5 |

**Montague - Porewater**

| Sample ID | | M-2018-C2 (0-5cm) | M-2018-C2 (10-20cm) | M-2018-C2 (40-60cm) | M-2018-C2 (80-100cm) | M-2018-C3 (0-5cm) | M-2018-C3 (40-80cm) | M-2018-C3 (140-160cm) | M-2018-C3 (160-180cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Porewater Concentrations ($mg/L_{PW}$)** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/Lpw | 0.00 | 30.69 | 35.58 | 23.96 | 0.00 | 19.23 | 25.02 | 23.06 |
| Total Cyanide (CN) | mg/Lpw | 0.0000 | 0.0213 | 0.0217 | 0.0133 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| WAD Cyanide (Free) | mg/Lpw | 0.0000 | 0.0043 | 0.0043 | 0.0027 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Alkalinity (Total as CaCO3) | mg/Lpw | 197.84 | 0.00 | 0.00 | 0.00 | 94.34 | 0.00 | 0.00 | 0.00 |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | mg/Lpw | 0.0009 | 0.0000 | 0.0008 | 0.0026 | 0.0002 | 0.0005 | 0.0020 | 0.0003 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/Lpw | 95.11 | 617.98 | 355.75 | 131.49 | 56.60 | 630.71 | 221.16 | 291.81 |
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/Lpw | 0.2538 | 0.0541 | 0.5076 | 0.2105 | 0.3093 | 0.2657 | 0.1248 | 0.3718 |
| Dissolved Antimony (Sb) | mg/Lpw | 0.0133 | 0.0959 | 0.0396 | 0.0415 | 0.0006 | 0.0527 | 0.0114 | 0.0152 |
| Dissolved Arsenic (As) | mg/Lpw | 13.5441 | 9.6320 | 3.9697 | 0.7160 | 0.2677 | 0.8961 | 0.2768 | 0.3718 |
| Dissolved Barium (Ba) | mg/Lpw | 0.0378 | 0.0627 | 0.0633 | 0.0801 | 0.0437 | 0.0754 | 0.1270 | 0.1337 |
| Dissolved Beryllium (Be) | mg/Lpw | 0.0002 | 0.0002 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Dissolved Bismuth (Bi) | mg/Lpw | 0.0002 | 0.0001 | 0.0001 | 0.0003 | 0.0001 | 0.0001 | 0.0000 | 0.0002 |
| Dissolved Boron (B) | mg/Lpw | 0.1902 | 0.2131 | 0.0868 | 0.0266 | 0.0219 | 0.0385 | 0.0559 | 0.0235 |
| Dissolved Cadmium (Cd) | mg/Lpw | 0.0004 | 0.0009 | 0.0001 | 0.0004 | 0.0004 | 0.0001 | 0.0002 | 0.0001 |
| Dissolved Chromium (Cr) | mg/Lpw | 0.0019 | 0.0021 | 0.0037 | 0.0052 | 0.0046 | 0.0004 | 0.0055 | 0.0032 |
| Dissolved Cobalt (Co) | mg/Lpw | 0.0098 | 0.3452 | 0.0512 | 0.0186 | 0.0050 | 0.0340 | 0.0111 | 0.0112 |
| Dissolved Copper (Cu) | mg/Lpw | 0.0658 | 0.0055 | 0.0161 | 0.0314 | 0.0257 | 0.0014 | 0.0279 | 0.0202 |
| Dissolved Iron (Fe) | mg/Lpw | 4.2230 | 4.2619 | 1.1497 | 2.9279 | 0.6757 | 0.2192 | 0.1347 | 1.2472 |
| Dissolved Lead (Pb) | mg/Lpw | 0.0115 | 0.0017 | 0.0045 | 0.0375 | 0.0035 | 0.0043 | 0.0030 | 0.0074 |
| Dissolved Lithium (Li) | mg/Lpw | 0.0095 | 0.0119 | 0.0082 | 0.0027 | 0.0011 | 0.0042 | 0.0042 | 0.0028 |
| Dissolved Manganese (Mn) | mg/Lpw | 1.9593 | 15.1299 | 18.0045 | 12.4302 | 4.8048 | 8.6914 | 4.8970 | 5.6949 |
| Dissolved Molybdenum (Mo) | mg/Lpw | 0.0039 | 0.0011 | 0.0020 | 0.0002 | 0.0013 | 0.0022 | 0.0003 | 0.0004 |
| Dissolved Nickel (Ni) | mg/Lpw | 0.0318 | 0.5455 | 0.1228 | 0.0226 | 0.0142 | 0.0592 | 0.0142 | 0.0115 |
| Dissolved Selenium (Se) | mg/Lpw | 0.0009 | 0.0009 | 0.0003 | 0.0001 | 0.0005 | 0.0002 | 0.0002 | 0.0002 |
| Dissolved Silicon (Si) | mg/Lpw | 11.8701 | 4.4750 | 4.1649 | 2.7682 | 2.8521 | 5.3841 | 6.3874 | 4.5653 |
| Dissolved Silver (Ag) | mg/Lpw | 0.0001 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 |
| Dissolved Strontium (Sr) | mg/Lpw | 0.0985 | 0.4347 | 0.1983 | 0.0980 | 0.0724 | 0.2911 | 0.2015 | 0.2471 |
| Dissolved Thallium (Tl) | mg/Lpw | 0.0001 | 0.0002 | 0.0001 | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.0000 |
| Dissolved Tin (Sn) | mg/Lpw | 0.0038 | 0.0043 | 0.0017 | 0.0005 | 0.0004 | 0.0008 | 0.0005 | 0.0005 |
| Dissolved Titanium (Ti) | mg/Lpw | 0.0095 | 0.0107 | 0.0126 | 0.0054 | 0.0039 | 0.0035 | 0.0028 | 0.0096 |
| Dissolved Uranium (U) | mg/Lpw | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 |
| Dissolved Vanadium (V) | mg/Lpw | 0.0038 | 0.0043 | 0.0017 | 0.0005 | 0.0034 | 0.0032 | 0.0005 | 0.0009 |
| Dissolved Zinc (Zn) | mg/Lpw | 0.0374 | 2.1992 | 0.0620 | 0.0618 | 0.0320 | 0.0247 | 0.0716 | 0.0457 |
| Dissolved Zirconium (Zr) | mg/Lpw | 0.0019 | 0.0021 | 0.0013 | 0.0004 | 0.0002 | 0.0004 | 0.0003 | 0.0003 |
| Dissolved Calcium (Ca) | mg/Lpw | 26.67 | 134.68 | 78.53 | 33.54 | 17.35 | 141.91 | 63.34 | 75.30 |
| Dissolved Magnesium (Mg) | mg/Lpw | 6.96 | 68.19 | 38.61 | 11.50 | 3.23 | 66.92 | 15.36 | 25.18 |
| Dissolved Potassium (K) | mg/Lpw | 20.47 | 16.28 | 20.78 | 9.98 | 14.70 | 19.15 | 6.73 | 9.20 |
| Dissolved Sodium (Na) | mg/Lpw | 70.00 | 42.11 | 29.02 | 19.30 | 51.56 | 41.53 | 48.44 | 42.36 |
| Dissolved Sulphur (S) | mg/Lpw | 11.41 | 241.23 | 141.00 | 62.28 | 9.26 | 231.51 | 90.49 | 111.78 |
| Dissolved Sulphate (SO4) | mg/Lpw | 34.24 | 723.68 | 423.00 | 186.85 | 27.78 | 694.54 | 271.47 | 335.34 |

**Montague - Porewater**

| Sample ID | | M-2018-C4 (0-10cm) | M-2018-C4 (40-60cm) | M-2018-C4 (60-100cm) | M-2018-C5 (2.5-10cm) | M-2018-C5 (30-50cm) | M-2018-C9 (0-7.5cm) | M-2018-C9 (15-20cm) | M-2018-C9 (20-40cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Sample Coordinates** | | | | | | | | | |
| Latitude | | 44.71566296 | 44.71566296 | 44.71566296 | 44.71715896 | 44.71715896 | 44.73045903 | 44.73045903 | 44.73045903 |
| Longitude | | -63.52383401 | -63.52383401 | -63.52383401 | -63.52366897 | -63.52366897 | -63.48584002 | -63.48584002 | -63.48584002 |
| **EcoMetrix Porewater Test Data** | | | | | | | | | |
| Mass Sample (wet weight) | g-wet | 268.42 | 299.88 | 188.82 | 290.59 | 295.98 | 297.45 | 299.59 | 125.01 |
| Mass Water Added | g | 267.57 | 301.51 | 191.59 | 291.38 | 295.40 | 296.96 | 300.84 | 151.79 |
| Water-to-Solids Ratio | - | 1.00 | 1.01 | 1.01 | 1.00 | 1.00 | 1.00 | 1.00 | 1.21 |
| Lab pH | - | 5.86 | 5.89 | 5.92 | 6.28 | 6.39 | 4.84 | 4.67 | 5.01 |
| Lab Electrical Conductivity | µS/cm | 444.00 | 190.70 | 828.80 | 510.69 | 376.80 | 114.20 | 189.30 | 123.50 |
| Environmental Moisture Content | % | 59.0% | 23.2% | 44.0% | 38.6% | 29.0% | 88.2% | 66.9% | 60.0% |
| PW Volume | mL (g) | 158.37 | 69.57 | 83.08 | 112.17 | 85.83 | 262.35 | 200.43 | 75.01 |
| Total Water Mass | g | 425.94 | 371.08 | 274.67 | 403.55 | 381.23 | 559.31 | 501.27 | 226.80 |
| Total Water Volume | L | 0.426 | 0.371 | 0.275 | 0.404 | 0.381 | 0.559 | 0.501 | 0.227 |
| Sample Solids Mass (dry weight) | g | 110.05 | 230.31 | 105.74 | 178.42 | 210.15 | 35.10 | 99.16 | 50.00 |
| **Lab-Measured Constituent Concentration** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | 25 | 25 | 8.3 | 5.8 | 6.4 | 6.4 | 12 | 9.4 |
| Total Cyanide (CN) | mg/L | | | | | | | | |
| WAD Cyanide (Free) | mg/L | | | | | | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | | | | | | |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | µg/L | 0.08 | 0.04 | 0.61 | 0.21 | 0.95 | <0.01 | <0.01 | <0.01 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 98.4 | 29.2 | 346 | 178 | 129 | 32.1 | 57.9 | 32.8 |

**Montague - Porewater**

| Sample ID | | M-2018-C4 (0-10cm) | M-2018-C4 (40-60cm) | M-2018-C4 (60-100cm) | M-2018-C5 (2.5-10cm) | M-2018-C5 (30-50cm) | M-2018-C9 (0-7.5cm) | M-2018-C9 (15-20cm) | M-2018-C9 (20-40cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0343 | 5.49 | 0.0513 | 0.0621 | 0.147 | 0.133 | 0.273 | 0.0928 |
| Dissolved Antimony (Sb) | mg/L | 0.0033 | 0.000325 | 0.0375 | 0.0163 | 0.0149 | 0.000106 | 0.000089 | 0.000308 |
| Dissolved Arsenic (As) | mg/L | 0.27 | 0.477 | 3.49 | 1.11 | 1.37 | 0.00132 | 0.00114 | 0.00278 |
| Dissolved Barium (Ba) | mg/L | 0.0297 | 0.00517 | 0.0262 | 0.00808 | 0.0121 | 0.0667 | 0.101 | 0.0698 |
| Dissolved Beryllium (Be) | mg/L | <0.00005 | 0.000128 | <0.00005 | <0.00001 | <0.00005 | 0.000212 | 0.000589 | 0.00034 |
| Dissolved Bismuth (Bi) | mg/L | <0.000025 | 0.00095 | <0.000025 | 0.0000316 | 0.000046 | 0.0000066 | <0.000005 | <0.000005 |
| Dissolved Boron (B) | mg/L | <0.05 | <0.01 | <0.05 | <0.01 | <0.05 | <0.01 | <0.01 | <0.01 |
| Dissolved Cadmium (Cd) | mg/L | 0.000801 | 0.0000276 | <0.000025 | 0.0000434 | <0.000025 | 0.00014 | 0.00029 | 0.000463 |
| Dissolved Chromium (Cr) | mg/L | 0.00142 | 0.0108 | 0.00228 | <0.0001 | 0.0006 | 0.00048 | 0.00072 | 0.00093 |
| Dissolved Cobalt (Co) | mg/L | 0.00584 | 0.0013 | 0.0201 | 0.00397 | 0.00877 | 0.000389 | 0.00577 | 0.00689 |
| Dissolved Copper (Cu) | mg/L | 0.00675 | 0.02 | 0.0119 | 0.00319 | 0.00309 | 0.00648 | 0.00347 | 0.00346 |
| Dissolved Iron (Fe) | mg/L | 0.0336 | 10.2 | 0.0656 | 0.144 | 0.37 | 0.02 | 0.0349 | 0.0225 |
| Dissolved Lead (Pb) | mg/L | 0.000273 | 0.00613 | 0.000769 | 0.0014 | 0.00285 | 0.000736 | 0.000575 | 0.00033 |
| Dissolved Lithium (Li) | mg/L | 0.0052 | 0.0008 | 0.004 | 0.00387 | <0.0025 | 0.00201 | 0.00262 | 0.00313 |
| Dissolved Manganese (Mn) | mg/L | 14.5 | 1.91 | 8.96 | 0.651 | 3.12 | 0.0461 | 1.62 | 2.05 |
| Dissolved Molybdenum (Mo) | mg/L | <0.00025 | 0.000071 | 0.00118 | 0.000131 | 0.00122 | <0.00005 | <0.00005 | 0.00035 |
| Dissolved Nickel (Ni) | mg/L | 0.0564 | 0.00365 | 0.0234 | 0.0222 | 0.0275 | 0.00206 | 0.00562 | 0.00236 |
| Dissolved Selenium (Se) | mg/L | 0.0002 | 0.000208 | <0.0002 | 0.000287 | <0.0002 | 0.000074 | 0.000058 | 0.000145 |
| Dissolved Silicon (Si) | mg/L | 2.82 | 2.19 | 2.82 | 1.79 | 1.21 | 2.92 | 1.84 | 1.37 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | 0.0000249 | <0.000025 | 0.0000066 | <0.000025 | <0.000005 | <0.000005 | <0.000005 |
| Dissolved Strontium (Sr) | mg/L | 0.113 | 0.025 | 0.205 | 0.112 | 0.0812 | 0.0665 | 0.129 | 0.0747 |
| Dissolved Thallium (Tl) | mg/L | 0.000015 | 0.0000519 | 0.00005 | 0.000022 | <0.00001 | 0.000007 | 0.0000387 | 0.000206 |
| Dissolved Tin (Sn) | mg/L | <0.001 | <0.0002 | <0.001 | <0.0002 | <0.001 | <0.0002 | <0.0002 | <0.0002 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | 0.308 | <0.0025 | 0.0013 | 0.0054 | <0.0005 | 0.00052 | 0.00058 |
| Dissolved Uranium (U) | mg/L | <0.00001 | 0.000154 | 0.000026 | 0.0000064 | 0.000027 | 0.000023 | 0.000042 | 0.0000688 |
| Dissolved Vanadium (V) | mg/L | <0.001 | 0.0233 | <0.001 | 0.0003 | <0.001 | 0.00054 | 0.00042 | 0.00113 |
| Dissolved Zinc (Zn) | mg/L | 0.183 | 0.0138 | 0.0249 | 0.0191 | 0.0148 | 0.0191 | 0.0577 | 0.0909 |
| Dissolved Zirconium (Zr) | mg/L | <0.0005 | 0.00089 | <0.0005 | 0.0001 | <0.0005 | <0.0001 | <0.0001 | <0.0001 |
| Dissolved Calcium (Ca) | mg/L | 29.1 | 7.79 | 82.6 | 44.8 | 30.2 | 9.73 | 17.6 | 9.47 |
| Dissolved Magnesium (Mg) | mg/L | 6.26 | 2.35 | 33.9 | 16.1 | 13.1 | 1.89 | 3.42 | 2.21 |
| Dissolved Potassium (K) | mg/L | 4 | 1.68 | 11 | 8.61 | 6.6 | 0.521 | 0.504 | 0.588 |
| Dissolved Sodium (Na) | mg/L | 25.6 | 18 | 14.8 | 15.3 | 4.49 | 4.76 | 4.15 | 4.03 |
| Dissolved Sulphur (S) | mg/L | 51.2 | 18.6 | 135 | 69 | 47.5 | 11.6 | 21.4 | 13.7 |
| Dissolved Sulphate (SO4) | mg/L | 153.6 | 55.8 | 405 | 207 | 142.5 | 34.8 | 64.2 | 41.1 |

**Montague - Porewater**

| Sample ID | | M-2018-C4 (0-10cm) | M-2018-C4 (40-60cm) | M-2018-C4 (60-100cm) | M-2018-C5 (2.5-10cm) | M-2018-C5 (30-50cm) | M-2018-C9 (0-7.5cm) | M-2018-C9 (15-20cm) | M-2018-C9 (20-40cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Porewater Concentrations ($mg/L_{PW}$)** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/Lpw | 67.24 | 133.34 | 27.44 | 20.87 | 28.43 | 13.64 | 30.01 | 28.42 |
| Total Cyanide (CN) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| WAD Cyanide (Free) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Alkalinity (Total as CaCO3) | mg/Lpw | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | mg/Lpw | 0.0002 | 0.0002 | 0.0020 | 0.0008 | 0.0042 | 0.0000 | 0.0000 | 0.0000 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/Lpw | 264.65 | 155.75 | 1143.90 | 640.39 | 572.96 | 68.43 | 144.81 | 99.18 |
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/Lpw | 0.0923 | 29.2824 | 0.1696 | 0.2234 | 0.6529 | 0.2835 | 0.6828 | 0.2806 |
| Dissolved Antimony (Sb) | mg/Lpw | 0.0089 | 0.0017 | 0.1240 | 0.0586 | 0.0662 | 0.0002 | 0.0002 | 0.0009 |
| Dissolved Arsenic (As) | mg/Lpw | 0.7262 | 2.5442 | 11.5382 | 3.9935 | 6.0849 | 0.0028 | 0.0029 | 0.0084 |
| Dissolved Barium (Ba) | mg/Lpw | 0.0799 | 0.0276 | 0.0866 | 0.0291 | 0.0537 | 0.1422 | 0.2526 | 0.2111 |
| Dissolved Beryllium (Be) | mg/Lpw | 0.0001 | 0.0007 | 0.0002 | 0.0000 | 0.0002 | 0.0005 | 0.0015 | 0.0010 |
| Dissolved Bismuth (Bi) | mg/Lpw | 0.0001 | 0.0051 | 0.0001 | 0.0001 | 0.0002 | 0.0000 | 0.0000 | 0.0000 |
| Dissolved Boron (B) | mg/Lpw | 0.1345 | 0.0533 | 0.1653 | 0.0360 | 0.2221 | 0.0213 | 0.0250 | 0.0302 |
| Dissolved Cadmium (Cd) | mg/Lpw | 0.0022 | 0.0001 | 0.0001 | 0.0002 | 0.0001 | 0.0003 | 0.0007 | 0.0014 |
| Dissolved Chromium (Cr) | mg/Lpw | 0.0038 | 0.0576 | 0.0075 | 0.0004 | 0.0027 | 0.0010 | 0.0018 | 0.0028 |
| Dissolved Cobalt (Co) | mg/Lpw | 0.0157 | 0.0069 | 0.0665 | 0.0143 | 0.0390 | 0.0008 | 0.0144 | 0.0208 |
| Dissolved Copper (Cu) | mg/Lpw | 0.0182 | 0.1067 | 0.0393 | 0.0115 | 0.0137 | 0.0138 | 0.0087 | 0.0105 |
| Dissolved Iron (Fe) | mg/Lpw | 0.0904 | 54.4045 | 0.2169 | 0.5181 | 1.6434 | 0.0426 | 0.0873 | 0.0680 |
| Dissolved Lead (Pb) | mg/Lpw | 0.0007 | 0.0327 | 0.0025 | 0.0050 | 0.0127 | 0.0016 | 0.0014 | 0.0010 |
| Dissolved Lithium (Li) | mg/Lpw | 0.0140 | 0.0043 | 0.0132 | 0.0139 | 0.0111 | 0.0043 | 0.0066 | 0.0095 |
| Dissolved Manganese (Mn) | mg/Lpw | 38.9984 | 10.1875 | 29.6224 | 2.3421 | 13.8575 | 0.0983 | 4.0516 | 6.1986 |
| Dissolved Molybdenum (Mo) | mg/Lpw | 0.0007 | 0.0004 | 0.0039 | 0.0005 | 0.0054 | 0.0001 | 0.0001 | 0.0011 |
| Dissolved Nickel (Ni) | mg/Lpw | 0.1517 | 0.0195 | 0.0774 | 0.0799 | 0.1221 | 0.0044 | 0.0141 | 0.0071 |
| Dissolved Selenium (Se) | mg/Lpw | 0.0005 | 0.0011 | 0.0007 | 0.0010 | 0.0009 | 0.0002 | 0.0001 | 0.0004 |
| Dissolved Silicon (Si) | mg/Lpw | 7.5845 | 11.6810 | 9.3231 | 6.4399 | 5.3742 | 6.2252 | 4.6018 | 4.1425 |
| Dissolved Silver (Ag) | mg/Lpw | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0000 |
| Dissolved Strontium (Sr) | mg/Lpw | 0.3039 | 0.1333 | 0.6777 | 0.4029 | 0.3607 | 0.1418 | 0.3226 | 0.2259 |
| Dissolved Thallium (Tl) | mg/Lpw | 0.0000 | 0.0003 | 0.0002 | 0.0001 | 0.0000 | 0.0000 | 0.0001 | 0.0006 |
| Dissolved Tin (Sn) | mg/Lpw | 0.0027 | 0.0011 | 0.0033 | 0.0007 | 0.0044 | 0.0004 | 0.0005 | 0.0006 |
| Dissolved Titanium (Ti) | mg/Lpw | 0.0067 | 1.6428 | 0.0083 | 0.0047 | 0.0240 | 0.0011 | 0.0013 | 0.0018 |
| Dissolved Uranium (U) | mg/Lpw | 0.0000 | 0.0008 | 0.0001 | 0.0000 | 0.0001 | 0.0000 | 0.0001 | 0.0002 |
| Dissolved Vanadium (V) | mg/Lpw | 0.0027 | 0.1243 | 0.0033 | 0.0011 | 0.0044 | 0.0012 | 0.0011 | 0.0034 |
| Dissolved Zinc (Zn) | mg/Lpw | 0.4922 | 0.0736 | 0.0823 | 0.0687 | 0.0657 | 0.0407 | 0.1443 | 0.2749 |
| Dissolved Zirconium (Zr) | mg/Lpw | 0.0013 | 0.0047 | 0.0017 | 0.0004 | 0.0022 | 0.0002 | 0.0003 | 0.0003 |
| Dissolved Calcium (Ca) | mg/Lpw | 78.27 | 41.55 | 273.08 | 161.18 | 134.13 | 20.74 | 44.02 | 28.63 |
| Dissolved Magnesium (Mg) | mg/Lpw | 16.84 | 12.53 | 112.08 | 57.92 | 58.18 | 4.03 | 8.55 | 6.68 |
| Dissolved Potassium (K) | mg/Lpw | 10.76 | 8.96 | 36.37 | 30.98 | 29.31 | 1.11 | 1.26 | 1.78 |
| Dissolved Sodium (Na) | mg/Lpw | 68.85 | 96.01 | 48.93 | 55.05 | 19.94 | 10.15 | 10.38 | 12.19 |
| Dissolved Sulphur (S) | mg/Lpw | 137.70 | 99.21 | 446.32 | 248.24 | 210.97 | 24.73 | 53.52 | 41.42 |
| Dissolved Sulphate (SO4) | mg/Lpw | 413.11 | 297.62 | 1338.96 | 744.73 | 632.92 | 74.19 | 160.56 | 124.27 |

**Montague - Porewater**

| Sample ID | | M-2018-C10 (0-5cm) | M-2018-C10 (15-20cm) | M-2018-C10 (30-40cm) | M-2018-C11 (2.5-10cm) | M-2018-C11 (10-20cm) | M-2018-C11 (30-40cm) | M-2018-C12 (2.5-10cm) | M-2018-C12 (30-40cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Sample Coordinates** | | | | | | | | | |
| Latitude | | 44.71532299 | 44.71532299 | 44.71532299 | 44.71625003 | 44.71625003 | 44.71625003 | 44.70468904 | 44.70468904 |
| Longitude | | -63.54691199 | -63.54691199 | -63.54691199 | -63.54258399 | -63.54258399 | -63.54258399 | -63.50767999 | -63.50767999 |
| **EcoMetrix Porewater Test Data** | | | | | | | | | |
| Mass Sample (wet weight) | g-wet | 201.87 | 295.83 | 295.36 | 280.42 | 297.49 | 142.80 | 272.77 | 299.73 |
| Mass Water Added | g | 203.33 | 294.14 | 295.67 | 280.70 | 295.60 | 143.56 | 275.27 | 303.82 |
| Water-to-Solids Ratio | - | 1.01 | 0.99 | 1.00 | 1.00 | 0.99 | 1.01 | 1.01 | 1.01 |
| Lab pH | - | 5.53 | 5.00 | 5.33 | 4.63 | 5.00 | 5.07 | 3.95 | 4.29 |
| Lab Electrical Conductivity | µS/cm | 282.40 | 449.70 | 269.10 | 803.70 | 288.70 | 137.00 | 1024.00 | 755.00 |
| Environmental Moisture Content | % | 84.0% | 89.5% | 91.0% | 92.6% | 92.7% | 89.9% | 89.4% | 92.1% |
| PW Volume | mL (g) | 169.57 | 264.77 | 268.78 | 259.67 | 275.77 | 128.38 | 243.86 | 276.05 |
| Total Water Mass | g | 372.90 | 558.91 | 564.45 | 540.37 | 571.37 | 271.94 | 519.13 | 579.87 |
| Total Water Volume | L | 0.373 | 0.559 | 0.564 | 0.540 | 0.571 | 0.272 | 0.519 | 0.580 |
| Sample Solids Mass (dry weight) | g | 32.30 | 31.06 | 26.58 | 20.75 | 21.72 | 14.42 | 28.91 | 23.68 |
| **Lab-Measured Constituent Concentration** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | 17 | 11 | 14 | 25 | 11 | 11.6 | 63 | 17 |
| Total Cyanide (CN) | mg/L | | | | <0.005 | <0.005 | | | |
| WAD Cyanide (Free) | mg/L | | | | <0.001 | <0.001 | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | | | | | | |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | µg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 62.4 | 133 | 55.5 | 329 | 94.8 | 29.4 | 295 | 214 |

**Montague - Porewater**

| Sample ID | | M-2018-C10 (0-5cm) | M-2018-C10 (15-20cm) | M-2018-C10 (30-40cm) | M-2018-C11 (2.5-10cm) | M-2018-C11 (10-20cm) | M-2018-C11 (30-40cm) | M-2018-C12 (2.5-10cm) | M-2018-C12 (30-40cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0421 | 0.0558 | 0.0603 | 0.456 | 0.0788 | 0.111 | 6.59 | 1.07 |
| Dissolved Antimony (Sb) | mg/L | 0.000576 | 0.000382 | 0.000386 | <0.0001 | 0.000037 | 0.000194 | <0.0001 | <0.0001 |
| Dissolved Arsenic (As) | mg/L | 0.0105 | 0.0141 | 0.0152 | 0.0221 | 0.0553 | 0.665 | 0.0015 | 0.00235 |
| Dissolved Barium (Ba) | mg/L | 0.0804 | 0.0616 | 0.046 | 0.0339 | 0.0635 | 0.0182 | 0.0303 | 0.0387 |
| Dissolved Beryllium (Be) | mg/L | <0.00001 | 0.000039 | 0.000019 | 0.000274 | 0.000016 | <0.00002 | 0.00331 | 0.000479 |
| Dissolved Bismuth (Bi) | mg/L | <0.000005 | <0.000005 | 0.00003 | <0.000025 | 0.0000057 | 0.000029 | <0.000025 | <0.000025 |
| Dissolved Boron (B) | mg/L | 0.019 | 0.021 | 0.017 | <0.05 | 0.01 | <0.02 | <0.05 | <0.05 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000498 | 0.000107 | 0.0000856 | 0.000351 | 0.0000281 | 0.000079 | 0.0424 | 0.00366 |
| Dissolved Chromium (Cr) | mg/L | 0.00076 | 0.00088 | 0.00098 | 0.00084 | 0.0018 | 0.001 | 0.00058 | <0.0005 |
| Dissolved Cobalt (Co) | mg/L | 0.0000714 | 0.000414 | 0.0000827 | 0.142 | 0.0047 | 0.00065 | 0.186 | 0.0236 |
| Dissolved Copper (Cu) | mg/L | 0.00308 | 0.00351 | 0.00371 | 0.00235 | 0.00849 | 0.00337 | 0.0144 | 0.00031 |
| Dissolved Iron (Fe) | mg/L | 0.0395 | 0.0162 | 0.0289 | 0.0987 | 0.0348 | 0.0522 | 0.102 | 0.0355 |
| Dissolved Lead (Pb) | mg/L | 0.000337 | 0.000234 | 0.00028 | 0.000675 | 0.000356 | 0.000274 | 0.0171 | 0.000691 |
| Dissolved Lithium (Li) | mg/L | 0.00086 | 0.00102 | 0.00059 | 0.0105 | 0.00412 | 0.0018 | 0.0107 | 0.0025 |
| Dissolved Manganese (Mn) | mg/L | 0.00732 | 0.379 | 0.0899 | 12.6 | 1.39 | 0.316 | 32.2 | 15 |
| Dissolved Molybdenum (Mo) | mg/L | <0.00005 | 0.000057 | 0.000143 | <0.00025 | <0.00005 | <0.0001 | <0.00025 | <0.00025 |
| Dissolved Nickel (Ni) | mg/L | 0.00208 | 0.0027 | 0.00222 | 0.0648 | 0.00574 | 0.00301 | 0.425 | 0.0282 |
| Dissolved Selenium (Se) | mg/L | 0.000055 | 0.000061 | 0.000349 | <0.0002 | <0.00004 | <0.00008 | <0.0002 | <0.0002 |
| Dissolved Silicon (Si) | mg/L | 3.58 | 3.23 | 2.92 | 5.42 | 4.69 | 5.53 | 8.72 | 5.96 |
| Dissolved Silver (Ag) | mg/L | <0.000005 | <0.000005 | <0.000005 | <0.000025 | <0.000005 | <0.00001 | <0.000025 | <0.000025 |
| Dissolved Strontium (Sr) | mg/L | 0.0965 | 0.182 | 0.0807 | 0.447 | 0.134 | 0.0363 | 0.269 | 0.226 |
| Dissolved Thallium (Tl) | mg/L | 0.0000144 | 0.0000082 | 0.0000092 | 0.000036 | 0.0000035 | 0.0000108 | 0.000096 | 0.000092 |
| Dissolved Tin (Sn) | mg/L | <0.0002 | <0.0002 | <0.0002 | <0.001 | <0.0002 | <0.0004 | <0.001 | <0.001 |
| Dissolved Titanium (Ti) | mg/L | 0.00081 | <0.0005 | 0.0006 | <0.0025 | 0.00056 | <0.001 | <0.0025 | <0.0025 |
| Dissolved Uranium (U) | mg/L | 0.0000078 | 0.0000034 | 0.000008 | <0.00001 | 0.0000031 | 0.0000196 | 0.000092 | <0.00001 |
| Dissolved Vanadium (V) | mg/L | 0.00081 | 0.00045 | 0.00117 | <0.001 | <0.0002 | <0.0004 | <0.001 | <0.001 |
| Dissolved Zinc (Zn) | mg/L | 0.0107 | 0.0208 | 0.0204 | 0.237 | 0.0169 | 0.0148 | 1.92 | 0.191 |
| Dissolved Zirconium (Zr) | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0005 | <0.0001 | <0.0002 | <0.0005 | <0.0005 |
| Dissolved Calcium (Ca) | mg/L | 21 | 45.7 | 18.2 | 102 | 25.9 | 8.23 | 104 | 74.4 |
| Dissolved Magnesium (Mg) | mg/L | 2.4 | 4.7 | 2.4 | 17.9 | 7.33 | 2.16 | 8.95 | 6.9 |
| Dissolved Potassium (K) | mg/L | 2.14 | 1.46 | 1.18 | 0.81 | 0.259 | 0.85 | 3.46 | 1.86 |
| Dissolved Sodium (Na) | mg/L | 21.8 | 24.8 | 23.5 | 9 | 6.82 | 7.07 | 35.4 | 36.6 |
| Dissolved Sulphur (S) | mg/L | 24.3 | 49.7 | 23.7 | 123 | 34.2 | 12.9 | 147 | 93.2 |
| Dissolved Sulphate (SO4) | mg/L | 72.9 | 149.1 | 71.1 | 369 | 102.6 | 38.7 | 441 | 279.6 |

**Montague - Porewater**

| Sample ID | | M-2018-C10 (0-5cm) | M-2018-C10 (15-20cm) | M-2018-C10 (30-40cm) | M-2018-C11 (2.5-10cm) | M-2018-C11 (10-20cm) | M-2018-C11 (30-40cm) | M-2018-C12 (2.5-10cm) | M-2018-C12 (30-40cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Porewater Concentrations ($mg/L_{PW}$)** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/Lpw | 37.38 | 23.22 | 29.40 | 52.02 | 22.79 | 24.57 | 134.12 | 35.71 |
| Total Cyanide (CN) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0104 | 0.0104 | 0.0000 | 0.0000 | 0.0000 |
| WAD Cyanide (Free) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0021 | 0.0021 | 0.0000 | 0.0000 | 0.0000 |
| Alkalinity (Total as CaCO3) | mg/Lpw | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/Lpw | 137.22 | 280.75 | 116.55 | 684.65 | 196.42 | 62.28 | 628.00 | 449.53 |
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/Lpw | 0.0926 | 0.1178 | 0.1266 | 0.9489 | 0.1633 | 0.2351 | 14.0289 | 2.2476 |
| Dissolved Antimony (Sb) | mg/Lpw | 0.0013 | 0.0008 | 0.0008 | 0.0002 | 0.0001 | 0.0004 | 0.0002 | 0.0002 |
| Dissolved Arsenic (As) | mg/Lpw | 0.0231 | 0.0298 | 0.0319 | 0.0460 | 0.1146 | 1.4086 | 0.0032 | 0.0049 |
| Dissolved Barium (Ba) | mg/Lpw | 0.1768 | 0.1300 | 0.0966 | 0.0705 | 0.1316 | 0.0386 | 0.0645 | 0.0813 |
| Dissolved Beryllium (Be) | mg/Lpw | 0.0000 | 0.0001 | 0.0000 | 0.0006 | 0.0000 | 0.0000 | 0.0070 | 0.0010 |
| Dissolved Bismuth (Bi) | mg/Lpw | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0000 | 0.0001 | 0.0001 | 0.0001 |
| Dissolved Boron (B) | mg/Lpw | 0.0418 | 0.0443 | 0.0357 | 0.1040 | 0.0207 | 0.0424 | 0.1064 | 0.1050 |
| Dissolved Cadmium (Cd) | mg/Lpw | 0.0001 | 0.0002 | 0.0002 | 0.0007 | 0.0001 | 0.0002 | 0.0903 | 0.0077 |
| Dissolved Chromium (Cr) | mg/Lpw | 0.0017 | 0.0019 | 0.0021 | 0.0017 | 0.0037 | 0.0021 | 0.0012 | 0.0011 |
| Dissolved Cobalt (Co) | mg/Lpw | 0.0002 | 0.0009 | 0.0002 | 0.2955 | 0.0097 | 0.0014 | 0.3960 | 0.0496 |
| Dissolved Copper (Cu) | mg/Lpw | 0.0068 | 0.0074 | 0.0078 | 0.0049 | 0.0176 | 0.0071 | 0.0307 | 0.0007 |
| Dissolved Iron (Fe) | mg/Lpw | 0.0869 | 0.0342 | 0.0607 | 0.2054 | 0.0721 | 0.1106 | 0.2171 | 0.0746 |
| Dissolved Lead (Pb) | mg/Lpw | 0.0007 | 0.0005 | 0.0006 | 0.0014 | 0.0007 | 0.0006 | 0.0364 | 0.0015 |
| Dissolved Lithium (Li) | mg/Lpw | 0.0019 | 0.0022 | 0.0012 | 0.0219 | 0.0085 | 0.0038 | 0.0228 | 0.0053 |
| Dissolved Manganese (Mn) | mg/Lpw | 0.0161 | 0.8000 | 0.1888 | 26.2205 | 2.8799 | 0.6694 | 68.5480 | 31.5089 |
| Dissolved Molybdenum (Mo) | mg/Lpw | 0.0001 | 0.0001 | 0.0003 | 0.0005 | 0.0001 | 0.0002 | 0.0005 | 0.0005 |
| Dissolved Nickel (Ni) | mg/Lpw | 0.0046 | 0.0057 | 0.0047 | 0.1348 | 0.0119 | 0.0064 | 0.9047 | 0.0592 |
| Dissolved Selenium (Se) | mg/Lpw | 0.0001 | 0.0001 | 0.0007 | 0.0004 | 0.0001 | 0.0002 | 0.0004 | 0.0004 |
| Dissolved Silicon (Si) | mg/Lpw | 7.8727 | 6.8183 | 6.1322 | 11.2790 | 9.7172 | 11.7140 | 18.5633 | 12.5195 |
| Dissolved Silver (Ag) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0001 | 0.0001 |
| Dissolved Strontium (Sr) | mg/Lpw | 0.2122 | 0.3842 | 0.1695 | 0.9302 | 0.2776 | 0.0769 | 0.5727 | 0.4747 |
| Dissolved Thallium (Tl) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0002 | 0.0002 |
| Dissolved Tin (Sn) | mg/Lpw | 0.0004 | 0.0004 | 0.0004 | 0.0021 | 0.0004 | 0.0008 | 0.0021 | 0.0021 |
| Dissolved Titanium (Ti) | mg/Lpw | 0.0018 | 0.0011 | 0.0013 | 0.0052 | 0.0012 | 0.0021 | 0.0053 | 0.0053 |
| Dissolved Uranium (U) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 0.0000 |
| Dissolved Vanadium (V) | mg/Lpw | 0.0018 | 0.0009 | 0.0025 | 0.0021 | 0.0004 | 0.0008 | 0.0021 | 0.0021 |
| Dissolved Zinc (Zn) | mg/Lpw | 0.0235 | 0.0439 | 0.0428 | 0.4932 | 0.0350 | 0.0314 | 4.0873 | 0.4012 |
| Dissolved Zirconium (Zr) | mg/Lpw | 0.0002 | 0.0002 | 0.0002 | 0.0010 | 0.0002 | 0.0004 | 0.0011 | 0.0011 |
| Dissolved Calcium (Ca) | mg/Lpw | 46.18 | 96.47 | 38.22 | 212.26 | 53.66 | 17.43 | 221.40 | 156.28 |
| Dissolved Magnesium (Mg) | mg/Lpw | 5.28 | 9.92 | 5.04 | 37.25 | 15.19 | 4.58 | 19.05 | 14.49 |
| Dissolved Potassium (K) | mg/Lpw | 4.71 | 3.08 | 2.48 | 1.69 | 0.54 | 1.80 | 7.37 | 3.91 |
| Dissolved Sodium (Na) | mg/Lpw | 47.94 | 52.35 | 49.35 | 18.73 | 14.13 | 14.98 | 75.36 | 76.88 |
| Dissolved Sulphur (S) | mg/Lpw | 53.44 | 104.91 | 49.77 | 255.96 | 70.86 | 27.33 | 312.94 | 195.78 |
| Dissolved Sulphate (SO4) | mg/Lpw | 160.31 | 314.74 | 149.31 | 767.89 | 212.58 | 81.98 | 938.81 | 587.33 |

**Montague - Porewater**

| Sample ID | | M-2018-C13 (2.5-10cm) | M-2018-C13 (20-30cm) | M-2018-C17 (2.5-10cm) | M-2018-C17 (15-20cm) | M-2018-C17 (30-40cm) | M-2018-C18 (0-2.5cm) | M-2018-C18 (2.5-10cm) | M-2018-C18 (10-20cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Sample Coordinates** | | | | | | | | | |
| Latitude | | 44.71307396 | 44.71307396 | 44.71998501 | 44.71998501 | 44.71998501 | 44.71898387 | 44.71898387 | 44.71898387 |
| Longitude | | -63.51727299 | -63.51727299 | -63.50946601 | -63.50946601 | -63.50946601 | -63.50804284 | -63.50804284 | -63.50804284 |
| **EcoMetrix Porewater Test Data** | | | | | | | | | |
| Mass Sample (wet weight) | g-wet | 290.54 | 300.86 | 280.23 | 300.47 | 301.23 | 265.13 | 282.29 | 296.89 |
| Mass Water Added | g | 290.88 | 299.76 | 280.81 | 302.38 | 301.69 | 265.10 | 282.75 | 300.97 |
| Water-to-Solids Ratio | - | 1.00 | 1.00 | 1.00 | 1.01 | 1.00 | 1.00 | 1.00 | 1.01 |
| Lab pH | - | 4.88 | 4.90 | 5.88 | 6.08 | 5.73 | 5.14 | 4.72 | 4.52 |
| Lab Electrical Conductivity | µS/cm | 83.49 | 56.96 | 196.90 | 160.80 | 313.40 | 469.10 | 633.50 | 807.20 |
| Environmental Moisture Content | % | 87.8% | 90.0% | 25.2% | 21.3% | 21.4% | 89.5% | 54.6% | 69.8% |
| PW Volume | mL (g) | 255.09 | 270.77 | 70.62 | 64.00 | 64.46 | 237.29 | 154.13 | 207.23 |
| Total Water Mass | g | 545.97 | 570.53 | 351.43 | 366.38 | 366.15 | 502.39 | 436.88 | 508.20 |
| Total Water Volume | L | 0.546 | 0.571 | 0.351 | 0.366 | 0.366 | 0.502 | 0.437 | 0.508 |
| Sample Solids Mass (dry weight) | g | 35.45 | 30.09 | 209.61 | 236.47 | 236.77 | 27.84 | 128.16 | 89.66 |
| **Lab-Measured Constituent Concentration** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | 38 | 6.6 | 25 | <5.0 | 12 | 15 | 12 | 17 |
| Total Cyanide (CN) | mg/L | | | | | | | <0.005 | <0.005 |
| WAD Cyanide (Free) | mg/L | | | | | | | <0.001 | <0.001 |
| Alkalinity (Total as CaCO3) | mg/L | | | | | | | | |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | µg/L | 0.14 | 0.18 | 0.35 | 3.1 | 0.05 | <0.01 | 0.01 | <0.01 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 21 | 11.2 | 24.2 | 28.3 | 98 | 72.7 | 129 | 207 |

**Montague - Porewater**

| Sample ID | | M-2018-C13 (2.5-10cm) | M-2018-C13 (20-30cm) | M-2018-C17 (2.5-10cm) | M-2018-C17 (15-20cm) | M-2018-C17 (30-40cm) | M-2018-C18 (0-2.5cm) | M-2018-C18 (2.5-10cm) | M-2018-C18 (10-20cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.223 | 0.364 | 0.0132 | 0.0675 | 0.0112 | 0.0688 | 0.185 | 0.251 |
| Dissolved Antimony (Sb) | mg/L | 0.00134 | 0.000443 | 0.00595 | 0.012 | 0.00504 | 0.00023 | 0.000465 | 0.000393 |
| Dissolved Arsenic (As) | mg/L | 0.0491 | 0.331 | 12.4 | 7.54 | 2.99 | 0.0232 | 0.175 | 0.237 |
| Dissolved Barium (Ba) | mg/L | 0.0147 | 0.00782 | 0.00157 | 0.00583 | 0.019 | 0.0672 | 0.0593 | 0.0413 |
| Dissolved Beryllium (Be) | mg/L | 0.000034 | 0.000012 | <0.0001 | <0.0001 | <0.00005 | 0.000034 | 0.000064 | 0.000102 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000416 | 0.00016 | 0.000054 | 0.000244 | <0.000025 | <0.000005 | <0.000005 | <0.000005 |
| Dissolved Boron (B) | mg/L | 0.03 | <0.01 | <0.1 | <0.1 | <0.05 | 0.015 | 0.012 | 0.013 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000919 | 0.0000784 | <0.00005 | <0.00005 | <0.000025 | 0.0000807 | 0.000125 | 0.000113 |
| Dissolved Chromium (Cr) | mg/L | 0.00256 | 0.0003 | <0.001 | 0.0034 | 0.00163 | 0.00124 | 0.00013 | 0.00079 |
| Dissolved Cobalt (Co) | mg/L | 0.00125 | 0.000365 | 0.00771 | 0.00379 | 0.0368 | 0.0087 | 0.0153 | 0.0215 |
| Dissolved Copper (Cu) | mg/L | 0.0111 | 0.00649 | 0.00232 | 0.00368 | 0.00056 | 0.00487 | 0.0014 | 0.0113 |
| Dissolved Iron (Fe) | mg/L | 0.154 | 0.154 | 4.45 | 1.62 | 3.81 | 0.0906 | 2.75 | 4.02 |
| Dissolved Lead (Pb) | mg/L | 0.00118 | 0.00423 | 0.00465 | 0.0155 | 0.000495 | 0.000474 | 0.0116 | 0.00795 |
| Dissolved Lithium (Li) | mg/L | <0.0005 | <0.0005 | <0.005 | <0.005 | 0.0044 | <0.0005 | 0.00061 | 0.0006 |
| Dissolved Manganese (Mn) | mg/L | 0.176 | 0.07 | 0.949 | 0.572 | 1.61 | 1.4 | 4.41 | 6.71 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000058 | 0.00007 | <0.0005 | <0.0005 | <0.00025 | <0.00005 | <0.00005 | <0.00005 |
| Dissolved Nickel (Ni) | mg/L | 0.00655 | 0.00108 | 0.0059 | 0.00489 | 0.047 | 0.00651 | 0.0125 | 0.0133 |
| Dissolved Selenium (Se) | mg/L | 0.000154 | 0.00015 | <0.0004 | <0.0004 | <0.0002 | <0.00004 | <0.00004 | <0.00004 |
| Dissolved Silicon (Si) | mg/L | 3.63 | 3.61 | 3.45 | 1.64 | 1.82 | 1.84 | 1.93 | 2.09 |
| Dissolved Silver (Ag) | mg/L | 0.0000111 | 0.0000609 | <0.00005 | <0.00005 | <0.000025 | 0.0000063 | <0.000005 | <0.000005 |
| Dissolved Strontium (Sr) | mg/L | 0.0241 | 0.0088 | 0.0256 | 0.0387 | 0.117 | 0.0798 | 0.136 | 0.215 |
| Dissolved Thallium (Tl) | mg/L | 0.000012 | 0.0000236 | <0.00002 | <0.00002 | 0.000012 | 0.0000274 | 0.0000186 | 0.0000207 |
| Dissolved Tin (Sn) | mg/L | <0.0002 | <0.0002 | <0.002 | <0.002 | <0.001 | <0.0002 | <0.0002 | <0.0002 |
| Dissolved Titanium (Ti) | mg/L | 0.00229 | 0.0046 | <0.005 | <0.005 | <0.0025 | <0.0005 | 0.00233 | <0.0005 |
| Dissolved Uranium (U) | mg/L | 0.0000223 | 0.0000375 | <0.00002 | <0.00002 | <0.00001 | 0.0000035 | 0.0000162 | 0.000021 |
| Dissolved Vanadium (V) | mg/L | 0.00049 | 0.00056 | <0.002 | <0.002 | <0.001 | 0.00169 | 0.00309 | <0.0002 |
| Dissolved Zinc (Zn) | mg/L | 0.0825 | 0.0198 | 0.0092 | 0.005 | 0.0222 | 0.0737 | 0.0436 | 0.0491 |
| Dissolved Zirconium (Zr) | mg/L | <0.0001 | 0.00022 | <0.001 | <0.001 | <0.0005 | <0.0001 | <0.0001 | <0.0001 |
| Dissolved Calcium (Ca) | mg/L | 5.56 | 2.95 | 8.06 | 9.42 | 22.3 | 19.9 | 36.7 | 60.7 |
| Dissolved Magnesium (Mg) | mg/L | 1.73 | 0.925 | 1 | 1.17 | 10.3 | 5.59 | 9.11 | 13.4 |
| Dissolved Potassium (K) | mg/L | 0.278 | 0.097 | 3.12 | 3.42 | 3.89 | 2.18 | 2.25 | 2.54 |
| Dissolved Sodium (Na) | mg/L | 8 | 2.97 | 16.8 | 10.7 | 6.84 | 54.7 | 56.5 | 56.5 |
| Dissolved Sulphur (S) | mg/L | 7.84 | 3.61 | 8.5 | 11 | 38.4 | 42.6 | 66.9 | 93.1 |
| Dissolved Sulphate (SO4) | mg/L | 23.52 | 10.83 | 25.5 | 33 | 115.2 | 127.8 | 200.7 | 279.3 |

**Montague - Porewater**

| Sample ID | | M-2018-C13 (2.5-10cm) | M-2018-C13 (20-30cm) | M-2018-C17 (2.5-10cm) | M-2018-C17 (15-20cm) | M-2018-C17 (30-40cm) | M-2018-C18 (0-2.5cm) | M-2018-C18 (2.5-10cm) | M-2018-C18 (10-20cm) |
|---|---|---|---|---|---|---|---|---|---|
| **Porewater Concentrations ($mg/L_{PW}$)** | | | | | | | | | |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/Lpw | 81.33 | 13.91 | 124.41 | 28.62 | 68.16 | 31.76 | 34.01 | 41.69 |
| Total Cyanide (CN) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0142 | 0.0123 |
| WAD Cyanide (Free) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 0.0025 |
| Alkalinity (Total as CaCO3) | mg/Lpw | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Mercury** | | | | | | | | | |
| Dissolved Mercury (Hg) | mg/Lpw | 0.0003 | 0.0004 | 0.0017 | 0.0177 | 0.0003 | 0.0000 | 0.0000 | 0.0000 |
| **Calculated Parameters** | | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/Lpw | 44.95 | 23.60 | 120.43 | 162.01 | 556.64 | 153.92 | 365.65 | 507.64 |
| **Constituents by ICPMS** | | | | | | | | | |
| Dissolved Aluminum (Al) | mg/Lpw | 0.4773 | 0.7670 | 0.0657 | 0.3864 | 0.0636 | 0.1457 | 0.5244 | 0.6155 |
| Dissolved Antimony (Sb) | mg/Lpw | 0.0029 | 0.0009 | 0.0296 | 0.0687 | 0.0286 | 0.0005 | 0.0013 | 0.0010 |
| Dissolved Arsenic (As) | mg/Lpw | 0.1051 | 0.6974 | 61.7082 | 43.1641 | 16.9833 | 0.0491 | 0.4960 | 0.5812 |
| Dissolved Barium (Ba) | mg/Lpw | 0.0315 | 0.0165 | 0.0078 | 0.0334 | 0.1079 | 0.1423 | 0.1681 | 0.1013 |
| Dissolved Beryllium (Be) | mg/Lpw | 0.0001 | 0.0000 | 0.0005 | 0.0006 | 0.0003 | 0.0001 | 0.0002 | 0.0003 |
| Dissolved Bismuth (Bi) | mg/Lpw | 0.0001 | 0.0003 | 0.0003 | 0.0014 | 0.0001 | 0.0000 | 0.0000 | 0.0000 |
| Dissolved Boron (B) | mg/Lpw | 0.0642 | 0.0211 | 0.4976 | 0.5725 | 0.2840 | 0.0318 | 0.0340 | 0.0319 |
| Dissolved Cadmium (Cd) | mg/Lpw | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0001 | 0.0002 | 0.0004 | 0.0003 |
| Dissolved Chromium (Cr) | mg/Lpw | 0.0055 | 0.0006 | 0.0050 | 0.0195 | 0.0093 | 0.0026 | 0.0004 | 0.0019 |
| Dissolved Cobalt (Co) | mg/Lpw | 0.0027 | 0.0008 | 0.0384 | 0.0217 | 0.2090 | 0.0184 | 0.0434 | 0.0527 |
| Dissolved Copper (Cu) | mg/Lpw | 0.0238 | 0.0137 | 0.0115 | 0.0211 | 0.0032 | 0.0103 | 0.0040 | 0.0277 |
| Dissolved Iron (Fe) | mg/Lpw | 0.3296 | 0.3245 | 22.1453 | 9.2740 | 21.6409 | 0.1918 | 7.7948 | 9.8585 |
| Dissolved Lead (Pb) | mg/Lpw | 0.0025 | 0.0089 | 0.0231 | 0.0887 | 0.0028 | 0.0010 | 0.0329 | 0.0195 |
| Dissolved Lithium (Li) | mg/Lpw | 0.0011 | 0.0011 | 0.0249 | 0.0286 | 0.0250 | 0.0011 | 0.0017 | 0.0015 |
| Dissolved Manganese (Mn) | mg/Lpw | 0.3767 | 0.1475 | 4.7227 | 3.2745 | 9.1449 | 2.9641 | 12.5001 | 16.4553 |
| Dissolved Molybdenum (Mo) | mg/Lpw | 0.0001 | 0.0001 | 0.0025 | 0.0029 | 0.0014 | 0.0001 | 0.0001 | 0.0001 |
| Dissolved Nickel (Ni) | mg/Lpw | 0.0140 | 0.0023 | 0.0294 | 0.0280 | 0.2670 | 0.0138 | 0.0354 | 0.0326 |
| Dissolved Selenium (Se) | mg/Lpw | 0.0003 | 0.0003 | 0.0020 | 0.0023 | 0.0011 | 0.0001 | 0.0001 | 0.0001 |
| Dissolved Silicon (Si) | mg/Lpw | 7.7692 | 7.6064 | 17.1688 | 9.3885 | 10.3377 | 3.8956 | 5.4706 | 5.1254 |
| Dissolved Silver (Ag) | mg/Lpw | 0.0000 | 0.0001 | 0.0002 | 0.0003 | 0.0001 | 0.0000 | 0.0000 | 0.0000 |
| Dissolved Strontium (Sr) | mg/Lpw | 0.0516 | 0.0185 | 0.1274 | 0.2215 | 0.6646 | 0.1690 | 0.3855 | 0.5273 |
| Dissolved Thallium (Tl) | mg/Lpw | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Dissolved Tin (Sn) | mg/Lpw | 0.0004 | 0.0004 | 0.0100 | 0.0114 | 0.0057 | 0.0004 | 0.0006 | 0.0005 |
| Dissolved Titanium (Ti) | mg/Lpw | 0.0049 | 0.0097 | 0.0249 | 0.0286 | 0.0142 | 0.0011 | 0.0066 | 0.0012 |
| Dissolved Uranium (U) | mg/Lpw | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0000 | 0.0001 |
| Dissolved Vanadium (V) | mg/Lpw | 0.0010 | 0.0012 | 0.0100 | 0.0114 | 0.0057 | 0.0036 | 0.0088 | 0.0005 |
| Dissolved Zinc (Zn) | mg/Lpw | 0.1766 | 0.0417 | 0.0458 | 0.0286 | 0.1261 | 0.1560 | 0.1236 | 0.1204 |
| Dissolved Zirconium (Zr) | mg/Lpw | 0.0002 | 0.0005 | 0.0050 | 0.0057 | 0.0028 | 0.0002 | 0.0003 | 0.0002 |
| Dissolved Calcium (Ca) | mg/Lpw | 11.90 | 6.22 | 40.11 | 53.93 | 126.66 | 42.13 | 104.03 | 148.86 |
| Dissolved Magnesium (Mg) | mg/Lpw | 3.70 | 1.95 | 4.98 | 6.70 | 58.50 | 11.84 | 25.82 | 32.86 |
| Dissolved Potassium (K) | mg/Lpw | 0.59 | 0.20 | 15.53 | 19.58 | 22.10 | 4.62 | 6.38 | 6.23 |
| Dissolved Sodium (Na) | mg/Lpw | 17.12 | 6.26 | 83.60 | 61.25 | 38.85 | 115.81 | 160.15 | 138.56 |
| Dissolved Sulphur (S) | mg/Lpw | 16.78 | 7.61 | 42.30 | 62.97 | 218.11 | 90.19 | 189.63 | 228.31 |
| Dissolved Sulphate (SO4) | mg/Lpw | 50.34 | 22.82 | 126.90 | 188.91 | 654.34 | 270.58 | 568.88 | 684.94 |

**Montague - Porewater**

| Sample ID | | M-2018-C18 (20-30cm) | M-2018-C19 (0-5cm) | M-2018-C19 (20-30cm) |
|---|---|---|---|---|
| **Sample Coordinates** | | | | |
| Latitude | | 44.71898387 | 44.72331396 | 44.72331396 |
| Longitude | | -63.50804284 | -63.50636202 | -63.50636202 |
| **EcoMetrix Porewater Test Data** | | | | |
| Mass Sample (wet weight) | g-wet | 302.85 | 290.59 | 307.96 |
| Mass Water Added | g | 299.70 | 292.42 | 307.69 |
| Water-to-Solids Ratio | - | 0.99 | 1.01 | 1.00 |
| Lab pH | - | 4.69 | 5.51 | 4.41 |
| Lab Electrical Conductivity | µS/cm | 874.80 | 137.80 | 300.60 |
| Environmental Moisture Content | % | 79.1% | 79.0% | 24.6% |
| PW Volume | mL (g) | 239.55 | 229.57 | 75.76 |
| Total Water Mass | g | 539.25 | 521.99 | 383.45 |
| Total Water Volume | L | 0.539 | 0.522 | 0.383 |
| Sample Solids Mass (dry weight) | g | 63.30 | 61.02 | 232.20 |
| **Lab-Measured Constituent Concentration** | | | | |
| **Inorganics** | | | | |
| Acidity | mg/L | 15 | 17 | 24 |
| Total Cyanide (CN) | mg/L | | | |
| WAD Cyanide (Free) | mg/L | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | |
| **Mercury** | | | | |
| Dissolved Mercury (Hg) | µg/L | 0.03 | 0.12 | 0.02 |
| **Calculated Parameters** | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 231 | 16.3 | 64.8 |

**Montague - Porewater**

| Sample ID | | M-2018-C18 (20-30cm) | M-2018-C19 (0-5cm) | M-2018-C19 (20-30cm) |
|---|---|---|---|---|
| **Constituents by ICPMS** | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.245 | 0.13 | 0.162 |
| Dissolved Antimony (Sb) | mg/L | 0.00089 | 0.00186 | 0.00169 |
| Dissolved Arsenic (As) | mg/L | 0.0863 | 0.129 | 3.53 |
| Dissolved Barium (Ba) | mg/L | 0.0586 | 0.0223 | 0.0122 |
| Dissolved Beryllium (Be) | mg/L | 0.000036 | 0.000034 | 0.000492 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000105 | 0.000049 | <0.000025 |
| Dissolved Boron (B) | mg/L | 0.018 | 0.013 | <0.05 |
| Dissolved Cadmium (Cd) | mg/L | 0.00016 | 0.000132 | 0.000587 |
| Dissolved Chromium (Cr) | mg/L | 0.00126 | 0.00286 | <0.0005 |
| Dissolved Cobalt (Co) | mg/L | 0.00891 | 0.00497 | 0.245 |
| Dissolved Copper (Cu) | mg/L | 0.0158 | 0.0168 | 0.00281 |
| Dissolved Iron (Fe) | mg/L | 1.28 | 0.243 | 5.65 |
| Dissolved Lead (Pb) | mg/L | 0.00295 | 0.00201 | 0.0281 |
| Dissolved Lithium (Li) | mg/L | 0.00058 | 0.00057 | 0.0119 |
| Dissolved Manganese (Mn) | mg/L | 6.6 | 1.04 | 10.2 |
| Dissolved Molybdenum (Mo) | mg/L | <0.00005 | 0.000098 | <0.00025 |
| Dissolved Nickel (Ni) | mg/L | 0.00525 | 0.0138 | 0.211 |
| Dissolved Selenium (Se) | mg/L | 0.000043 | 0.000047 | <0.0002 |
| Dissolved Silicon (Si) | mg/L | 1.87 | 1.97 | 2.73 |
| Dissolved Silver (Ag) | mg/L | <0.000005 | 0.0000119 | <0.000025 |
| Dissolved Strontium (Sr) | mg/L | 0.248 | 0.0184 | 0.0706 |
| Dissolved Thallium (Tl) | mg/L | 0.0000369 | 0.000015 | 0.000044 |
| Dissolved Tin (Sn) | mg/L | <0.0002 | <0.0002 | <0.001 |
| Dissolved Titanium (Ti) | mg/L | 0.0008 | 0.00242 | <0.0025 |
| Dissolved Uranium (U) | mg/L | 0.0000188 | 0.0000182 | 0.000023 |
| Dissolved Vanadium (V) | mg/L | <0.0002 | 0.00201 | <0.001 |
| Dissolved Zinc (Zn) | mg/L | 0.0316 | 0.0336 | 0.64 |
| Dissolved Zirconium (Zr) | mg/L | <0.0001 | 0.00014 | <0.0005 |
| Dissolved Calcium (Ca) | mg/L | 64.3 | 4.39 | 16.8 |
| Dissolved Magnesium (Mg) | mg/L | 17.1 | 1.3 | 5.53 |
| Dissolved Potassium (K) | mg/L | 1.6 | 1.52 | 3.74 |
| Dissolved Sodium (Na) | mg/L | 66.7 | 14.7 | 5.92 |
| Dissolved Sulphur (S) | mg/L | 103 | 10.3 | 35.5 |
| Dissolved Sulphate (SO4) | mg/L | 309 | 30.9 | 106.5 |

**Montague - Porewater**

| Sample ID | | M-2018-C18 (20-30cm) | M-2018-C19 (0-5cm) | M-2018-C19 (20-30cm) |
|---|---|---|---|---|
| **Porewater Concentrations ($mg/L_{PW}$)** | | | | |
| **Inorganics** | | | | |
| Acidity | mg/Lpw | 33.77 | 38.65 | 121.48 |
| Total Cyanide (CN) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 |
| WAD Cyanide (Free) | mg/Lpw | 0.0000 | 0.0000 | 0.0000 |
| Alkalinity (Total as CaCO3) | mg/Lpw | 0.00 | 0.00 | 0.00 |
| **Mercury** | | | | |
| Dissolved Mercury (Hg) | mg/Lpw | 0.0001 | 0.0003 | 0.0001 |
| **Calculated Parameters** | | | | |
| Dissolved Hardness (CaCO3) | mg/Lpw | 520.00 | 37.06 | 327.98 |
| **Constituents by ICPMS** | | | | |
| Dissolved Aluminum (Al) | mg/Lpw | 0.5515 | 0.2956 | 0.8200 |
| Dissolved Antimony (Sb) | mg/Lpw | 0.0020 | 0.0042 | 0.0086 |
| Dissolved Arsenic (As) | mg/Lpw | 0.1943 | 0.2933 | 17.8670 |
| Dissolved Barium (Ba) | mg/Lpw | 0.1319 | 0.0507 | 0.0618 |
| Dissolved Beryllium (Be) | mg/Lpw | 0.0001 | 0.0001 | 0.0025 |
| Dissolved Bismuth (Bi) | mg/Lpw | 0.0000 | 0.0001 | 0.0001 |
| Dissolved Boron (B) | mg/Lpw | 0.0405 | 0.0296 | 0.2531 |
| Dissolved Cadmium (Cd) | mg/Lpw | 0.0004 | 0.0003 | 0.0030 |
| Dissolved Chromium (Cr) | mg/Lpw | 0.0028 | 0.0065 | 0.0025 |
| Dissolved Cobalt (Co) | mg/Lpw | 0.0201 | 0.0113 | 1.2401 |
| Dissolved Copper (Cu) | mg/Lpw | 0.0356 | 0.0382 | 0.0142 |
| Dissolved Iron (Fe) | mg/Lpw | 2.8814 | 0.5525 | 28.5973 |
| Dissolved Lead (Pb) | mg/Lpw | 0.0066 | 0.0046 | 0.1422 |
| Dissolved Lithium (Li) | mg/Lpw | 0.0013 | 0.0013 | 0.0602 |
| Dissolved Manganese (Mn) | mg/Lpw | 14.8571 | 2.3647 | 51.6271 |
| Dissolved Molybdenum (Mo) | mg/Lpw | 0.0001 | 0.0002 | 0.0013 |
| Dissolved Nickel (Ni) | mg/Lpw | 0.0118 | 0.0314 | 1.0680 |
| Dissolved Selenium (Se) | mg/Lpw | 0.0001 | 0.0001 | 0.0010 |
| Dissolved Silicon (Si) | mg/Lpw | 4.2095 | 4.4794 | 13.8178 |
| Dissolved Silver (Ag) | mg/Lpw | 0.0000 | 0.0000 | 0.0001 |
| Dissolved Strontium (Sr) | mg/Lpw | 0.5583 | 0.0418 | 0.3573 |
| Dissolved Thallium (Tl) | mg/Lpw | 0.0001 | 0.0000 | 0.0002 |
| Dissolved Tin (Sn) | mg/Lpw | 0.0005 | 0.0005 | 0.0051 |
| Dissolved Titanium (Ti) | mg/Lpw | 0.0018 | 0.0055 | 0.0127 |
| Dissolved Uranium (U) | mg/Lpw | 0.0000 | 0.0000 | 0.0001 |
| Dissolved Vanadium (V) | mg/Lpw | 0.0005 | 0.0046 | 0.0051 |
| Dissolved Zinc (Zn) | mg/Lpw | 0.0711 | 0.0764 | 3.2393 |
| Dissolved Zirconium (Zr) | mg/Lpw | 0.0002 | 0.0003 | 0.0025 |
| Dissolved Calcium (Ca) | mg/Lpw | 144.74 | 9.98 | 85.03 |
| Dissolved Magnesium (Mg) | mg/Lpw | 38.49 | 2.96 | 27.99 |
| Dissolved Potassium (K) | mg/Lpw | 3.60 | 3.46 | 18.93 |
| Dissolved Sodium (Na) | mg/Lpw | 150.15 | 33.42 | 29.96 |
| Dissolved Sulphur (S) | mg/Lpw | 231.86 | 23.42 | 179.68 |
| Dissolved Sulphate (SO4) | mg/Lpw | 695.58 | 70.26 | 539.05 |

| Analyte | Units | M-2018-C1 (0-5cm) | M-2018-SFC-T9 | M-2018-C13 (2.5-10cm) | M-2018-C5 (2.5-10cm) | M-2018-SFC-T23 | M-2018-SFC-T35 | M-2018-C4 (0-10cm) | M-2018-C18 (0-2.5cm) |
|---|---|---|---|---|---|---|---|---|---|
| Dissolved As(III) | ug/L | 5200 | 85.3 | 6.39 | 44.7 | ≤4.0 | 1.47 | 2.47 | 17.9 |
| Dissolved As(V) | ug/L | 326 | 299 | 36.2 | 1170 | 3470 | 489 | 279 | 5.97 |
| Dissolved Dimethylarsinic Acids | ug/L | ≤5.0 | ≤0.125 | ≤0.125 | ≤5.0 | ≤5.0 | ≤0.125 | ≤0.125 | ≤0.125 |
| Dissolved Monomethylarsonic Acid | ug/L | ≤9.0 | ≤0.225 | ≤0.225 | ≤9.0 | ≤9.0 | ≤0.225 | ≤0.225 | ≤0.225 |

# Appendix D **Laboratory Certificates of Analysis**

**SGS Canada Inc.**
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

13-February-2019

**Ecometrix**
Attn : Daniel Skruch

6800 Campobello Road, Mississauga
Canada, L5N 2L8
Phone: 905-794-2325, Fax:905-794-2338

**Date Rec. :** 23 January 2019
**LR Report:** **CA15296-JAN19**
**Reference:** 18-2525

**Copy:** #1

# CERTIFICATE OF ANALYSIS
## Final Report

| Analysis | 1: Analysis Start Date | 2: Analysis Start Time | 3: Analysis Completed Date | 4: Analysis Completed Time | 5: M-2018-C1 (0-5) | 6: M-2018-C1 (10-20) | 7: M-2018-C1 (40-60) | 8: M-2018-C1 (180-200) | 9: M-2018-SFC-T3 |
|---|---|---|---|---|---|---|---|---|---|
| Paste pH | 11-Feb-19 | 09:13 | 13-Feb-19 | 13:59 | --- | --- | --- | --- | --- |
| Fizz Rate [---] | 11-Feb-19 | 09:13 | 13-Feb-19 | 13:59 | --- | --- | --- | --- | --- |
| Sample weight [g] | 11-Feb-19 | 09:13 | 13-Feb-19 | 13:59 | --- | --- | --- | --- | --- |
| HCl Added [mL] | 11-Feb-19 | 09:13 | 13-Feb-19 | 13:59 | --- | --- | --- | --- | --- |
| HCl [Normality] | 11-Feb-19 | 09:13 | 13-Feb-19 | 13:59 | --- | --- | --- | --- | --- |
| NaOH [Normality] | 11-Feb-19 | 09:13 | 13-Feb-19 | 13:59 | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | 11-Feb-19 | 09:13 | 13-Feb-19 | 13:59 | --- | --- | --- | --- | --- |
| Final pH [no unit] | 11-Feb-19 | 09:13 | 13-Feb-19 | 13:59 | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | 11-Feb-19 | 09:13 | 13-Feb-19 | 13:59 | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | 13-Feb-19 | 15:42 | 13-Feb-19 | 15:42 | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | 13-Feb-19 | 15:42 | 13-Feb-19 | 15:42 | --- | --- | --- | --- | --- |
| NP/AP [ratio] | 13-Feb-19 | 15:42 | 13-Feb-19 | 15:42 | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 11-Feb-19 | 14:23 | 13-Feb-19 | 13:40 | 0.044 | 0.014 | 0.230 | 0.170 | 0.021 |
| Acid Leachable SO4-S [%] | 13-Feb-19 | 13:59 | 13-Feb-19 | 13:40 | < 0.02 | < 0.02 | 0.02 | < 0.02 | < 0.02 |
| Sulphide [%] | 13-Feb-19 | 13:00 | 13-Feb-19 | 13:40 | 0.04 | 0.03 | 0.21 | 0.16 | 0.02 |
| Carbon (total) [%] | 11-Feb-19 | 14:23 | 11-Feb-19 | 14:25 | 5.36 | 0.905 | 0.153 | 2.33 | 0.449 |
| Carbonate [%] | 11-Feb-19 | 14:21 | 11-Feb-19 | 14:25 | 0.140 | 0.065 | 0.270 | 0.325 | 0.045 |

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**LR Report :** **CA15296-JAN19**

| Analysis | 10: M-2018-SFC-T7 | 11: M-2018-SFC-T2 | 12: M-2018-SFC-T9 | 13: M-2018-SFC-T14 | 14: M-2018-SFC-T28AHP | 15: M-2018-SFC-T12 | 16: M-2018-SFC-T13 | 17: M-2018-SFC-T15 | 18: M-2018-SW12-CORE (2.5-10) | 19: M-2018-SW12-CORE (30-40) |
|---|---|---|---|---|---|---|---|---|---|---|
| Paste pH | 5.94 | --- | 5.50 | --- | 4.03 | --- | --- | --- | --- | --- |
| Fizz Rate [---] | 1 | --- | 1 | --- | 1 | --- | --- | --- | --- | --- |
| Sample weight [g] | 1.98 | --- | 2.04 | --- | 2.03 | --- | --- | --- | --- | --- |
| HCl Added [mL] | 20.00 | --- | 20.00 | --- | 20.00 | --- | --- | --- | --- | --- |
| HCl [Normality] | 0.10 | --- | 0.10 | --- | 0.10 | --- | --- | --- | --- | --- |
| NaOH [Normality] | 0.10 | --- | 0.10 | --- | 0.10 | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | 18.35 | --- | 20.66 | --- | 25.47 | --- | --- | --- | --- | --- |
| Final pH [no unit] | 1.35 | --- | 1.34 | --- | 1.12 | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | 4.2 | --- | -1.6 | --- | -13.5 | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | 18.8 | --- | 11.2 | --- | 3.75 | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | -14.55 | --- | -12.85 | --- | -17.25 | --- | --- | --- | --- | --- |
| NP/AP [ratio] | 0.22 | --- | -0.14 | --- | -3.60 | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 0.588 | 0.152 | 0.414 | 0.220 | 0.318 | 0.730 | 0.714 | 0.320 | 0.680 | 0.644 |
| Acid Leachable SO4-S [%] | < 0.02 | 0.04 | 0.05 | 0.09 | 0.20 | 0.08 | 0.20 | 0.06 | 0.46 | 0.41 |
| Sulphide [%] | 0.60 | 0.11 | 0.36 | 0.13 | 0.12 | 0.65 | 0.51 | 0.26 | 0.22 | 0.23 |
| Carbon (total) [%] | 1.99 | 0.775 | 3.74 | 1.63 | 0.092 | 1.55 | 0.600 | 0.262 | 7.83 | 12.1 |
| Carbonate [%] | 0.080 | 0.195 | 0.060 | 0.070 | 0.075 | 0.270 | 0.380 | 0.145 | 0.120 | < 0.025 |

| Analysis | 20: M-2018-C5 (2.5-10) | 21: M-2018-C5 (30-50) | 22: M-2018-SFC-T25 | 23: M-2018-SFC-T26 | 24: M-2018-SFC-T27 | 25: M-2018-SFC-T32 | 26: M-2018-SFC-T17 | 27: M-2018-SFC-T20 | 28: M-2018-SFC-T23 | 29: M-2018-SFC-T30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Paste pH | 6.83 | --- | 6.94 | --- | --- | --- | --- | --- | --- | --- |
| Fizz Rate [---] | 1 | --- | 1 | --- | --- | --- | --- | --- | --- | --- |
| Sample weight [g] | 2.01 | --- | 2.00 | --- | --- | --- | --- | --- | --- | --- |
| HCl Added [mL] | 20.00 | --- | 20.00 | --- | --- | --- | --- | --- | --- | --- |
| HCl [Normality] | 0.10 | --- | 0.10 | --- | --- | --- | --- | --- | --- | --- |
| NaOH [Normality] | 0.10 | --- | 0.10 | --- | --- | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | 16.24 | --- | 17.71 | --- | --- | --- | --- | --- | --- | --- |
| Final pH [no unit] | 1.37 | --- | 1.12 | --- | --- | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | 9.4 | --- | 5.7 | --- | --- | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | 7.81 | --- | 1.25 | --- | --- | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | 1.59 | --- | 4.45 | --- | --- | --- | --- | --- | --- | --- |

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| Analysis | 20: M-2018-C5 (2.5-10) | 21: M-2018-C5 (30-50) | 22: M-2018-SFC-T25 | 23: M-2018-SFC-T26 | 24: M-2018-SFC-T27 | 25: M-2018-SFC-T32 | 26: M-2018-SFC-T17 | 27: M-2018-SFC-T20 | 28: M-2018-SFC-T23 | 29: M-2018-SFC-T30 |
|---|---|---|---|---|---|---|---|---|---|---|
| NP/AP [ratio] | 1.20 | --- | 4.56 | --- | --- | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 0.315 | 0.518 | 0.054 | 0.032 | 0.226 | 0.749 | 0.029 | 0.015 | 0.011 | 0.031 |
| Acid Leachable SO4-S [%] | 0.06 | 0.12 | < 0.02 | 0.03 | 0.21 | 0.15 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Sulphide [%] | 0.25 | 0.40 | 0.04 | < 0.02 | 0.02 | 0.60 | 0.02 | < 0.02 | < 0.02 | 0.02 |
| Carbon (total) [%] | 0.614 | 0.414 | 0.213 | 0.134 | 0.055 | 0.353 | 0.491 | 0.098 | 0.112 | 0.256 |
| Carbonate [%] | 0.230 | 0.929 | 0.070 | 0.055 | 0.050 | 0.365 | 0.190 | 0.200 | 0.230 | 0.924 |

| Analysis | 30: M-2018-SFC-T35 | 31: M-2018-C11 (2.5-10) | 32: M-2018-C11 (10-20) | 33: M-2018-C11 (30-40) | 34: M-2018-C2 (0-5) | 35: M-2018-C2 (10-20) | 36: M-2018-C2 (80-100) | 37: M-2018-C3 (0-5) | 38: M-2018-C3 (40-80) |
|---|---|---|---|---|---|---|---|---|---|
| Paste pH | --- | NSS | --- | --- | --- | --- | --- | --- | --- |
| Fizz Rate [---] | --- | 1 | --- | --- | --- | --- | --- | --- | --- |
| Sample weight [g] | --- | 1.89 | --- | --- | --- | --- | --- | --- | --- |
| HCl Added [mL] | --- | 27.00 | --- | --- | --- | --- | --- | --- | --- |
| HCl [Normality] | --- | 0.10 | --- | --- | --- | --- | --- | --- | --- |
| NaOH [Normality] | --- | 0.10 | --- | --- | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | --- | 38.94 | --- | --- | --- | --- | --- | --- | --- |
| Final pH [no unit] | --- | 1.56 | --- | --- | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | --- | -31.6 | --- | --- | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | --- | 12.2 | --- | --- | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | --- | -43.79 | --- | --- | --- | --- | --- | --- | --- |
| NP/AP [ratio] | --- | -2.59 | --- | --- | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 0.206 | 0.979 | 0.750 | 0.701 | 0.464 | 0.656 | 0.084 | 0.210 | 0.261 |
| Acid Leachable SO4-S [%] | 0.05 | 0.59 | 0.43 | 0.38 | 0.07 | 0.12 | 0.03 | 0.10 | 0.05 |
| Sulphide [%] | 0.16 | 0.39 | 0.32 | 0.32 | 0.39 | 0.54 | 0.05 | 0.11 | 0.21 |
| Carbon (total) [%] | 0.252 | 38.0 | 45.8 | 45.8 | 2.47 | 0.384 | 5.40 | 16.8 | 1.50 |
| Carbonate [%] | 0.944 | < 0.025 | < 0.025 | 0.030 | 0.105 | 0.050 | 0.065 | 0.070 | 0.305 |

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| Analysis | 39: M-2018-C3 (140-160) | 40: M-2018-C3 (160-180) | 41: M-2018-C4 (0-10) | 42: M-2018-C4 (40-60) | 43: M-2018-C4 (60-100) | 44: M-2018-C18 (0-2.5) | 45: M-2018-C18 (2.5-10) | 46: M-2018-C18 (10-20) | 47: M-2018-C18 (20-30) |
|---|---|---|---|---|---|---|---|---|---|
| Paste pH | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fizz Rate [---] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample weight [g] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HCl Added [mL] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HCl [Normality] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NaOH [Normality] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Final pH [no unit] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NP/AP [ratio] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 0.532 | 0.501 | 0.491 | 0.054 | 0.452 | 0.557 | 0.198 | 0.610 | 0.733 |
| Acid Leachable SO4-S [%] | 0.10 | 0.23 | 0.16 | 0.03 | 0.14 | 0.26 | 0.14 | 0.39 | 0.40 |
| Sulphide [%] | 0.43 | 0.27 | 0.33 | 0.02 | 0.31 | 0.30 | 0.06 | 0.22 | 0.33 |
| Carbon (total) [%] | 9.44 | 18.5 | 4.13 | 0.677 | 2.94 | 23.5 | 4.31 | 9.96 | 27.1 |
| Carbonate [%] | 0.105 | 0.100 | 0.040 | 0.040 | 0.255 | < 0.025 | < 0.025 | 0.040 | 0.155 |

| Analysis | 48: M-2018-SFC SOIL C.MOORE | 49: M-2018-SW9-C ORE (0-7.5) | 50: M-2018-SW9-C ORE (15-20) | 51: M-2018-SW10-C ORE (0-5) | 52: M-2018-SW10-C ORE (15-20) | 53: M-2018-SW10-C ORE (30-40) | 54: M-2018-C17 (2.5-10) | 55: M-2018-C17 (15-20) | 56: M-2018-C17 (30-40) |
|---|---|---|---|---|---|---|---|---|---|
| Paste pH | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fizz Rate [---] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample weight [g] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HCl Added [mL] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HCl [Normality] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NaOH [Normality] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Final pH [no unit] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- |

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| Analysis | 48: M-2018-SFC SOIL C.MOORE | 49: M-2018-SW9-C ORE (0-7.5) | 50: M-2018-SW9-C ORE (15-20) | 51: M-2018-SW10-C ORE (0-5) | 52: M-2018-SW10-C ORE (15-20) | 53: M-2018-SW10-C ORE (30-40) | 54: M-2018-C17 (2.5-10) | 55: M-2018-C17 (15-20) | 56: M-2018-C17 (30-40) |
|---|---|---|---|---|---|---|---|---|---|
| NP/AP [ratio] | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 0.029 | 0.165 | 0.085 | 0.160 | 0.434 | 0.282 | 0.106 | 0.116 | 0.358 |
| Acid Leachable SO4-S [%] | < 0.02 | 0.14 | 0.06 | 0.13 | 0.31 | 0.16 | 0.05 | 0.03 | 0.10 |
| Sulphide [%] | 0.02 | 0.03 | 0.02 | 0.03 | 0.12 | 0.12 | 0.06 | 0.09 | 0.26 |
| Carbon (total) [%] | 2.02 | 8.29 | 4.68 | 7.11 | 17.2 | 13.5 | 0.459 | 0.170 | 0.183 |
| Carbonate [%] | 0.345 | < 0.025 | < 0.025 | 0.030 | < 0.025 | < 0.025 | 0.030 | < 0.025 | 0.105 |

| Analysis | 57: G-2018-C2 (0-5) | 58: G-2018-C2 (20-40) | 59: G-2018-C2 (60-80) | 60: G-2018-C3 (0-5) | 61: G-2018-C3 (20-40) | 62: G-2018-C3 (100-120) | 63: G-2018-C5 (2.5-10) | 64: G-2018-C5 (15-20) | 65: G-2018-C11 (0-7.5) |
|---|---|---|---|---|---|---|---|---|---|
| Paste pH | --- | 5.06 | --- | --- | --- | --- | --- | --- | --- |
| Fizz Rate [---] | --- | 1 | --- | --- | --- | --- | --- | --- | --- |
| Sample weight [g] | --- | 2.02 | --- | --- | --- | --- | --- | --- | --- |
| HCl Added [mL] | --- | 20.00 | --- | --- | --- | --- | --- | --- | --- |
| HCl [Normality] | --- | 0.10 | --- | --- | --- | --- | --- | --- | --- |
| NaOH [Normality] | --- | 0.10 | --- | --- | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | --- | 18.99 | --- | --- | --- | --- | --- | --- | --- |
| Final pH [no unit] | --- | 1.50 | --- | --- | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | --- | 2.5 | --- | --- | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | --- | 31.9 | --- | --- | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | --- | -29.38 | --- | --- | --- | --- | --- | --- | --- |
| NP/AP [ratio] | --- | 0.08 | --- | --- | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 0.080 | 1.46 | 0.642 | 0.086 | 0.458 | 0.440 | 1.07 | 1.33 | 0.491 |
| Acid Leachable SO4-S [%] | 0.03 | 0.44 | 0.13 | 0.04 | 0.09 | 0.17 | 0.29 | 0.35 | 0.22 |
| Sulphide [%] | 0.05 | 1.02 | 0.51 | 0.05 | 0.37 | 0.27 | 0.78 | 0.98 | 0.27 |
| Carbon (total) [%] | 0.885 | 0.630 | 0.314 | 1.32 | 0.409 | 5.14 | 3.96 | 2.93 | 24.1 |
| Carbonate [%] | 0.090 | 0.105 | 0.130 | 0.100 | 0.270 | 0.160 | 0.824 | 0.649 | < 0.025 |

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| Analysis | 66: G-2018-C11 (15-20) | 67: G-2018-C12 (2.5-10) | 68: G-2018-C12 (20-40) | 69: G-2018-C13 (2.5-10) | 70: G-2018-C13 (20-40) | 71: G-2018-C7 (2.5-10) | 72: G-2018-C7 (15-20) | 73: G-2018-C7 (20-30) | 74: G-2018-C8 (0-5) | 75: G-2018-C8 (15-20) |
|---|---|---|---|---|---|---|---|---|---|---|
| Paste pH | --- | --- | --- | 4.87 | --- | --- | --- | --- | --- | 7.31 |
| Fizz Rate [---] | --- | --- | --- | 1 | --- | --- | --- | --- | --- | 1 |
| Sample weight [g] | --- | --- | --- | 2.00 | --- | --- | --- | --- | --- | 2.00 |
| HCl Added [mL] | --- | --- | --- | 20.00 | --- | --- | --- | --- | --- | 20.00 |
| HCl [Normality] | --- | --- | --- | 0.10 | --- | --- | --- | --- | --- | 0.10 |
| NaOH [Normality] | --- | --- | --- | 0.10 | --- | --- | --- | --- | --- | 0.10 |
| NaOH to pH=8.3 [mL] | --- | --- | --- | 21.99 | --- | --- | --- | --- | --- | 10.23 |
| Final pH [no unit] | --- | --- | --- | 1.23 | --- | --- | --- | --- | --- | 1.52 |
| NP [t CaCO3/1000 t] | --- | --- | --- | -5.0 | --- | --- | --- | --- | --- | 24.4 |
| AP [t CaCO3/1000 t] | --- | --- | --- | 3.44 | --- | --- | --- | --- | --- | 2.81 |
| Net NP [t CaCO3/1000 t] | --- | --- | --- | -8.44 | --- | --- | --- | --- | --- | 21.6 |
| NP/AP [ratio] | --- | --- | --- | -1.45 | --- | --- | --- | --- | --- | 8.68 |
| Sulphur (total) [%] | 0.464 | 0.233 | 0.343 | 0.246 | 0.454 | 0.344 | 0.292 | 0.428 | 0.098 | 0.146 |
| Acid Leachable SO4-S [%] | 0.15 | 0.11 | 0.22 | 0.14 | 0.19 | 0.21 | 0.23 | 0.23 | 0.05 | 0.06 |
| Sulphide [%] | 0.31 | 0.12 | 0.12 | 0.11 | 0.26 | 0.13 | 0.06 | 0.20 | 0.05 | 0.09 |
| Carbon (total) [%] | 24.8 | 9.54 | 19.7 | 8.62 | 27.2 | 12.8 | 24.4 | 36.9 | 3.84 | 0.501 |
| Carbonate [%] | < 0.025 | < 0.025 | < 0.025 | 0.090 | < 0.025 | 0.440 | 0.115 | 0.190 | < 0.025 | 1.29 |

| Analysis | 76: G-2018-C8 (40-50) | 77: G-2018-C9 (0-7.5) | 78: G-2018-C9 (20-30) | 79: G-2018-C10 (2.5-10) | 80: G-2018-C10 (15-20) | 81: G-2018-C10 (40-50) | 82: G-2018-C14 (2.5-10) | 83: G-2018-C14 (15-20) | 84: G-2018-C14 (40-50) | 85: G-2018-C15 (2.5-10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Paste pH | --- | 5.73 | --- | --- | --- | --- | --- | --- | --- | --- |
| Fizz Rate [---] | --- | 1 | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample weight [g] | --- | 1.99 | --- | --- | --- | --- | --- | --- | --- | --- |
| HCl Added [mL] | --- | 20.00 | --- | --- | --- | --- | --- | --- | --- | --- |
| HCl [Normality] | --- | 0.10 | --- | --- | --- | --- | --- | --- | --- | --- |
| NaOH [Normality] | --- | 0.10 | --- | --- | --- | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | --- | 19.79 | --- | --- | --- | --- | --- | --- | --- | --- |
| Final pH [no unit] | --- | 1.27 | --- | --- | --- | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | --- | 0.5 | --- | --- | --- | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | --- | 3.12 | --- | --- | --- | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | --- | -2.62 | --- | --- | --- | --- | --- | --- | --- | --- |

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| Analysis | 76: G-2018-C8 (40-50) | 77: G-2018-C9 (0-7.5) | 78: G-2018-C9 (20-30) | 79: G-2018-C10 (2.5-10) | 80: G-2018-C10 (15-20) | 81: G-2018-C10 (40-50) | 82: G-2018-C14 (2.5-10) | 83: G-2018-C14 (15-20) | 84: G-2018-C14 (40-50) | 85: G-2018-C15 (2.5-10) |
|---|---|---|---|---|---|---|---|---|---|---|
| NP/AP [ratio] | --- | 0.16 | --- | --- | --- | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 0.218 | 0.280 | 0.232 | 0.538 | 0.024 | 0.005 | 0.151 | 0.110 | 0.666 | 0.089 |
| Acid Leachable SO4-S [%] | 0.07 | 0.18 | 0.12 | 0.37 | < 0.02 | < 0.02 | 0.06 | 0.04 | 0.19 | 0.04 |
| Sulphide [%] | 0.15 | 0.10 | 0.11 | 0.17 | 0.02 | < 0.02 | 0.09 | 0.07 | 0.48 | 0.05 |
| Carbon (total) [%] | 0.587 | 10.6 | 8.00 | 6.40 | 1.02 | 0.267 | 0.208 | 0.201 | 2.39 | 0.476 |
| Carbonate [%] | 2.29 | < 0.025 | 0.140 | 1.05 | 0.035 | < 0.025 | 0.120 | 0.105 | 0.390 | 0.110 |

| Analysis | 86: G-2018-C15 (15-20) | 87: G-2018-C15 (20-30) | 88: G-2018-C17 (0-5) | 89: G-2018-C17 (10-20) | 90: G-2018-C17 (40-50) | 91: G-2018-C6 (29NOV) (0-7.5) | 92: G-2018-C6 (29NOV) (10-15) | 93: G-2018-C6 (29NOV) (40-50) | 94: G-2018-WR1 | 95: G-2018-WR2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Paste pH | --- | --- | --- | 7.45 | --- | --- | --- | --- | --- | 5.88 |
| Fizz Rate [---] | --- | --- | --- | 3 | --- | --- | --- | --- | --- | 1 |
| Sample weight [g] | --- | --- | --- | 1.99 | --- | --- | --- | --- | --- | 2.04 |
| HCl Added [mL] | --- | --- | --- | 20.00 | --- | --- | --- | --- | --- | 20.00 |
| HCl [Normality] | --- | --- | --- | 0.10 | --- | --- | --- | --- | --- | 0.10 |
| NaOH [Normality] | --- | --- | --- | 0.10 | --- | --- | --- | --- | --- | 0.10 |
| NaOH to pH=8.3 [mL] | --- | --- | --- | 12.47 | --- | --- | --- | --- | --- | 19.86 |
| Final pH [no unit] | --- | --- | --- | 1.38 | --- | --- | --- | --- | --- | 1.10 |
| NP [t CaCO3/1000 t] | --- | --- | --- | 18.9 | --- | --- | --- | --- | --- | 0.3 |
| AP [t CaCO3/1000 t] | --- | --- | --- | 4.06 | --- | --- | --- | --- | --- | 2.50 |
| Net NP [t CaCO3/1000 t] | --- | --- | --- | 14.8 | --- | --- | --- | --- | --- | -2.20 |
| NP/AP [ratio] | --- | --- | --- | 4.65 | --- | --- | --- | --- | --- | 0.12 |
| Sulphur (total) [%] | 0.468 | 0.436 | 0.247 | 0.234 | 0.303 | 0.108 | 0.077 | 0.429 | 0.124 | 0.137 |
| Acid Leachable SO4-S [%] | 0.23 | 0.21 | 0.12 | 0.10 | 0.10 | 0.07 | 0.06 | 0.30 | 0.05 | 0.06 |
| Sulphide [%] | 0.24 | 0.23 | 0.13 | 0.13 | 0.20 | 0.04 | 0.02 | 0.13 | 0.07 | 0.08 |
| Carbon (total) [%] | 27.3 | 32.7 | 1.73 | 1.26 | 1.04 | 7.34 | 1.43 | 34.5 | 0.174 | 0.440 |
| Carbonate [%] | 0.075 | 0.090 | 0.200 | 0.924 | 1.14 | 0.155 | 0.135 | 0.165 | 0.225 | 0.370 |

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| Analysis | 96: G-2018-WR3 | 97: G-2018-WR4 | 98: G-2018-WR5 | 99: G-2018-WR6 | 100: G-2018-SFC-1 (0-20) | 101: G-2018-SFC-2 | 102: G-2018-SFC-3 | 103: G-2018-SFC-4 | 104: G-2018-SFC-5 | 105: G-2018-SFC-6 |
|---|---|---|---|---|---|---|---|---|---|---|
| Paste pH | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fizz Rate [---] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample weight [g] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HCl Added [mL] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HCl [Normality] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NaOH [Normality] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Final pH [no unit] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NP/AP [ratio] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 0.039 | 0.217 | 0.040 | 0.017 | 0.228 | 0.061 | 0.008 | 0.023 | 0.012 | 0.095 |
| Acid Leachable SO4-S [%] | < 0.02 | 0.07 | 0.04 | < 0.02 | 0.17 | 0.04 | < 0.02 | 0.02 | < 0.02 | 0.04 |
| Sulphide [%] | 0.02 | 0.15 | < 0.02 | < 0.02 | 0.06 | 0.02 | < 0.02 | < 0.02 | < 0.02 | 0.05 |
| Carbon (total) [%] | 0.303 | 0.307 | 0.460 | 0.360 | 0.061 | 0.161 | 0.411 | 0.067 | 0.337 | 0.470 |
| Carbonate [%] | 0.225 | 0.834 | 0.510 | 0.255 | 0.080 | 0.135 | 0.050 | 0.055 | 0.050 | 0.570 |

| Analysis | 106: G-2018-SFC-7 | 107: G-2018-SFC-8 | 108: G-2018-SFC-10 | 109: G-2018-SFC-11 | 110: G-2018-SFC-12 | 111: G-2018-SFC-13 | 112: G-2018-SFC-14 | 113: G-2018-SFC-15 | 114: G-2018-SFC-16 | 115: G-2018-SFC-18 |
|---|---|---|---|---|---|---|---|---|---|---|
| Paste pH | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fizz Rate [---] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample weight [g] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HCl Added [mL] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HCl [Normality] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NaOH [Normality] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Final pH [no unit] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

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| Analysis | 106: G-2018-SFC-7 | 107: G-2018-SFC-8 | 108: G-2018-SFC-10 | 109: G-2018-SFC-11 | 110: G-2018-SFC-12 | 111: G-2018-SFC-13 | 112: G-2018-SFC-14 | 113: G-2018-SFC-15 | 114: G-2018-SFC-16 | 115: G-2018-SFC-18 |
|---|---|---|---|---|---|---|---|---|---|---|
| NP/AP [ratio] | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 0.026 | 0.064 | 0.013 | 0.122 | 2.54 | 0.045 | 0.101 | 0.034 | 0.140 | 0.056 |
| Acid Leachable SO4-S [%] | 0.03 | 0.02 | < 0.02 | 0.10 | 0.71 | < 0.02 | 0.04 | 0.03 | 0.04 | 0.04 |
| Sulphide [%] | < 0.02 | 0.04 | < 0.02 | 0.02 | 1.83 | 0.03 | 0.06 | < 0.02 | 0.10 | 0.02 |
| Carbon (total) [%] | 0.236 | 0.232 | 0.074 | 0.059 | 0.238 | 0.163 | 0.091 | 0.185 | 1.27 | 0.115 |
| Carbonate [%] | 0.355 | 0.495 | 0.070 | 0.080 | 0.095 | 0.115 | 0.120 | 0.150 | 0.150 | 0.130 |

| Analysis | 116: G-2018-C1 (0-10) | 117: G-2018-C1 (20-40) | 118: G-2018-C1 (140-160) | 119: G-2018-C4 (0-5) | 120: G-2018-C4 (10-20) |
|---|---|---|---|---|---|
| Paste pH | --- | --- | --- | --- | --- |
| Fizz Rate [---] | --- | --- | --- | --- | --- |
| Sample weight [g] | --- | --- | --- | --- | --- |
| HCl Added [mL] | --- | --- | --- | --- | --- |
| HCl [Normality] | --- | --- | --- | --- | --- |
| NaOH [Normality] | --- | --- | --- | --- | --- |
| NaOH to pH=8.3 [mL] | --- | --- | --- | --- | --- |
| Final pH [no unit] | --- | --- | --- | --- | --- |
| NP [t CaCO3/1000 t] | --- | --- | --- | --- | --- |
| AP [t CaCO3/1000 t] | --- | --- | --- | --- | --- |
| Net NP [t CaCO3/1000 t] | --- | --- | --- | --- | --- |
| NP/AP [ratio] | --- | --- | --- | --- | --- |
| Sulphur (total) [%] | 0.034 | 0.148 | 0.201 | 0.051 | 0.062 |
| Acid Leachable SO4-S [%] | < 0.02 | 0.06 | 0.05 | < 0.02 | 0.02 |
| Sulphide [%] | 0.03 | 0.09 | 0.15 | 0.04 | 0.04 |
| Carbon (total) [%] | 0.325 | 0.375 | 4.40 | 3.76 | 2.36 |
| Carbonate [%] | 0.110 | 0.550 | 0.070 | 0.060 | 0.100 |

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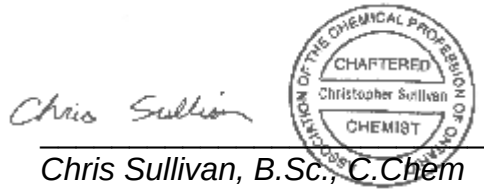
*NP (Neutralization Potential)

$$= \frac{50 \times (N \text{ of HCL} \times \text{Total HCL added} - N \text{ NaOH} \times \text{NaOH added})}{\text{Weight of Sample}}$$

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.02 will be calculated using a 0.02 value.




*Chris Sullivan, B.Sc., C.Chem*
*Project Specialist,*
*Environment, Health & Safety*

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11-February-2019

**Ecometrix**
Attn : Daniel Skruch

6800 Campobello Road, Mississauga
Canada, L5N 2L8
Phone: 905-794-2325, Fax:905-794-2338

**Date Rec. :** 22 January 2019
**LR Report:** **CA15297-JAN19**
**Reference:** 18-2525

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# CERTIFICATE OF ANALYSIS
## Final Report

| Analysis | 1: Analysis Start Date | 2: Analysis Start Time | 3: Analysis Completed Date | 4: Analysis Completed Time | 5: M-2018-C1 (0-5) | 6: M-2018-C1 (10-20) | 7: M-2018-C1 (40-60) | 8: M-2018-C1 (140-160) | 9: M-2018-C1 (180-200) | 10: M-2018-SFC-T3 | 11: M-2018-SFC-T7 | 12: M-2018-SFC-T2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | --- | --- | --- | --- | 63.4 | 26.4 | 27.0 | 18.7 | 29.1 | 29.6 | 40.1 | 34.2 |
| Mercury [ug/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 8.3 | 2.1 | 1.4 | 26 | 32 | 3.3 | 8.0 | 3.8 |
| Silver [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 0.36 | 0.15 | 0.091 | 0.29 | 0.65 | 0.13 | 0.32 | 0.15 |
| Arsenic [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 2100 | 690 | 1800 | 1300 | 1400 | 1600 | 12000 | 2500 |
| Aluminum [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 14000 | 13000 | 12000 | 8800 | 9000 | 16000 | 14000 | 16000 |
| Barium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 81 | 52 | 44 | 38 | 43 | 82 | 75 | 83 |
| Beryllium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 0.57 | 0.30 | 0.26 | 0.23 | 0.23 | 0.41 | 0.37 | 0.43 |
| Bismuth [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 1.5 | 0.84 | 0.83 | 2.0 | 2.2 | 1.2 | 2.5 | 1.1 |
| Calcium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 3500 | 1500 | 2300 | 2800 | 3300 | 1800 | 2500 | 3100 |
| Cadmium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 0.93 | 0.18 | 0.22 | 0.29 | 0.38 | 0.22 | 0.52 | 0.33 |
| Cobalt [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 32 | 6.8 | 13 | 8.6 | 9.0 | 12 | 25 | 21 |
| Chromium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 33 | 40 | 32 | 54 | 42 | 35 | 18 | 19 |
| Copper [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 130 | 97 | 78 | 100 | 120 | 79 | 120 | 75 |
| Iron [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 38000 | 29000 | 29000 | 21000 | 22000 | 37000 | 48000 | 38000 |
| Potassium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 2600 | 4700 | 4500 | 3500 | 3100 | 6400 | 4500 | 6400 |
| Lithium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 19 | 20 | 19 | 14 | 14 | 24 | 21 | 25 |
| Magnesium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 7300 | 8100 | 8000 | 5900 | 5900 | 9500 | 8600 | 9900 |
| Manganese [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 1200 | 260 | 260 | 280 | 320 | 390 | 1300 | 590 |
| Molybdenum [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 0.46 | 0.19 | 0.24 | 0.29 | 0.43 | 0.17 | 0.38 | 0.22 |
| Nickel [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 70 | 28 | 36 | 22 | 23 | 35 | 59 | 52 |
| Lead [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 83 | 31 | 22 | 68 | 87 | 40 | 140 | 35 |

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**LR Report :** **CA15297-JAN19**

| Analysis | 1: Analysis Start Date | 2: Analysis Start Time | 3: Analysis Completed Date | 4: Analysis Completed Time | 5: M-2018-C1 (0-5) | 6: M-2018-C1 (10-20) | 7: M-2018-C1 (40-60) | 8: M-2018-C1 (140-160) | 9: M-2018-C1 (180-200) | 10: M-2018-SFC-T3 | 11: M-2018-SFC-T7 | 12: M-2018-SFC-T2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 11-Feb-19 | 12:44 | 11-Feb-19 | 14:15 | 640 | 360 | 2400 | 1400 | 1800 | 350 | 5600 | 1500 |
| Antimony [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 7.1 | 4.2 | 4.8 | 2.2 | 2.7 | 4.8 | 18 | 6.7 |
| Selenium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 0.91 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | 0.88 | < 0.7 |
| Tin [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 1.1 | 0.51 | < 0.5 | < 0.5 | < 0.5 | 0.52 | 0.54 | 0.51 |
| Strontium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 16 | 9.7 | 9.0 | 10 | 13 | 13 | 18 | 15 |
| Titanium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 620 | 760 | 710 | 420 | 450 | 860 | 740 | 830 |
| Thallium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 0.25 | 0.29 | 0.28 | 0.18 | 0.19 | 0.36 | 0.35 | 0.38 |
| Uranium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 0.60 | 0.50 | 0.43 | 0.36 | 0.35 | 0.69 | 0.48 | 0.65 |
| Vanadium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 30 | 18 | 16 | 12 | 12 | 22 | 21 | 23 |
| Yttrium [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 6.0 | 4.0 | 3.4 | 2.5 | 3.1 | 5.2 | 4.0 | 5.0 |
| Zinc [µg/g] | 08-Feb-19 | 14:39 | 11-Feb-19 | 08:51 | 350 | 110 | 120 | 130 | 150 | 120 | 220 | 150 |

| Analysis | 13: M-2018-SFC-T9 | 14: M-2018-SFC-T14 | 15: M-2018-SFC-T28 AHP | 16: M-2018-SFC-12 | 17: M-2018-SFC-13 | 18: M-2018-SFC-15 | 19: M-2018-SW12-CORE (2.5-10) | 20: M-2018-SW12-CORE (30-40) | 21: M-2018-C13 (2.5-10) | 22: M-2018-C13 (20-30) | 23: M-2018-C5 (2.5-10) | 24: M-2018-C5 (30-50) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | 50.7 | 35.4 | 14.8 | 36.8 | 34.8 | 29.8 | 89.4 | 92.1 | 87.8 | 90.0 | 38.6 | 29.0 |
| Mercury [ug/g] | 6.0 | 6.4 | 3.8 | 4.1 | 6.1 | 4.7 | 0.30 | 0.13 | 35 | 30 | 4.5 | 7.2 |
| Silver [µg/g] | 0.29 | 0.23 | 0.95 | 0.29 | 0.29 | 0.23 | 0.27 | 0.20 | 0.55 | 0.48 | 0.26 | 0.19 |
| Arsenic [µg/g] | 6600 | 4200 | 54000 | 10000 | 12000 | 6400 | 140 | 64 | 130 | 360 | 14000 | 7900 |
| Aluminum [µg/g] | 15000 | 14000 | 6800 | 13000 | 14000 | 15000 | 26000 | 25000 | 9000 | 9100 | 15000 | 14000 |
| Barium [µg/g] | 58 | 79 | 33 | 100 | 89 | 74 | 160 | 67 | 66 | 49 | 76 | 63 |
| Beryllium [µg/g] | 0.59 | 0.46 | 0.12 | 0.44 | 0.42 | 0.41 | 1.4 | 1.1 | 0.42 | 0.46 | 0.33 | 0.40 |
| Bismuth [µg/g] | 1.7 | 1.6 | 6.7 | 2.0 | 2.0 | 1.4 | 0.63 | 0.22 | 2.9 | 2.0 | 1.9 | 1.4 |
| Calcium [µg/g] | 2200 | 2300 | 350 | 3300 | 4900 | 3000 | 2800 | 3200 | 7200 | 5400 | 5600 | 5700 |
| Cadmium [µg/g] | 0.93 | 0.29 | 0.085 | 0.73 | 0.34 | 0.33 | 2.1 | 1.2 | 0.83 | 0.62 | 0.38 | 0.20 |
| Cobalt [µg/g] | 25 | 20 | 1.7 | 30 | 30 | 25 | 37 | 13 | 4.2 | 3.0 | 25 | 19 |
| Chromium [µg/g] | 17 | 20 | 12 | 48 | 24 | 23 | 31 | 35 | 36 | 4.1 | 27 | 21 |
| Copper [µg/g] | 120 | 70 | 43 | 97 | 82 | 78 | 60 | 23 | 110 | 92 | 88 | 60 |
| Iron [µg/g] | 41000 | 35000 | 79000 | 43000 | 45000 | 41000 | 53000 | 39000 | 9900 | 4400 | 51000 | 39000 |
| Potassium [µg/g] | 4100 | 4600 | 3600 | 3900 | 5400 | 5700 | 2200 | 640 | 380 | 340 | 4900 | 5600 |
| Lithium [µg/g] | 21 | 23 | 7.4 | 20 | 23 | 24 | 23 | 6.9 | < 2 | < 2 | 22 | 23 |
| Magnesium [µg/g] | 7600 | 8400 | 3700 | 8300 | 9900 | 9600 | 4000 | 1400 | 1100 | 930 | 10000 | 11000 |
| Manganese [µg/g] | 700 | 490 | 90 | 2300 | 830 | 620 | 2400 | 1200 | 210 | 180 | 1200 | 500 |
| Molybdenum [µg/g] | 0.85 | 0.18 | 1.2 | 0.66 | 0.31 | 0.22 | 3.0 | 3.9 | 0.40 | 0.48 | 0.24 | 0.25 |
| Nickel [µg/g] | 47 | 39 | 9.7 | 63 | 54 | 47 | 82 | 29 | 17 | 12 | 53 | 42 |
| Lead [µg/g] | 82 | 90 | 360 | 100 | 100 | 78 | 120 | 20 | 170 | 130 | 88 | 62 |

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**LR Report :** **CA15297-JAN19**

| Analysis | 13: M-2018-SFC-T9AHP | 14: M-2018-SFC-T14 | 15: M-2018-SFC-T28 | 16: M-2018-SFC-12 | 17: M-2018-SFC-13 | 18: M-2018-SFC-15 | 19: M-2018-SW12-CORE (2.5-10) | 20: M-2018-SW12-CORE (30-40) | 21: M-2018-C13 (2.5-10) | 22: M-2018-C13 (20-30) | 23: M-2018-C5 (2.5-10) | 24: M-2018-C5 (30-50) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 4400 | 2100 | 2800 | 6400 | 6100 | 3100 | 6100 | 6200 | 4000 | 4800 | 3000 | 4700 |
| Antimony [µg/g] | 11 | 8.1 | 97 | 19 | 20 | 10 | 1.2 | < 0.8 | 3.3 | 2.4 | 16 | 13 |
| Selenium [µg/g] | 1.2 | < 0.7 | 3.0 | 0.91 | 0.83 | < 0.7 | 2.0 | 2.5 | 2.9 | 3.1 | < 0.7 | < 0.7 |
| Tin [µg/g] | 0.65 | < 0.5 | < 0.5 | 0.54 | < 0.5 | < 0.5 | 3.4 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Strontium [µg/g] | 13 | 14 | 3.6 | 16 | 23 | 17 | 17 | 14 | 34 | 24 | 37 | 24 |
| Titanium [µg/g] | 690 | 550 | 600 | 600 | 640 | 730 | 270 | 260 | 71 | 62 | 750 | 640 |
| Thallium [µg/g] | 0.34 | 0.27 | 0.34 | 0.31 | 0.32 | 0.34 | 0.27 | 0.12 | 0.069 | 0.051 | 0.32 | 0.30 |
| Uranium [µg/g] | 0.68 | 0.56 | 0.25 | 0.47 | 0.50 | 0.54 | 1.5 | 1.2 | 0.82 | 0.97 | 0.44 | 0.60 |
| Vanadium [µg/g] | 42 | 19 | 11 | 22 | 20 | 20 | 96 | 21 | 5.9 | 4.8 | 21 | 19 |
| Yttrium [µg/g] | 6.1 | 4.1 | 1.1 | 4.7 | 4.7 | 4.8 | 20 | 24 | 8.2 | 9.5 | 4.8 | 4.3 |
| Zinc [µg/g] | 190 | 150 | 32 | 240 | 180 | 180 | 390 | 150 | 200 | 110 | 210 | 140 |

| Analysis | 25: M-2018-SFC-T25 | 26: M-2018-SFC-T26 | 27: M-2018-SFC-T27 | 28: M-2018-SFC-T32 | 29: M-2018-SFC-T17 | 30: M-2018-SFC-T20 | 31: M-2018-SFC-T23 | 32: M-2018-SFC-T30 | 33: M-2018-SFC-T35 | 34: M-2018-C19 (0-5) | 35: M-2018-C19 (20-30) | 36: M-2018-C11 (2.5-10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | 26.9 | 22.5 | 22.6 | 21.6 | 19.4 | 16.5 | 18.2 | 21.1 | 19.0 | 79.0 | 24.6 | 92.6 |
| Mercury [ug/g] | 2.8 | 0.60 | 5.4 | 4.8 | 17 | 0.81 | 0.67 | 0.82 | 0.74 | 15 | 7.0 | 1.1 |
| Silver [µg/g] | 0.096 | 0.11 | 0.53 | 0.30 | 0.24 | 0.084 | 0.093 | 0.060 | 0.10 | 0.44 | 0.24 | 0.13 |
| Arsenic [µg/g] | 3000 | 9400 | 37000 | 15000 | 5400 | 1500 | 3900 | 2300 | 4300 | 3800 | 2900 | 550 |
| Aluminum [µg/g] | 14000 | 10000 | 6300 | 13000 | 11000 | 14000 | 13000 | 13000 | 12000 | 12000 | 8300 | 11000 |
| Barium [µg/g] | 66 | 36 | 37 | 61 | 47 | 59 | 55 | 54 | 51 | 78 | 42 | 85 |
| Beryllium [µg/g] | 0.36 | 0.16 | 0.12 | 0.33 | 0.24 | 0.31 | 0.30 | 0.32 | 0.30 | 0.81 | 0.22 | 0.81 |
| Bismuth [µg/g] | 0.93 | 1.0 | 4.3 | 2.1 | 1.0 | 0.69 | 0.79 | 0.66 | 0.85 | 1.7 | 1.3 | 0.25 |
| Calcium [µg/g] | 2600 | 920 | 99 | 5400 | 1400 | 2400 | 3100 | 5600 | 5500 | 2900 | 960 | 7700 |
| Cadmium [µg/g] | 0.16 | 0.13 | 0.085 | 0.45 | 0.20 | 0.17 | 0.19 | 0.14 | 0.21 | 2.9 | 0.56 | 1.3 |
| Cobalt [µg/g] | 17 | 4.6 | 1.3 | 23 | 5.8 | 13 | 13 | 11 | 20 | 28 | 9.6 | 39 |
| Chromium [µg/g] | 29 | 32 | 44 | 37 | 57 | 61 | 52 | 50 | 47 | 13 | 9.2 | 7.0 |
| Copper [µg/g] | 60 | 17 | 38 | 110 | 64 | 62 | 56 | 42 | 58 | 120 | 72 | 25 |
| Iron [µg/g] | 34000 | 36000 | 60000 | 51000 | 34000 | 33000 | 35000 | 30000 | 34000 | 23000 | 19000 | 14000 |
| Potassium [µg/g] | 5400 | 3800 | 3500 | 4800 | 3600 | 5900 | 5200 | 5400 | 5000 | 1500 | 2600 | 970 |
| Lithium [µg/g] | 24 | 14 | 6.7 | 22 | 18 | 22 | 21 | 22 | 20 | 10 | 14 | 4.5 |
| Magnesium [µg/g] | 8500 | 6500 | 3500 | 9300 | 6900 | 8700 | 8500 | 9600 | 9500 | 3300 | 4300 | 1600 |
| Manganese [µg/g] | 450 | 190 | 95 | 670 | 200 | 440 | 490 | 660 | 690 | 940 | 180 | 860 |
| Molybdenum [µg/g] | 0.19 | 0.40 | 0.89 | 0.38 | 0.36 | 0.24 | 0.25 | 0.20 | 0.26 | 1.2 | 0.63 | 1.1 |
| Nickel [µg/g] | 39 | 16 | 9.3 | 50 | 21 | 34 | 35 | 32 | 45 | 41 | 19 | 49 |
| Lead [µg/g] | 31 | 49 | 200 | 110 | 46 | 21 | 29 | 18 | 29 | 100 | 56 | 37 |

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Test method information available upon request. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

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**LR Report :** **CA15297-JAN19**

| Analysis | 25: M-2018-SFC-T25 | 26: M-2018-SFC-T26 | 27: M-2018-SFC-T27 | 28: M-2018-SFC-T32 | 29: M-2018-SFC-T17 | 30: M-2018-SFC-T20 | 31: M-2018-SFC-T23 | 32: M-2018-SFC-T30 | 33: M-2018-SFC-T35 | 34: M-2018-C19 (0-5) | 35: M-2018-C19 (20-30) | 36: M-2018-C11 (2.5-10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 570 | 270 | 1900 | 6100 | 260 | 160 | 95 | 350 | 2000 | 4000 | 2400 | 7800 |
| Antimony [µg/g] | 5.0 | 14 | 67 | 22 | 11 | 2.4 | 5.3 | 4.0 | 5.8 | 3.3 | 3.7 | < 0.8 |
| Selenium [µg/g] | < 0.7 | < 0.7 | 2.2 | 0.85 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | 1.8 | < 0.7 | 2.0 |
| Tin [µg/g] | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 0.50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 1.0 | < 0.5 | < 0.5 |
| Strontium [µg/g] | 17 | 7.4 | 2.4 | 26 | 9.9 | 16 | 18 | 22 | 22 | 16 | 9.2 | 40 |
| Titanium [µg/g] | 780 | 570 | 600 | 680 | 630 | 850 | 740 | 630 | 650 | 240 | 250 | 140 |
| Thallium [µg/g] | 0.33 | 0.22 | 0.34 | 0.30 | 0.23 | 0.31 | 0.28 | 0.26 | 0.25 | 0.33 | 0.14 | 0.059 |
| Uranium [µg/g] | 0.56 | 0.31 | 0.26 | 0.42 | 0.35 | 0.44 | 0.41 | 0.37 | 0.32 | 0.85 | 0.34 | 0.76 |
| Vanadium [µg/g] | 19 | 14 | 11 | 20 | 16 | 18 | 18 | 17 | 16 | 43 | 9.9 | 16 |
| Yttrium [µg/g] | 4.4 | 2.8 | 1.1 | 4.0 | 3.2 | 3.7 | 3.9 | 4.0 | 3.8 | 9.1 | 2.4 | 32 |
| Zinc [µg/g] | 95 | 48 | 31 | 220 | 89 | 120 | 120 | 95 | 130 | 240 | 120 | 87 |

| Analysis | 37: M-2018-C11 (10-20) | 38: M-2018-C11 (30-40) | 39: M-2018-C2 (0-5) | 40: M-2018-C2 (10-20) | 41: M-2018-C2 (40-60) | 42: M-2018-C2 (80-100) | 43: M-2018-C3 (0-5) | 44: M-2018-C3 (40-80) | 45: M-2018-C3 (140-160) | 46: M-2018-C3 (160-180) | 47: M-2018-C4 (0-10) | 48: M-2018-C4 (40-60) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | 92.7 | 89.9 | 36.0 | 30.4 | 29.7 | 60.1 | 84.7 | 35.0 | 61.5 | 73.9 | 59.0 | 23.2 |
| Mercury [ug/g] | 0.22 | 0.52 | 27 | 1.2 | 2.1 | 2.1 | 4.4 | 9.0 | 17 | 7.8 | 4.0 | 0.20 |
| Silver [µg/g] | 0.11 | 0.12 | 0.38 | 0.14 | 0.11 | 0.19 | 0.27 | 0.22 | 0.44 | 0.32 | 0.36 | 0.013 |
| Arsenic [µg/g] | 120 | 210 | 5400 | 8900 | 4200 | 8200 | 5400 | 2200 | 5000 | 2500 | 11000 | 500 |
| Aluminum [µg/g] | 6700 | 6900 | 12000 | 12000 | 13000 | 12000 | 23000 | 12000 | 13000 | 12000 | 14000 | 16000 |
| Barium [µg/g] | 56 | 57 | 57 | 49 | 64 | 110 | 440 | 50 | 76 | 65 | 470 | 35 |
| Beryllium [µg/g] | 0.37 | 0.41 | 0.33 | 0.34 | 0.35 | 0.41 | 1.7 | 0.33 | 0.42 | 0.46 | 0.75 | 0.26 |
| Bismuth [µg/g] | < 0.09 | 0.15 | 2.0 | 1.4 | 1.1 | 1.1 | 1.2 | 1.2 | 1.6 | 0.94 | 2.0 | 0.35 |
| Calcium [µg/g] | 7300 | 7600 | 1900 | 1500 | 3400 | 4000 | 6700 | 3000 | 4100 | 5600 | 2800 | 900 |
| Cadmium [µg/g] | 0.53 | 0.62 | 0.33 | 0.27 | 0.21 | 0.89 | 4.0 | 0.27 | 0.58 | 0.52 | 2.7 | 0.032 |
| Cobalt [µg/g] | 10 | 4.0 | 11 | 13 | 14 | 37 | 120 | 13 | 15 | 11 | 88 | 3.7 |
| Chromium [µg/g] | 4.2 | 4.9 | 14 | 14 | 15 | 14 | 18 | 57 | 13 | 12 | 56 | 18 |
| Copper [µg/g] | 15 | 21 | 95 | 97 | 73 | 120 | 93 | 73 | 93 | 63 | 130 | 9.9 |
| Iron [µg/g] | 5300 | 6100 | 30000 | 38000 | 34000 | 55000 | 77000 | 28000 | 31000 | 25000 | 58000 | 28000 |
| Potassium [µg/g] | 230 | 630 | 3300 | 4100 | 5100 | 3200 | 2100 | 3900 | 3400 | 2700 | 2800 | 1300 |
| Lithium [µg/g] | < 2 | < 2 | 20 | 21 | 22 | 17 | 15 | 21 | 20 | 14 | 18 | 17 |
| Magnesium [µg/g] | 1000 | 1200 | 6600 | 7600 | 8500 | 6900 | 4000 | 7600 | 6700 | 5300 | 6500 | 3800 |
| Manganese [µg/g] | 420 | 290 | 480 | 240 | 520 | 2900 | 35000 | 350 | 450 | 620 | 21000 | 330 |
| Molybdenum [µg/g] | 0.71 | 0.76 | 0.47 | 0.36 | 0.32 | 0.79 | 7.3 | 0.42 | 0.51 | 0.75 | 2.0 | 0.52 |
| Nickel [µg/g] | 16 | 13 | 27 | 37 | 35 | 63 | 130 | 30 | 32 | 24 | 120 | 13 |
| Lead [µg/g] | 22 | 26 | 80 | 57 | 40 | 58 | 110 | 43 | 74 | 42 | 120 | 8.6 |

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**LR Report :** **CA15297-JAN19**

| Analysis | 37: M-2018-C11 (10-20) | 38: M-2018-C11 (30-40) | 39: M-2018-C2 (0-5) | 40: M-2018-C2 (10-20) | 41: M-2018-C2 (40-60) | 42: M-2018-C2 (80-100) | 43: M-2018-C3 (0-5) | 44: M-2018-C3 (40-80) | 45: M-2018-C3 (140-160) | 46: M-2018-C3 (160-180) | 47: M-2018-C4 (0-10) | 48: M-2018-C4 (40-60) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 5400 | 4800 | 4200 | 5400 | 3200 | 710 | 2000 | 2500 | 5100 | 4100 | 4300 | 530 |
| Antimony [µg/g] | < 0.8 | < 0.8 | 10 | 17 | 7.8 | 12 | 3.1 | 3.9 | 8.1 | 3.9 | 15 | < 0.8 |
| Selenium [µg/g] | 2.1 | 2.3 | 0.72 | < 0.7 | < 0.7 | 0.89 | 4.3 | < 0.7 | 1.4 | 2.1 | 1.6 | < 0.7 |
| Tin [µg/g] | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 1.5 | < 0.5 | < 0.5 | < 0.5 | 0.79 | < 0.5 |
| Strontium [µg/g] | 39 | 36 | 11 | 10 | 14 | 24 | 34 | 11 | 19 | 21 | 21 | 5.8 |
| Titanium [µg/g] | 73 | 91 | 410 | 530 | 610 | 490 | 310 | 550 | 370 | 360 | 500 | 460 |
| Thallium [µg/g] | < 0.02 | < 0.02 | 0.20 | 0.26 | 0.28 | 0.32 | 0.44 | 0.23 | 0.17 | 0.13 | 0.60 | 0.11 |
| Uranium [µg/g] | 0.70 | 1.3 | 0.48 | 0.35 | 0.48 | 0.37 | 1.5 | 0.55 | 0.93 | 1.1 | 0.67 | 0.33 |
| Vanadium [µg/g] | 5.8 | 4.9 | 15 | 15 | 17 | 27 | 140 | 16 | 15 | 13 | 37 | 21 |
| Yttrium [µg/g] | 13 | 16 | 4.0 | 4.0 | 4.0 | 5.0 | 15 | 4.3 | 5.9 | 8.3 | 6.5 | 1.8 |
| Zinc [µg/g] | 25 | 19 | 140 | 160 | 130 | 230 | 370 | 110 | 190 | 100 | 430 | 31 |

| Analysis | 49: M-2018-C4 (60-100) | 50: M-2018-C18 (0-2.5) | 51: M-2018-C18 (2.5-10) | 52: M-2018-C18 (10-20) | 53: M-2018-C18 (20-30) | 54: M-2018-SFC SOIL C.MOORE | 55: M-2018-SW9-C ORE (0-7.5) | 56: M-2018-SW9-C ORE (15-20) | 57: M-2018-SW9-C ORE (20-40) | 58: M-2018-SW10- CORE (0-5) | 59: M-2018-SW10- CORE (15-20) | 60: M-2018-SW10- CORE (30-40) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | 44.0 | 89.5 | 54.6 | 69.8 | 79.1 | 24.6 | 88.2 | 66.9 | 60.0 | 84.0 | 89.5 | 91.0 |
| Mercury [ug/g] | 3.5 | 0.26 | 0.14 | 0.70 | 2.2 | 46 | 0.42 | 0.09 | 0.10 | 2.4 | 0.50 | 0.17 |
| Silver [µg/g] | 0.13 | 0.13 | 0.058 | 0.14 | 0.46 | 0.36 | 0.15 | 0.059 | 0.054 | 0.21 | 0.22 | 0.25 |
| Arsenic [µg/g] | 2900 | 580 | 210 | 620 | 610 | 2900 | 56 | 26 | 18 | 750 | 520 | 110 |
| Aluminum [µg/g] | 15000 | 14000 | 19000 | 18000 | 14000 | 11000 | 16000 | 10000 | 12000 | 19000 | 17000 | 23000 |
| Barium [µg/g] | 96 | 93 | 85 | 90 | 70 | 69 | 41 | 35 | 45 | 190 | 84 | 63 |
| Beryllium [µg/g] | 0.48 | 0.56 | 0.46 | 0.53 | 0.62 | 0.31 | 1.5 | 1.4 | 1.8 | 1.2 | 0.83 | 1.0 |
| Bismuth [µg/g] | 0.97 | 0.29 | 0.31 | 0.36 | 0.48 | 1.2 | 0.54 | 0.18 | 0.21 | 0.78 | 0.25 | 0.24 |
| Calcium [µg/g] | 4200 | 5200 | 2200 | 2600 | 5000 | 1400 | 980 | 890 | 1100 | 3700 | 4100 | 3700 |
| Cadmium [µg/g] | 0.23 | 2.1 | 0.46 | 0.44 | 0.87 | 0.21 | 0.31 | 0.40 | 0.54 | 1.6 | 1.1 | 1.1 |
| Cobalt [µg/g] | 16 | 22 | 17 | 19 | 12 | 11 | 16 | 8.9 | 10 | 52 | 11 | 9.3 |
| Chromium [µg/g] | 18 | 26 | 34 | 24 | 210 | 13 | 77 | 92 | 14 | 50 | 16 | 21 |
| Copper [µg/g] | 60 | 46 | 39 | 37 | 40 | 44 | 19 | 9.4 | 13 | 60 | 25 | 28 |
| Iron [µg/g] | 33000 | 32000 | 34000 | 31000 | 15000 | 29000 | 21000 | 15000 | 20000 | 39000 | 17000 | 18000 |
| Potassium [µg/g] | 7000 | 1400 | 2700 | 2500 | 770 | 2700 | 850 | 1100 | 1800 | 2700 | 1000 | 1100 |
| Lithium [µg/g] | 24 | 13 | 25 | 22 | 10 | 18 | 16 | 19 | 25 | 22 | 9.2 | 9.9 |
| Magnesium [µg/g] | 8800 | 4600 | 9800 | 7500 | 2500 | 5000 | 2200 | 3000 | 3700 | 5900 | 2300 | 2900 |
| Manganese [µg/g] | 500 | 670 | 610 | 580 | 670 | 440 | 1300 | 340 | 410 | 5900 | 1600 | 1500 |
| Molybdenum [µg/g] | 0.31 | 1.1 | 0.56 | 0.84 | 1.4 | 0.60 | 1.6 | 0.90 | 1.2 | 2.4 | 2.1 | 2.5 |
| Nickel [µg/g] | 35 | 36 | 40 | 32 | 23 | 21 | 16 | 14 | 16 | 63 | 17 | 22 |
| Lead [µg/g] | 35 | 78 | 77 | 60 | 43 | 120 | 69 | 10 | 8.8 | 98 | 31 | 24 |

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**LR Report :** **CA15297-JAN19**

| Analysis | 49: M-2018-C4 (60-100) | 50: M-2018-C18 (0-2.5) | 51: M-2018-C18 (2.5-10) | 52: M-2018-C18 (10-20) | 53: M-2018-C18 (20-30) | 54: M-2018-SFC SOIL C.MOORE | 55: M-2018-SW9-C ORE (0-7.5) | 56: M-2018-SW9-C ORE (15-20) | 57: M-2018-SW9-C ORE (20-40) | 58: M-2018-SW10- CORE (0-5) | 59: M-2018-SW10- CORE (15-20) | 60: M-2018-SW10- CORE (30-40) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 4200 | 4500 | 1800 | 5200 | 5900 | 250 | 1200 | 680 | 500 | 1300 | 3400 | 2600 |
| Antimony [µg/g] | 4.7 | < 0.8 | < 0.8 | < 0.8 | 1.7 | 4.1 | < 0.8 | < 0.8 | < 0.8 | 1.8 | < 0.8 | < 0.8 |
| Selenium [µg/g] | < 0.7 | 1.1 | < 0.7 | 1.2 | 3.9 | < 0.7 | 1.8 | 0.81 | 0.77 | 1.3 | 2.5 | 3.5 |
| Tin [µg/g] | < 0.5 | 1.0 | 0.83 | 0.98 | 0.78 | 1.9 | 2.3 | 0.68 | 0.79 | 2.7 | < 0.5 | < 0.5 |
| Strontium [µg/g] | 18 | 25 | 15 | 16 | 23 | 11 | 9.2 | 7.6 | 8.9 | 23 | 21 | 19 |
| Titanium [µg/g] | 650 | 290 | 500 | 350 | 290 | 370 | 470 | 420 | 530 | 370 | 260 | 280 |
| Thallium [µg/g] | 0.31 | 0.24 | 0.17 | 0.18 | 0.25 | 0.16 | 0.17 | 0.29 | 0.37 | 0.28 | 0.14 | 0.17 |
| Uranium [µg/g] | 0.58 | 0.71 | 0.64 | 0.84 | 1.7 | 0.58 | 3.5 | 2.5 | 3.7 | 2.6 | 1.2 | 1.5 |
| Vanadium [µg/g] | 20 | 120 | 48 | 28 | 16 | 17 | 61 | 15 | 16 | 77 | 18 | 16 |
| Yttrium [µg/g] | 4.3 | 10 | 7.7 | 7.9 | 7.1 | 3.6 | 9.8 | 7.0 | 9.5 | 24 | 22 | 30 |
| Zinc [µg/g] | 99 | 280 | 140 | 100 | 71 | 63 | 50 | 97 | 110 | 300 | 110 | 120 |

| Analysis | 61: M-2018-C17 (2.5-10) | 62: M-2018-C17 (15-20) | 63: M-2018-C17 (30-40) | 64: G-2018-C2 (0-5) | 65: G-2018-C2 (20-40) | 66: G-2018-C2 (60-80) | 67: G-2018-C3 (0-5) | 68: G-2018-C3 (20-40) | 69: G-2018-C3 (60-80) | 70: G-2018-C3 (100-120) | 71: G-2018-C5 (2.5-10) | 72: G-2018-C5 (15-20) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | 25.2 | 21.3 | 21.4 | 34.3 | 29.8 | 25.1 | 35.1 | 30.4 | 19.2 | 45.2 | 59.4 | 42.1 |
| Mercury [ug/g] | 28 | 14 | 11 | 0.84 | 1.4 | 0.53 | 1.5 | 0.51 | 8.2 | 9.8 | 29 | 40 |
| Silver [µg/g] | 0.47 | 0.37 | 0.54 | 0.070 | 0.34 | 0.17 | 0.18 | 0.15 | 0.21 | 0.24 | 0.59 | 0.56 |
| Arsenic [µg/g] | 6100 | 3200 | 5500 | 920 | 18000 | 6900 | 2200 | 5200 | 4900 | 2200 | 15000 | 16000 |
| Aluminum [µg/g] | 6900 | 7500 | 7100 | 7100 | 7400 | 8400 | 9400 | 7600 | 5300 | 7800 | 8600 | 8800 |
| Barium [µg/g] | 34 | 30 | 29 | 30 | 28 | 35 | 36 | 38 | 23 | 36 | 66 | 52 |
| Beryllium [µg/g] | 0.16 | 0.16 | 0.17 | 0.18 | 0.20 | 0.24 | 0.21 | 0.29 | 0.16 | 0.23 | 0.42 | 0.41 |
| Bismuth [µg/g] | 2.2 | 1.6 | 2.4 | 0.33 | 1.4 | 0.62 | 0.62 | 0.59 | 0.85 | 0.83 | 1.6 | 1.5 |
| Calcium [µg/g] | 1100 | 1000 | 1500 | 1400 | 2000 | 1700 | 1800 | 2500 | 2200 | 4200 | 3000 | 2400 |
| Cadmium [µg/g] | 0.16 | 0.23 | 0.21 | 0.15 | 0.25 | 0.28 | 0.12 | 0.21 | 0.22 | 0.19 | 0.85 | 0.58 |
| Cobalt [µg/g] | 5.8 | 6.5 | 12 | 5.1 | 43 | 77 | 5.7 | 11 | 10 | 6.7 | 44 | 35 |
| Chromium [µg/g] | 8.8 | 69 | 73 | 86 | 10 | 11 | 78 | 11 | 81 | 58 | 100 | 69 |
| Copper [µg/g] | 50 | 66 | 54 | 20 | 48 | 37 | 33 | 29 | 31 | 25 | 50 | 45 |
| Iron [µg/g] | 31000 | 26000 | 29000 | 19000 | 36000 | 26000 | 27000 | 24000 | 20000 | 17000 | 67000 | 41000 |
| Potassium [µg/g] | 1800 | 1800 | 1900 | 1900 | 1700 | 2600 | 2000 | 2200 | 1400 | 1400 | 1300 | 1600 |
| Lithium [µg/g] | 9.5 | 12 | 12 | 11 | 11 | 12 | 14 | 11 | 8.3 | 10 | 12 | 15 |
| Magnesium [µg/g] | 3800 | 4500 | 4600 | 4400 | 4700 | 5300 | 6000 | 4600 | 3300 | 3600 | 4200 | 5100 |
| Manganese [µg/g] | 260 | 230 | 250 | 190 | 240 | 240 | 250 | 290 | 250 | 220 | 1200 | 510 |
| Molybdenum [µg/g] | 0.66 | 0.50 | 0.59 | 0.89 | 0.92 | 1.1 | 1.1 | 0.85 | 0.61 | 0.45 | 1.2 | 1.1 |
| Nickel [µg/g] | 14 | 21 | 30 | 19 | 59 | 93 | 20 | 27 | 24 | 17 | 79 | 65 |
| Lead [µg/g] | 120 | 85 | 150 | 21 | 69 | 32 | 36 | 29 | 47 | 48 | 100 | 99 |

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Test method information available upon request. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

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**LR Report :** **CA15297-JAN19**

| Analysis | 61: M-2018-C17 (2.5-10) | 62: M-2018-C17 (15-20) | 63: M-2018-C17 (30-40) | 64: G-2018-C2 (0-5) | 65: G-2018-C2 (20-40) | 66: G-2018-C2 (60-80) | 67: G-2018-C3 (0-5) | 68: G-2018-C3 (20-40) | 69: G-2018-C3 (60-80) | 70: G-2018-C3 (100-120) | 71: G-2018-C5 (2.5-10) | 72: G-2018-C5 (15-20) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 900 | 1100 | 3000 | 760 | 12000 | 5400 | 770 | 3800 | 4100 | 3500 | 8600 | 11000 |
| Antimony [µg/g] | 10 | 6.7 | 7.3 | 1.2 | 24 | 7.5 | 2.6 | 7.6 | 8.7 | 2.5 | 15 | 14 |
| Selenium [µg/g] | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | 0.74 | < 0.7 |
| Tin [µg/g] | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 0.72 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 1.0 | 0.84 |
| Strontium [µg/g] | 11 | 12 | 11 | 17 | 22 | 20 | 20 | 24 | 20 | 36 | 29 | 24 |
| Titanium [µg/g] | 260 | 220 | 200 | 260 | 260 | 270 | 330 | 260 | 190 | 200 | 210 | 220 |
| Thallium [µg/g] | 0.16 | 0.12 | 0.14 | 0.069 | 0.097 | 0.092 | 0.088 | 0.086 | 0.065 | 0.060 | 0.17 | 0.17 |
| Uranium [µg/g] | 0.35 | 0.31 | 0.33 | 0.28 | 0.35 | 0.32 | 0.36 | 0.32 | 0.25 | 0.43 | 0.53 | 0.67 |
| Vanadium [µg/g] | 10 | 9.7 | 8.9 | 8.3 | 8.6 | 9.2 | 11 | 8.9 | 6.1 | 9.0 | 12 | 12 |
| Yttrium [µg/g] | 1.9 | 2.4 | 2.2 | 4.7 | 5.8 | 7.1 | 6.1 | 7.3 | 3.6 | 4.0 | 7.0 | 8.5 |
| Zinc [µg/g] | 46 | 61 | 70 | 47 | 61 | 69 | 51 | 50 | 50 | 46 | 140 | 88 |

| Analysis | 73: G-2018-C11 (0-7.5) | 74: G-2018-C11 (15-20) | 75: G-2018-C12 (2.5-10) | 76: G-2018-C12 (10-20) | 77: G-2018-C12 (20-40) | 78: G-2018-C13 (2.5-10) | 79: G-2018-C13 (15-20) | 80: G-2018-C13 (20-40) | 81: G-2018-C6 (28NOV) (2.5-10) | 82: G-2018-C6 (28NOV) (10-20) | 83: G-2018-C6 (28NOV) (20-30) | 84: G-2018-C7 (2.5-10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | 90.6 | 83.8 | 80.3 | 89.8 | 88.7 | 74.9 | 87.2 | 87.5 | 81.6 | 31.9 | 45.0 | 85.5 |
| Mercury [ug/g] | 2.1 | 1.9 | 2.2 | 0.72 | 0.63 | 2.3 | 0.44 | 0.21 | 11 | 14 | 39 | 1.3 |
| Silver [µg/g] | 0.22 | 0.17 | 0.16 | 0.21 | 0.24 | 0.18 | 0.19 | 0.16 | 0.35 | 0.76 | 0.67 | 0.29 |
| Arsenic [µg/g] | 2400 | 1000 | 1500 | 510 | 250 | 2100 | 770 | 150 | 8100 | 27000 | 2700 | 53 |
| Aluminum [µg/g] | 9300 | 10000 | 11000 | 8800 | 9400 | 13000 | 7500 | 7300 | 13000 | 6900 | 11000 | 8900 |
| Barium [µg/g] | 57 | 74 | 72 | 43 | 49 | 73 | 33 | 30 | 110 | 32 | 69 | 59 |
| Beryllium [µg/g] | 0.38 | 0.47 | 0.45 | 0.32 | 0.36 | 0.48 | 0.23 | 0.23 | 0.66 | 0.24 | 0.41 | 0.45 |
| Bismuth [µg/g] | 0.60 | 0.47 | 0.34 | 0.17 | 0.17 | 0.73 | 0.14 | < 0.09 | 1.0 | 2.1 | 1.8 | 0.23 |
| Calcium [µg/g] | 2100 | 2800 | 1700 | 2600 | 2700 | 1800 | 2800 | 2800 | 4000 | 1500 | 2600 | 4800 |
| Cadmium [µg/g] | 0.77 | 0.48 | 0.26 | 0.21 | 0.25 | 0.46 | 0.21 | 0.24 | 1.1 | 0.46 | 0.54 | 0.51 |
| Cobalt [µg/g] | 14 | 11 | 7.5 | 5.1 | 3.7 | 14 | 9.0 | 4.5 | 35 | 49 | 7.1 | 6.9 |
| Chromium [µg/g] | 28 | 12 | 15 | 12 | 13 | 17 | 490 | 9.7 | 14 | 120 | 14 | 9.1 |
| Copper [µg/g] | 21 | 17 | 12 | 12 | 14 | 19 | 20 | 11 | 43 | 50 | 18 | 23 |
| Iron [µg/g] | 12000 | 14000 | 19000 | 15000 | 12000 | 21000 | 15000 | 11000 | 85000 | 52000 | 20000 | 12000 |
| Potassium [µg/g] | 2200 | 2100 | 2700 | 1200 | 1400 | 2900 | 480 | 350 | 1200 | 1100 | 3300 | 840 |
| Lithium [µg/g] | 6.7 | 8.9 | 14 | 7.8 | 8.6 | 16 | 5.4 | 5.0 | 8.4 | 10 | 17 | 6.1 |
| Magnesium [µg/g] | 2600 | 3000 | 4800 | 2000 | 2300 | 5800 | 1100 | 1000 | 2800 | 3600 | 6100 | 1800 |
| Manganese [µg/g] | 500 | 990 | 390 | 520 | 340 | 470 | 870 | 670 | 3000 | 370 | 250 | 320 |
| Molybdenum [µg/g] | 1.3 | 1.2 | 1.1 | 1.1 | 1.1 | 1.2 | 2.2 | 0.92 | 1.2 | 1.4 | 0.26 | 0.86 |
| Nickel [µg/g] | 14 | 17 | 16 | 13 | 13 | 21 | 23 | 9.2 | 55 | 74 | 18 | 14 |
| Lead [µg/g] | 82 | 39 | 21 | 12 | 12 | 52 | 12 | 9.1 | 85 | 110 | 99 | 37 |

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**LR Report :** **CA15297-JAN19**

| Analysis | 73: G-2018-C11 (0-7.5) | 74: G-2018-C11 (15-20) | 75: G-2018-C12 (2.5-10) | 76: G-2018-C12 (10-20) | 77: G-2018-C12 (20-40) | 78: G-2018-C13 (2.5-10) | 79: G-2018-C13 (15-20) | 80: G-2018-C13 (20-40) | 81: G-2018-C6 (28NOV) (2.5-10) | 82: G-2018-C6 (28NOV) (10-20) | 83: G-2018-C6 (28NOV) (20-30) | 84: G-2018-C7 (2.5-10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 3500 | 3100 | 1600 | 2300 | 2200 | 2100 | 3200 | 3100 | 2500 | 18000 | 2000 | 3300 |
| Antimony [µg/g] | 1.6 | 1.3 | < 0.8 | < 0.8 | < 0.8 | 1.8 | < 0.8 | < 0.8 | 6.1 | 33 | 3.1 | 0.96 |
| Selenium [µg/g] | 1.7 | 1.5 | 1.1 | 2.0 | 2.3 | 0.99 | 2.5 | 2.5 | 1.3 | < 0.7 | < 0.7 | 1.4 |
| Tin [µg/g] | 1.1 | 0.63 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 0.61 | < 0.5 | 1.2 | 0.96 | < 0.5 | 1.1 |
| Strontium [µg/g] | 22 | 29 | 19 | 25 | 27 | 20 | 26 | 27 | 35 | 18 | 28 | 49 |
| Titanium [µg/g] | 190 | 220 | 170 | 210 | 220 | 210 | 220 | 200 | 210 | 210 | 190 | 170 |
| Thallium [µg/g] | 0.18 | 0.12 | 0.11 | 0.055 | 0.061 | 0.15 | 0.035 | 0.026 | 0.21 | 0.10 | 0.13 | 0.13 |
| Uranium [µg/g] | 0.49 | 0.68 | 0.55 | 0.63 | 0.70 | 0.56 | 0.64 | 0.61 | 0.54 | 0.36 | 0.46 | 1.4 |
| Vanadium [µg/g] | 16 | 11 | 11 | 7.8 | 7.7 | 13 | 9.0 | 6.9 | 18 | 9.4 | 11 | 12 |
| Yttrium [µg/g] | 7.1 | 8.3 | 6.4 | 6.6 | 7.3 | 7.0 | 6.4 | 6.5 | 11 | 4.3 | 4.2 | 6.0 |
| Zinc [µg/g] | 53 | 52 | 61 | 31 | 32 | 67 | 11 | 11 | 210 | 63 | 70 | 34 |

| Analysis | 85: G-2018-C7 (15-20) | 86: G-2018-C7 (20-30) | 87: G-2018-C8 (0-5) | 88: G-2018-C8 (15-20) | 89: G-2018-C8 (40-50) | 90: G-2018-C9 (0-7.5) | 91: G-2018-C9 (20-30) | 92: G-2018-C9 (30-40) | 93: G-2018-C10 (2.5-10) | 94: G-2018-C10 (15-20) | 95: G-2018-C10 (40-50) | 96: G-2018-C14 (2.5-10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | 75.0 | 81.2 | 57.3 | 20.7 | 21.5 | 75.9 | 57.8 | 80.2 | 59.4 | 23.3 | 17.8 | 25.2 |
| Mercury [ug/g] | 0.57 | 0.60 | 2.1 | 4.1 | 3.4 | 4.0 | 11 | 1.5 | 20 | 0.25 | 0.06 | 1.1 |
| Silver [µg/g] | 0.35 | 0.95 | 0.16 | 0.20 | 0.19 | 0.25 | 0.20 | 0.47 | 0.27 | 0.019 | 0.042 | 0.052 |
| Arsenic [µg/g] | 22 | 22 | 640 | 1400 | 1100 | 1200 | 1600 | 230 | 82 | 34 | 17 | 2600 |
| Aluminum [µg/g] | 11000 | 19000 | 11000 | 13000 | 12000 | 11000 | 12000 | 10000 | 6500 | 9000 | 8000 | 6300 |
| Barium [µg/g] | 59 | 69 | 40 | 49 | 40 | 40 | 76 | 50 | 34 | 30 | 35 | 33 |
| Beryllium [µg/g] | 0.48 | 1.4 | 0.24 | 0.30 | 0.24 | 0.29 | 0.49 | 0.42 | 0.31 | 0.19 | 0.21 | 0.17 |
| Bismuth [µg/g] | 0.15 | 0.21 | 0.81 | 1.0 | 0.77 | 1.1 | 0.79 | 0.30 | 0.35 | 0.15 | 0.16 | 0.30 |
| Calcium [µg/g] | 4900 | 6300 | 3000 | 7400 | 11000 | 5100 | 3800 | 8500 | 1600 | 650 | 1800 | 1300 |
| Cadmium [µg/g] | 0.18 | 0.46 | 0.36 | 0.12 | 0.15 | 0.41 | 0.23 | 0.17 | 0.14 | < 0.02 | 0.030 | 0.10 |
| Cobalt [µg/g] | 6.7 | 5.7 | 9.1 | 20 | 16 | 8.5 | 21 | 4.0 | 2.7 | 4.1 | 6.8 | 5.1 |
| Chromium [µg/g] | 13 | 22 | 15 | 34 | 59 | 14 | 26 | 9.3 | 7.6 | 78 | 64 | 80 |
| Copper [µg/g] | 11 | 28 | 70 | 54 | 75 | 65 | 34 | 17 | 19 | 4.8 | 15 | 13 |
| Iron [µg/g] | 14000 | 8000 | 32000 | 34000 | 34000 | 28000 | 25000 | 13000 | 12000 | 14000 | 15000 | 19000 |
| Potassium [µg/g] | 930 | 380 | 1700 | 2500 | 3100 | 1500 | 3100 | 1000 | 680 | 860 | 1500 | 1700 |
| Lithium [µg/g] | 9.5 | 8.5 | 21 | 28 | 24 | 19 | 21 | 4.9 | 3.5 | 13 | 13 | 9.3 |
| Magnesium [µg/g] | 2900 | 1200 | 6200 | 9300 | 9500 | 5700 | 6300 | 2200 | 1200 | 3200 | 4100 | 3700 |
| Manganese [µg/g] | 300 | 250 | 420 | 660 | 840 | 520 | 440 | 830 | 170 | 150 | 210 | 160 |
| Molybdenum [µg/g] | 0.57 | 0.81 | 0.77 | 0.55 | 0.72 | 0.95 | 0.69 | 0.73 | 1.1 | 0.41 | 0.27 | 0.65 |
| Nickel [µg/g] | 15 | 11 | 32 | 40 | 41 | 31 | 31 | 9.5 | 6.7 | 13 | 17 | 14 |
| Lead [µg/g] | 18 | 30 | 55 | 63 | 44 | 77 | 48 | 23 | 920 | 21 | 6.1 | 18 |

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**LR Report :** **CA15297-JAN19**

| Analysis | 85: G-2018-C7 (15-20) | 86: G-2018-C7 (20-30) | 87: G-2018-C8 (0-5) | 88: G-2018-C8 (15-20) | 89: G-2018-C8 (40-50) | 90: G-2018-C9 (0-7.5) | 91: G-2018-C9 (20-30) | 92: G-2018-C9 (30-40) | 93: G-2018-C10 (2.5-10) | 94: G-2018-C10 (15-20) | 95: G-2018-C10 (40-50) | 96: G-2018-C14 (2.5-10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 1900 | 3100 | 850 | 1400 | 2000 | 2200 | 1900 | 2300 | 890 | 210 | 38 | 1400 |
| Antimony [µg/g] | < 0.8 | < 0.8 | 5.0 | 4.1 | 2.7 | 3.2 | 1.9 | < 0.8 | < 0.8 | < 0.8 | < 0.8 | 3.2 |
| Selenium [µg/g] | 1.5 | 3.6 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | 2.0 | 1.0 | < 0.7 | < 0.7 | < 0.7 |
| Tin [µg/g] | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 0.51 | < 0.5 | < 0.5 | 1.1 | < 0.5 | < 0.5 | < 0.5 |
| Strontium [µg/g] | 51 | 71 | 35 | 77 | 110 | 52 | 45 | 100 | 19 | 8.6 | 19 | 17 |
| Titanium [µg/g] | 270 | 270 | 260 | 160 | 320 | 220 | 160 | 230 | 140 | 300 | 430 | 220 |
| Thallium [µg/g] | 0.095 | 0.11 | 0.13 | 0.10 | 0.13 | 0.092 | 0.16 | 0.078 | 0.14 | 0.070 | 0.062 | 0.058 |
| Uranium [µg/g] | 1.6 | 3.9 | 0.31 | 0.41 | 0.35 | 0.42 | 0.79 | 1.9 | 0.62 | 0.44 | 0.53 | 0.24 |
| Vanadium [µg/g] | 9.6 | 7.4 | 12 | 12 | 12 | 12 | 13 | 6.9 | 7.8 | 12 | 12 | 7.6 |
| Yttrium [µg/g] | 5.8 | 15 | 4.3 | 4.7 | 4.4 | 5.2 | 5.3 | 5.2 | 3.7 | 4.3 | 6.2 | 3.9 |
| Zinc [µg/g] | 26 | 22 | 140 | 95 | 93 | 110 | 76 | 20 | 13 | 23 | 31 | 35 |

| Analysis | 97: G-2018-C14 (15-20) | 98: G-2018-C14 (40-50) | 99: G-2018-C15 (2.5-10) | 100: G-2018-C15 (15-20) | 101: G-2018-C15 (20-30) | 102: G-2018-C17 (0-5) | 103: G-2018-C17 (10-20) | 104: G-2018-C17 (40-50) | 105: G-2018-C6 (29NOV) (0-7.5) | 106: G-2018-C6 (29NOV) (10-15) | 107: G-2018-C6 (29NOV) (20-30) | 108: G-2018-C6 (29NOV) (40-50) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | 24.3 | 34.6 | 28.2 | 76.3 | 79.3 | 40.8 | 30.5 | 33.2 | 63.9 | 36.0 | 21.5 | 83.7 |
| Mercury [ug/g] | 0.66 | 44 | 1.6 | 1.1 | 0.69 | 3.0 | 4.6 | 7.7 | 29 | 29 | 14 | 9.8 |
| Silver [µg/g] | 0.052 | 0.37 | 0.12 | 0.16 | 0.22 | 0.19 | 0.19 | 0.23 | 0.65 | 0.63 | 0.78 | 0.76 |
| Arsenic [µg/g] | 2100 | 7600 | 1900 | 1900 | 3100 | 2800 | 1700 | 3300 | 1200 | 1100 | 43000 | 550 |
| Aluminum [µg/g] | 6500 | 6100 | 12000 | 8400 | 9500 | 16000 | 11000 | 13000 | 8900 | 11000 | 12000 | 13000 |
| Barium [µg/g] | 31 | 33 | 56 | 39 | 35 | 77 | 45 | 64 | 58 | 55 | 69 | 38 |
| Beryllium [µg/g] | 0.17 | 0.18 | 0.33 | 0.31 | 0.34 | 0.46 | 0.31 | 0.41 | 0.36 | 0.35 | 0.41 | 0.57 |
| Bismuth [µg/g] | 0.28 | 1.2 | 0.41 | 0.27 | 0.21 | 0.43 | 0.38 | 0.59 | 1.5 | 1.5 | 2.1 | 0.65 |
| Calcium [µg/g] | 1100 | 1300 | 1700 | 8000 | 7300 | 3000 | 8000 | 9400 | 2400 | 1900 | 2800 | 4600 |
| Cadmium [µg/g] | 0.10 | 0.28 | 0.17 | 0.26 | 0.37 | 0.36 | 0.20 | 0.40 | 0.65 | 0.51 | 0.36 | 0.36 |
| Cobalt [µg/g] | 4.6 | 13 | 10 | 8.6 | 12 | 13 | 9.1 | 11 | 8.3 | 5.5 | 66 | 2.8 |
| Chromium [µg/g] | 84 | 94 | 57 | 79 | 9.0 | 21 | 23 | 18 | 12 | 14 | 17 | 11 |
| Copper [µg/g] | 11 | 31 | 26 | 15 | 14 | 43 | 29 | 31 | 25 | 16 | 39 | 19 |
| Iron [µg/g] | 18000 | 24000 | 28000 | 16000 | 15000 | 33000 | 27000 | 28000 | 24000 | 20000 | 74000 | 9600 |
| Potassium [µg/g] | 1900 | 1500 | 2800 | 1400 | 1200 | 3300 | 2600 | 3800 | 1900 | 2600 | 3900 | 1100 |
| Lithium [µg/g] | 9.3 | 8.4 | 18 | 6.8 | 5.4 | 25 | 20 | 20 | 14 | 18 | 18 | 6.2 |
| Magnesium [µg/g] | 3800 | 3400 | 7700 | 3100 | 2500 | 9900 | 7500 | 8400 | 4900 | 6800 | 6700 | 2600 |
| Manganese [µg/g] | 160 | 180 | 290 | 490 | 510 | 460 | 640 | 670 | 320 | 250 | 470 | 180 |
| Molybdenum [µg/g] | 0.66 | 0.87 | 0.51 | 0.68 | 0.72 | 0.49 | 0.28 | 0.38 | 0.52 | 0.21 | 1.7 | 0.72 |
| Nickel [µg/g] | 14 | 25 | 25 | 19 | 31 | 29 | 22 | 26 | 23 | 16 | 87 | 10 |
| Lead [µg/g] | 18 | 76 | 25 | 18 | 16 | 36 | 23 | 43 | 99 | 86 | 96 | 40 |

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**LR Report :** **CA15297-JAN19**

| Analysis | 97: G-2018-C14 (15-20) | 98: G-2018-C14 (40-50) | 99: G-2018-C15 (2.5-10) | 100: G-2018-C15 (15-20) | 101: G-2018-C15 (20-30) | 102: G-2018-C17 (0-5) | 103: G-2018-C17 (10-20) | 104: G-2018-C17 (40-50) | 105: G-2018-C6 (29NOV) (0-7.5) | 106: G-2018-C6 (29NOV) (10-15) | 107: G-2018-C6 (29NOV) (20-30) | 108: G-2018-C6 (29NOV) (40-50) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 1000 | 5700 | 940 | 3900 | 3400 | 2100 | 2300 | 2900 | 1100 | 770 | 26000 | 3000 |
| Antimony [µg/g] | 3.0 | 8.3 | 2.6 | 1.3 | 1.6 | 2.9 | 1.7 | 2.9 | 2.5 | 2.3 | 41 | 0.99 |
| Selenium [µg/g] | < 0.7 | < 0.7 | < 0.7 | 1.3 | 2.0 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | 2.5 |
| Tin [µg/g] | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Strontium [µg/g] | 14 | 16 | 20 | 64 | 61 | 31 | 58 | 66 | 28 | 23 | 34 | 40 |
| Titanium [µg/g] | 210 | 200 | 290 | 180 | 200 | 260 | 280 | 250 | 150 | 190 | 300 | 280 |
| Thallium [µg/g] | 0.065 | 0.072 | 0.12 | 0.066 | 0.066 | 0.15 | 0.12 | 0.12 | 0.12 | 0.12 | 0.14 | 0.045 |
| Uranium [µg/g] | 0.24 | 0.27 | 0.46 | 0.75 | 1.3 | 0.46 | 0.51 | 0.49 | 0.41 | 0.31 | 0.47 | 2.2 |
| Vanadium [µg/g] | 7.6 | 7.9 | 14 | 6.6 | 6.0 | 16 | 14 | 15 | 9.7 | 11 | 15 | 7.3 |
| Yttrium [µg/g] | 3.4 | 4.2 | 6.8 | 5.2 | 5.4 | 7.5 | 6.4 | 7.0 | 4.8 | 4.3 | 5.8 | 6.1 |
| Zinc [µg/g] | 34 | 66 | 66 | 40 | 59 | 92 | 59 | 75 | 89 | 76 | 64 | 33 |

| Analysis | 109: G-2018-WR1 | 110: G-2018-WR2 | 111: G-2018-WR3 | 112: G-2018-WR4 | 113: G-2018-WR5 | 114: G-2018-WR6 | 115: G-2018-SFC-1 (0-20) | 116: G-2018-SFC-2 | 117: G-2018-SFC-3 | 118: G-2018-SFC-4 | 119: G-2018-SFC-5 | 120: G-2018-SFC-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | 9.72 | 15.7 | 11.8 | 7.38 | 14.1 | 9.51 | 17.0 | 20.8 | 20.5 | 12.4 | 24.3 | 25.2 |
| Mercury [ug/g] | --- | --- | --- | --- | --- | --- | 6.0 | 2.6 | 0.14 | 0.21 | 0.27 | 1.0 |
| Silver [µg/g] | 0.17 | 0.44 | 0.086 | 0.066 | 0.095 | 0.097 | 0.77 | 0.37 | 0.068 | 0.15 | 0.052 | 0.13 |
| Arsenic [µg/g] | 2500 | 12000 | 1600 | 4100 | 850 | 380 | 31000 | 15000 | 600 | 2200 | 550 | 1800 |
| Aluminum [µg/g] | 11000 | 8400 | 13000 | 14000 | 17000 | 17000 | 5100 | 8100 | 7000 | 8400 | 6600 | 11000 |
| Barium [µg/g] | 68 | 49 | 69 | 73 | 82 | 80 | 34 | 48 | 35 | 45 | 28 | 57 |
| Beryllium [µg/g] | 0.34 | 0.19 | 0.40 | 0.42 | 0.53 | 0.49 | 0.12 | 0.19 | 0.18 | 0.22 | 0.17 | 0.33 |
| Bismuth [µg/g] | 0.61 | 1.5 | 0.34 | 0.39 | 0.53 | 0.47 | 2.6 | 1.4 | 0.28 | 0.61 | 0.24 | 0.51 |
| Calcium [µg/g] | 3300 | 1400 | 2900 | 5600 | 4400 | 3000 | 160 | 1100 | 1300 | 1100 | 1300 | 6500 |
| Cadmium [µg/g] | 0.20 | 0.095 | 0.11 | 0.057 | 0.068 | 0.11 | 0.090 | 0.091 | 0.050 | 0.37 | 0.089 | 0.16 |
| Cobalt [µg/g] | 15 | 8.1 | 13 | 14 | 21 | 15 | 1.9 | 3.4 | 2.5 | 12 | 4.2 | 10 |
| Chromium [µg/g] | 17 | 14 | 18 | 19 | 23 | 23 | 8.8 | 12 | 10 | 12 | 100 | 47 |
| Copper [µg/g] | 39 | 170 | 28 | 27 | 49 | 41 | 8.6 | 7.3 | 14 | 32 | 20 | 34 |
| Iron [µg/g] | 31000 | 37000 | 29000 | 34000 | 39000 | 38000 | 48000 | 37000 | 17000 | 27000 | 16000 | 28000 |
| Potassium [µg/g] | 3400 | 1900 | 3400 | 4400 | 5000 | 4000 | 1800 | 2500 | 2100 | 2600 | 1700 | 3400 |
| Lithium [µg/g] | 15 | 11 | 18 | 25 | 34 | 28 | 6.5 | 11 | 11 | 12 | 10 | 18 |
| Magnesium [µg/g] | 6600 | 4900 | 6800 | 7600 | 9700 | 10000 | 2800 | 4800 | 4200 | 5000 | 4200 | 7000 |
| Manganese [µg/g] | 490 | 320 | 510 | 560 | 590 | 590 | 110 | 210 | 190 | 490 | 190 | 710 |
| Molybdenum [µg/g] | 0.67 | 0.77 | 0.52 | 0.52 | 2.2 | 0.22 | 1.3 | 1.0 | 0.93 | 1.1 | 0.74 | 0.89 |
| Nickel [µg/g] | 33 | 17 | 28 | 35 | 50 | 35 | 9.0 | 9.9 | 9.0 | 24 | 15 | 28 |
| Lead [µg/g] | 45 | 290 | 27 | 17 | 21 | 33 | 170 | 93 | 16 | 46 | 14 | 28 |

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00016956057

**SGS Canada Inc.**
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Phone: 705-652-2000 FAX: 705-652-6365

**LR Report :** **CA15297-JAN19**

| Analysis | 109: G-2018-WR1 | 110: G-2018-WR2 | 111: G-2018-WR3 | 112: G-2018-WR4 | 113: G-2018-WR5 | 114: G-2018-WR6 | 115: G-2018-SFC-1 (0-20) | 116: G-2018-SFC-2 | 117: G-2018-SFC-3 | 118: G-2018-SFC-4 | 119: G-2018-SFC-5 | 120: G-2018-SFC-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 1200 | 1300 | 430 | 2100 | 430 | 240 | 1800 | 530 | 59 | 180 | 100 | 1000 |
| Antimony [µg/g] | 1.2 | 19 | 1.3 | 6.0 | 1.9 | < 0.8 | 33 | 13 | 1.3 | 2.8 | 1.2 | 1.8 |
| Selenium [µg/g] | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 |
| Tin [µg/g] | 0.99 | 5.9 | 0.61 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Strontium [µg/g] | 32 | 15 | 25 | 61 | 49 | 33 | 3.7 | 14 | 16 | 15 | 15 | 51 |
| Titanium [µg/g] | 310 | 260 | 330 | 270 | 330 | 250 | 200 | 230 | 250 | 270 | 250 | 260 |
| Thallium [µg/g] | 0.12 | 0.083 | 0.12 | 0.15 | 0.18 | 0.14 | 0.11 | 0.090 | 0.069 | 0.10 | 0.065 | 0.11 |
| Uranium [µg/g] | 0.46 | 0.41 | 0.59 | 0.42 | 0.52 | 0.60 | 0.19 | 0.33 | 0.26 | 0.33 | 0.26 | 0.60 |
| Vanadium [µg/g] | 14 | 11 | 16 | 16 | 18 | 18 | 6.5 | 10 | 8.1 | 9.3 | 7.7 | 12 |
| Yttrium [µg/g] | 7.1 | 4.7 | 7.3 | 5.1 | 6.6 | 6.0 | 1.7 | 4.0 | 3.8 | 5.2 | 4.3 | 7.1 |
| Zinc [µg/g] | 81 | 56 | 55 | 61 | 82 | 80 | 24 | 31 | 32 | 51 | 35 | 61 |

| Analysis | 121: G-2018-SFC-7 | 122: G-2018-SFC-8 | 123: G-2018-SFC-10 | 124: G-2018-SFC-11 | 125: G-2018-SFC-12 | 126: G-2018-SFC-13 | 127: G-2018-SFC-14 | 128: G-2018-SFC-15 | 129: G-2018-SFC-16 | 130: G-2018-SFC-18 | 131: G-2018-C1 (0-10) | 132: G-2018-C1 (20-40) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture [%] | 23.4 | 21.5 | 21.4 | 11.9 | 16.6 | 22.5 | 21.4 | 19.6 | 34.1 | 17.6 | 26.6 | 20.1 |
| Mercury [ug/g] | 0.57 | 0.37 | 0.24 | 0.33 | 18 | 1.7 | 0.67 | 0.65 | 1.2 | 1.1 | 0.34 | 1.5 |
| Silver [µg/g] | 0.12 | 0.083 | 0.18 | 0.31 | 6.2 | 0.31 | 0.23 | 0.19 | 0.22 | 0.25 | 0.089 | 0.15 |
| Arsenic [µg/g] | 4500 | 920 | 1600 | 8700 | 170000 | 5600 | 9000 | 8200 | 2100 | 11000 | 1200 | 680 |
| Aluminum [µg/g] | 9000 | 7500 | 7200 | 5500 | 370 | 7900 | 5700 | 6100 | 9600 | 6500 | 7000 | 14000 |
| Barium [µg/g] | 39 | 32 | 30 | 28 | 13 | 34 | 27 | 29 | 42 | 31 | 30 | 62 |
| Beryllium [µg/g] | 0.25 | 0.19 | 0.21 | 0.11 | 0.024 | 0.20 | 0.14 | 0.14 | 0.27 | 0.14 | 0.17 | 0.35 |
| Bismuth [µg/g] | 0.47 | 0.33 | 0.66 | 1.6 | 25 | 1.1 | 1.0 | 0.93 | 0.72 | 1.2 | 0.38 | 0.55 |
| Calcium [µg/g] | 5000 | 4800 | 1400 | 810 | 38 | 1800 | 1300 | 1000 | 3400 | 890 | 2100 | 5900 |
| Cadmium [µg/g] | 0.24 | 0.14 | 0.67 | < 0.02 | 0.16 | 0.21 | 0.10 | 0.077 | 0.23 | 0.12 | 0.096 | 0.17 |
| Cobalt [µg/g] | 9.7 | 7.7 | 9.6 | 1.4 | 3.0 | 13 | 5.3 | 4.4 | 9.4 | 4.9 | 5.1 | 20 |
| Chromium [µg/g] | 62 | 65 | 66 | 68 | 13 | 63 | 67 | 67 | 14 | 66 | 82 | 42 |
| Copper [µg/g] | 35 | 25 | 45 | 3.7 | 82 | 33 | 13 | 13 | 36 | 11 | 20 | 31 |
| Iron [µg/g] | 26000 | 19000 | 22000 | 27000 | 160000 | 27000 | 25000 | 24000 | 26000 | 28000 | 18000 | 36000 |
| Potassium [µg/g] | 2600 | 2100 | 2200 | 1700 | 320 | 2000 | 1700 | 1800 | 2300 | 1700 | 1900 | 3600 |
| Lithium [µg/g] | 14 | 12 | 11 | 8.0 | < 2 | 11 | 8.4 | 8.7 | 15 | 9.0 | 11 | 20 |
| Magnesium [µg/g] | 6300 | 4900 | 4600 | 3400 | 97 | 5000 | 3700 | 3800 | 6000 | 4000 | 4500 | 8600 |
| Manganese [µg/g] | 500 | 400 | 500 | 110 | 9.8 | 360 | 190 | 200 | 400 | 200 | 280 | 920 |
| Molybdenum [µg/g] | 0.80 | 1.0 | 1.2 | 1.0 | 2.2 | 0.61 | 0.87 | 1.5 | 1.1 | 1.6 | 0.91 | 2.2 |
| Nickel [µg/g] | 29 | 23 | 41 | 8.1 | 5.1 | 27 | 13 | 10 | 28 | 11 | 16 | 45 |
| Lead [µg/g] | 23 | 19 | 39 | 93 | 1400 | 63 | 47 | 41 | 47 | 48 | 21 | 29 |

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Test method information available upon request. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

000169057

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Phone: 705-652-2000 FAX: 705-652-6365

**LR Report :** **CA15297-JAN19**

| Analysis | 121: G-2018-SFC-7 | 122: G-2018-SFC-8 | 123: G-2018-SFC-10 | 124: G-2018-SFC-11 | 125: G-2018-SFC-12 | 126: G-2018-SFC-13 | 127: G-2018-SFC-14 | 128: G-2018-SFC-15 | 129: G-2018-SFC-16 | 130: G-2018-SFC-18 | 131: G-2018-C1 (0-10) | 132: G-2018-C1 (20-40) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulphur [µg/g] | 240 | 610 | 110 | 1000 | 17000 | 410 | 840 | 290 | 1300 | 460 | 310 | 1500 |
| Antimony [µg/g] | 4.5 | 1.3 | 2.0 | 8.3 | 240 | 6.1 | 11 | 12 | 3.3 | 16 | 1.5 | < 0.8 |
| Selenium [µg/g] | < 0.7 | < 0.7 | < 0.7 | < 0.7 | 3.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 |
| Tin [µg/g] | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 2.1 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Strontium [µg/g] | 57 | 37 | 18 | 11 | 5.8 | 27 | 17 | 16 | 31 | 13 | 23 | 45 |
| Titanium [µg/g] | 310 | 270 | 270 | 210 | 120 | 250 | 220 | 210 | 310 | 230 | 250 | 320 |
| Thallium [µg/g] | 0.11 | 0.081 | 0.10 | 0.066 | 0.18 | 0.090 | 0.072 | 0.083 | 0.098 | 0.088 | 0.072 | 0.12 |
| Uranium [µg/g] | 0.42 | 0.29 | 0.33 | 0.20 | 0.064 | 0.34 | 0.24 | 0.26 | 0.45 | 0.29 | 0.27 | 0.48 |
| Vanadium [µg/g] | 10 | 8.7 | 8.2 | 7.8 | 1.4 | 9.2 | 6.9 | 7.4 | 12 | 8.0 | 8.0 | 15 |
| Yttrium [µg/g] | 8.2 | 5.1 | 6.5 | 2.4 | 0.32 | 5.4 | 3.5 | 3.6 | 6.5 | 3.8 | 4.3 | 7.0 |
| Zinc [µg/g] | 57 | 48 | 78 | 23 | 11 | 57 | 27 | 27 | 64 | 28 | 40 | 71 |

| Analysis | 133: G-2018-C1 (60-80) | 134: G-2018-C1 (140-160) | 135: G-2018-C4 (0-5) | 136: G-2018-C4 (10-20) |
|---|---|---|---|---|
| Moisture [%] | 19.1 | 39.3 | 51.7 | 35.5 |
| Mercury [ug/g] | 11 | 4.9 | 0.37 | 3.6 |
| Silver [µg/g] | 0.26 | 0.098 | 0.11 | 0.15 |
| Arsenic [µg/g] | 2000 | 1500 | 3300 | 490 |
| Aluminum [µg/g] | 10000 | 8200 | 9200 | 10000 |
| Barium [µg/g] | 59 | 31 | 40 | 43 |
| Beryllium [µg/g] | 0.31 | 0.23 | 0.25 | 0.28 |
| Bismuth [µg/g] | 0.79 | 0.39 | 0.34 | 0.41 |
| Calcium [µg/g] | 2300 | 2100 | 1400 | 1100 |
| Cadmium [µg/g] | 0.28 | 0.14 | 0.13 | 0.11 |
| Cobalt [µg/g] | 16 | 22 | 7.4 | 5.5 |
| Chromium [µg/g] | 13 | 9.3 | 12 | 13 |
| Copper [µg/g] | 35 | 20 | 18 | 13 |
| Iron [µg/g] | 26000 | 16000 | 34000 | 18000 |
| Potassium [µg/g] | 3200 | 1400 | 1300 | 1700 |
| Lithium [µg/g] | 14 | 10 | 10 | 12 |
| Magnesium [µg/g] | 5600 | 3200 | 3000 | 4100 |
| Manganese [µg/g] | 510 | 220 | 490 | 250 |
| Molybdenum [µg/g] | 1.4 | 0.73 | 0.96 | 0.82 |
| Nickel [µg/g] | 37 | 46 | 14 | 12 |
| Lead [µg/g] | 45 | 24 | 24 | 20 |

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00016960S7

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**LR Report :** **CA15297-JAN19**

| Analysis | 133: G-2018-C1 (60-80) | 134: G-2018-C1 (140-160) | 135: G-2018-C4 (0-5) | 136: G-2018-C4 (10-20) |
|---|---|---|---|---|
| Sulphur [µg/g] | 1900 | 1700 | 410 | 480 |
| Antimony [µg/g] | 4.7 | 1.3 | 1.6 | 1.3 |
| Selenium [µg/g] | < 0.7 | < 0.7 | < 0.7 | < 0.7 |
| Tin [µg/g] | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Strontium [µg/g] | 24 | 19 | 15 | 14 |
| Titanium [µg/g] | 240 | 200 | 260 | 280 |
| Thallium [µg/g] | 0.11 | 0.052 | 0.077 | 0.095 |
| Uranium [µg/g] | 0.40 | 0.35 | 0.39 | 0.36 |
| Vanadium [µg/g] | 11 | 8.4 | 13 | 12 |
| Yttrium [µg/g] | 5.4 | 5.0 | 5.2 | 4.1 |
| Zinc [µg/g] | 87 | 66 | 31 | 32 |

Chris Sullivan

CHARTERED
Christopher Sullivan
CHEMIST

*Chris Sullivan, B.Sc., C.Chem*
*Project Specialist,*
*Environment, Health & Safety*

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00016956057



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Phone: 705-652-2000 FAX: 705-652-6365

**LR Report :** **CA15297-JAN19**

# Quality Control Report

| Inorganic Analysis | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Reporting Limit | Unit | Method Blank | Duplicate | | | | LCS / Spike Blank | | | Matrix Spike / Reference Material | | | |
| | | | | Result 1 | Result 2 | RPD | Acceptance Criteria | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | | |
| | | | | | | | % | | Low | High | | Low | High | |
| *Mercury by CVAAS - QCBatchID: EMS0044-FEB19* | | | | | | | | | | | | | | |
| Mercury | 0.05 | ug/g | <0.05 | | | 8 | 20 | 105 | 80 | 120 | NV | 70 | 130 | |
| *Metals in Soil - Aqua-regia/ICP-MS - QCBatchID: EMS0044-FEB19* | | | | | | | | | | | | | | |
| Aluminum | 3 | µg/g | <3 | | | 8 | 20 | 108 | 70 | 130 | 104 | 70 | 130 | |
| Antimony | 0.8 | µg/g | <0.8 | | | 5 | 20 | 100 | 70 | 130 | NV | 70 | 130 | |
| Arsenic | 0.5 | µg/g | <0.5 | | | 5 | 20 | 100 | 70 | 130 | 105 | 70 | 130 | |
| Barium | 0.01 | µg/g | <0.01 | | | 0 | 20 | 102 | 70 | 130 | 84 | 70 | 130 | |
| Beryllium | 0.02 | µg/g | <0.02 | | | 6 | 20 | 105 | 70 | 130 | NV | 70 | 130 | |
| Bismuth | 0.09 | µg/g | <0.09 | | | 10 | 20 | 100 | 70 | 130 | NV | 70 | 130 | |
| Cadmium | 0.02 | µg/g | <0.02 | | | 1 | 20 | 103 | 70 | 130 | NV | 70 | 130 | |
| Calcium | 3 | µg/g | <3 | | | 8 | 20 | 106 | 70 | 130 | NV | 70 | 130 | |
| Chromium | 0.5 | µg/g | <0.5 | | | 9 | 20 | 103 | 70 | 130 | 82 | 70 | 130 | |
| Cobalt | 0.01 | µg/g | <0.01 | | | 9 | 20 | 104 | 70 | 130 | 102 | 70 | 130 | |
| Copper | 0.1 | µg/g | <0.1 | | | 7 | 20 | 105 | 70 | 130 | 101 | 70 | 130 | |
| Iron | 3 | µg/g | <3 | | | 10 | 20 | 109 | 70 | 130 | 109 | 70 | 130 | |
| Lead | 0.05 | µg/g | <0.05 | | | 7 | 20 | 107 | 70 | 130 | 110 | 70 | 130 | |
| Lithium | 2 | µg/g | <2 | | | 3 | 20 | 107 | 70 | 130 | NV | 70 | 130 | |
| Magnesium | 3 | µg/g | <3 | | | 7 | 20 | 107 | 70 | 130 | NV | 70 | 130 | |
| Manganese | 0.1 | µg/g | <0.1 | | | 7 | 20 | 107 | 70 | 130 | 115 | 70 | 130 | |
| Molybdenum | 0.1 | µg/g | <0.1 | | | 2 | 20 | 95 | 70 | 130 | NV | 70 | 130 | |
| Nickel | 0.1 | µg/g | <0.1 | | | 9 | 20 | 106 | 70 | 130 | 91 | 70 | 130 | |
| Potassium | 3 | µg/g | <3 | | | 1 | 20 | 104 | 70 | 130 | NV | 70 | 130 | |
| Selenium | 0.7 | µg/g | <0.7 | | | 5 | 20 | 108 | 70 | 130 | NV | 70 | 130 | |
| Silver | 0.01 | µg/g | <0.01 | | | 7 | 20 | 100 | 70 | 130 | 116 | 70 | 130 | |
| Strontium | 0.02 | µg/g | <0.02 | | | 8 | 20 | 105 | 70 | 130 | NV | 70 | 130 | |
| Thallium | 0.02 | µg/g | <0.02 | | | 11 | 20 | 106 | 70 | 130 | NV | 70 | 130 | |
| Tin | 0.5 | µg/g | <0.5 | | | 5 | 20 | 109 | 70 | 130 | NV | 70 | 130 | |
| Titanium | 0.1 | µg/g | <0.1 | | | 10 | 20 | 102 | 70 | 130 | NV | 70 | 130 | |
| Uranium | 0.002 | µg/g | <0.002 | | | 9 | 20 | 102 | 70 | 130 | NV | 70 | 130 | |
| Vanadium | 1 | µg/g | <1 | | | 9 | 20 | 104 | 70 | 130 | 107 | 70 | 130 | |
| Yttrium | 0.004 | µg/g | <0.004 | | | 4 | 20 | 104 | 70 | 130 | NV | 70 | 130 | |
| Zinc | 0.7 | µg/g | <0.7 | | | 8 | 20 | 106 | 70 | 130 | 84 | 70 | 130 | |
| *Metals in Soil - ICP-OES - QCBatchID: ESG0025-FEB19* | | | | | | | | | | | | | | |
| Sulphur | 3 | µg/g | <3 | | | 5 | 20 | 91 | 80 | 120 | NV | 70 | 130 | |

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0001659057

Success Through Science®

Your Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B8X4697-M058-01-01, B8X4697-M058-02-01

**Report Date: 2018/12/28**
Report #: R2669157
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B8B0540**
**Received: 2018/12/18, 09:35**

Sample Matrix: Water
# Samples Received: 17

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) (1) | 17 | N/A | 2018/12/27 | BBY WI-00033 | Auto Calc |
| Mercury (Total) by CVAF | 17 | 2018/12/22 | 2018/12/22 | BBY7SOP-00015 | BCMOE BCLM Oct2013 m |
| Elements by ICPMS Digested LL (total) | 17 | 2018/12/21 | 2018/12/24 | BBY7SOP-00003 | EPA 6020b R2 m |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | 17 | N/A | 2018/12/27 | BBY WI-00033 | Auto Calc |

**Remarks:**

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).

Encryption Key



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
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CANADA L5N 2L8

Your C.O.C. #: B8X4697-M058-01-01, B8X4697-M058-02-01

**Report Date: 2018/12/28**
Report #: R2669157
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B8B0540**
**Received: 2018/12/18, 09:35**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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

Maxxam Job #: B8B0540
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | UZ2879 | UZ2880 | UZ2881 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | 2018/11/28 | 2018/11/29 | | |
| COC Number | | B8X4697-M058-01-01 | B8X4697-M058-01-01 | B8X4697-M058-01-01 | | |
| | UNITS | G-2018-C5 SW | G-2018-C6 SW | G-2018-C7 SW | RDL | QC Batch |
| **Total Metals by ICPMS** | | | | | | |
| Total Aluminum (Al) | mg/L | 0.213 | 0.133 | 0.341 | 0.0030 | 9273673 |
| Total Antimony (Sb) | mg/L | 0.000354 | 0.000173 | 0.000042 | 0.000020 | 9273673 |
| Total Arsenic (As) | mg/L | 0.130 | 0.0882 | 0.00180 | 0.000020 | 9273673 |
| Total Barium (Ba) | mg/L | 0.00680 | 0.00283 | 0.00254 | 0.000050 | 9273673 |
| Total Beryllium (Be) | mg/L | 0.000011 | <0.000010 | 0.000017 | 0.000010 | 9273673 |
| Total Bismuth (Bi) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9273673 |
| Total Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9273673 |
| Total Cadmium (Cd) | mg/L | 0.0000167 | <0.0000050 | 0.0000158 | 0.0000050 | 9273673 |
| Total Chromium (Cr) | mg/L | 0.00026 | 0.00017 | 0.00034 | 0.00010 | 9273673 |
| Total Cobalt (Co) | mg/L | 0.000227 | 0.000086 | 0.000153 | 0.000010 | 9273673 |
| Total Copper (Cu) | mg/L | 0.00269 | 0.00119 | 0.00082 | 0.00010 | 9273673 |
| Total Iron (Fe) | mg/L | 0.515 | 0.280 | 0.240 | 0.0050 | 9273673 |
| Total Lead (Pb) | mg/L | 0.000353 | 0.000193 | 0.000405 | 0.000020 | 9273673 |
| Total Manganese (Mn) | mg/L | 0.0651 | 0.0258 | 0.0205 | 0.00010 | 9273673 |
| Total Molybdenum (Mo) | mg/L | <0.000050 | <0.000050 | <0.000050 | 0.000050 | 9273673 |
| Total Nickel (Ni) | mg/L | 0.00223 | 0.00085 | 0.00070 | 0.00010 | 9273673 |
| Total Phosphorus (P) | mg/L | 0.0083 | 0.0066 | 0.0065 | 0.0050 | 9273673 |
| Total Selenium (Se) | mg/L | 0.000074 | 0.000062 | 0.000070 | 0.000040 | 9273673 |
| Total Silicon (Si) | mg/L | 1.77 | 1.74 | 1.31 | 0.050 | 9273673 |
| Total Silver (Ag) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9273673 |
| Total Strontium (Sr) | mg/L | 0.0246 | 0.0259 | 0.0117 | 0.000050 | 9273673 |
| Total Thallium (Tl) | mg/L | 0.0000055 | 0.0000031 | 0.0000052 | 0.0000020 | 9273673 |
| Total Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9273673 |
| Total Titanium (Ti) | mg/L | <0.0020 | <0.0020 | 0.0021 | 0.0020 | 9273673 |
| Total Uranium (U) | mg/L | 0.0000169 | 0.0000104 | 0.0000131 | 0.0000050 | 9273673 |
| Total Vanadium (V) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9273673 |
| Total Zinc (Zn) | mg/L | 0.0055 | 0.0012 | 0.0016 | 0.0010 | 9273673 |
| Total Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9273673 |
| Total Sulphur (S) | mg/L | 1.72 | 1.19 | <0.60 | 0.60 | 9273673 |

RDL = Reportable Detection Limit



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B8B0540
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | UZ2882 | UZ2883 | UZ2884 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/29 | 2018/11/29 | | |
| COC Number | | B8X4697-M058-01-01 | B8X4697-M058-01-01 | B8X4697-M058-01-01 | | |
| | UNITS | G-2018-C8 SW | G-2018-C9 SW | G-2018-C10 SW | RDL | QC Batch |
| **Total Metals by ICPMS** | | | | | | |
| Total Aluminum (Al) | mg/L | 0.0358 | 0.287 | 0.207 | 0.0030 | 9273673 |
| Total Antimony (Sb) | mg/L | 0.000249 | 0.000191 | 0.000070 | 0.000020 | 9273673 |
| Total Arsenic (As) | mg/L | 0.0129 | 0.0883 | 0.0125 | 0.000020 | 9273673 |
| Total Barium (Ba) | mg/L | 0.000900 | 0.00219 | 0.00214 | 0.000050 | 9273673 |
| Total Beryllium (Be) | mg/L | <0.000010 | 0.000014 | 0.000011 | 0.000010 | 9273673 |
| Total Bismuth (Bi) | mg/L | <0.000010 | 0.000016 | <0.000010 | 0.000010 | 9273673 |
| Total Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9273673 |
| Total Cadmium (Cd) | mg/L | <0.0000050 | 0.0000136 | 0.0000080 | 0.0000050 | 9273673 |
| Total Chromium (Cr) | mg/L | <0.00010 | 0.00031 | 0.00021 | 0.00010 | 9273673 |
| Total Cobalt (Co) | mg/L | 0.000035 | 0.000609 | 0.000191 | 0.000010 | 9273673 |
| Total Copper (Cu) | mg/L | 0.00157 | 0.00190 | 0.00051 | 0.00010 | 9273673 |
| Total Iron (Fe) | mg/L | 0.0788 | 2.78 | 0.351 | 0.0050 | 9273673 |
| Total Lead (Pb) | mg/L | 0.000072 | 0.00191 | 0.000123 | 0.000020 | 9273673 |
| Total Manganese (Mn) | mg/L | 0.00290 | 0.107 | 0.0493 | 0.00010 | 9273673 |
| Total Molybdenum (Mo) | mg/L | <0.000050 | 0.000072 | <0.000050 | 0.000050 | 9273673 |
| Total Nickel (Ni) | mg/L | 0.00076 | 0.00131 | 0.00050 | 0.00010 | 9273673 |
| Total Phosphorus (P) | mg/L | <0.0050 | 0.0342 | 0.0072 | 0.0050 | 9273673 |
| Total Selenium (Se) | mg/L | <0.000040 | 0.000086 | 0.000063 | 0.000040 | 9273673 |
| Total Silicon (Si) | mg/L | 1.02 | 1.37 | 1.16 | 0.050 | 9273673 |
| Total Silver (Ag) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9273673 |
| Total Strontium (Sr) | mg/L | 0.0345 | 0.0326 | 0.0159 | 0.000050 | 9273673 |
| Total Thallium (Tl) | mg/L | <0.0000020 | 0.0000062 | 0.0000034 | 0.0000020 | 9273673 |
| Total Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9273673 |
| Total Titanium (Ti) | mg/L | <0.0020 | 0.0048 | <0.0020 | 0.0020 | 9273673 |
| Total Uranium (U) | mg/L | 0.0000078 | 0.0000247 | 0.0000113 | 0.0000050 | 9273673 |
| Total Vanadium (V) | mg/L | <0.00020 | 0.00037 | <0.00020 | 0.00020 | 9273673 |
| Total Zinc (Zn) | mg/L | <0.0010 | 0.0029 | 0.0020 | 0.0010 | 9273673 |
| Total Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9273673 |
| Total Sulphur (S) | mg/L | 1.05 | 0.94 | 0.61 | 0.60 | 9273673 |

RDL = Reportable Detection Limit



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B8B0540
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | UZ2885 | UZ2886 | UZ2887 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | 2018/11/28 | 2018/11/28 | | |
| COC Number | | B8X4697-M058-01-01 | B8X4697-M058-01-01 | B8X4697-M058-01-01 | | |
| | UNITS | G-2018-C11 SW | G-2018-C12 SW | G-2018-C13 SW | RDL | QC Batch |
| **Total Metals by ICPMS** | | | | | | |
| Total Aluminum (Al) | mg/L | 0.282 | 0.226 | 0.190 | 0.0030 | 9274584 |
| Total Antimony (Sb) | mg/L | 0.000033 | 0.000059 | 0.000055 | 0.000020 | 9274584 |
| Total Arsenic (As) | mg/L | 0.0128 | 0.0364 | 0.0382 | 0.000020 | 9274584 |
| Total Barium (Ba) | mg/L | 0.00215 | 0.00226 | 0.00202 | 0.000050 | 9274584 |
| Total Beryllium (Be) | mg/L | 0.000011 | 0.000012 | <0.000010 | 0.000010 | 9274584 |
| Total Bismuth (Bi) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9274584 |
| Total Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9274584 |
| Total Cadmium (Cd) | mg/L | 0.0000155 | 0.0000158 | 0.0000141 | 0.0000050 | 9274584 |
| Total Chromium (Cr) | mg/L | 0.00024 | 0.00021 | 0.00019 | 0.00010 | 9274584 |
| Total Cobalt (Co) | mg/L | 0.000653 | 0.000314 | 0.000256 | 0.000010 | 9274584 |
| Total Copper (Cu) | mg/L | 0.00035 | 0.00041 | 0.00035 | 0.00010 | 9274584 |
| Total Iron (Fe) | mg/L | 0.418 | 0.484 | 0.445 | 0.0050 | 9274584 |
| Total Lead (Pb) | mg/L | 0.000387 | 0.000278 | 0.000237 | 0.000020 | 9274584 |
| Total Manganese (Mn) | mg/L | 0.0636 | 0.0691 | 0.0584 | 0.00010 | 9274584 |
| Total Molybdenum (Mo) | mg/L | <0.000050 | <0.000050 | <0.000050 | 0.000050 | 9274584 |
| Total Nickel (Ni) | mg/L | 0.00048 | 0.00069 | 0.00057 | 0.00010 | 9274584 |
| Total Phosphorus (P) | mg/L | 0.0084 | 0.0093 | 0.0101 | 0.0050 | 9274584 |
| Total Selenium (Se) | mg/L | 0.000080 | 0.000074 | 0.000069 | 0.000040 | 9274584 |
| Total Silicon (Si) | mg/L | 1.55 | 1.33 | 1.39 | 0.050 | 9274584 |
| Total Silver (Ag) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9274584 |
| Total Strontium (Sr) | mg/L | 0.00733 | 0.00923 | 0.00881 | 0.000050 | 9274584 |
| Total Thallium (Tl) | mg/L | 0.0000027 | 0.0000028 | 0.0000022 | 0.0000020 | 9274584 |
| Total Tin (Sn) | mg/L | 0.00032 | <0.00020 | <0.00020 | 0.00020 | 9274584 |
| Total Titanium (Ti) | mg/L | 0.0034 | 0.0023 | <0.0020 | 0.0020 | 9274584 |
| Total Uranium (U) | mg/L | 0.0000083 | 0.0000081 | 0.0000067 | 0.0000050 | 9274584 |
| Total Vanadium (V) | mg/L | 0.00022 | <0.00020 | <0.00020 | 0.00020 | 9274584 |
| Total Zinc (Zn) | mg/L | 0.0022 | 0.0029 | 0.0020 | 0.0010 | 9274584 |
| Total Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9274584 |
| Total Sulphur (S) | mg/L | <0.60 | <0.60 | <0.60 | 0.60 | 9274584 |

RDL = Reportable Detection Limit



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Maxxam Job #: B8B0540
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | UZ2888 | UZ2890 | UZ2891 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/29 | 2018/11/29 | | |
| COC Number | | B8X4697-M058-01-01 | B8X4697-M058-02-01 | B8X4697-M058-02-01 | | |
| | UNITS | G-2018-SW14 | G-2018-SW15 | G-2018-SW16 | RDL | QC Batch |
| **Total Metals by ICPMS** | | | | | | |
| Total Aluminum (Al) | mg/L | 0.187 | 0.199 | 0.318 | 0.0030 | 9274584 |
| Total Antimony (Sb) | mg/L | 0.000527 | 0.000229 | 0.000303 | 0.000020 | 9274584 |
| Total Arsenic (As) | mg/L | 0.358 | 0.138 | 0.262 | 0.000020 | 9274584 |
| Total Barium (Ba) | mg/L | 0.00201 | 0.00194 | 0.00259 | 0.000050 | 9274584 |
| Total Beryllium (Be) | mg/L | <0.000010 | 0.000012 | 0.000021 | 0.000010 | 9274584 |
| Total Bismuth (Bi) | mg/L | <0.000010 | <0.000010 | 0.000017 | 0.000010 | 9274584 |
| Total Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9274584 |
| Total Cadmium (Cd) | mg/L | 0.0000230 | 0.0000179 | 0.0000257 | 0.0000050 | 9274584 |
| Total Chromium (Cr) | mg/L | 0.00019 | 0.00018 | 0.00038 | 0.00010 | 9274584 |
| Total Cobalt (Co) | mg/L | 0.000457 | 0.000716 | 0.000908 | 0.000010 | 9274584 |
| Total Copper (Cu) | mg/L | 0.00273 | 0.00129 | 0.00165 | 0.00010 | 9274584 |
| Total Iron (Fe) | mg/L | 0.363 | 0.377 | 0.866 | 0.0050 | 9274584 |
| Total Lead (Pb) | mg/L | 0.000386 | 0.000368 | 0.00153 | 0.000020 | 9274584 |
| Total Manganese (Mn) | mg/L | 0.0309 | 0.0585 | 0.0583 | 0.00010 | 9274584 |
| Total Molybdenum (Mo) | mg/L | 0.000102 | <0.000050 | 0.000061 | 0.000050 | 9274584 |
| Total Nickel (Ni) | mg/L | 0.00218 | 0.00166 | 0.00206 | 0.00010 | 9274584 |
| Total Phosphorus (P) | mg/L | 0.0091 | 0.0102 | 0.0202 | 0.0050 | 9274584 |
| Total Selenium (Se) | mg/L | 0.000056 | 0.000052 | 0.000067 | 0.000040 | 9274584 |
| Total Silicon (Si) | mg/L | 1.28 | 1.39 | 1.45 | 0.050 | 9274584 |
| Total Silver (Ag) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9274584 |
| Total Strontium (Sr) | mg/L | 0.0182 | 0.0192 | 0.0199 | 0.000050 | 9274584 |
| Total Thallium (Tl) | mg/L | 0.0000037 | 0.0000030 | 0.0000047 | 0.0000020 | 9274584 |
| Total Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9274584 |
| Total Titanium (Ti) | mg/L | <0.0020 | 0.0024 | 0.0075 | 0.0020 | 9274584 |
| Total Uranium (U) | mg/L | 0.0000082 | 0.0000070 | 0.0000108 | 0.0000050 | 9274584 |
| Total Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00038 | 0.00020 | 9274584 |
| Total Zinc (Zn) | mg/L | 0.0051 | 0.0042 | 0.0056 | 0.0010 | 9274584 |
| Total Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9274584 |
| Total Sulphur (S) | mg/L | 1.26 | 1.20 | 1.17 | 0.60 | 9274584 |

RDL = Reportable Detection Limit



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B8B0540
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | UZ2892 | UZ2893 | UZ2894 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/30 | 2018/11/27 | 2018/11/27 | | |
| COC Number | | B8X4697-M058-02-01 | B8X4697-M058-02-01 | B8X4697-M058-02-01 | | |
| | UNITS | G-2018-SW17 | G-2018-P1 SW | G-2018-P2 SW | RDL | QC Batch |
| **Total Metals by ICPMS** | | | | | | |
| Total Aluminum (Al) | mg/L | 0.166 | 0.253 | 0.300 | 0.0030 | 9274584 |
| Total Antimony (Sb) | mg/L | 0.000180 | 0.000136 | 0.000161 | 0.000020 | 9274584 |
| Total Arsenic (As) | mg/L | 0.124 | 0.0721 | 0.0999 | 0.000020 | 9274584 |
| Total Barium (Ba) | mg/L | 0.00220 | 0.00254 | 0.00353 | 0.000050 | 9274584 |
| Total Beryllium (Be) | mg/L | 0.000011 | 0.000018 | 0.000014 | 0.000010 | 9274584 |
| Total Bismuth (Bi) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9274584 |
| Total Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9274584 |
| Total Cadmium (Cd) | mg/L | 0.0000139 | 0.0000259 | 0.0000354 | 0.0000050 | 9274584 |
| Total Chromium (Cr) | mg/L | 0.00022 | 0.00028 | 0.00033 | 0.00010 | 9274584 |
| Total Cobalt (Co) | mg/L | 0.000088 | 0.000597 | 0.00144 | 0.000010 | 9274584 |
| Total Copper (Cu) | mg/L | 0.00126 | 0.00101 | 0.00127 | 0.00010 | 9274584 |
| Total Iron (Fe) | mg/L | 0.210 | 0.700 | 1.04 | 0.0050 | 9274584 |
| Total Lead (Pb) | mg/L | 0.000121 | 0.000656 | 0.000775 | 0.000020 | 9274584 |
| Total Manganese (Mn) | mg/L | 0.0113 | 0.0595 | 0.105 | 0.00010 | 9274584 |
| Total Molybdenum (Mo) | mg/L | <0.000050 | <0.000050 | 0.000080 | 0.000050 | 9274584 |
| Total Nickel (Ni) | mg/L | 0.00137 | 0.00139 | 0.00324 | 0.00010 | 9274584 |
| Total Phosphorus (P) | mg/L | 0.0072 | 0.0102 | 0.0122 | 0.0050 | 9274584 |
| Total Selenium (Se) | mg/L | 0.000070 | 0.000069 | 0.000068 | 0.000040 | 9274584 |
| Total Silicon (Si) | mg/L | 1.28 | 1.64 | 1.76 | 0.050 | 9274584 |
| Total Silver (Ag) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9274584 |
| Total Strontium (Sr) | mg/L | 0.0156 | 0.0129 | 0.0225 | 0.000050 | 9274584 |
| Total Thallium (Tl) | mg/L | 0.0000031 | 0.0000037 | 0.0000043 | 0.0000020 | 9274584 |
| Total Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9274584 |
| Total Titanium (Ti) | mg/L | <0.0020 | 0.0030 | 0.0031 | 0.0020 | 9274584 |
| Total Uranium (U) | mg/L | 0.0000072 | 0.0000091 | 0.0000150 | 0.0000050 | 9274584 |
| Total Vanadium (V) | mg/L | <0.00020 | 0.00027 | 0.00025 | 0.00020 | 9274584 |
| Total Zinc (Zn) | mg/L | 0.0019 | 0.0045 | 0.0063 | 0.0010 | 9274584 |
| Total Zirconium (Zr) | mg/L | <0.00010 | 0.00016 | <0.00010 | 0.00010 | 9274584 |
| Total Sulphur (S) | mg/L | <0.60 | 0.70 | 1.68 | 0.60 | 9274584 |

RDL = Reportable Detection Limit



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Maxxam Job #: B8B0540
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | UZ2895 | | UZ2896 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/27 | | 2018/11/27 | | |
| COC Number | | B8X4697-M058-02-01 | | B8X4697-M058-02-01 | | |
| | UNITS | G-2018-P3 SW | RDL | G-2018-P4 SW | RDL | QC Batch |
| **Total Metals by ICPMS** | | | | | | |
| Total Aluminum (Al) | mg/L | 1.40 | 0.15 | 0.289 | 0.0030 | 9274584 |
| Total Antimony (Sb) | mg/L | 0.0016 | 0.0010 | 0.000069 | 0.000020 | 9274584 |
| Total Arsenic (As) | mg/L | 18.4 | 0.0010 | 0.0270 | 0.000020 | 9274584 |
| Total Barium (Ba) | mg/L | 0.0437 | 0.0025 | 0.00251 | 0.000050 | 9274584 |
| Total Beryllium (Be) | mg/L | <0.00050 | 0.00050 | 0.000012 | 0.000010 | 9274584 |
| Total Bismuth (Bi) | mg/L | <0.00050 | 0.00050 | <0.000010 | 0.000010 | 9274584 |
| Total Boron (B) | mg/L | <0.50 | 0.50 | <0.010 | 0.010 | 9274584 |
| Total Cadmium (Cd) | mg/L | 0.00030 | 0.00025 | 0.0000168 | 0.0000050 | 9274584 |
| Total Chromium (Cr) | mg/L | <0.0050 | 0.0050 | 0.00034 | 0.00010 | 9274584 |
| Total Cobalt (Co) | mg/L | 0.00896 | 0.00050 | 0.000428 | 0.000010 | 9274584 |
| Total Copper (Cu) | mg/L | 0.0125 | 0.0050 | 0.00080 | 0.00010 | 9274584 |
| Total Iron (Fe) | mg/L | 80.0 | 0.25 | 0.518 | 0.0050 | 9274584 |
| Total Lead (Pb) | mg/L | 0.0132 | 0.0010 | 0.000591 | 0.000020 | 9274584 |
| Total Manganese (Mn) | mg/L | 2.01 | 0.0050 | 0.0492 | 0.00010 | 9274584 |
| Total Molybdenum (Mo) | mg/L | <0.0025 | 0.0025 | <0.000050 | 0.000050 | 9274584 |
| Total Nickel (Ni) | mg/L | 0.0241 | 0.0050 | 0.00091 | 0.00010 | 9274584 |
| Total Phosphorus (P) | mg/L | 0.28 | 0.25 | 0.0117 | 0.0050 | 9274584 |
| Total Selenium (Se) | mg/L | <0.0020 | 0.0020 | 0.000070 | 0.000040 | 9274584 |
| Total Silicon (Si) | mg/L | 5.3 | 2.5 | 1.63 | 0.050 | 9274584 |
| Total Silver (Ag) | mg/L | <0.00050 | 0.00050 | <0.000010 | 0.000010 | 9274584 |
| Total Strontium (Sr) | mg/L | 0.216 | 0.0025 | 0.00931 | 0.000050 | 9274584 |
| Total Thallium (Tl) | mg/L | <0.00010 | 0.00010 | 0.0000039 | 0.0000020 | 9274584 |
| Total Tin (Sn) | mg/L | <0.010 | 0.010 | <0.00020 | 0.00020 | 9274584 |
| Total Titanium (Ti) | mg/L | <0.10 | 0.10 | 0.0063 | 0.0020 | 9274584 |
| Total Uranium (U) | mg/L | <0.00025 | 0.00025 | 0.0000096 | 0.0000050 | 9274584 |
| Total Vanadium (V) | mg/L | <0.010 | 0.010 | 0.00032 | 0.00020 | 9274584 |
| Total Zinc (Zn) | mg/L | <0.050 | 0.050 | 0.0036 | 0.0010 | 9274584 |
| Total Zirconium (Zr) | mg/L | <0.0050 | 0.0050 | <0.00010 (1) | 0.00010 | 9274584 |
| Total Sulphur (S) | mg/L | <30 | 30 | <0.60 | 0.60 | 9274584 |

RDL = Reportable Detection Limit
(1) Matrix Spike for Zirconium outside acceptance criteria (10% of analytes failure allowed).



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Maxxam Job #: B8B0540
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## LOW LEVEL TOTAL METALS WITH CV HG (WATER)

| Maxxam ID | | UZ2879 | UZ2880 | UZ2881 | UZ2882 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | 2018/11/28 | 2018/11/29 | 2018/11/29 | | |
| COC Number | | B8X4697-M058-01-01 | B8X4697-M058-01-01 | B8X4697-M058-01-01 | B8X4697-M058-01-01 | | |
| | UNITS | G-2018-C5 SW | G-2018-C6 SW | G-2018-C7 SW | G-2018-C8 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 12.0 | 12.6 | 5.97 | 16.2 | 0.50 | 9272190 |
| **Elements** | | | | | | | |
| Total Mercury (Hg) | mg/L | 0.000045 (1) | 0.000028 (1) | <0.000020 (1) | <0.000020 (1) | 0.000020 | 9274769 |
| **Total Metals by ICPMS** | | | | | | | |
| Total Calcium (Ca) | mg/L | 3.78 | 4.05 | 1.49 | 4.23 | 0.25 | 9272347 |
| Total Magnesium (Mg) | mg/L | 0.62 | 0.60 | 0.54 | 1.37 | 0.25 | 9272347 |
| Total Potassium (K) | mg/L | 0.51 | 0.39 | <0.25 | 0.31 | 0.25 | 9272347 |
| Total Sodium (Na) | mg/L | 5.22 | 4.45 | 2.74 | 2.22 | 0.25 | 9272347 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

| Maxxam ID | | UZ2883 | UZ2884 | UZ2885 | UZ2886 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/29 | 2018/11/28 | 2018/11/28 | | |
| COC Number | | B8X4697-M058-01-01 | B8X4697-M058-01-01 | B8X4697-M058-01-01 | B8X4697-M058-01-01 | | |
| | UNITS | G-2018-C9 SW | G-2018-C10 SW | G-2018-C11 SW | G-2018-C12 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 15.2 | 7.53 | 3.61 | 4.55 | 0.50 | 9272190 |
| **Elements** | | | | | | | |
| Total Mercury (Hg) | mg/L | 0.000049 (1) | <0.000020 (1) | <0.000020 (1) | <0.000020 (1) | 0.000020 | 9274769 |
| **Total Metals by ICPMS** | | | | | | | |
| Total Calcium (Ca) | mg/L | 3.92 | 1.86 | 0.79 | 1.08 | 0.25 | 9272347 |
| Total Magnesium (Mg) | mg/L | 1.32 | 0.70 | 0.40 | 0.45 | 0.25 | 9272347 |
| Total Potassium (K) | mg/L | 0.51 | <0.25 | <0.25 | <0.25 | 0.25 | 9272347 |
| Total Sodium (Na) | mg/L | 2.61 | 2.77 | 3.40 | 3.82 | 0.25 | 9272347 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.



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MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## LOW LEVEL TOTAL METALS WITH CV HG (WATER)

| Maxxam ID | | UZ2887 | UZ2888 | UZ2890 | UZ2891 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | 2018/11/29 | 2018/11/29 | 2018/11/29 | | |
| COC Number | | B8X4697-M058-01-01 | B8X4697-M058-01-01 | B8X4697-M058-02-01 | B8X4697-M058-02-01 | | |
| | UNITS | G-2018-C13 SW | G-2018-SW14 | G-2018-SW15 | G-2018-SW16 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 4.38 | 8.86 | 9.40 | 9.98 | 0.50 | 9272190 |
| **Elements** | | | | | | | |
| Total Mercury (Hg) | mg/L | <0.000020 (1) | 0.000036 (1) | <0.000020 (1) | 0.000031 (1) | 0.000020 | 9274769 |
| **Total Metals by ICPMS** | | | | | | | |
| Total Calcium (Ca) | mg/L | 1.05 | 2.67 | 2.85 | 2.96 | 0.25 | 9272347 |
| Total Magnesium (Mg) | mg/L | 0.43 | 0.53 | 0.55 | 0.63 | 0.25 | 9272347 |
| Total Potassium (K) | mg/L | <0.25 | 0.33 | 0.30 | 0.31 | 0.25 | 9272347 |
| Total Sodium (Na) | mg/L | 3.51 | 4.10 | 4.13 | 4.52 | 0.25 | 9272347 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

| Maxxam ID | | UZ2892 | UZ2893 | UZ2894 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/30 | 2018/11/27 | 2018/11/27 | | |
| COC Number | | B8X4697-M058-02-01 | B8X4697-M058-02-01 | B8X4697-M058-02-01 | | |
| | UNITS | G-2018-SW17 | G-2018-P1 SW | G-2018-P2 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Total Hardness (CaCO3) | mg/L | 7.39 | 6.43 | 10.6 | 0.50 | 9272190 |
| **Elements** | | | | | | |
| Total Mercury (Hg) | mg/L | 0.000030 (1) | <0.000020 (1) | <0.000020 (1) | 0.000020 | 9274769 |
| **Total Metals by ICPMS** | | | | | | |
| Total Calcium (Ca) | mg/L | 2.21 | 1.78 | 3.19 | 0.25 | 9272347 |
| Total Magnesium (Mg) | mg/L | 0.46 | 0.48 | 0.64 | 0.25 | 9272347 |
| Total Potassium (K) | mg/L | <0.25 | <0.25 | <0.25 | 0.25 | 9272347 |
| Total Sodium (Na) | mg/L | 3.54 | 5.97 | 6.32 | 0.25 | 9272347 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.



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MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## LOW LEVEL TOTAL METALS WITH CV HG (WATER)

| Maxxam ID | | UZ2895 | | UZ2896 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/27 | | 2018/11/27 | | |
| COC Number | | B8X4697-M058-02-01 | | B8X4697-M058-02-01 | | |
| | UNITS | G-2018-P3 SW | RDL | G-2018-P4 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Total Hardness (CaCO3) | mg/L | 72.3 | 0.50 | 4.81 | 0.50 | 9272190 |
| **Elements** | | | | | | |
| Total Mercury (Hg) | mg/L | 0.000339 (1) | 0.000020 | <0.000020 (1) | 0.000020 | 9274769 |
| **Total Metals by ICPMS** | | | | | | |
| Total Calcium (Ca) | mg/L | 29 | 13 | 1.17 | 0.25 | 9272347 |
| Total Magnesium (Mg) | mg/L | <13 | 13 | 0.46 | 0.25 | 9272347 |
| Total Potassium (K) | mg/L | <13 | 13 | <0.25 | 0.25 | 9272347 |
| Total Sodium (Na) | mg/L | <13 | 13 | 5.88 | 0.25 | 9272347 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.



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MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## TEST SUMMARY

**Maxxam ID:** UZ2879 **Collected:** 2018/11/28
**Sample ID:** G-2018-C5 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9273673 | 2018/12/21 | 2018/12/24 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Automated Statchk |

**Maxxam ID:** UZ2880 **Collected:** 2018/11/28
**Sample ID:** G-2018-C6 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9273673 | 2018/12/21 | 2018/12/24 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Automated Statchk |

**Maxxam ID:** UZ2881 **Collected:** 2018/11/29
**Sample ID:** G-2018-C7 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9273673 | 2018/12/21 | 2018/12/24 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Report Automation Engine |

**Maxxam ID:** UZ2882 **Collected:** 2018/11/29
**Sample ID:** G-2018-C8 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9273673 | 2018/12/21 | 2018/12/24 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Report Automation Engine |

**Maxxam ID:** UZ2883 **Collected:** 2018/11/29
**Sample ID:** G-2018-C9 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Automated Statchk |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9273673 | 2018/12/21 | 2018/12/24 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Automated Statchk |



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MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## TEST SUMMARY

**Maxxam ID:** UZ2884
**Sample ID:** G-2018-C10 SW
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9273673 | 2018/12/21 | 2018/12/24 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Automated Statchk |

**Maxxam ID:** UZ2885
**Sample ID:** G-2018-C11 SW
**Matrix:** Water

**Collected:** 2018/11/28
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Automated Statchk |

**Maxxam ID:** UZ2886
**Sample ID:** G-2018-C12 SW
**Matrix:** Water

**Collected:** 2018/11/28
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Automated Statchk |

**Maxxam ID:** UZ2887
**Sample ID:** G-2018-C13 SW
**Matrix:** Water

**Collected:** 2018/11/28
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Automated Statchk |

**Maxxam ID:** UZ2888
**Sample ID:** G-2018-SW14
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Report Automation Engine |



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MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## TEST SUMMARY

**Maxxam ID:** UZ2890 **Collected:** 2018/11/29
**Sample ID:** G-2018-SW15 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Automated Statchk |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Report Automation Engine |

**Maxxam ID:** UZ2891 **Collected:** 2018/11/29
**Sample ID:** G-2018-SW16 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Automated Statchk |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Report Automation Engine |

**Maxxam ID:** UZ2892 **Collected:** 2018/11/30
**Sample ID:** G-2018-SW17 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Automated Statchk |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Report Automation Engine |

**Maxxam ID:** UZ2893 **Collected:** 2018/11/27
**Sample ID:** G-2018-P1 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Automated Statchk |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Automated Statchk |

**Maxxam ID:** UZ2894 **Collected:** 2018/11/27
**Sample ID:** G-2018-P2 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Automated Statchk |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Automated Statchk |



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MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## TEST SUMMARY

**Maxxam ID:** UZ2895
**Sample ID:** G-2018-P3 SW
**Matrix:** Water

**Collected:** 2018/11/27
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Report Automation Engine |

**Maxxam ID:** UZ2896
**Sample ID:** G-2018-P4 SW
**Matrix:** Water

**Collected:** 2018/11/27
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9272190 | N/A | 2018/12/27 | Automated Statchk |
| Mercury (Total) by CVAF | CV/AF | 9274769 | 2018/12/22 | 2018/12/22 | Edwin Lamigo |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9272347 | N/A | 2018/12/27 | Automated Statchk |



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MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 5.7°C |
| Package 2 | 3.0°C |

Report to include results for Mercury by CVAF for all samples as per client request.

Effective October 1, 2013, the BC MOE SAMPLE PRESERVATION & HOLDING TIME REQUIREMENTS states that Mercury in water requires a glass or PTFE container with Hydrochloric Acid (HCl) preservation. Sample container and preservation received was not in compliance. Maxxam added HCl to stabilize Mercury for all samples prior to analysis.

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments**

Sample UZ2895 [G-2018-P3 SW] Elements by ICPMS Digested LL (total): Detection limits raised due to dilution to bring analyte within the calibrated range.

**Results relate only to the items tested.**



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## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9273673 | Total Aluminum (Al) | 2018/12/24 | 124 (1) | 80 - 120 | 106 | 80 - 120 | <0.0030 | mg/L | 10 | 20 |
| 9273673 | Total Antimony (Sb) | 2018/12/24 | 107 | 80 - 120 | 106 | 80 - 120 | <0.000020 | mg/L | | |
| 9273673 | Total Arsenic (As) | 2018/12/24 | 107 | 80 - 120 | 105 | 80 - 120 | <0.000020 | mg/L | 1.3 | 20 |
| 9273673 | Total Barium (Ba) | 2018/12/24 | 106 | 80 - 120 | 105 | 80 - 120 | <0.000050 | mg/L | | |
| 9273673 | Total Beryllium (Be) | 2018/12/24 | 105 | 80 - 120 | 105 | 80 - 120 | <0.000010 | mg/L | | |
| 9273673 | Total Bismuth (Bi) | 2018/12/24 | 118 | 80 - 120 | 120 | 80 - 120 | <0.000010 | mg/L | | |
| 9273673 | Total Boron (B) | 2018/12/24 | 103 | 80 - 120 | 104 | 80 - 120 | <0.010 | mg/L | 5.7 | 20 |
| 9273673 | Total Cadmium (Cd) | 2018/12/24 | 109 | 80 - 120 | 108 | 80 - 120 | <0.0000050 | mg/L | 7.3 | 20 |
| 9273673 | Total Chromium (Cr) | 2018/12/24 | 105 | 80 - 120 | 106 | 80 - 120 | <0.00010 | mg/L | | |
| 9273673 | Total Cobalt (Co) | 2018/12/24 | 104 | 80 - 120 | 108 | 80 - 120 | <0.000010 | mg/L | 3.4 | 20 |
| 9273673 | Total Copper (Cu) | 2018/12/24 | 104 | 80 - 120 | 104 | 80 - 120 | <0.00010 | mg/L | 3.1 | 20 |
| 9273673 | Total Iron (Fe) | 2018/12/24 | NC | 80 - 120 | 107 | 80 - 120 | <0.0050 | mg/L | 8.0 | 20 |
| 9273673 | Total Lead (Pb) | 2018/12/24 | 108 | 80 - 120 | 109 | 80 - 120 | <0.000020 | mg/L | 5.1 | 20 |
| 9273673 | Total Manganese (Mn) | 2018/12/24 | 107 | 80 - 120 | 106 | 80 - 120 | <0.00010 | mg/L | 4.4 | 20 |
| 9273673 | Total Molybdenum (Mo) | 2018/12/24 | 106 | 80 - 120 | 104 | 80 - 120 | <0.000050 | mg/L | 1.9 | 20 |
| 9273673 | Total Nickel (Ni) | 2018/12/24 | 103 | 80 - 120 | 106 | 80 - 120 | <0.00010 | mg/L | 6.5 | 20 |
| 9273673 | Total Phosphorus (P) | 2018/12/24 | 105 | 80 - 120 | 101 | 80 - 120 | <0.0050 | mg/L | | |
| 9273673 | Total Selenium (Se) | 2018/12/24 | 106 | 80 - 120 | 104 | 80 - 120 | <0.000040 | mg/L | 3.9 | 20 |
| 9273673 | Total Silicon (Si) | 2018/12/24 | 110 | 80 - 120 | 97 | 80 - 120 | <0.050 | mg/L | | |
| 9273673 | Total Silver (Ag) | 2018/12/24 | 106 | 80 - 120 | 104 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9273673 | Total Strontium (Sr) | 2018/12/24 | NC | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | | |
| 9273673 | Total Sulphur (S) | 2018/12/24 | 106 | 80 - 120 | 102 | 80 - 120 | <0.60 | mg/L | | |
| 9273673 | Total Thallium (Tl) | 2018/12/24 | 117 | 80 - 120 | 117 | 80 - 120 | <0.0000020 | mg/L | | |
| 9273673 | Total Tin (Sn) | 2018/12/24 | 105 | 80 - 120 | 104 | 80 - 120 | <0.00020 | mg/L | | |
| 9273673 | Total Titanium (Ti) | 2018/12/24 | 130 (1) | 80 - 120 | 106 | 80 - 120 | <0.0020 | mg/L | | |
| 9273673 | Total Uranium (U) | 2018/12/24 | 116 | 80 - 120 | 109 | 80 - 120 | <0.0000050 | mg/L | | |
| 9273673 | Total Vanadium (V) | 2018/12/24 | 104 | 80 - 120 | 103 | 80 - 120 | <0.00020 | mg/L | | |
| 9273673 | Total Zinc (Zn) | 2018/12/24 | 107 | 80 - 120 | 108 | 80 - 120 | <0.0010 | mg/L | 3.9 | 20 |
| 9273673 | Total Zirconium (Zr) | 2018/12/24 | 104 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | | |
| 9274584 | Total Aluminum (Al) | 2018/12/24 | 110 | 80 - 120 | 105 | 80 - 120 | 0.0047, RDL=0.0030 (2) | mg/L | 7.5 | 20 |
| 9274584 | Total Antimony (Sb) | 2018/12/24 | 107 | 80 - 120 | 106 | 80 - 120 | <0.000020 | mg/L | 1.4 | 20 |
| 9274584 | Total Arsenic (As) | 2018/12/24 | 109 | 80 - 120 | 105 | 80 - 120 | <0.000020 | mg/L | 0.49 | 20 |

## QUALITY ASSURANCE REPORT(CONT'D)



| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9274584 | Total Barium (Ba) | 2018/12/24 | 99 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | 3.9 | 20 |
| 9274584 | Total Beryllium (Be) | 2018/12/24 | 107 | 80 - 120 | 102 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9274584 | Total Bismuth (Bi) | 2018/12/24 | 102 | 80 - 120 | 101 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9274584 | Total Boron (B) | 2018/12/24 | 103 | 80 - 120 | 101 | 80 - 120 | <0.010 | mg/L | 4.0 | 20 |
| 9274584 | Total Cadmium (Cd) | 2018/12/24 | 106 | 80 - 120 | 103 | 80 - 120 | <0.0000050 | mg/L | 2.4 | 20 |
| 9274584 | Total Chromium (Cr) | 2018/12/24 | 102 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | 2.8 | 20 |
| 9274584 | Total Cobalt (Co) | 2018/12/24 | 106 | 80 - 120 | 105 | 80 - 120 | <0.000010 | mg/L | 4.7 | 20 |
| 9274584 | Total Copper (Cu) | 2018/12/24 | 101 | 80 - 120 | 100 | 80 - 120 | <0.00010 | mg/L | 6.3 | 20 |
| 9274584 | Total Iron (Fe) | 2018/12/24 | 107 | 80 - 120 | 102 | 80 - 120 | <0.0050 | mg/L | 1.9 | 20 |
| 9274584 | Total Lead (Pb) | 2018/12/24 | 106 | 80 - 120 | 103 | 80 - 120 | <0.000020 | mg/L | 2.6 | 20 |
| 9274584 | Total Manganese (Mn) | 2018/12/24 | 102 | 80 - 120 | 104 | 80 - 120 | <0.00010 | mg/L | 3.9 | 20 |
| 9274584 | Total Molybdenum (Mo) | 2018/12/24 | 111 | 80 - 120 | 107 | 80 - 120 | <0.000050 | mg/L | 1.1 | 20 |
| 9274584 | Total Nickel (Ni) | 2018/12/24 | 103 | 80 - 120 | 103 | 80 - 120 | <0.00010 | mg/L | 3.4 | 20 |
| 9274584 | Total Phosphorus (P) | 2018/12/24 | 100 | 80 - 120 | 97 | 80 - 120 | <0.0050 | mg/L | 4.6 | 20 |
| 9274584 | Total Selenium (Se) | 2018/12/24 | 109 | 80 - 120 | 106 | 80 - 120 | <0.000040 | mg/L | 17 | 20 |
| 9274584 | Total Silicon (Si) | 2018/12/24 | 93 | 80 - 120 | 93 | 80 - 120 | <0.050 | mg/L | 3.9 | 20 |
| 9274584 | Total Silver (Ag) | 2018/12/24 | 105 | 80 - 120 | 101 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9274584 | Total Strontium (Sr) | 2018/12/24 | 108 | 80 - 120 | 105 | 80 - 120 | 0.000218, RDL=0.000050 (3) | mg/L | 0.66 | 20 |
| 9274584 | Total Sulphur (S) | 2018/12/24 | 103 | 80 - 120 | 99 | 80 - 120 | <0.60 | mg/L | | |
| 9274584 | Total Thallium (Tl) | 2018/12/24 | 108 | 80 - 120 | 101 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9274584 | Total Tin (Sn) | 2018/12/24 | 107 | 80 - 120 | 103 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9274584 | Total Titanium (Ti) | 2018/12/24 | 114 | 80 - 120 | 104 | 80 - 120 | <0.0020 | mg/L | 4.7 | 20 |
| 9274584 | Total Uranium (U) | 2018/12/24 | 109 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | 5.8 | 20 |
| 9274584 | Total Vanadium (V) | 2018/12/24 | 104 | 80 - 120 | 102 | 80 - 120 | <0.00020 | mg/L | 1.4 | 20 |
| 9274584 | Total Zinc (Zn) | 2018/12/24 | NC | 80 - 120 | 105 | 80 - 120 | <0.0010 | mg/L | 3.5 | 20 |
| 9274584 | Total Zirconium (Zr) | 2018/12/24 | 124 (1) | 80 - 120 | 103 | 80 - 120 | <0.00010 | mg/L | 6.0 | 20 |



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Maxxam Job #: B8B0540
Report Date: 2018/12/28

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9274769 | Total Mercury (Hg) | 2018/12/22 | 97 | 80 - 120 | 99 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Method Blank exceeds acceptance limits for Aluminum. Sample values for Aluminum are >10x the concentration of the method blank and the contamination is considered irrelevant.

(3) Method Blank exceeds acceptance limits for Strontium. Sample values for Strontium are >10x the concentration of the method blank and the contamination is considered irrelevant.



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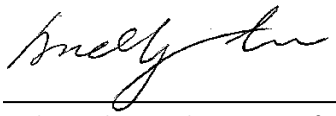
Maxxam Job #: B8B0540
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

## VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist

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Your Project #: MB8X4700
Site Location: 18-2525 MONTAGUE

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B8X4700-M058-01-01, B8X4700-M058-02-01, B8X4700-M058-03-01

**Report Date: 2018/12/28**
Report #: R2669159
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B8B0550**
**Received: 2018/12/18, 09:35**

Sample Matrix: Water
# Samples Received: 26

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | 26 | N/A | 2018/12/24 | BBY WI-00033 | Auto Calc |
| Mercury (Dissolved) by CVAF | 14 | N/A | 2018/12/21 | BBY7SOP-00015 | BCMOE BCLM Oct2013 m |
| Mercury (Dissolved) by CVAF | 12 | N/A | 2018/12/22 | BBY7SOP-00015 | BCMOE BCLM Oct2013 m |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 26 | N/A | 2018/12/24 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 25 | N/A | 2018/12/22 | BBY7SOP-00002 | EPA 6020b R2 m |
| Elements by ICPMS Low Level (dissolved) | 1 | N/A | 2018/12/24 | BBY7SOP-00002 | EPA 6020b R2 m |
| Filter and HNO3 Preserve for Metals | 26 | N/A | 2018/12/19 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.



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Your Project #: MB8X4700
Site Location: 18-2525 MONTAGUE

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B8X4700-M058-01-01, B8X4700-M058-02-01, B8X4700-M058-03-01

**Report Date: 2018/12/28**
Report #: R2669159
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B8B0550**
**Received: 2018/12/18, 09:35**

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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Maxxam Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | UZ2914 | UZ2915 | UZ2916 | UZ2917 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | 2018/11/28 | 2018/11/29 | 2018/11/29 | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | |
| | UNITS | G-2018-C5 SW | G-2018-C6 SW | G-2018-C7 SW | G-2018-C8 SW | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | UZ2918 | UZ2919 | UZ2920 | UZ2921 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/29 | 2018/11/28 | 2018/11/28 | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | |
| | UNITS | G-2018-C9 SW | G-2018-C10 SW | G-2018-C11 SW | G-2018-C12 SW | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | UZ2922 | UZ2923 | UZ2924 | UZ2925 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | 2018/11/29 | 2018/11/29 | 2018/11/29 | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-02-01 | B8X4700-M058-02-01 | |
| | UNITS | G-2018-C13 SW | G-2018-SW14 | G-2018-SW15 | G-2018-SW16 | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | UZ2926 | UZ2927 | UZ2928 | UZ2929 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/30 | 2018/11/30 | 2018/11/30 | 2018/11/27 | |
| COC Number | | B8X4700-M058-02-01 | B8X4700-M058-02-01 | B8X4700-M058-02-01 | B8X4700-M058-02-01 | |
| | UNITS | G-2018-SW17 | G-2018-P18 | G-2018-P19 | G-2018-P1 SW | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | UZ2930 | UZ2931 | UZ2932 | UZ2933 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/29 | 2018/11/27 | 2018/11/29 | |
| COC Number | | B8X4700-M058-02-01 | B8X4700-M058-02-01 | B8X4700-M058-02-01 | B8X4700-M058-02-01 | |
| | UNITS | G-2018-P1 A | G-2018-P1 B | G-2018-P2 SW | G-2018-P2A | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | UZ2934 | UZ2935 | UZ2936 | UZ2937 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/27 | 2018/11/29 | 2018/11/29 | |
| COC Number | | B8X4700-M058-03-01 | B8X4700-M058-03-01 | B8X4700-M058-03-01 | B8X4700-M058-03-01 | |
| | UNITS | G-2018-P2B | G-2018-P3 SW | G-2018-P3A | G-2018-P3B | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |



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Maxxam Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## RESULTS OF CHEMICAL ANALYSES OF WATER

| **Maxxam ID** | | UZ2938 | UZ2939 | |
|---|---|---|---|---|
| **Sampling Date** | | 2018/11/27 | 2018/11/29 | |
| **COC Number** | | B8X4700-M058-03-01 | B8X4700-M058-03-01 | |
| | **UNITS** | **G-2018-P4 SW** | **G-2018-P4B** | **QC Batch** |
| **Calculated Parameters** | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | ONSITE |



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Maxxam Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## MERCURY BY COLD VAPOR (WATER)

| Maxxam ID | | UZ2914 | UZ2915 | UZ2916 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | 2018/11/28 | 2018/11/29 | | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | | |
| | UNITS | G-2018-C5 SW | G-2018-C6 SW | G-2018-C7 SW | RDL | QC Batch |
| **Elements** | | | | | | |
| Dissolved Mercury (Hg) | mg/L | 0.0000453 | 0.0000216 | 0.0000082 | 0.0000020 | 9272572 |
| RDL = Reportable Detection Limit | | | | | | |

| Maxxam ID | | UZ2917 | UZ2918 | UZ2919 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/29 | 2018/11/29 | | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | | |
| | UNITS | G-2018-C8 SW | G-2018-C9 SW | G-2018-C10 SW | RDL | QC Batch |
| **Elements** | | | | | | |
| Dissolved Mercury (Hg) | mg/L | 0.0000101 | 0.0000081 | 0.0000298 | 0.0000020 | 9272572 |
| RDL = Reportable Detection Limit | | | | | | |

| Maxxam ID | | UZ2920 | UZ2921 | UZ2922 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | 2018/11/28 | 2018/11/28 | | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | | |
| | UNITS | G-2018-C11 SW | G-2018-C12 SW | G-2018-C13 SW | RDL | QC Batch |
| **Elements** | | | | | | |
| Dissolved Mercury (Hg) | mg/L | 0.0000154 | <0.0000020 | 0.0000055 | 0.0000020 | 9272572 |
| RDL = Reportable Detection Limit | | | | | | |

| Maxxam ID | | UZ2923 | UZ2924 | UZ2925 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/29 | 2018/11/29 | | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-02-01 | B8X4700-M058-02-01 | | |
| | UNITS | G-2018-SW14 | G-2018-SW15 | G-2018-SW16 | RDL | QC Batch |
| **Elements** | | | | | | |
| Dissolved Mercury (Hg) | mg/L | 0.0000177 | 0.0000315 | 0.0000238 | 0.0000020 | 9272572 |
| RDL = Reportable Detection Limit | | | | | | |

| Maxxam ID | | UZ2926 | UZ2927 | | | UZ2928 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/30 | 2018/11/30 | | | 2018/11/30 | | |
| COC Number | | B8X4700-M058-02-01 | B8X4700-M058-02-01 | | | B8X4700-M058-02-01 | | |
| | UNITS | G-2018-SW17 | G-2018-P18 | RDL | QC Batch | G-2018-P19 | RDL | QC Batch |
| **Elements** | | | | | | | | |
| Dissolved Mercury (Hg) | mg/L | 0.0000248 | 0.0000270 | 0.0000020 | 9272572 | <0.000020 (1) | 0.000020 | 9274771 |
| RDL = Reportable Detection Limit | | | | | | | | |
| (1) Detection limits raised due to insufficient sample volume. | | | | | | | | |

Maxxam Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## MERCURY BY COLD VAPOR (WATER)

| Maxxam ID | | UZ2929 | UZ2930 | UZ2931 | UZ2932 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/27 | 2018/11/29 | 2018/11/29 | 2018/11/27 | | |
| COC Number | | B8X4700-M058-02-01 | B8X4700-M058-02-01 | B8X4700-M058-02-01 | B8X4700-M058-02-01 | | |
| | UNITS | G-2018-P1 SW | G-2018-P1 A | G-2018-P1 B | G-2018-P2 SW | RDL | QC Batch |
| **Elements** | | | | | | | |
| Dissolved Mercury (Hg) | mg/L | <0.000020 (1) | <0.000020 (1) | 0.000032 (1) | <0.000020 (1) | 0.000020 | 9274771 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

| Maxxam ID | | UZ2933 | UZ2934 | UZ2935 | UZ2936 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/29 | 2018/11/27 | 2018/11/29 | | |
| COC Number | | B8X4700-M058-02-01 | B8X4700-M058-03-01 | B8X4700-M058-03-01 | B8X4700-M058-03-01 | | |
| | UNITS | G-2018-P2A | G-2018-P2B | G-2018-P3 SW | G-2018-P3A | RDL | QC Batch |
| **Elements** | | | | | | | |
| Dissolved Mercury (Hg) | mg/L | <0.000020 (1) | 0.000113 (1) | 0.000114 (1) | 0.000025 (1) | 0.000020 | 9274771 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

| Maxxam ID | | UZ2937 | UZ2938 | UZ2939 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/27 | 2018/11/29 | | |
| COC Number | | B8X4700-M058-03-01 | B8X4700-M058-03-01 | B8X4700-M058-03-01 | | |
| | UNITS | G-2018-P3B | G-2018-P4 SW | G-2018-P4B | RDL | QC Batch |
| **Elements** | | | | | | |
| Dissolved Mercury (Hg) | mg/L | <0.000020 (1) | <0.000020 (1) | 0.000784 (1) | 0.000020 | 9274771 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.



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Maxxam Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2914 | UZ2915 | UZ2916 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | 2018/11/28 | 2018/11/29 | | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | | |
| | UNITS | G-2018-C5 SW | G-2018-C6 SW | G-2018-C7 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 11.6 | 12.6 | 6.15 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.200 | 0.131 | 0.345 | 0.00050 | 9272326 |
| Dissolved Antimony (Sb) | mg/L | 0.000336 | 0.000170 | 0.000044 | 0.000020 | 9272326 |
| Dissolved Arsenic (As) | mg/L | 0.104 | 0.0837 | 0.00181 | 0.000020 | 9272326 |
| Dissolved Barium (Ba) | mg/L | 0.00566 | 0.00253 | 0.00230 | 0.000020 | 9272326 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | 0.000021 | 0.000010 | 9272326 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9272326 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000156 | <0.0000050 | 0.0000161 | 0.0000050 | 9272326 |
| Dissolved Chromium (Cr) | mg/L | 0.00024 | 0.00021 | 0.00028 | 0.00010 | 9272326 |
| Dissolved Cobalt (Co) | mg/L | 0.000151 | 0.0000733 | 0.000138 | 0.0000050 | 9272326 |
| Dissolved Copper (Cu) | mg/L | 0.00258 | 0.00129 | 0.000981 | 0.000050 | 9272326 |
| Dissolved Iron (Fe) | mg/L | 0.299 | 0.224 | 0.235 | 0.0010 | 9272326 |
| Dissolved Lead (Pb) | mg/L | 0.000217 | 0.000135 | 0.000338 | 0.0000050 | 9272326 |
| Dissolved Lithium (Li) | mg/L | 0.00071 | 0.00059 | 0.00051 | 0.00050 | 9272326 |
| Dissolved Manganese (Mn) | mg/L | 0.0415 | 0.0205 | 0.0204 | 0.000050 | 9272326 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | <0.000050 | <0.000050 | 0.000050 | 9272326 |
| Dissolved Nickel (Ni) | mg/L | 0.00192 | 0.000809 | 0.000652 | 0.000020 | 9272326 |
| Dissolved Selenium (Se) | mg/L | 0.000061 | 0.000047 | 0.000069 | 0.000040 | 9272326 |
| Dissolved Silicon (Si) | mg/L | 1.81 | 1.83 | 1.43 | 0.050 | 9272326 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Strontium (Sr) | mg/L | 0.0257 | 0.0273 | 0.0128 | 0.000050 | 9272326 |
| Dissolved Thallium (Tl) | mg/L | 0.0000039 | <0.0000020 | 0.0000040 | 0.0000020 | 9272326 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00023 | <0.00020 | 0.00020 | 9272326 |
| Dissolved Titanium (Ti) | mg/L | 0.00136 | 0.00145 | 0.00220 | 0.00050 | 9272326 |
| Dissolved Uranium (U) | mg/L | 0.0000115 | 0.0000071 | 0.0000101 | 0.0000020 | 9272326 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00021 | 0.00020 | 9272326 |
| Dissolved Zinc (Zn) | mg/L | 0.00528 | 0.00146 | 0.00233 | 0.00010 | 9272326 |
| Dissolved Zirconium (Zr) | mg/L | 0.00010 | <0.00010 | <0.00010 | 0.00010 | 9272326 |
| Dissolved Calcium (Ca) | mg/L | 3.64 | 4.05 | 1.55 | 0.050 | 9270528 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2914 | UZ2915 | UZ2916 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/28 | 2018/11/28 | 2018/11/29 | | |
| **COC Number** | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | | |
| | **UNITS** | **G-2018-C5 SW** | **G-2018-C6 SW** | **G-2018-C7 SW** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 0.601 | 0.607 | 0.554 | 0.050 | 9270528 |
| Dissolved Potassium (K) | mg/L | 0.504 | 0.388 | 0.173 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 4.96 | 4.39 | 2.81 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 1.54 | 1.03 | <0.60 | 0.60 | 9272326 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2917 | UZ2918 | UZ2919 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/29 | 2018/11/29 | | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | | |
| | UNITS | G-2018-C8 SW | G-2018-C9 SW | G-2018-C10 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 19.7 | 14.3 | 7.65 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0423 | 0.0830 | 0.230 | 0.00050 | 9272326 |
| Dissolved Antimony (Sb) | mg/L | 0.000314 | 0.000151 | 0.000087 | 0.000020 | 9272326 |
| Dissolved Arsenic (As) | mg/L | 0.0160 | 0.00719 | 0.0249 | 0.000020 | 9272326 |
| Dissolved Barium (Ba) | mg/L | 0.00102 | 0.000747 | 0.00213 | 0.000020 | 9272326 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9272326 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | 0.0000053 | 0.0000050 | 9272326 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9272326 |
| Dissolved Cadmium (Cd) | mg/L | <0.0000050 | <0.0000050 | 0.0000090 | 0.0000050 | 9272326 |
| Dissolved Chromium (Cr) | mg/L | <0.00010 | 0.00012 | 0.00024 | 0.00010 | 9272326 |
| Dissolved Cobalt (Co) | mg/L | 0.0000377 | 0.0000413 | 0.000300 | 0.0000050 | 9272326 |
| Dissolved Copper (Cu) | mg/L | 0.00197 | 0.000959 | 0.000829 | 0.000050 | 9272326 |
| Dissolved Iron (Fe) | mg/L | 0.0773 | 0.124 | 0.397 | 0.0010 | 9272326 |
| Dissolved Lead (Pb) | mg/L | 0.0000694 | 0.0000762 | 0.000305 | 0.0000050 | 9272326 |
| Dissolved Lithium (Li) | mg/L | 0.00073 | <0.00050 | 0.00051 | 0.00050 | 9272326 |
| Dissolved Manganese (Mn) | mg/L | 0.00220 | 0.00311 | 0.0478 | 0.000050 | 9272326 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | <0.000050 | <0.000050 | 0.000050 | 9272326 |
| Dissolved Nickel (Ni) | mg/L | 0.000847 | 0.000963 | 0.000640 | 0.000020 | 9272326 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | <0.000040 | 0.000057 | 0.000040 | 9272326 |
| Dissolved Silicon (Si) | mg/L | 1.33 | 1.28 | 1.26 | 0.050 | 9272326 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Strontium (Sr) | mg/L | 0.0454 | 0.0314 | 0.0170 | 0.000050 | 9272326 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | <0.0000020 | <0.0000020 | 0.0000020 | 9272326 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9272326 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00139 | 0.00288 | 0.00050 | 9272326 |
| Dissolved Uranium (U) | mg/L | 0.0000062 | 0.0000051 | 0.0000081 | 0.0000020 | 9272326 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9272326 |
| Dissolved Zinc (Zn) | mg/L | 0.00126 | 0.00154 | 0.00477 | 0.00010 | 9272326 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9272326 |
| Dissolved Calcium (Ca) | mg/L | 5.12 | 3.73 | 1.90 | 0.050 | 9270528 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2917 | UZ2918 | UZ2919 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/29 | 2018/11/29 | 2018/11/29 | | |
| **COC Number** | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | | |
| | **UNITS** | **G-2018-C8 SW** | **G-2018-C9 SW** | **G-2018-C10 SW** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 1.68 | 1.22 | 0.703 | 0.050 | 9270528 |
| Dissolved Potassium (K) | mg/L | 0.375 | 0.487 | 0.168 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 2.68 | 2.50 | 2.74 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 1.08 | 0.73 | <0.60 | 0.60 | 9272326 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
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Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2920 | UZ2921 | UZ2922 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | 2018/11/28 | 2018/11/28 | | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | | |
| | UNITS | G-2018-C11 SW | G-2018-C12 SW | G-2018-C13 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 4.34 | 4.51 | 4.47 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.254 | 0.216 | 0.185 | 0.00050 | 9272326 |
| Dissolved Antimony (Sb) | mg/L | 0.000043 | 0.000051 | 0.000055 | 0.000020 | 9272326 |
| Dissolved Arsenic (As) | mg/L | 0.0124 | 0.0331 | 0.0348 | 0.000020 | 9272326 |
| Dissolved Barium (Ba) | mg/L | 0.00247 | 0.00228 | 0.00204 | 0.000020 | 9272326 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9272326 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9272326 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000258 | 0.0000150 | 0.0000122 | 0.0000050 | 9272326 |
| Dissolved Chromium (Cr) | mg/L | 0.00030 | 0.00021 | 0.00020 | 0.00010 | 9272326 |
| Dissolved Cobalt (Co) | mg/L | 0.000333 | 0.000286 | 0.000246 | 0.0000050 | 9272326 |
| Dissolved Copper (Cu) | mg/L | 0.00164 | 0.000360 | 0.000340 | 0.000050 | 9272326 |
| Dissolved Iron (Fe) | mg/L | 0.318 | 0.427 | 0.395 | 0.0010 | 9272326 |
| Dissolved Lead (Pb) | mg/L | 0.000356 | 0.000260 | 0.000204 | 0.0000050 | 9272326 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | <0.00050 | <0.00050 | 0.00050 | 9272326 |
| Dissolved Manganese (Mn) | mg/L | 0.0225 | 0.0669 | 0.0572 | 0.000050 | 9272326 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | <0.000050 | <0.000050 | 0.000050 | 9272326 |
| Dissolved Nickel (Ni) | mg/L | 0.000588 | 0.000619 | 0.000609 | 0.000020 | 9272326 |
| Dissolved Selenium (Se) | mg/L | 0.000064 | 0.000066 | 0.000060 | 0.000040 | 9272326 |
| Dissolved Silicon (Si) | mg/L | 1.61 | 1.33 | 1.39 | 0.050 | 9272326 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Strontium (Sr) | mg/L | 0.00467 | 0.00922 | 0.00887 | 0.000050 | 9272326 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | <0.0000020 | <0.0000020 | 0.0000020 | 9272326 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9272326 |
| Dissolved Titanium (Ti) | mg/L | 0.00313 | 0.00137 | 0.00161 | 0.00050 | 9272326 |
| Dissolved Uranium (U) | mg/L | 0.0000071 | 0.0000062 | 0.0000051 | 0.0000020 | 9272326 |
| Dissolved Vanadium (V) | mg/L | 0.00022 | <0.00020 | <0.00020 | 0.00020 | 9272326 |
| Dissolved Zinc (Zn) | mg/L | 0.00872 | 0.00235 | 0.00211 | 0.00010 | 9272326 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9272326 |
| Dissolved Calcium (Ca) | mg/L | 1.37 | 1.07 | 1.07 | 0.050 | 9270528 |

RDL = Reportable Detection Limit



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Maxxam Job #: B8B0550
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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2920 | UZ2921 | UZ2922 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/28 | 2018/11/28 | 2018/11/28 | | |
| **COC Number** | | B8X4700-M058-01-01 | B8X4700-M058-01-01 | B8X4700-M058-01-01 | | |
| | **UNITS** | **G-2018-C11 SW** | **G-2018-C12 SW** | **G-2018-C13 SW** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 0.223 | 0.448 | 0.436 | 0.050 | 9270528 |
| Dissolved Potassium (K) | mg/L | 0.141 | 0.152 | 0.178 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 3.19 | 3.70 | 3.54 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | <0.60 | <0.60 | <0.60 | 0.60 | 9272326 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2923 | UZ2924 | UZ2925 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | 2018/11/29 | 2018/11/29 | | |
| COC Number | | B8X4700-M058-01-01 | B8X4700-M058-02-01 | B8X4700-M058-02-01 | | |
| | UNITS | G-2018-SW14 | G-2018-SW15 | G-2018-SW16 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 9.42 | 10.2 | 10.6 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.180 | 0.186 | 0.202 | 0.00050 | 9272326 |
| Dissolved Antimony (Sb) | mg/L | 0.000329 | 0.000224 | 0.000213 | 0.000020 | 9272326 |
| Dissolved Arsenic (As) | mg/L | 0.225 | 0.124 | 0.0906 | 0.000020 | 9272326 |
| Dissolved Barium (Ba) | mg/L | 0.00217 | 0.00344 | 0.00357 | 0.000020 | 9272326 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9272326 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9272326 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000208 | 0.0000283 | 0.0000292 | 0.0000050 | 9272326 |
| Dissolved Chromium (Cr) | mg/L | 0.00023 | 0.00022 | 0.00023 | 0.00010 | 9272326 |
| Dissolved Cobalt (Co) | mg/L | 0.000704 | 0.000541 | 0.000580 | 0.0000050 | 9272326 |
| Dissolved Copper (Cu) | mg/L | 0.0117 | 0.00192 | 0.00216 | 0.000050 | 9272326 |
| Dissolved Iron (Fe) | mg/L | 0.356 | 0.279 | 0.301 | 0.0010 | 9272326 |
| Dissolved Lead (Pb) | mg/L | 0.000613 | 0.000277 | 0.000342 | 0.0000050 | 9272326 |
| Dissolved Lithium (Li) | mg/L | 0.00054 | 0.00054 | 0.00054 | 0.00050 | 9272326 |
| Dissolved Manganese (Mn) | mg/L | 0.0509 | 0.0381 | 0.0337 | 0.000050 | 9272326 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000084 | <0.000050 | <0.000050 | 0.000050 | 9272326 |
| Dissolved Nickel (Ni) | mg/L | 0.00185 | 0.00167 | 0.00169 | 0.000020 | 9272326 |
| Dissolved Selenium (Se) | mg/L | 0.000047 | 0.000045 | 0.000050 | 0.000040 | 9272326 |
| Dissolved Silicon (Si) | mg/L | 1.33 | 1.33 | 1.36 | 0.050 | 9272326 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Strontium (Sr) | mg/L | 0.0195 | 0.0156 | 0.0156 | 0.000050 | 9272326 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | <0.0000020 | 0.0000025 | 0.0000020 | 9272326 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9272326 |
| Dissolved Titanium (Ti) | mg/L | 0.00168 | 0.00144 | 0.00197 | 0.00050 | 9272326 |
| Dissolved Uranium (U) | mg/L | 0.0000059 | 0.0000062 | 0.0000065 | 0.0000020 | 9272326 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00021 | 0.00020 | 9272326 |
| Dissolved Zinc (Zn) | mg/L | 0.0140 | 0.00912 | 0.00967 | 0.00010 | 9272326 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9272326 |
| Dissolved Calcium (Ca) | mg/L | 2.87 | 3.32 | 3.45 | 0.050 | 9270528 |

RDL = Reportable Detection Limit



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Maxxam Job #: B8B0550
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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2923 | UZ2924 | UZ2925 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/29 | 2018/11/29 | 2018/11/29 | | |
| **COC Number** | | B8X4700-M058-01-01 | B8X4700-M058-02-01 | B8X4700-M058-02-01 | | |
| | **UNITS** | **G-2018-SW14** | **G-2018-SW15** | **G-2018-SW16** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 0.548 | 0.471 | 0.476 | 0.050 | 9270528 |
| Dissolved Potassium (K) | mg/L | 0.343 | 0.314 | 0.307 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 4.16 | 4.00 | 4.25 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 1.45 | 1.12 | 1.22 | 0.60 | 9272326 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
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## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2926 | | UZ2927 | UZ2928 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/30 | | 2018/11/30 | 2018/11/30 | | |
| COC Number | | B8X4700-M058-02-01 | | B8X4700-M058-02-01 | B8X4700-M058-02-01 | | |
| | UNITS | G-2018-SW17 | RDL | G-2018-P18 | G-2018-P19 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 6.58 | 0.50 | 10.3 | 39.8 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.185 | 0.00050 | 0.0802 | 0.0225 | 0.0025 | 9272326 |
| Dissolved Antimony (Sb) | mg/L | 0.000156 | 0.000020 | 0.00093 | 0.00035 | 0.00010 | 9272326 |
| Dissolved Arsenic (As) | mg/L | 0.103 | 0.000020 | 2.09 | 1.31 | 0.00010 | 9272326 |
| Dissolved Barium (Ba) | mg/L | 0.00253 | 0.000020 | 0.00534 | 0.0128 | 0.00010 | 9272326 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000010 | <0.000050 | <0.000050 | 0.000050 | 9272326 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000050 | <0.000025 | <0.000025 | 0.000025 | 9272326 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | <0.050 | <0.050 | 0.050 | 9272326 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000155 | 0.0000050 | <0.000025 | <0.000025 | 0.000025 | 9272326 |
| Dissolved Chromium (Cr) | mg/L | 0.00021 | 0.00010 | <0.00050 | 0.00071 | 0.00050 | 9272326 |
| Dissolved Cobalt (Co) | mg/L | 0.000109 | 0.0000050 | 0.00400 | 0.00139 | 0.000025 | 9272326 |
| Dissolved Copper (Cu) | mg/L | 0.00105 | 0.000050 | 0.00356 | 0.00046 | 0.00025 | 9272326 |
| Dissolved Iron (Fe) | mg/L | 0.204 | 0.0010 | 4.57 | 18.3 | 0.0050 | 9272326 |
| Dissolved Lead (Pb) | mg/L | 0.000117 | 0.0000050 | 0.00175 | 0.000182 | 0.000025 | 9272326 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00050 | <0.0025 | <0.0025 | 0.0025 | 9272326 |
| Dissolved Manganese (Mn) | mg/L | 0.0164 | 0.000050 | 0.297 | 0.812 | 0.00025 | 9272326 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000050 | 0.00031 | <0.00025 | 0.00025 | 9272326 |
| Dissolved Nickel (Ni) | mg/L | 0.00123 | 0.000020 | 0.00524 | 0.00224 | 0.00010 | 9272326 |
| Dissolved Selenium (Se) | mg/L | 0.000061 | 0.000040 | <0.00020 | <0.00020 | 0.00020 | 9272326 |
| Dissolved Silicon (Si) | mg/L | 1.27 | 0.050 | 1.28 | 3.33 | 0.25 | 9272326 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | <0.000025 | <0.000025 | 0.000025 | 9272326 |
| Dissolved Strontium (Sr) | mg/L | 0.0141 | 0.000050 | 0.0223 | 0.109 | 0.00025 | 9272326 |
| Dissolved Thallium (Tl) | mg/L | 0.0000020 | 0.0000020 | <0.000010 | <0.000010 | 0.000010 | 9272326 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | <0.0010 | <0.0010 | 0.0010 | 9272326 |
| Dissolved Titanium (Ti) | mg/L | 0.00107 | 0.00050 | <0.0025 | <0.0025 | 0.0025 | 9272326 |
| Dissolved Uranium (U) | mg/L | 0.0000067 | 0.0000020 | <0.000010 | <0.000010 | 0.000010 | 9272326 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00020 | <0.0010 | <0.0010 | 0.0010 | 9272326 |
| Dissolved Zinc (Zn) | mg/L | 0.00182 | 0.00010 | 0.0168 | 0.0120 | 0.00050 | 9272326 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | <0.00050 | <0.00050 | 0.00050 | 9272326 |
| Dissolved Calcium (Ca) | mg/L | 1.93 | 0.050 | 3.20 | 14.2 | 0.25 | 9270528 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2926 | | UZ2927 | UZ2928 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/30 | | 2018/11/30 | 2018/11/30 | | |
| COC Number | | B8X4700-M058-02-01 | | B8X4700-M058-02-01 | B8X4700-M058-02-01 | | |
| | UNITS | G-2018-SW17 | RDL | G-2018-P18 | G-2018-P19 | RDL | QC Batch |
| Dissolved Magnesium (Mg) | mg/L | 0.431 | 0.050 | 0.55 | 1.03 | 0.25 | 9270528 |
| Dissolved Potassium (K) | mg/L | 0.160 | 0.050 | 0.43 | 1.36 | 0.25 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 3.23 | 0.050 | 4.28 | 3.09 | 0.25 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 0.64 | 0.60 | <3.0 | <3.0 | 3.0 | 9272326 |
| RDL = Reportable Detection Limit | | | | | | | |



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Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2929 | UZ2930 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2018/11/27 | 2018/11/29 | | |
| COC Number | | B8X4700-M058-02-01 | B8X4700-M058-02-01 | | |
| | UNITS | G-2018-P1 SW | G-2018-P1 A | RDL | QC Batch |
| **Calculated Parameters** | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 6.36 | 79.3 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.237 | 0.0184 | 0.00050 | 9272335 |
| Dissolved Antimony (Sb) | mg/L | 0.000138 | 0.000384 | 0.000020 | 9272335 |
| Dissolved Arsenic (As) | mg/L | 0.0673 | 0.815 | 0.000020 | 9272335 |
| Dissolved Barium (Ba) | mg/L | 0.00271 | 0.0258 | 0.000020 | 9272335 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | 0.000010 | 9272335 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | 9272335 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.074 | 0.010 | 9272335 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000235 | <0.0000050 | 0.0000050 | 9272335 |
| Dissolved Chromium (Cr) | mg/L | 0.00028 | 0.00088 | 0.00010 | 9272335 |
| Dissolved Cobalt (Co) | mg/L | 0.000599 | 0.00589 | 0.0000050 | 9272335 |
| Dissolved Copper (Cu) | mg/L | 0.000873 | 0.000372 | 0.000050 | 9272335 |
| Dissolved Iron (Fe) | mg/L | 0.647 | 10.4 | 0.0010 | 9272335 |
| Dissolved Lead (Pb) | mg/L | 0.000519 | 0.0000563 | 0.0000050 | 9272335 |
| Dissolved Lithium (Li) | mg/L | 0.00052 | 0.00315 | 0.00050 | 9272335 |
| Dissolved Manganese (Mn) | mg/L | 0.0580 | 1.16 | 0.000050 | 9272335 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.00227 | 0.000050 | 9272335 |
| Dissolved Nickel (Ni) | mg/L | 0.00135 | 0.0357 | 0.000020 | 9272335 |
| Dissolved Selenium (Se) | mg/L | 0.000069 | <0.000040 | 0.000040 | 9272335 |
| Dissolved Silicon (Si) | mg/L | 1.61 | 4.75 | 0.050 | 9272335 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | 9272335 |
| Dissolved Strontium (Sr) | mg/L | 0.0127 | 0.194 | 0.000050 | 9272335 |
| Dissolved Thallium (Tl) | mg/L | 0.0000034 | <0.0000020 | 0.0000020 | 9272335 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | 0.00020 | 9272335 |
| Dissolved Titanium (Ti) | mg/L | 0.00257 | <0.00050 | 0.00050 | 9272335 |
| Dissolved Uranium (U) | mg/L | 0.0000073 | 0.0000082 | 0.0000020 | 9272335 |
| Dissolved Vanadium (V) | mg/L | 0.00027 | <0.00020 | 0.00020 | 9272335 |
| Dissolved Zinc (Zn) | mg/L | 0.00444 | 0.0223 | 0.00010 | 9272335 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | 0.00010 | 9272335 |
| Dissolved Calcium (Ca) | mg/L | 1.76 | 27.5 | 0.050 | 9270528 |

RDL = Reportable Detection Limit

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Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2929 | UZ2930 | | |
|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/27 | 2018/11/29 | | |
| **COC Number** | | B8X4700-M058-02-01 | B8X4700-M058-02-01 | | |
| | **UNITS** | **G-2018-P1 SW** | **G-2018-P1 A** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 0.476 | 2.59 | 0.050 | 9270528 |
| Dissolved Potassium (K) | mg/L | 0.153 | 4.51 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 5.73 | 3.69 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 0.74 | 12.5 | 0.60 | 9272335 |
| RDL = Reportable Detection Limit | | | | | |



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## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2930 | | | UZ2931 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | | | 2018/11/29 | | |
| COC Number | | B8X4700-M058-02-01 | | | B8X4700-M058-02-01 | | |
| | UNITS | G-2018-P1 A Lab-Dup | RDL | QC Batch | G-2018-P1 B | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | | | | 154 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0181 | 0.00050 | 9272335 | 0.0075 | 0.0010 | 9272335 |
| Dissolved Antimony (Sb) | mg/L | 0.000395 | 0.000020 | 9272335 | 0.000761 | 0.000040 | 9272335 |
| Dissolved Arsenic (As) | mg/L | 0.811 | 0.000020 | 9272335 | 0.935 | 0.000040 | 9272335 |
| Dissolved Barium (Ba) | mg/L | 0.0255 | 0.000020 | 9272335 | 0.0420 | 0.000040 | 9272335 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000010 | 9272335 | <0.000020 | 0.000020 | 9272335 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000050 | 9272335 | <0.000010 | 0.000010 | 9272335 |
| Dissolved Boron (B) | mg/L | 0.074 | 0.010 | 9272335 | 0.142 | 0.020 | 9272335 |
| Dissolved Cadmium (Cd) | mg/L | <0.0000050 | 0.0000050 | 9272335 | 0.000014 | 0.000010 | 9272335 |
| Dissolved Chromium (Cr) | mg/L | 0.00089 | 0.00010 | 9272335 | 0.00063 | 0.00020 | 9272335 |
| Dissolved Cobalt (Co) | mg/L | 0.00588 | 0.0000050 | 9272335 | 0.00116 | 0.000010 | 9272335 |
| Dissolved Copper (Cu) | mg/L | 0.000367 | 0.000050 | 9272335 | 0.00030 | 0.00010 | 9272335 |
| Dissolved Iron (Fe) | mg/L | 10.4 | 0.0010 | 9272335 | 1.56 | 0.0020 | 9272335 |
| Dissolved Lead (Pb) | mg/L | 0.0000530 | 0.0000050 | 9272335 | 0.000180 | 0.000010 | 9272335 |
| Dissolved Lithium (Li) | mg/L | 0.00315 | 0.00050 | 9272335 | 0.0040 | 0.0010 | 9272335 |
| Dissolved Manganese (Mn) | mg/L | 1.17 | 0.000050 | 9272335 | 1.10 | 0.00010 | 9272335 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00225 | 0.000050 | 9272335 | 0.00296 | 0.00010 | 9272335 |
| Dissolved Nickel (Ni) | mg/L | 0.0354 | 0.000020 | 9272335 | 0.00738 | 0.000040 | 9272335 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000040 | 9272335 | <0.000080 | 0.000080 | 9272335 |
| Dissolved Silicon (Si) | mg/L | 4.69 | 0.050 | 9272335 | 4.55 | 0.10 | 9272335 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | 9272335 | <0.000010 | 0.000010 | 9272335 |
| Dissolved Strontium (Sr) | mg/L | 0.193 | 0.000050 | 9272335 | 0.364 | 0.00010 | 9272335 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | 0.0000020 | 9272335 | <0.0000040 | 0.0000040 | 9272335 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9272335 | <0.00040 | 0.00040 | 9272335 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00050 | 9272335 | <0.0010 | 0.0010 | 9272335 |
| Dissolved Uranium (U) | mg/L | 0.0000077 | 0.0000020 | 9272335 | 0.0000345 | 0.0000040 | 9272335 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00020 | 9272335 | <0.00040 | 0.00040 | 9272335 |
| Dissolved Zinc (Zn) | mg/L | 0.0222 | 0.00010 | 9272335 | 0.0332 | 0.00020 | 9272335 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | 9272335 | <0.00020 | 0.00020 | 9272335 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2930 | | | UZ2931 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/29 | | | 2018/11/29 | | |
| **COC Number** | | B8X4700-M058-02-01 | | | B8X4700-M058-02-01 | | |
| | **UNITS** | **G-2018-P1 A Lab-Dup** | **RDL** | **QC Batch** | **G-2018-P1 B** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | | | | 57.1 | 0.10 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | | | | 2.66 | 0.10 | 9270528 |
| Dissolved Potassium (K) | mg/L | | | | 6.51 | 0.10 | 9270528 |
| Dissolved Sodium (Na) | mg/L | | | | 3.65 | 0.10 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 12.7 | 0.60 | 9272335 | 23.4 | 1.2 | 9272335 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2932 | | UZ2933 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/27 | | 2018/11/29 | | |
| COC Number | | B8X4700-M058-02-01 | | B8X4700-M058-02-01 | | |
| | UNITS | G-2018-P2 SW | RDL | G-2018-P2A | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 10.6 | 0.50 | 318 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.255 | 0.00050 | 0.407 | 0.0025 | 9272335 |
| Dissolved Antimony (Sb) | mg/L | 0.000145 | 0.000020 | 0.00085 | 0.00010 | 9272335 |
| Dissolved Arsenic (As) | mg/L | 0.0897 | 0.000020 | 0.960 | 0.00010 | 9272335 |
| Dissolved Barium (Ba) | mg/L | 0.00294 | 0.000020 | 0.0321 | 0.00010 | 9272335 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000010 | 0.000165 | 0.000050 | 9272335 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000050 | <0.000025 | 0.000025 | 9272335 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 0.087 | 0.050 | 9272335 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000344 | 0.0000050 | <0.000025 | 0.000025 | 9272335 |
| Dissolved Chromium (Cr) | mg/L | 0.00028 | 0.00010 | 0.00227 | 0.00050 | 9272335 |
| Dissolved Cobalt (Co) | mg/L | 0.00139 | 0.0000050 | 0.482 | 0.000025 | 9272335 |
| Dissolved Copper (Cu) | mg/L | 0.000991 | 0.000050 | 0.00246 | 0.00025 | 9272335 |
| Dissolved Iron (Fe) | mg/L | 0.953 | 0.0010 | 61.3 | 0.0050 | 9272335 |
| Dissolved Lead (Pb) | mg/L | 0.000479 | 0.0000050 | 0.000458 | 0.000025 | 9272335 |
| Dissolved Lithium (Li) | mg/L | 0.00085 | 0.00050 | 0.0310 | 0.0025 | 9272335 |
| Dissolved Manganese (Mn) | mg/L | 0.104 | 0.000050 | 22.6 | 0.00025 | 9272335 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000074 | 0.000050 | 0.00121 | 0.00025 | 9272335 |
| Dissolved Nickel (Ni) | mg/L | 0.00303 | 0.000020 | 0.420 | 0.00010 | 9272335 |
| Dissolved Selenium (Se) | mg/L | 0.000063 | 0.000040 | <0.00020 | 0.00020 | 9272335 |
| Dissolved Silicon (Si) | mg/L | 1.80 | 0.050 | 11.6 | 0.25 | 9272335 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | <0.000025 | 0.000025 | 9272335 |
| Dissolved Strontium (Sr) | mg/L | 0.0232 | 0.000050 | 0.799 | 0.00025 | 9272335 |
| Dissolved Thallium (Tl) | mg/L | 0.0000040 | 0.0000020 | <0.000010 | 0.000010 | 9272335 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9272335 |
| Dissolved Titanium (Ti) | mg/L | 0.00227 | 0.00050 | <0.0025 | 0.0025 | 9272335 |
| Dissolved Uranium (U) | mg/L | 0.0000116 | 0.0000020 | <0.000010 | 0.000010 | 9272335 |
| Dissolved Vanadium (V) | mg/L | 0.00025 | 0.00020 | <0.0010 | 0.0010 | 9272335 |
| Dissolved Zinc (Zn) | mg/L | 0.00518 | 0.00010 | 0.110 | 0.00050 | 9272335 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | <0.00050 | 0.00050 | 9272335 |
| Dissolved Calcium (Ca) | mg/L | 3.22 | 0.050 | 93.7 | 0.25 | 9270528 |

RDL = Reportable Detection Limit



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Maxxam Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2932 | | UZ2933 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/27 | | 2018/11/29 | | |
| **COC Number** | | B8X4700-M058-02-01 | | B8X4700-M058-02-01 | | |
| | **UNITS** | **G-2018-P2 SW** | **RDL** | **G-2018-P2A** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 0.623 | 0.050 | 20.5 | 0.25 | 9270528 |
| Dissolved Potassium (K) | mg/L | 0.231 | 0.050 | 10.1 | 0.25 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 6.20 | 0.050 | 5.86 | 0.25 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 2.22 | 0.60 | 148 | 3.0 | 9272335 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2934 | | UZ2935 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | | 2018/11/27 | | |
| COC Number | | B8X4700-M058-03-01 | | B8X4700-M058-03-01 | | |
| | UNITS | G-2018-P2B | RDL | G-2018-P3 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 56.7 | 0.50 | 68.8 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.284 | 0.00050 | 0.0176 | 0.0025 | 9272335 |
| Dissolved Antimony (Sb) | mg/L | 0.00237 | 0.000020 | 0.00059 | 0.00010 | 9272335 |
| Dissolved Arsenic (As) | mg/L | 0.576 | 0.000020 | 1.51 | 0.00010 | 9272335 |
| Dissolved Barium (Ba) | mg/L | 0.0278 | 0.000020 | 0.00743 | 0.00010 | 9272335 |
| Dissolved Beryllium (Be) | mg/L | 0.000078 | 0.000010 | <0.000050 | 0.000050 | 9272335 |
| Dissolved Bismuth (Bi) | mg/L | 0.000121 | 0.0000050 | <0.000025 | 0.000025 | 9272335 |
| Dissolved Boron (B) | mg/L | 0.250 | 0.010 | <0.050 | 0.050 | 9272335 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000357 | 0.0000050 | 0.000033 | 0.000025 | 9272335 |
| Dissolved Chromium (Cr) | mg/L | 0.00302 | 0.00010 | <0.00050 | 0.00050 | 9272335 |
| Dissolved Cobalt (Co) | mg/L | 0.0164 | 0.0000050 | 0.00331 | 0.000025 | 9272335 |
| Dissolved Copper (Cu) | mg/L | 0.00271 | 0.000050 | 0.00117 | 0.00025 | 9272335 |
| Dissolved Iron (Fe) | mg/L | 4.54 | 0.0010 | 10.9 | 0.0050 | 9272335 |
| Dissolved Lead (Pb) | mg/L | 0.0118 | 0.0000050 | 0.000080 | 0.000025 | 9272335 |
| Dissolved Lithium (Li) | mg/L | 0.00380 | 0.00050 | <0.0025 | 0.0025 | 9272335 |
| Dissolved Manganese (Mn) | mg/L | 1.53 | 0.000050 | 1.34 | 0.00025 | 9272335 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00302 | 0.000050 | 0.00049 | 0.00025 | 9272335 |
| Dissolved Nickel (Ni) | mg/L | 0.0252 | 0.000020 | 0.00841 | 0.00010 | 9272335 |
| Dissolved Selenium (Se) | mg/L | 0.000066 | 0.000040 | <0.00020 | 0.00020 | 9272335 |
| Dissolved Silicon (Si) | mg/L | 2.41 | 0.050 | 3.04 | 0.25 | 9272335 |
| Dissolved Silver (Ag) | mg/L | 0.0000182 | 0.0000050 | <0.000025 | 0.000025 | 9272335 |
| Dissolved Strontium (Sr) | mg/L | 0.0820 | 0.000050 | 0.162 | 0.00025 | 9272335 |
| Dissolved Thallium (Tl) | mg/L | 0.0000036 | 0.0000020 | <0.000010 | 0.000010 | 9272335 |
| Dissolved Tin (Sn) | mg/L | 0.00039 | 0.00020 | <0.0010 | 0.0010 | 9272335 |
| Dissolved Titanium (Ti) | mg/L | 0.00755 | 0.00050 | <0.0025 | 0.0025 | 9272335 |
| Dissolved Uranium (U) | mg/L | 0.0000945 | 0.0000020 | <0.000010 | 0.000010 | 9272335 |
| Dissolved Vanadium (V) | mg/L | 0.00090 | 0.00020 | <0.0010 | 0.0010 | 9272335 |
| Dissolved Zinc (Zn) | mg/L | 0.0525 | 0.00010 | 0.00871 | 0.00050 | 9272335 |
| Dissolved Zirconium (Zr) | mg/L | 0.00056 | 0.00010 | <0.00050 | 0.00050 | 9272335 |
| Dissolved Calcium (Ca) | mg/L | 19.1 | 0.050 | 24.3 | 0.25 | 9270528 |
| RDL = Reportable Detection Limit | | | | | | |

Maxxam Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2934 | | UZ2935 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/29 | | 2018/11/27 | | |
| **COC Number** | | B8X4700-M058-03-01 | | B8X4700-M058-03-01 | | |
| | **UNITS** | **G-2018-P2B** | **RDL** | **G-2018-P3 SW** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 2.21 | 0.050 | 2.00 | 0.25 | 9270528 |
| Dissolved Potassium (K) | mg/L | 9.41 | 0.050 | 1.84 | 0.25 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 4.56 | 0.050 | 2.73 | 0.25 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 6.25 | 0.60 | 9.4 | 3.0 | 9272335 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2936 | | UZ2937 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | | 2018/11/29 | | |
| COC Number | | B8X4700-M058-03-01 | | B8X4700-M058-03-01 | | |
| | UNITS | G-2018-P3A | RDL | G-2018-P3B | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 333 | 0.50 | 185 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.00466 | 0.00050 | 0.0325 | 0.0025 | 9272335 |
| Dissolved Antimony (Sb) | mg/L | 0.000758 | 0.000020 | 0.00208 | 0.00010 | 9272335 |
| Dissolved Arsenic (As) | mg/L | 0.548 | 0.000020 | 2.93 | 0.00010 | 9272335 |
| Dissolved Barium (Ba) | mg/L | 0.0386 | 0.000020 | 0.0228 | 0.00010 | 9272335 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000010 | 0.00137 | 0.000050 | 9272335 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000050 | 0.000109 | 0.000025 | 9272335 |
| Dissolved Boron (B) | mg/L | 0.063 | 0.010 | 0.193 | 0.050 | 9272335 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000131 | 0.0000050 | 0.00144 | 0.000025 | 9272335 |
| Dissolved Chromium (Cr) | mg/L | 0.00045 | 0.00010 | 0.00283 | 0.00050 | 9272335 |
| Dissolved Cobalt (Co) | mg/L | 0.00290 | 0.0000050 | 0.0127 | 0.000025 | 9272335 |
| Dissolved Copper (Cu) | mg/L | 0.000274 | 0.000050 | 0.00210 | 0.00025 | 9272335 |
| Dissolved Iron (Fe) | mg/L | 6.27 | 0.0010 | 39.8 | 0.0050 | 9272335 |
| Dissolved Lead (Pb) | mg/L | 0.000187 | 0.0000050 | 0.00165 | 0.000025 | 9272335 |
| Dissolved Lithium (Li) | mg/L | 0.00091 | 0.00050 | 0.0043 | 0.0025 | 9272335 |
| Dissolved Manganese (Mn) | mg/L | 1.67 | 0.000050 | 3.85 | 0.00025 | 9272335 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00250 | 0.000050 | 0.00471 | 0.00025 | 9272335 |
| Dissolved Nickel (Ni) | mg/L | 0.0341 | 0.000020 | 0.0838 | 0.00010 | 9272335 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000040 | 0.00142 | 0.00020 | 9272335 |
| Dissolved Silicon (Si) | mg/L | 10.6 | 0.050 | 6.52 | 0.25 | 9272335 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | 0.000034 | 0.000025 | 9272335 |
| Dissolved Strontium (Sr) | mg/L | 0.800 | 0.000050 | 0.384 | 0.00025 | 9272335 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | 0.0000020 | 0.000125 | 0.000010 | 9272335 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9272335 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00050 | <0.0025 | 0.0025 | 9272335 |
| Dissolved Uranium (U) | mg/L | 0.0000575 | 0.0000020 | 0.00139 | 0.000010 | 9272335 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00020 | 0.0011 | 0.0010 | 9272335 |
| Dissolved Zinc (Zn) | mg/L | 0.0290 | 0.00010 | 0.0257 | 0.00050 | 9272335 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | <0.00050 | 0.00050 | 9272335 |
| Dissolved Calcium (Ca) | mg/L | 118 | 0.050 | 63.8 | 0.25 | 9270528 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2936 | | UZ2937 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/29 | | 2018/11/29 | | |
| **COC Number** | | B8X4700-M058-03-01 | | B8X4700-M058-03-01 | | |
| | **UNITS** | **G-2018-P3A** | **RDL** | **G-2018-P3B** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 9.42 | 0.050 | 6.20 | 0.25 | 9270528 |
| Dissolved Potassium (K) | mg/L | 4.67 | 0.050 | 10.3 | 0.25 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 7.61 | 0.050 | 6.20 | 0.25 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 49.1 | 0.60 | 7.5 | 3.0 | 9272335 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2938 | UZ2939 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2018/11/27 | 2018/11/29 | | |
| COC Number | | B8X4700-M058-03-01 | B8X4700-M058-03-01 | | |
| | UNITS | G-2018-P4 SW | G-2018-P4B | RDL | QC Batch |
| **Calculated Parameters** | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 4.70 | 47.2 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.240 | 0.379 | 0.00050 | 9272335 |
| Dissolved Antimony (Sb) | mg/L | 0.000062 | 0.00202 | 0.000020 | 9272335 |
| Dissolved Arsenic (As) | mg/L | 0.0232 | 0.518 | 0.000020 | 9272335 |
| Dissolved Barium (Ba) | mg/L | 0.00241 | 0.00910 | 0.000020 | 9272335 |
| Dissolved Beryllium (Be) | mg/L | 0.000013 | 0.000025 | 0.000010 | 9272335 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.000286 | 0.0000050 | 9272335 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.250 | 0.010 | 9272335 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000153 | 0.0000720 | 0.0000050 | 9272335 |
| Dissolved Chromium (Cr) | mg/L | 0.00032 | 0.00337 | 0.00010 | 9272335 |
| Dissolved Cobalt (Co) | mg/L | 0.000377 | 0.00751 | 0.0000050 | 9272335 |
| Dissolved Copper (Cu) | mg/L | 0.000671 | 0.00992 | 0.000050 | 9272335 |
| Dissolved Iron (Fe) | mg/L | 0.447 | 4.62 | 0.0010 | 9272335 |
| Dissolved Lead (Pb) | mg/L | 0.000463 | 0.0130 | 0.0000050 | 9272335 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00051 | 0.00050 | 9272335 |
| Dissolved Manganese (Mn) | mg/L | 0.0456 | 1.07 | 0.000050 | 9272335 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.00469 | 0.000050 | 9272335 |
| Dissolved Nickel (Ni) | mg/L | 0.000727 | 0.0999 | 0.000020 | 9272335 |
| Dissolved Selenium (Se) | mg/L | 0.000064 | 0.000134 | 0.000040 | 9272335 |
| Dissolved Silicon (Si) | mg/L | 1.50 | 3.58 | 0.050 | 9272335 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000741 | 0.0000050 | 9272335 |
| Dissolved Strontium (Sr) | mg/L | 0.00918 | 0.0507 | 0.000050 | 9272335 |
| Dissolved Thallium (Tl) | mg/L | 0.0000022 | 0.0000088 | 0.0000020 | 9272335 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | 0.00020 | 9272335 |
| Dissolved Titanium (Ti) | mg/L | 0.00219 | 0.0351 | 0.00050 | 9272335 |
| Dissolved Uranium (U) | mg/L | 0.0000069 | 0.000191 | 0.0000020 | 9272335 |
| Dissolved Vanadium (V) | mg/L | 0.00029 | 0.00077 | 0.00020 | 9272335 |
| Dissolved Zinc (Zn) | mg/L | 0.00316 | 0.0517 | 0.00010 | 9272335 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00429 | 0.00010 | 9272335 |
| Dissolved Calcium (Ca) | mg/L | 1.15 | 16.7 | 0.050 | 9270528 |
| RDL = Reportable Detection Limit | | | | | |

Maxxam Job #: B8B0550
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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2938 | UZ2939 | | |
|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/27 | 2018/11/29 | | |
| **COC Number** | | B8X4700-M058-03-01 | B8X4700-M058-03-01 | | |
| | **UNITS** | **G-2018-P4 SW** | **G-2018-P4B** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 0.444 | 1.33 | 0.050 | 9270528 |
| Dissolved Potassium (K) | mg/L | 0.126 | 6.01 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 5.69 | 5.14 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | <0.60 | 3.59 | 0.60 | 9272335 |
| RDL = Reportable Detection Limit | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2914
**Sample ID:** G-2018-C5 SW
**Matrix:** Water

**Collected:** 2018/11/28
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2915
**Sample ID:** G-2018-C6 SW
**Matrix:** Water

**Collected:** 2018/11/28
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2916
**Sample ID:** G-2018-C7 SW
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/24 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2917
**Sample ID:** G-2018-C8 SW
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2918
**Sample ID:** G-2018-C9 SW
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2918 **Collected:** 2018/11/29
**Sample ID:** G-2018-C9 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2919 **Collected:** 2018/11/29
**Sample ID:** G-2018-C10 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2920 **Collected:** 2018/11/28
**Sample ID:** G-2018-C11 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2921 **Collected:** 2018/11/28
**Sample ID:** G-2018-C12 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2922 **Collected:** 2018/11/28
**Sample ID:** G-2018-C13 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |



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Maxxam Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2922
**Sample ID:** G-2018-C13 SW
**Matrix:** Water

**Collected:** 2018/11/28
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2923
**Sample ID:** G-2018-SW14
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2924
**Sample ID:** G-2018-SW15
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2925
**Sample ID:** G-2018-SW16
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2926
**Sample ID:** G-2018-SW17
**Matrix:** Water

**Collected:** 2018/11/30
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |



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Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2926 **Collected:** 2018/11/30
**Sample ID:** G-2018-SW17 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2927 **Collected:** 2018/11/30
**Sample ID:** G-2018-P18 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2928 **Collected:** 2018/11/30
**Sample ID:** G-2018-P19 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2929 **Collected:** 2018/11/27
**Sample ID:** G-2018-P1 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2930 **Collected:** 2018/11/29
**Sample ID:** G-2018-P1 A **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2930
**Sample ID:** G-2018-P1 A
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2930 Dup
**Sample ID:** G-2018-P1 A
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |

**Maxxam ID:** UZ2931
**Sample ID:** G-2018-P1 B
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2932
**Sample ID:** G-2018-P2 SW
**Matrix:** Water

**Collected:** 2018/11/27
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2933
**Sample ID:** G-2018-P2A
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |



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MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2934
**Sample ID:** G-2018-P2B
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2935
**Sample ID:** G-2018-P3 SW
**Matrix:** Water

**Collected:** 2018/11/27
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2936
**Sample ID:** G-2018-P3A
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2937
**Sample ID:** G-2018-P3B
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2938
**Sample ID:** G-2018-P4 SW
**Matrix:** Water

**Collected:** 2018/11/27
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |



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Maxxam Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2938
**Sample ID:** G-2018-P4 SW
**Matrix:** Water

**Collected:** 2018/11/27
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2939
**Sample ID:** G-2018-P4B
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272335 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |



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Maxxam Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 5.7°C |
| Package 2 | 3.0°C |

Report to include results for Mercury by CVAF as per client request.

Effective October 1, 2013, the BC MOE SAMPLE PRESERVATION & HOLDING TIME REQUIREMENTS states that Mercury in water requires a glass or PTFE container with Hydrochloric Acid (HCl) preservation. Sample container and preservation received was not in compliance. Maxxam added HCl to stabilize Mercury to all samples prior to analysis.

**LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments**

Sample UZ2927 [G-2018-P18] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
Sample UZ2928 [G-2018-P19] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
Sample UZ2931 [G-2018-P1 B] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
Sample UZ2933 [G-2018-P2A] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
Sample UZ2935 [G-2018-P3 SW] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
Sample UZ2937 [G-2018-P3B] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

**Results relate only to the items tested.**



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## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9272326 | Dissolved Aluminum (Al) | 2018/12/22 | 98 | 80 - 120 | 107 | 80 - 120 | <0.00050 | mg/L | 3.7 | 20 |
| 9272326 | Dissolved Antimony (Sb) | 2018/12/22 | NC | 80 - 120 | 108 | 80 - 120 | <0.000020 | mg/L | 0.53 | 20 |
| 9272326 | Dissolved Arsenic (As) | 2018/12/22 | NC | 80 - 120 | 110 | 80 - 120 | <0.000020 | mg/L | 1.3 | 20 |
| 9272326 | Dissolved Barium (Ba) | 2018/12/22 | 97 | 80 - 120 | 106 | 80 - 120 | <0.000020 | mg/L | 1.5 | 20 |
| 9272326 | Dissolved Beryllium (Be) | 2018/12/22 | 92 | 80 - 120 | 103 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9272326 | Dissolved Bismuth (Bi) | 2018/12/22 | 93 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9272326 | Dissolved Boron (B) | 2018/12/22 | 93 | 80 - 120 | 101 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 9272326 | Dissolved Cadmium (Cd) | 2018/12/22 | 97 | 80 - 120 | 107 | 80 - 120 | <0.0000050 | mg/L | 2.7 | 20 |
| 9272326 | Dissolved Chromium (Cr) | 2018/12/22 | 93 | 80 - 120 | 104 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9272326 | Dissolved Cobalt (Co) | 2018/12/22 | 91 | 80 - 120 | 103 | 80 - 120 | <0.0000050 | mg/L | 1.1 | 20 |
| 9272326 | Dissolved Copper (Cu) | 2018/12/22 | 88 | 80 - 120 | 102 | 80 - 120 | <0.000050 | mg/L | 0.21 | 20 |
| 9272326 | Dissolved Iron (Fe) | 2018/12/22 | 97 | 80 - 120 | 110 | 80 - 120 | <0.0010 | mg/L | 0.13 | 20 |
| 9272326 | Dissolved Lead (Pb) | 2018/12/22 | 95 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | 2.0 | 20 |
| 9272326 | Dissolved Lithium (Li) | 2018/12/22 | 93 | 80 - 120 | 105 | 80 - 120 | <0.00050 | mg/L | 3.0 | 20 |
| 9272326 | Dissolved Manganese (Mn) | 2018/12/22 | NC | 80 - 120 | 106 | 80 - 120 | <0.000050 | mg/L | 0.039 | 20 |
| 9272326 | Dissolved Molybdenum (Mo) | 2018/12/22 | 104 | 80 - 120 | 108 | 80 - 120 | <0.000050 | mg/L | 4.7 | 20 |
| 9272326 | Dissolved Nickel (Ni) | 2018/12/22 | 88 | 80 - 120 | 105 | 80 - 120 | <0.000020 | mg/L | 0.51 | 20 |
| 9272326 | Dissolved Selenium (Se) | 2018/12/22 | 97 | 80 - 120 | 106 | 80 - 120 | <0.000040 | mg/L | 5.1 | 20 |
| 9272326 | Dissolved Silicon (Si) | 2018/12/22 | NC | 80 - 120 | 107 | 80 - 120 | <0.050 | mg/L | 0.98 | 20 |
| 9272326 | Dissolved Silver (Ag) | 2018/12/22 | 96 | 80 - 120 | 106 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9272326 | Dissolved Strontium (Sr) | 2018/12/22 | NC | 80 - 120 | 108 | 80 - 120 | <0.000050 | mg/L | 0.28 | 20 |
| 9272326 | Dissolved Sulphur (S) | 2018/12/22 | NC | 80 - 120 | 107 | 80 - 120 | <0.60 | mg/L | 1.6 | 20 |
| 9272326 | Dissolved Thallium (Tl) | 2018/12/22 | 95 | 80 - 120 | 104 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9272326 | Dissolved Tin (Sn) | 2018/12/22 | 98 | 80 - 120 | 111 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9272326 | Dissolved Titanium (Ti) | 2018/12/22 | 99 | 80 - 120 | 107 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9272326 | Dissolved Uranium (U) | 2018/12/22 | 101 | 80 - 120 | 108 | 80 - 120 | <0.0000020 | mg/L | 0.63 | 20 |
| 9272326 | Dissolved Vanadium (V) | 2018/12/22 | 98 | 80 - 120 | 105 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9272326 | Dissolved Zinc (Zn) | 2018/12/22 | 90 | 80 - 120 | 113 | 80 - 120 | <0.00010 | mg/L | 0.95 | 20 |
| 9272326 | Dissolved Zirconium (Zr) | 2018/12/22 | 103 | 80 - 120 | 108 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9272335 | Dissolved Aluminum (Al) | 2018/12/22 | 97 | 80 - 120 | 108 | 80 - 120 | <0.00050 | mg/L | 2.0 | 20 |
| 9272335 | Dissolved Antimony (Sb) | 2018/12/22 | 99 | 80 - 120 | 108 | 80 - 120 | <0.000020 | mg/L | 2.9 | 20 |



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Maxxam Job #: B8B0550
Report Date: 2018/12/28

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9272335 | Dissolved Arsenic (As) | 2018/12/22 | NC | 80 - 120 | 109 | 80 - 120 | 0.000034, RDL=0.000020 (1) | mg/L | 0.54 | 20 |
| 9272335 | Dissolved Barium (Ba) | 2018/12/22 | 96 | 80 - 120 | 106 | 80 - 120 | <0.000020 | mg/L | 1.1 | 20 |
| 9272335 | Dissolved Beryllium (Be) | 2018/12/22 | 95 | 80 - 120 | 99 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9272335 | Dissolved Bismuth (Bi) | 2018/12/22 | 96 | 80 - 120 | 104 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9272335 | Dissolved Boron (B) | 2018/12/22 | 94 | 80 - 120 | 99 | 80 - 120 | <0.010 | mg/L | 0.32 | 20 |
| 9272335 | Dissolved Cadmium (Cd) | 2018/12/22 | 97 | 80 - 120 | 107 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9272335 | Dissolved Chromium (Cr) | 2018/12/22 | 95 | 80 - 120 | 104 | 80 - 120 | <0.00010 | mg/L | 1.5 | 20 |
| 9272335 | Dissolved Cobalt (Co) | 2018/12/22 | 94 | 80 - 120 | 104 | 80 - 120 | <0.0000050 | mg/L | 0.12 | 20 |
| 9272335 | Dissolved Copper (Cu) | 2018/12/22 | 92 | 80 - 120 | 102 | 80 - 120 | <0.000050 | mg/L | 1.2 | 20 |
| 9272335 | Dissolved Iron (Fe) | 2018/12/22 | NC | 80 - 120 | 107 | 80 - 120 | <0.0010 | mg/L | 0.48 | 20 |
| 9272335 | Dissolved Lead (Pb) | 2018/12/22 | 96 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | 6.0 | 20 |
| 9272335 | Dissolved Lithium (Li) | 2018/12/22 | 96 | 80 - 120 | 102 | 80 - 120 | <0.00050 | mg/L | 0.10 | 20 |
| 9272335 | Dissolved Manganese (Mn) | 2018/12/22 | NC | 80 - 120 | 106 | 80 - 120 | <0.000050 | mg/L | 0.093 | 20 |
| 9272335 | Dissolved Molybdenum (Mo) | 2018/12/22 | 100 | 80 - 120 | 107 | 80 - 120 | <0.000050 | mg/L | 0.88 | 20 |
| 9272335 | Dissolved Nickel (Ni) | 2018/12/22 | 94 | 80 - 120 | 105 | 80 - 120 | <0.000020 | mg/L | 0.75 | 20 |
| 9272335 | Dissolved Selenium (Se) | 2018/12/22 | 97 | 80 - 120 | 105 | 80 - 120 | <0.000040 | mg/L | NC | 20 |
| 9272335 | Dissolved Silicon (Si) | 2018/12/22 | 89 | 80 - 120 | 105 | 80 - 120 | <0.050 | mg/L | 1.4 | 20 |
| 9272335 | Dissolved Silver (Ag) | 2018/12/22 | 97 | 80 - 120 | 106 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9272335 | Dissolved Strontium (Sr) | 2018/12/22 | NC | 80 - 120 | 108 | 80 - 120 | <0.000050 | mg/L | 0.81 | 20 |
| 9272335 | Dissolved Sulphur (S) | 2018/12/22 | 98 | 80 - 120 | 106 | 80 - 120 | <0.60 | mg/L | 1.3 | 20 |
| 9272335 | Dissolved Thallium (Tl) | 2018/12/22 | 98 | 80 - 120 | 105 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9272335 | Dissolved Tin (Sn) | 2018/12/22 | 97 | 80 - 120 | 110 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9272335 | Dissolved Titanium (Ti) | 2018/12/22 | 96 | 80 - 120 | 106 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9272335 | Dissolved Uranium (U) | 2018/12/22 | 100 | 80 - 120 | 107 | 80 - 120 | <0.0000020 | mg/L | 6.3 | 20 |
| 9272335 | Dissolved Vanadium (V) | 2018/12/22 | 98 | 80 - 120 | 106 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9272335 | Dissolved Zinc (Zn) | 2018/12/22 | 96 | 80 - 120 | 113 | 80 - 120 | <0.00010 | mg/L | 0.73 | 20 |
| 9272335 | Dissolved Zirconium (Zr) | 2018/12/22 | 97 | 80 - 120 | 108 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9272572 | Dissolved Mercury (Hg) | 2018/12/21 | 95 | 80 - 120 | 99 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |



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Maxxam Job #: B8B0550
Report Date: 2018/12/28

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9274771 | Dissolved Mercury (Hg) | 2018/12/22 | 96 | 80 - 120 | 97 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Method blank exceeds acceptance limits for As- 2X RDL acceptable for low level metals determination.



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Maxxam Job #: B8B0550
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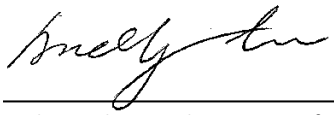
MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist

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



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: MB8X4703
Site Location: 18-2525 MONTAGUE

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B8X4703-M058-01-01, B8X4703-M058-02-01, B8X4703-M058-03-01

**Report Date: 2018/12/28**
Report #: R2669158
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B8B0538**
**Received: 2018/12/18, 09:35**

Sample Matrix: Water
# Samples Received: 25

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | 24 | N/A | 2018/12/24 | BBY WI-00033 | Auto Calc |
| Mercury (Dissolved) by CVAF | 10 | N/A | 2018/12/21 | BBY7SOP-00015 | BCMOE BCLM Oct2013 m |
| Mercury (Dissolved) by CVAF | 15 | N/A | 2018/12/22 | BBY7SOP-00015 | BCMOE BCLM Oct2013 m |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 24 | N/A | 2018/12/24 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 19 | N/A | 2018/12/21 | BBY7SOP-00002 | EPA 6020b R2 m |
| Elements by ICPMS Low Level (dissolved) | 4 | N/A | 2018/12/22 | BBY7SOP-00002 | EPA 6020b R2 m |
| Elements by ICPMS Low Level (dissolved) | 1 | N/A | 2018/12/24 | BBY7SOP-00002 | EPA 6020b R2 m |
| Filter and HNO3 Preserve for Metals | 25 | N/A | 2018/12/19 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Your Project #: MB8X4703
Site Location: 18-2525 MONTAGUE

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B8X4703-M058-01-01, B8X4703-M058-02-01, B8X4703-M058-03-01

**Report Date: 2018/12/28**
Report #: R2669158
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B8B0538**
**Received: 2018/12/18, 09:35**

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## RESULTS OF CHEMICAL ANALYSES OF WATER

| **Maxxam ID** | | UZ2853 | UZ2854 | UZ2855 | UZ2856 | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | 2018/11/24 | 2018/11/25 | 2018/11/25 | |
| **COC Number** | | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-01-01 | |
| | **UNITS** | **M-2018-P1A** | **M-2018-P1B** | **M-2018-P1SW** | **M-2018-P2A** | **QC Batch** |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| **Maxxam ID** | | UZ2857 | UZ2858 | UZ2859 | UZ2860 | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | 2018/11/25 | 2018/11/25 | 2018/11/25 | |
| **COC Number** | | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-01-01 | |
| | **UNITS** | **M-2018-P2B** | **M-2018-SW2** | **M-2018-P3A** | **M-2018-P3B** | **QC Batch** |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| **Maxxam ID** | | UZ2861 | UZ2862 | UZ2863 | UZ2864 | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | 2018/11/25 | 2018/11/25 | 2018/11/25 | |
| **COC Number** | | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | |
| | **UNITS** | **M-2018-SW3** | **M-2018-P4A** | **M-2018-P4B** | **M-2018-SW4** | **QC Batch** |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| **Maxxam ID** | | UZ2865 | UZ2866 | UZ2867 | UZ2868 | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | 2018/11/26 | 2018/11/26 | 2018/11/30 | |
| **COC Number** | | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | |
| | **UNITS** | **M-2018-C5 SW** | **M-2018-SW9** | **M-2018-SW10** | **M-2018-SW11** | **QC Batch** |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| **Maxxam ID** | | UZ2869 | UZ2870 | UZ2871 | UZ2872 | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/26 | 2018/12/01 | 2018/12/01 | 2018/12/01 | |
| **COC Number** | | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | |
| | **UNITS** | **M-2018-SW12** | **M-2018-C13 SW** | **M-2018-SW14** | **M-2018-SW15** | **QC Batch** |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| **Maxxam ID** | | UZ2874 | UZ2875 | UZ2876 | UZ2877 | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/12/01 | 2018/12/01 | 2018/12/01 | 2018/12/01 | |
| **COC Number** | | B8X4703-M058-03-01 | B8X4703-M058-03-01 | B8X4703-M058-03-01 | B8X4703-M058-03-01 | |
| | **UNITS** | **M-2018-SW16** | **M-2018-C17 SW** | **M-2018-C18 SW** | **M-2018-C19 SW** | **QC Batch** |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## RESULTS OF CHEMICAL ANALYSES OF WATER

| **Maxxam ID** | | UZ2878 | |
|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | |
| **COC Number** | | B8X4703-M058-03-01 | |
| | **UNITS** | **M-2018-MBSW** | **QC Batch** |
| **Calculated Parameters** | | | |
| Filter and HNO3 Preservation | N/A | FIELD | ONSITE |



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## MERCURY BY COLD VAPOR (WATER)

| Maxxam ID | | UZ2853 | UZ2854 | UZ2855 | UZ2856 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | 2018/11/24 | 2018/11/25 | 2018/11/25 | | |
| COC Number | | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-01-01 | | |
| | UNITS | M-2018-P1A | M-2018-P1B | M-2018-P1SW | M-2018-P2A | RDL | QC Batch |
| **Elements** | | | | | | | |
| Dissolved Mercury (Hg) | mg/L | 0.000029 (1) | <0.000020 (1) | 0.000079 (1) | 0.000238 (1) | 0.000020 | 9272533 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

| Maxxam ID | | UZ2857 | UZ2858 | UZ2859 | UZ2860 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | 2018/11/25 | 2018/11/25 | 2018/11/25 | | |
| COC Number | | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-01-01 | | |
| | UNITS | M-2018-P2B | M-2018-SW2 | M-2018-P3A | M-2018-P3B | RDL | QC Batch |
| **Elements** | | | | | | | |
| Dissolved Mercury (Hg) | mg/L | <0.000020 (1) | <0.000020 (1) | <0.000020 (1) | <0.000020 (1) | 0.000020 | 9272533 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

| Maxxam ID | | UZ2861 | UZ2862 | UZ2863 | UZ2864 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | 2018/11/25 | 2018/11/25 | 2018/11/25 | | |
| COC Number | | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | | |
| | UNITS | M-2018-SW3 | M-2018-P4A | M-2018-P4B | M-2018-SW4 | RDL | QC Batch |
| **Elements** | | | | | | | |
| Dissolved Mercury (Hg) | mg/L | <0.000020 (1) | 0.000048 (1) | 0.000030 (1) | <0.000020 (1) | 0.000020 | 9272533 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

| Maxxam ID | | UZ2865 | UZ2866 | UZ2867 | UZ2868 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | 2018/11/26 | 2018/11/26 | 2018/11/30 | | |
| COC Number | | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | | |
| | UNITS | M-2018-C5 SW | M-2018-SW9 | M-2018-SW10 | M-2018-SW11 | RDL | QC Batch |
| **Elements** | | | | | | | |
| Dissolved Mercury (Hg) | mg/L | <0.000020 (1) | <0.000020 (1) | <0.000020 (1) | <0.000020 (1) | 0.000020 | 9272533 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

| Maxxam ID | | UZ2869 | UZ2870 | UZ2871 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/26 | 2018/12/01 | 2018/12/01 | | |
| COC Number | | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | | |
| | UNITS | M-2018-SW12 | M-2018-C13 SW | M-2018-SW14 | RDL | QC Batch |
| **Elements** | | | | | | |
| Dissolved Mercury (Hg) | mg/L | <0.000020 (1) | 0.000111 (1) | 0.000030 (1) | 0.000020 | 9272533 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## MERCURY BY COLD VAPOR (WATER)

| Maxxam ID | | UZ2872 | | | UZ2874 | UZ2875 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/12/01 | | | 2018/12/01 | 2018/12/01 | | |
| COC Number | | B8X4703-M058-02-01 | | | B8X4703-M058-03-01 | B8X4703-M058-03-01 | | |
| | UNITS | M-2018-SW15 | RDL | QC Batch | M-2018-SW16 | M-2018-C17 SW | RDL | QC Batch |
| **Elements** | | | | | | | | |
| Dissolved Mercury (Hg) | mg/L | 0.000023 (1) | 0.000020 | 9274771 | 0.0000258 | 0.0000040 | 0.0000020 | 9272572 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

| Maxxam ID | | UZ2876 | UZ2877 | UZ2878 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/12/01 | 2018/12/01 | 2018/11/25 | | |
| COC Number | | B8X4703-M058-03-01 | B8X4703-M058-03-01 | B8X4703-M058-03-01 | | |
| | UNITS | M-2018-C18 SW | M-2018-C19 SW | M-2018-MBSW | RDL | QC Batch |
| **Elements** | | | | | | |
| Dissolved Mercury (Hg) | mg/L | 0.0000031 | 0.0000090 | <0.0000020 | 0.0000020 | 9272572 |

RDL = Reportable Detection Limit



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2853 | | UZ2855 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | | 2018/11/25 | | |
| COC Number | | B8X4703-M058-01-01 | | B8X4703-M058-01-01 | | |
| | UNITS | M-2018-P1A | RDL | M-2018-P1SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 159 | 0.50 | 26.0 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | <0.025 | 0.025 | 0.0471 | 0.00050 | 9272319 |
| Dissolved Antimony (Sb) | mg/L | <0.0010 | 0.0010 | 0.00124 | 0.000020 | 9272319 |
| Dissolved Arsenic (As) | mg/L | 19.8 | 0.0010 | 0.398 | 0.000020 | 9272319 |
| Dissolved Barium (Ba) | mg/L | 0.0391 | 0.0010 | 0.00603 | 0.000020 | 9272319 |
| Dissolved Beryllium (Be) | mg/L | <0.00050 | 0.00050 | <0.000010 | 0.000010 | 9272319 |
| Dissolved Bismuth (Bi) | mg/L | <0.00025 | 0.00025 | 0.0000151 | 0.0000050 | 9272319 |
| Dissolved Boron (B) | mg/L | <0.50 | 0.50 | <0.010 | 0.010 | 9272319 |
| Dissolved Cadmium (Cd) | mg/L | <0.00025 | 0.00025 | 0.0000270 | 0.0000050 | 9272319 |
| Dissolved Chromium (Cr) | mg/L | <0.0050 | 0.0050 | 0.00031 | 0.00010 | 9272319 |
| Dissolved Cobalt (Co) | mg/L | 0.00111 | 0.00025 | 0.000229 | 0.0000050 | 9272319 |
| Dissolved Copper (Cu) | mg/L | <0.0025 | 0.0025 | 0.00620 | 0.000050 | 9272319 |
| Dissolved Iron (Fe) | mg/L | 26.5 | 0.050 | 0.208 | 0.0010 | 9272319 |
| Dissolved Lead (Pb) | mg/L | <0.00025 | 0.00025 | 0.000678 | 0.0000050 | 9272319 |
| Dissolved Lithium (Li) | mg/L | <0.025 | 0.025 | 0.00059 | 0.00050 | 9272319 |
| Dissolved Manganese (Mn) | mg/L | 2.98 | 0.0025 | 0.0175 | 0.000050 | 9272319 |
| Dissolved Molybdenum (Mo) | mg/L | <0.0025 | 0.0025 | <0.000050 | 0.000050 | 9272319 |
| Dissolved Nickel (Ni) | mg/L | 0.0132 | 0.0010 | 0.00299 | 0.000020 | 9272319 |
| Dissolved Selenium (Se) | mg/L | <0.0020 | 0.0020 | 0.000086 | 0.000040 | 9272319 |
| Dissolved Silicon (Si) | mg/L | 7.8 | 2.5 | 2.27 | 0.050 | 9272319 |
| Dissolved Silver (Ag) | mg/L | <0.00025 | 0.00025 | 0.0000062 | 0.0000050 | 9272319 |
| Dissolved Strontium (Sr) | mg/L | 0.138 | 0.0025 | 0.0190 | 0.000050 | 9272319 |
| Dissolved Thallium (Tl) | mg/L | <0.00010 | 0.00010 | 0.0000038 | 0.0000020 | 9272319 |
| Dissolved Tin (Sn) | mg/L | <0.010 | 0.010 | <0.00020 | 0.00020 | 9272319 |
| Dissolved Titanium (Ti) | mg/L | <0.025 | 0.025 | <0.00050 | 0.00050 | 9272319 |
| Dissolved Uranium (U) | mg/L | <0.00010 | 0.00010 | 0.0000082 | 0.0000020 | 9272319 |
| Dissolved Vanadium (V) | mg/L | <0.010 | 0.010 | 0.00025 | 0.00020 | 9272319 |
| Dissolved Zinc (Zn) | mg/L | 0.0121 | 0.0050 | 0.0178 | 0.00010 | 9272319 |
| Dissolved Zirconium (Zr) | mg/L | <0.0050 | 0.0050 | <0.00010 | 0.00010 | 9272319 |
| Dissolved Calcium (Ca) | mg/L | 52.9 | 2.5 | 6.57 | 0.050 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | 6.7 | 2.5 | 2.32 | 0.050 | 9270528 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2853 | | UZ2855 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | | 2018/11/25 | | |
| **COC Number** | | B8X4703-M058-01-01 | | B8X4703-M058-01-01 | | |
| | **UNITS** | **M-2018-P1A** | **RDL** | **M-2018-P1SW** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 5.1 | 2.5 | 1.58 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 7.5 | 2.5 | 6.04 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | <30 | 30 | 2.97 | 0.60 | 9272319 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
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## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2855 | | | UZ2856 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | | | 2018/11/25 | | |
| COC Number | | B8X4703-M058-01-01 | | | B8X4703-M058-01-01 | | |
| | UNITS | M-2018-P1SW Lab-Dup | RDL | QC Batch | M-2018-P2A | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | | | | 96.9 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0478 | 0.00050 | 9272319 | 0.093 | 0.025 | 9272319 |
| Dissolved Antimony (Sb) | mg/L | 0.00124 | 0.000020 | 9272319 | 0.0012 | 0.0010 | 9272319 |
| Dissolved Arsenic (As) | mg/L | 0.406 | 0.000020 | 9272319 | 12.5 | 0.0010 | 9272319 |
| Dissolved Barium (Ba) | mg/L | 0.00607 | 0.000020 | 9272319 | 0.111 | 0.0010 | 9272319 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000010 | 9272319 | <0.00050 | 0.00050 | 9272319 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000149 | 0.0000050 | 9272319 | <0.00025 | 0.00025 | 9272319 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 9272319 | <0.50 | 0.50 | 9272319 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000263 | 0.0000050 | 9272319 | <0.00025 | 0.00025 | 9272319 |
| Dissolved Chromium (Cr) | mg/L | 0.00030 | 0.00010 | 9272319 | <0.0050 | 0.0050 | 9272319 |
| Dissolved Cobalt (Co) | mg/L | 0.000242 | 0.0000050 | 9272319 | 0.0320 | 0.00025 | 9272319 |
| Dissolved Copper (Cu) | mg/L | 0.00626 | 0.000050 | 9272319 | <0.0025 | 0.0025 | 9272319 |
| Dissolved Iron (Fe) | mg/L | 0.208 | 0.0010 | 9272319 | 99.7 | 0.050 | 9272319 |
| Dissolved Lead (Pb) | mg/L | 0.000680 | 0.0000050 | 9272319 | 0.00187 | 0.00025 | 9272319 |
| Dissolved Lithium (Li) | mg/L | 0.00060 | 0.00050 | 9272319 | <0.025 | 0.025 | 9272319 |
| Dissolved Manganese (Mn) | mg/L | 0.0177 | 0.000050 | 9272319 | 22.3 | 0.0025 | 9272319 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000050 | 0.000050 | 9272319 | <0.0025 | 0.0025 | 9272319 |
| Dissolved Nickel (Ni) | mg/L | 0.00293 | 0.000020 | 9272319 | 0.0320 | 0.0010 | 9272319 |
| Dissolved Selenium (Se) | mg/L | 0.000083 | 0.000040 | 9272319 | <0.0020 | 0.0020 | 9272319 |
| Dissolved Silicon (Si) | mg/L | 2.27 | 0.050 | 9272319 | 8.8 | 2.5 | 9272319 |
| Dissolved Silver (Ag) | mg/L | 0.0000075 | 0.0000050 | 9272319 | <0.00025 | 0.00025 | 9272319 |
| Dissolved Strontium (Sr) | mg/L | 0.0189 | 0.000050 | 9272319 | 0.120 | 0.0025 | 9272319 |
| Dissolved Thallium (Tl) | mg/L | 0.0000034 | 0.0000020 | 9272319 | <0.00010 | 0.00010 | 9272319 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9272319 | <0.010 | 0.010 | 9272319 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00050 | 9272319 | <0.025 | 0.025 | 9272319 |
| Dissolved Uranium (U) | mg/L | 0.0000081 | 0.0000020 | 9272319 | <0.00010 | 0.00010 | 9272319 |
| Dissolved Vanadium (V) | mg/L | 0.00025 | 0.00020 | 9272319 | <0.010 | 0.010 | 9272319 |
| Dissolved Zinc (Zn) | mg/L | 0.0176 | 0.00010 | 9272319 | 0.0823 | 0.0050 | 9272319 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | 9272319 | <0.0050 | 0.0050 | 9272319 |
| Dissolved Calcium (Ca) | mg/L | | | | 26.0 | 2.5 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | | | | 7.8 | 2.5 | 9270528 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2855 | | | UZ2856 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | | | 2018/11/25 | | |
| **COC Number** | | B8X4703-M058-01-01 | | | B8X4703-M058-01-01 | | |
| | **UNITS** | **M-2018-P1SW Lab-Dup** | **RDL** | **QC Batch** | **M-2018-P2A** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | | | | 12.5 | 2.5 | 9270528 |
| Dissolved Sodium (Na) | mg/L | | | | 20.4 | 2.5 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 3.59 | 0.60 | 9272319 | <30 | 30 | 9272319 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2857 | | UZ2858 | UZ2859 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | | 2018/11/25 | 2018/11/25 | | |
| COC Number | | B8X4703-M058-01-01 | | B8X4703-M058-01-01 | B8X4703-M058-01-01 | | |
| | UNITS | M-2018-P2B | RDL | M-2018-SW2 | M-2018-P3A | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 155 | 0.50 | 25.6 | 121 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0162 | 0.0025 | 0.0169 | 0.0552 | 0.00050 | 9272319 |
| Dissolved Antimony (Sb) | mg/L | 0.00221 | 0.00010 | 0.000488 | 0.000367 | 0.000020 | 9272319 |
| Dissolved Arsenic (As) | mg/L | 0.985 | 0.00010 | 0.190 | 0.0436 | 0.000020 | 9272319 |
| Dissolved Barium (Ba) | mg/L | 0.0379 | 0.00010 | 0.00343 | 0.0388 | 0.000020 | 9272319 |
| Dissolved Beryllium (Be) | mg/L | <0.000050 | 0.000050 | <0.000010 | <0.000010 | 0.000010 | 9272319 |
| Dissolved Bismuth (Bi) | mg/L | <0.000025 | 0.000025 | <0.0000050 | <0.0000050 | 0.0000050 | 9272319 |
| Dissolved Boron (B) | mg/L | 0.144 | 0.050 | <0.010 | 0.034 | 0.010 | 9272319 |
| Dissolved Cadmium (Cd) | mg/L | <0.000025 | 0.000025 | <0.0000050 | 0.0000057 | 0.0000050 | 9272319 |
| Dissolved Chromium (Cr) | mg/L | 0.00110 | 0.00050 | <0.00010 | 0.00916 | 0.00010 | 9272319 |
| Dissolved Cobalt (Co) | mg/L | 0.0159 | 0.000025 | 0.0000911 | 0.00270 | 0.0000050 | 9272319 |
| Dissolved Copper (Cu) | mg/L | 0.00027 | 0.00025 | 0.00126 | 0.000395 | 0.000050 | 9272319 |
| Dissolved Iron (Fe) | mg/L | 16.6 | 0.0050 | 0.0198 | 4.77 | 0.0010 | 9272319 |
| Dissolved Lead (Pb) | mg/L | 0.000251 | 0.000025 | 0.0000355 | 0.000343 | 0.0000050 | 9272319 |
| Dissolved Lithium (Li) | mg/L | 0.0033 | 0.0025 | <0.00050 | <0.00050 | 0.00050 | 9272319 |
| Dissolved Manganese (Mn) | mg/L | 12.8 | 0.00025 | 0.0114 | 1.15 | 0.000050 | 9272319 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00301 | 0.00025 | <0.000050 | 0.00117 | 0.000050 | 9272319 |
| Dissolved Nickel (Ni) | mg/L | 0.0810 | 0.00010 | 0.000791 | 0.0498 | 0.000020 | 9272319 |
| Dissolved Selenium (Se) | mg/L | <0.00020 | 0.00020 | 0.000048 | 0.000062 | 0.000040 | 9272319 |
| Dissolved Silicon (Si) | mg/L | 4.94 | 0.25 | 1.24 | 8.63 | 0.050 | 9272319 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | 0.000025 | <0.0000050 | 0.0000062 | 0.0000050 | 9272319 |
| Dissolved Strontium (Sr) | mg/L | 0.111 | 0.00025 | 0.0245 | 0.126 | 0.000050 | 9272319 |
| Dissolved Thallium (Tl) | mg/L | <0.000010 | 0.000010 | <0.0000020 | <0.0000020 | 0.0000020 | 9272319 |
| Dissolved Tin (Sn) | mg/L | <0.0010 | 0.0010 | <0.00020 | <0.00020 | 0.00020 | 9272319 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | 0.0025 | <0.00050 | <0.00050 | 0.00050 | 9272319 |
| Dissolved Uranium (U) | mg/L | 0.000070 | 0.000010 | 0.0000021 | 0.0000158 | 0.0000020 | 9272319 |
| Dissolved Vanadium (V) | mg/L | <0.0010 | 0.0010 | <0.00020 | 0.00028 | 0.00020 | 9272319 |
| Dissolved Zinc (Zn) | mg/L | 0.0357 | 0.00050 | 0.00269 | 0.0234 | 0.00010 | 9272319 |
| Dissolved Zirconium (Zr) | mg/L | <0.00050 | 0.00050 | <0.00010 | <0.00010 | 0.00010 | 9272319 |
| Dissolved Calcium (Ca) | mg/L | 47.8 | 0.25 | 7.51 | 31.2 | 0.050 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | 8.53 | 0.25 | 1.67 | 10.5 | 0.050 | 9270528 |

RDL = Reportable Detection Limit

Maxxam Job #: B8B0538
Report Date: 2018/12/28

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Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2857 | | UZ2858 | UZ2859 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | | 2018/11/25 | 2018/11/25 | | |
| COC Number | | B8X4703-M058-01-01 | | B8X4703-M058-01-01 | B8X4703-M058-01-01 | | |
| | UNITS | M-2018-P2B | RDL | M-2018-SW2 | M-2018-P3A | RDL | QC Batch |
| Dissolved Potassium (K) | mg/L | 11.1 | 0.25 | 1.04 | 3.14 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 27.9 | 0.25 | 29.8 | 14.4 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 3.1 | 3.0 | 3.48 | <0.60 | 0.60 | 9272319 |
| RDL = Reportable Detection Limit | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2860 | UZ2861 | UZ2862 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | 2018/11/25 | 2018/11/25 | | |
| COC Number | | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-01-01 | | |
| | UNITS | M-2018-P3B | M-2018-SW3 | M-2018-P4A | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 234 | 26.4 | 173 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0170 | 0.0173 | 0.0373 | 0.00050 | 9272319 |
| Dissolved Antimony (Sb) | mg/L | 0.000542 | 0.000085 | 0.00164 | 0.000020 | 9272319 |
| Dissolved Arsenic (As) | mg/L | 0.127 | 0.0321 | 0.0968 | 0.000020 | 9272319 |
| Dissolved Barium (Ba) | mg/L | 0.0520 | 0.00439 | 0.0167 | 0.000020 | 9272319 |
| Dissolved Beryllium (Be) | mg/L | 0.000035 | <0.000010 | <0.000010 | 0.000010 | 9272319 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | 0.0000061 | 0.0000050 | 9272319 |
| Dissolved Boron (B) | mg/L | 0.029 | <0.010 | 0.297 | 0.010 | 9272319 |
| Dissolved Cadmium (Cd) | mg/L | <0.0000050 | <0.0000050 | 0.000242 | 0.0000050 | 9272319 |
| Dissolved Chromium (Cr) | mg/L | 0.00160 | <0.00010 | 0.00233 | 0.00010 | 9272319 |
| Dissolved Cobalt (Co) | mg/L | 0.00691 | 0.0000425 | 0.0207 | 0.0000050 | 9272319 |
| Dissolved Copper (Cu) | mg/L | 0.000114 | 0.000737 | 0.00211 | 0.000050 | 9272319 |
| Dissolved Iron (Fe) | mg/L | 22.3 | 0.0279 | 1.45 | 0.0010 | 9272319 |
| Dissolved Lead (Pb) | mg/L | 0.000106 | 0.0000322 | 0.000331 | 0.0000050 | 9272319 |
| Dissolved Lithium (Li) | mg/L | 0.00333 | <0.00050 | 0.00739 | 0.00050 | 9272319 |
| Dissolved Manganese (Mn) | mg/L | 5.07 | 0.00354 | 6.16 | 0.000050 | 9272319 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000985 | <0.000050 | 0.00294 | 0.000050 | 9272319 |
| Dissolved Nickel (Ni) | mg/L | 0.0296 | 0.000450 | 0.124 | 0.000020 | 9272319 |
| Dissolved Selenium (Se) | mg/L | 0.000117 | 0.000050 | 0.000095 | 0.000040 | 9272319 |
| Dissolved Silicon (Si) | mg/L | 10.3 | 0.853 | 6.57 | 0.050 | 9272319 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272319 |
| Dissolved Strontium (Sr) | mg/L | 0.169 | 0.0273 | 0.130 | 0.000050 | 9272319 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | <0.0000020 | 0.0000130 | 0.0000020 | 9272319 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9272319 |
| Dissolved Titanium (Ti) | mg/L | 0.00070 | <0.00050 | 0.00275 | 0.00050 | 9272319 |
| Dissolved Uranium (U) | mg/L | 0.0000821 | 0.0000035 | 0.0000361 | 0.0000020 | 9272319 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9272319 |
| Dissolved Zinc (Zn) | mg/L | 0.0119 | 0.00116 | 0.115 | 0.00010 | 9272319 |
| Dissolved Zirconium (Zr) | mg/L | 0.00044 | <0.00010 | 0.00012 | 0.00010 | 9272319 |
| Dissolved Calcium (Ca) | mg/L | 77.8 | 8.17 | 45.1 | 0.050 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | 9.58 | 1.47 | 14.6 | 0.050 | 9270528 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2860 | UZ2861 | UZ2862 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | 2018/11/25 | 2018/11/25 | | |
| **COC Number** | | B8X4703-M058-01-01 | B8X4703-M058-01-01 | B8X4703-M058-01-01 | | |
| | **UNITS** | **M-2018-P3B** | **M-2018-SW3** | **M-2018-P4A** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 4.91 | 1.03 | 10.1 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 23.9 | 35.9 | 39.7 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 1.49 | 3.08 | 37.0 | 0.60 | 9272319 |
| RDL = Reportable Detection Limit | | | | | | |



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2863 | UZ2864 | UZ2865 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | 2018/11/25 | 2018/11/25 | | |
| COC Number | | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | | |
| | UNITS | M-2018-P4B | M-2018-SW4 | M-2018-C5 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 210 | 23.2 | 30.0 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0302 | 0.0295 | 0.0369 | 0.00050 | 9272319 |
| Dissolved Antimony (Sb) | mg/L | 0.00159 | 0.000090 | 0.000727 | 0.000020 | 9272319 |
| Dissolved Arsenic (As) | mg/L | 0.178 | 0.0360 | 0.121 | 0.000020 | 9272319 |
| Dissolved Barium (Ba) | mg/L | 0.0235 | 0.00463 | 0.00283 | 0.000020 | 9272319 |
| Dissolved Beryllium (Be) | mg/L | 0.000024 | <0.000010 | <0.000010 | 0.000010 | 9272319 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000063 | <0.0000050 | <0.0000050 | 0.0000050 | 9272319 |
| Dissolved Boron (B) | mg/L | 0.253 | <0.010 | <0.010 | 0.010 | 9272319 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000147 | 0.0000337 | 0.0000122 | 0.0000050 | 9272319 |
| Dissolved Chromium (Cr) | mg/L | 0.00271 | 0.00012 | 0.00012 | 0.00010 | 9272319 |
| Dissolved Cobalt (Co) | mg/L | 0.0191 | 0.000141 | 0.000785 | 0.0000050 | 9272319 |
| Dissolved Copper (Cu) | mg/L | 0.000652 | 0.00135 | 0.00299 | 0.000050 | 9272319 |
| Dissolved Iron (Fe) | mg/L | 8.58 | 0.0218 | 0.0671 | 0.0010 | 9272319 |
| Dissolved Lead (Pb) | mg/L | 0.000485 | 0.0000298 | 0.000119 | 0.0000050 | 9272319 |
| Dissolved Lithium (Li) | mg/L | 0.00717 | 0.00060 | 0.00089 | 0.00050 | 9272319 |
| Dissolved Manganese (Mn) | mg/L | 6.13 | 0.0339 | 0.0548 | 0.000050 | 9272319 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00200 | 0.000052 | 0.000055 | 0.000050 | 9272319 |
| Dissolved Nickel (Ni) | mg/L | 0.0980 | 0.00226 | 0.00283 | 0.000020 | 9272319 |
| Dissolved Selenium (Se) | mg/L | 0.000079 | 0.000047 | 0.000057 | 0.000040 | 9272319 |
| Dissolved Silicon (Si) | mg/L | 5.69 | 0.842 | 1.34 | 0.050 | 9272319 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272319 |
| Dissolved Strontium (Sr) | mg/L | 0.141 | 0.0239 | 0.0264 | 0.000050 | 9272319 |
| Dissolved Thallium (Tl) | mg/L | 0.0000050 | <0.0000020 | <0.0000020 | 0.0000020 | 9272319 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9272319 |
| Dissolved Titanium (Ti) | mg/L | 0.00052 | <0.00050 | <0.00050 | 0.00050 | 9272319 |
| Dissolved Uranium (U) | mg/L | 0.0000570 | 0.0000035 | 0.0000041 | 0.0000020 | 9272319 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00020 | 0.00020 | 9272319 |
| Dissolved Zinc (Zn) | mg/L | 0.0948 | 0.00954 | 0.0100 | 0.00010 | 9272319 |
| Dissolved Zirconium (Zr) | mg/L | 0.00022 | <0.00010 | <0.00010 | 0.00010 | 9272319 |
| Dissolved Calcium (Ca) | mg/L | 53.1 | 7.08 | 8.61 | 0.050 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | 18.8 | 1.34 | 2.07 | 0.050 | 9270528 |

RDL = Reportable Detection Limit



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2863 | UZ2864 | UZ2865 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | 2018/11/25 | 2018/11/25 | | |
| **COC Number** | | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | | |
| | **UNITS** | **M-2018-P4B** | **M-2018-SW4** | **M-2018-C5 SW** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 9.65 | 1.06 | 1.12 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 40.1 | 33.3 | 26.6 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 57.4 | 3.34 | 5.10 | 0.60 | 9272319 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2866 | UZ2867 | UZ2868 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/26 | 2018/11/26 | 2018/11/30 | | |
| COC Number | | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | | |
| | UNITS | M-2018-SW9 | M-2018-SW10 | M-2018-SW11 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 4.15 | 30.5 | 21.3 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.187 | 0.0230 | 0.395 | 0.00050 | 9272319 |
| Dissolved Antimony (Sb) | mg/L | <0.000020 | 0.000111 | 0.000086 | 0.000020 | 9272319 |
| Dissolved Arsenic (As) | mg/L | 0.000626 | 0.0153 | 0.0215 | 0.000020 | 9272319 |
| Dissolved Barium (Ba) | mg/L | 0.00433 | 0.00615 | 0.00903 | 0.000020 | 9272319 |
| Dissolved Beryllium (Be) | mg/L | 0.000076 | <0.000010 | 0.000069 | 0.000010 | 9272319 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272319 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9272319 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000181 | 0.0000067 | 0.000126 | 0.0000050 | 9272319 |
| Dissolved Chromium (Cr) | mg/L | 0.00012 | 0.00014 | 0.00015 | 0.00010 | 9272319 |
| Dissolved Cobalt (Co) | mg/L | 0.000154 | 0.0000650 | 0.00337 | 0.0000050 | 9272319 |
| Dissolved Copper (Cu) | mg/L | 0.000230 | 0.000768 | 0.000575 | 0.000050 | 9272319 |
| Dissolved Iron (Fe) | mg/L | 0.0976 | 0.0219 | 0.0628 | 0.0010 | 9272319 |
| Dissolved Lead (Pb) | mg/L | 0.000161 | 0.0000186 | 0.000239 | 0.0000050 | 9272319 |
| Dissolved Lithium (Li) | mg/L | 0.00101 | 0.00052 | 0.00133 | 0.00050 | 9272319 |
| Dissolved Manganese (Mn) | mg/L | 0.0684 | 0.0616 | 0.113 | 0.000050 | 9272319 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000450 | <0.000050 | 0.000050 | 9272319 |
| Dissolved Nickel (Ni) | mg/L | 0.000485 | 0.000506 | 0.00944 | 0.000020 | 9272319 |
| Dissolved Selenium (Se) | mg/L | 0.000047 | 0.000053 | 0.000051 | 0.000040 | 9272319 |
| Dissolved Silicon (Si) | mg/L | 1.25 | 1.24 | 1.60 | 0.050 | 9272319 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9272319 |
| Dissolved Strontium (Sr) | mg/L | 0.00632 | 0.0424 | 0.0217 | 0.000050 | 9272319 |
| Dissolved Thallium (Tl) | mg/L | 0.0000057 | <0.0000020 | <0.0000020 | 0.0000020 | 9272319 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9272319 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | <0.00050 | 0.00059 | 0.00050 | 9272319 |
| Dissolved Uranium (U) | mg/L | 0.0000759 | 0.0000610 | 0.0000053 | 0.0000020 | 9272319 |
| Dissolved Vanadium (V) | mg/L | 0.00045 | <0.00020 | 0.00038 | 0.00020 | 9272319 |
| Dissolved Zinc (Zn) | mg/L | 0.00218 | 0.00077 | 0.0120 | 0.00010 | 9272319 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9272319 |
| Dissolved Calcium (Ca) | mg/L | 0.972 | 9.91 | 6.33 | 0.050 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | 0.417 | 1.40 | 1.34 | 0.050 | 9270528 |

RDL = Reportable Detection Limit

Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2866 | UZ2867 | UZ2868 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/26 | 2018/11/26 | 2018/11/30 | | |
| **COC Number** | | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | | |
| | **UNITS** | **M-2018-SW9** | **M-2018-SW10** | **M-2018-SW11** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 0.257 | 1.36 | 0.702 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 3.89 | 31.2 | 19.4 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 0.87 | 3.87 | 5.41 | 0.60 | 9272319 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2869 | UZ2870 | UZ2871 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/26 | 2018/12/01 | 2018/12/01 | | |
| COC Number | | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | | |
| | UNITS | M-2018-SW12 | M-2018-C13 SW | M-2018-SW14 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 26.8 | 8.86 | 20.5 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0209 | 0.106 | 0.0703 | 0.00050 | 9272319 |
| Dissolved Antimony (Sb) | mg/L | 0.000055 | 0.000107 | 0.00130 | 0.000020 | 9272319 |
| Dissolved Arsenic (As) | mg/L | 0.000505 | 0.123 | 0.366 | 0.000020 | 9272319 |
| Dissolved Barium (Ba) | mg/L | 0.00495 | 0.00493 | 0.00641 | 0.000020 | 9272319 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9272319 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000287 | <0.0000050 | 0.0000050 | 9272319 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9272319 |
| Dissolved Cadmium (Cd) | mg/L | <0.0000050 | 0.0000592 | 0.0000265 | 0.0000050 | 9272319 |
| Dissolved Chromium (Cr) | mg/L | 0.00014 | 0.00016 | 0.00028 | 0.00010 | 9272319 |
| Dissolved Cobalt (Co) | mg/L | 0.0000362 | 0.00114 | 0.000407 | 0.0000050 | 9272319 |
| Dissolved Copper (Cu) | mg/L | 0.000865 | 0.00941 | 0.0153 | 0.000050 | 9272319 |
| Dissolved Iron (Fe) | mg/L | 0.0318 | 0.257 | 0.135 | 0.0010 | 9272319 |
| Dissolved Lead (Pb) | mg/L | 0.0000323 | 0.00163 | 0.000546 | 0.0000050 | 9272319 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00058 | <0.00050 | 0.00050 | 9272319 |
| Dissolved Manganese (Mn) | mg/L | 0.0105 | 0.0570 | 0.0180 | 0.000050 | 9272319 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000099 | 0.000084 | 0.000140 | 0.000050 | 9272319 |
| Dissolved Nickel (Ni) | mg/L | 0.000407 | 0.00250 | 0.00318 | 0.000020 | 9272319 |
| Dissolved Selenium (Se) | mg/L | 0.000048 | <0.000040 | 0.000081 | 0.000040 | 9272319 |
| Dissolved Silicon (Si) | mg/L | 0.700 | 1.86 | 2.04 | 0.050 | 9272319 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000076 | <0.0000050 | 0.0000050 | 9272319 |
| Dissolved Strontium (Sr) | mg/L | 0.0297 | 0.00849 | 0.0159 | 0.000050 | 9272319 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | 0.0000049 | 0.0000038 | 0.0000020 | 9272319 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9272319 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00085 | 0.00250 | 0.00050 | 9272319 |
| Dissolved Uranium (U) | mg/L | 0.0000062 | 0.0000090 | 0.0000082 | 0.0000020 | 9272319 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00066 | 0.00031 | 0.00020 | 9272319 |
| Dissolved Zinc (Zn) | mg/L | 0.00062 | 0.0305 | 0.0235 | 0.00010 | 9272319 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9272319 |
| Dissolved Calcium (Ca) | mg/L | 8.51 | 1.82 | 5.21 | 0.050 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | 1.34 | 1.05 | 1.80 | 0.050 | 9270528 |

RDL = Reportable Detection Limit



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2869 | UZ2870 | UZ2871 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/26 | 2018/12/01 | 2018/12/01 | | |
| **COC Number** | | B8X4703-M058-02-01 | B8X4703-M058-02-01 | B8X4703-M058-02-01 | | |
| | **UNITS** | **M-2018-SW12** | **M-2018-C13 SW** | **M-2018-SW14** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 1.21 | 0.414 | 1.41 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 39.0 | 4.63 | 5.08 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 3.18 | 1.03 | 2.56 | 0.60 | 9272319 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2872 | | | UZ2874 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/12/01 | | | 2018/12/01 | | |
| COC Number | | B8X4703-M058-02-01 | | | B8X4703-M058-03-01 | | |
| | UNITS | M-2018-SW15 | RDL | QC Batch | M-2018-SW16 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 6.54 | 0.50 | 9270527 | 358 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0383 | 0.00050 | 9272319 | 0.0388 | 0.0025 | 9272326 |
| Dissolved Antimony (Sb) | mg/L | 0.00388 | 0.000020 | 9272319 | 0.0152 | 0.00010 | 9272326 |
| Dissolved Arsenic (As) | mg/L | 0.940 | 0.000020 | 9272319 | 2.94 | 0.00010 | 9272326 |
| Dissolved Barium (Ba) | mg/L | 0.00219 | 0.000020 | 9272319 | 0.00209 | 0.00010 | 9272326 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000010 | 9272319 | <0.000050 | 0.000050 | 9272326 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000136 | 0.0000050 | 9272319 | <0.000025 | 0.000025 | 9272326 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 9272319 | <0.050 | 0.050 | 9272326 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000158 | 0.0000050 | 9272319 | 0.000076 | 0.000025 | 9272326 |
| Dissolved Chromium (Cr) | mg/L | 0.00024 | 0.00010 | 9272319 | <0.00050 | 0.00050 | 9272326 |
| Dissolved Cobalt (Co) | mg/L | 0.000145 | 0.0000050 | 9272319 | 0.00895 | 0.000025 | 9272326 |
| Dissolved Copper (Cu) | mg/L | 0.00206 | 0.000050 | 9272319 | 0.00794 | 0.00025 | 9272326 |
| Dissolved Iron (Fe) | mg/L | 0.214 | 0.0010 | 9272319 | 0.0130 | 0.0050 | 9272326 |
| Dissolved Lead (Pb) | mg/L | 0.000762 | 0.0000050 | 9272319 | 0.000040 | 0.000025 | 9272326 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00050 | 9272319 | 0.0239 | 0.0025 | 9272326 |
| Dissolved Manganese (Mn) | mg/L | 0.00576 | 0.000050 | 9272319 | 0.762 | 0.00025 | 9272326 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000095 | 0.000050 | 9272319 | 0.00046 | 0.00025 | 9272326 |
| Dissolved Nickel (Ni) | mg/L | 0.000818 | 0.000020 | 9272319 | 0.0472 | 0.00010 | 9272326 |
| Dissolved Selenium (Se) | mg/L | 0.000056 | 0.000040 | 9272319 | 0.00032 | 0.00020 | 9272326 |
| Dissolved Silicon (Si) | mg/L | 0.313 | 0.050 | 9272319 | 6.67 | 0.25 | 9272326 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | 9272319 | <0.000025 | 0.000025 | 9272326 |
| Dissolved Strontium (Sr) | mg/L | 0.00255 | 0.000050 | 9272319 | 0.138 | 0.00025 | 9272326 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | 0.0000020 | 9272319 | <0.000010 | 0.000010 | 9272326 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9272319 | <0.0010 | 0.0010 | 9272326 |
| Dissolved Titanium (Ti) | mg/L | 0.00144 | 0.00050 | 9272319 | <0.0025 | 0.0025 | 9272326 |
| Dissolved Uranium (U) | mg/L | 0.0000031 | 0.0000020 | 9272319 | 0.000348 | 0.000010 | 9272326 |
| Dissolved Vanadium (V) | mg/L | 0.00022 | 0.00020 | 9272319 | <0.0010 | 0.0010 | 9272326 |
| Dissolved Zinc (Zn) | mg/L | 0.0100 | 0.00010 | 9272319 | 0.0459 | 0.00050 | 9272326 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | 9272319 | <0.00050 | 0.00050 | 9272326 |
| Dissolved Calcium (Ca) | mg/L | 1.85 | 0.050 | 9270528 | 83.6 | 0.25 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | 0.464 | 0.050 | 9270528 | 36.2 | 0.25 | 9270528 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ2872 | | | UZ2874 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/12/01 | | | 2018/12/01 | | |
| **COC Number** | | B8X4703-M058-02-01 | | | B8X4703-M058-03-01 | | |
| | **UNITS** | **M-2018-SW15** | **RDL** | **QC Batch** | **M-2018-SW16** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 0.874 | 0.050 | 9270528 | 5.11 | 0.25 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 1.28 | 0.050 | 9270528 | 10.7 | 0.25 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 0.60 | 0.60 | 9272319 | 84.6 | 3.0 | 9272326 |
| RDL = Reportable Detection Limit | | | | | | | |



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2874 | | | UZ2875 | UZ2876 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/12/01 | | | 2018/12/01 | 2018/12/01 | | |
| COC Number | | B8X4703-M058-03-01 | | | B8X4703-M058-03-01 | B8X4703-M058-03-01 | | |
| | UNITS | M-2018-SW16 Lab-Dup | RDL | QC Batch | M-2018-C17 SW | M-2018-C18 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | | | | 25.5 | 22.0 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0402 | 0.0025 | 9272326 | 0.0548 | 0.0552 | 0.00050 | 9272326 |
| Dissolved Antimony (Sb) | mg/L | 0.0151 | 0.00010 | 9272326 | 0.000097 | 0.000089 | 0.000020 | 9272326 |
| Dissolved Arsenic (As) | mg/L | 2.90 | 0.00010 | 9272326 | 0.0240 | 0.00966 | 0.000020 | 9272326 |
| Dissolved Barium (Ba) | mg/L | 0.00206 | 0.00010 | 9272326 | 0.00947 | 0.0248 | 0.000020 | 9272326 |
| Dissolved Beryllium (Be) | mg/L | <0.000050 | 0.000050 | 9272326 | <0.000010 | <0.000010 | 0.000010 | 9272326 |
| Dissolved Bismuth (Bi) | mg/L | <0.000025 | 0.000025 | 9272326 | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Boron (B) | mg/L | <0.050 | 0.050 | 9272326 | 0.014 | <0.010 | 0.010 | 9272326 |
| Dissolved Cadmium (Cd) | mg/L | 0.000074 | 0.000025 | 9272326 | 0.0000102 | 0.0000346 | 0.0000050 | 9272326 |
| Dissolved Chromium (Cr) | mg/L | <0.00050 | 0.00050 | 9272326 | 0.00014 | 0.00014 | 0.00010 | 9272326 |
| Dissolved Cobalt (Co) | mg/L | 0.00905 | 0.000025 | 9272326 | 0.000145 | 0.000493 | 0.0000050 | 9272326 |
| Dissolved Copper (Cu) | mg/L | 0.00796 | 0.00025 | 9272326 | 0.00329 | 0.00474 | 0.000050 | 9272326 |
| Dissolved Iron (Fe) | mg/L | 0.0130 | 0.0050 | 9272326 | 0.0758 | 0.316 | 0.0010 | 9272326 |
| Dissolved Lead (Pb) | mg/L | 0.000041 | 0.000025 | 9272326 | 0.000193 | 0.000330 | 0.0000050 | 9272326 |
| Dissolved Lithium (Li) | mg/L | 0.0247 | 0.0025 | 9272326 | <0.00050 | <0.00050 | 0.00050 | 9272326 |
| Dissolved Manganese (Mn) | mg/L | 0.762 | 0.00025 | 9272326 | 0.0225 | 0.0784 | 0.000050 | 9272326 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00049 | 0.00025 | 9272326 | 0.000098 | 0.000063 | 0.000050 | 9272326 |
| Dissolved Nickel (Ni) | mg/L | 0.0474 | 0.00010 | 9272326 | 0.000953 | 0.00120 | 0.000020 | 9272326 |
| Dissolved Selenium (Se) | mg/L | 0.00030 | 0.00020 | 9272326 | 0.000057 | 0.000042 | 0.000040 | 9272326 |
| Dissolved Silicon (Si) | mg/L | 6.61 | 0.25 | 9272326 | 1.48 | 1.83 | 0.050 | 9272326 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | 0.000025 | 9272326 | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Strontium (Sr) | mg/L | 0.138 | 0.00025 | 9272326 | 0.0259 | 0.0230 | 0.000050 | 9272326 |
| Dissolved Thallium (Tl) | mg/L | <0.000010 | 0.000010 | 9272326 | 0.0000027 | 0.0000054 | 0.0000020 | 9272326 |
| Dissolved Tin (Sn) | mg/L | <0.0010 | 0.0010 | 9272326 | <0.00020 | <0.00020 | 0.00020 | 9272326 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | 0.0025 | 9272326 | <0.00050 | <0.00050 | 0.00050 | 9272326 |
| Dissolved Uranium (U) | mg/L | 0.000345 | 0.000010 | 9272326 | 0.0000061 | 0.0000084 | 0.0000020 | 9272326 |
| Dissolved Vanadium (V) | mg/L | <0.0010 | 0.0010 | 9272326 | <0.00020 | 0.00056 | 0.00020 | 9272326 |
| Dissolved Zinc (Zn) | mg/L | 0.0455 | 0.00050 | 9272326 | 0.0130 | 0.0217 | 0.00010 | 9272326 |
| Dissolved Zirconium (Zr) | mg/L | <0.00050 | 0.00050 | 9272326 | <0.00010 | <0.00010 | 0.00010 | 9272326 |
| Dissolved Calcium (Ca) | mg/L | | | | 6.99 | 5.92 | 0.050 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | | | | 1.94 | 1.75 | 0.050 | 9270528 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2874 | | | UZ2875 | UZ2876 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/12/01 | | | 2018/12/01 | 2018/12/01 | | |
| COC Number | | B8X4703-M058-03-01 | | | B8X4703-M058-03-01 | B8X4703-M058-03-01 | | |
| | UNITS | M-2018-SW16 Lab-Dup | RDL | QC Batch | M-2018-C17 SW | M-2018-C18 SW | RDL | QC Batch |
| Dissolved Potassium (K) | mg/L | | | | 1.04 | 1.22 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | | | | 31.0 | 62.9 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 86.0 | 3.0 | 9272326 | 2.75 | 5.86 | 0.60 | 9272326 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2877 | UZ2878 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2018/12/01 | 2018/11/25 | | |
| COC Number | | B8X4703-M058-03-01 | B8X4703-M058-03-01 | | |
| | UNITS | M-2018-C19 SW | M-2018-MBSW | RDL | QC Batch |
| **Calculated Parameters** | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 18.3 | 24.5 | 0.50 | 9270527 |
| **Dissolved Metals by ICPMS** | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0422 | 0.0293 | 0.00050 | 9272326 |
| Dissolved Antimony (Sb) | mg/L | 0.000130 | 0.000071 | 0.000020 | 9272326 |
| Dissolved Arsenic (As) | mg/L | 0.0429 | 0.00289 | 0.000020 | 9272326 |
| Dissolved Barium (Ba) | mg/L | 0.0144 | 0.00477 | 0.000020 | 9272326 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | 0.000010 | 9272326 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | 0.010 | 9272326 |
| Dissolved Cadmium (Cd) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Chromium (Cr) | mg/L | 0.00019 | 0.00012 | 0.00010 | 9272326 |
| Dissolved Cobalt (Co) | mg/L | 0.0000789 | 0.0000443 | 0.0000050 | 9272326 |
| Dissolved Copper (Cu) | mg/L | 0.00467 | 0.000814 | 0.000050 | 9272326 |
| Dissolved Iron (Fe) | mg/L | 0.0946 | 0.0373 | 0.0010 | 9272326 |
| Dissolved Lead (Pb) | mg/L | 0.000178 | 0.0000722 | 0.0000050 | 9272326 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | <0.00050 | 0.00050 | 9272326 |
| Dissolved Manganese (Mn) | mg/L | 0.00414 | 0.00828 | 0.000050 | 9272326 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000100 | 0.000088 | 0.000050 | 9272326 |
| Dissolved Nickel (Ni) | mg/L | 0.000718 | 0.000432 | 0.000020 | 9272326 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000048 | 0.000040 | 9272326 |
| Dissolved Silicon (Si) | mg/L | 1.68 | 0.713 | 0.050 | 9272326 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | 9272326 |
| Dissolved Strontium (Sr) | mg/L | 0.0181 | 0.0274 | 0.000050 | 9272326 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | <0.0000020 | 0.0000020 | 9272326 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | 0.00020 | 9272326 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | <0.00050 | 0.00050 | 9272326 |
| Dissolved Uranium (U) | mg/L | 0.0000035 | 0.0000056 | 0.0000020 | 9272326 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00020 | 9272326 |
| Dissolved Zinc (Zn) | mg/L | 0.0112 | 0.00076 | 0.00010 | 9272326 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | 0.00010 | 9272326 |
| Dissolved Calcium (Ca) | mg/L | 4.60 | 7.72 | 0.050 | 9270528 |
| Dissolved Magnesium (Mg) | mg/L | 1.67 | 1.26 | 0.050 | 9270528 |

RDL = Reportable Detection Limit



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Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ2877 | UZ2878 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2018/12/01 | 2018/11/25 | | |
| COC Number | | B8X4703-M058-03-01 | B8X4703-M058-03-01 | | |
| | UNITS | M-2018-C19 SW | M-2018-MBSW | RDL | QC Batch |
| Dissolved Potassium (K) | mg/L | 0.752 | 1.12 | 0.050 | 9270528 |
| Dissolved Sodium (Na) | mg/L | 19.5 | 35.4 | 0.050 | 9270528 |
| Dissolved Sulphur (S) | mg/L | 1.77 | 2.80 | 0.60 | 9272326 |
| RDL = Reportable Detection Limit | | | | | |



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Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2853
**Sample ID:** M-2018-P1A
**Matrix:** Water

**Collected:** 2018/11/25
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2854
**Sample ID:** M-2018-P1B
**Matrix:** Water

**Collected:** 2018/11/24
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/21 | Edwin Lamigo |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2855
**Sample ID:** M-2018-P1SW
**Matrix:** Water

**Collected:** 2018/11/25
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2855 Dup
**Sample ID:** M-2018-P1SW
**Matrix:** Water

**Collected:** 2018/11/25
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |

**Maxxam ID:** UZ2856
**Sample ID:** M-2018-P2A
**Matrix:** Water

**Collected:** 2018/11/25
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2857 **Collected:** 2018/11/25
**Sample ID:** M-2018-P2B **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2858 **Collected:** 2018/11/25
**Sample ID:** M-2018-SW2 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2859 **Collected:** 2018/11/25
**Sample ID:** M-2018-P3A **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2860 **Collected:** 2018/11/25
**Sample ID:** M-2018-P3B **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2861 **Collected:** 2018/11/25
**Sample ID:** M-2018-SW3 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2861 **Collected:** 2018/11/25
**Sample ID:** M-2018-SW3 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2862 **Collected:** 2018/11/25
**Sample ID:** M-2018-P4A **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2863 **Collected:** 2018/11/25
**Sample ID:** M-2018-P4B **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2864 **Collected:** 2018/11/25
**Sample ID:** M-2018-SW4 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2865 **Collected:** 2018/11/25
**Sample ID:** M-2018-C5 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2865
**Sample ID:** M-2018-C5 SW
**Matrix:** Water

**Collected:** 2018/11/25
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2866
**Sample ID:** M-2018-SW9
**Matrix:** Water

**Collected:** 2018/11/26
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2867
**Sample ID:** M-2018-SW10
**Matrix:** Water

**Collected:** 2018/11/26
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2868
**Sample ID:** M-2018-SW11
**Matrix:** Water

**Collected:** 2018/11/30
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2869
**Sample ID:** M-2018-SW12
**Matrix:** Water

**Collected:** 2018/11/26
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |



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Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2870
**Sample ID:** M-2018-C13 SW
**Matrix:** Water

**Collected:** 2018/12/01
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2871
**Sample ID:** M-2018-SW14
**Matrix:** Water

**Collected:** 2018/12/01
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272533 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2872
**Sample ID:** M-2018-SW15
**Matrix:** Water

**Collected:** 2018/12/01
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9274771 | N/A | 2018/12/22 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272319 | N/A | 2018/12/21 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2874
**Sample ID:** M-2018-SW16
**Matrix:** Water

**Collected:** 2018/12/01
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Automated Statchk |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2874 Dup
**Sample ID:** M-2018-SW16
**Matrix:** Water

**Collected:** 2018/12/01
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |



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Maxxam Job #: B8B0538
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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ2875
**Sample ID:** M-2018-C17 SW
**Matrix:** Water

**Collected:** 2018/12/01
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/24 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2876
**Sample ID:** M-2018-C18 SW
**Matrix:** Water

**Collected:** 2018/12/01
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2877
**Sample ID:** M-2018-C19 SW
**Matrix:** Water

**Collected:** 2018/12/01
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |

**Maxxam ID:** UZ2878
**Sample ID:** M-2018-MBSW
**Matrix:** Water

**Collected:** 2018/11/25
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9270527 | N/A | 2018/12/24 | Report Automation Engine |
| Mercury (Dissolved) by CVAF | CV/AF | 9272572 | N/A | 2018/12/21 | Edwin Lamigo |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9270528 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9272326 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/19 | Marilou H. Truant |



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MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 5.7°C |
| Package 2 | 3.0°C |

Report to include results for Mercury by CVAF on all samples as per client request.

Effective October 1, 2013, the BC MOE SAMPLE PRESERVATION & HOLDING TIME REQUIREMENTS states that Mercury in water requires a glass or PTFE container with Hydrochloric Acid (HCl) preservation. Sample container and preservation received was not in compliance. Maxxam added HCl to stabilize Mercury for all samples prior to analysis.

Lab ID UZ2854, Client ID: M-2008-P1B (IOA346): Low level dissolved Metals analysis could not be completed due to a spiking error in the lab. There was not additional volume to complete the test.

**LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments**

Sample UZ2853 [M-2018-P1A] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
Sample UZ2856 [M-2018-P2A] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
Sample UZ2857 [M-2018-P2B] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
Sample UZ2874 [M-2018-SW16] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

**Results relate only to the items tested.**



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## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9272319 | Dissolved Aluminum (Al) | 2018/12/21 | 98 | 80 - 120 | 107 | 80 - 120 | <0.00050 | mg/L | 1.4 | 20 |
| 9272319 | Dissolved Antimony (Sb) | 2018/12/21 | 97 | 80 - 120 | 104 | 80 - 120 | <0.000020 | mg/L | 0.36 | 20 |
| 9272319 | Dissolved Arsenic (As) | 2018/12/21 | NC | 80 - 120 | 106 | 80 - 120 | <0.000020 | mg/L | 2.0 | 20 |
| 9272319 | Dissolved Barium (Ba) | 2018/12/21 | 94 | 80 - 120 | 100 | 80 - 120 | <0.000020 | mg/L | 0.66 | 20 |
| 9272319 | Dissolved Beryllium (Be) | 2018/12/21 | 95 | 80 - 120 | 104 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9272319 | Dissolved Bismuth (Bi) | 2018/12/21 | 93 | 80 - 120 | 103 | 80 - 120 | <0.0000050 | mg/L | 1.3 | 20 |
| 9272319 | Dissolved Boron (B) | 2018/12/21 | 96 | 80 - 120 | 105 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 9272319 | Dissolved Cadmium (Cd) | 2018/12/21 | 97 | 80 - 120 | 106 | 80 - 120 | <0.0000050 | mg/L | 2.6 | 20 |
| 9272319 | Dissolved Chromium (Cr) | 2018/12/21 | 94 | 80 - 120 | 103 | 80 - 120 | <0.00010 | mg/L | 4.1 | 20 |
| 9272319 | Dissolved Cobalt (Co) | 2018/12/21 | 93 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | 5.6 | 20 |
| 9272319 | Dissolved Copper (Cu) | 2018/12/21 | 92 | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | 0.92 | 20 |
| 9272319 | Dissolved Iron (Fe) | 2018/12/21 | 94 | 80 - 120 | 106 | 80 - 120 | <0.0010 | mg/L | 0.15 | 20 |
| 9272319 | Dissolved Lead (Pb) | 2018/12/21 | 96 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | 0.35 | 20 |
| 9272319 | Dissolved Lithium (Li) | 2018/12/21 | 95 | 80 - 120 | 103 | 80 - 120 | <0.00050 | mg/L | 0.57 | 20 |
| 9272319 | Dissolved Manganese (Mn) | 2018/12/21 | 95 | 80 - 120 | 105 | 80 - 120 | <0.000050 | mg/L | 1.1 | 20 |
| 9272319 | Dissolved Molybdenum (Mo) | 2018/12/21 | 96 | 80 - 120 | 107 | 80 - 120 | <0.000050 | mg/L | 0.60 | 20 |
| 9272319 | Dissolved Nickel (Ni) | 2018/12/21 | 95 | 80 - 120 | 104 | 80 - 120 | <0.000020 | mg/L | 2.0 | 20 |
| 9272319 | Dissolved Selenium (Se) | 2018/12/21 | 96 | 80 - 120 | 103 | 80 - 120 | <0.000040 | mg/L | 4.0 | 20 |
| 9272319 | Dissolved Silicon (Si) | 2018/12/21 | 98 | 80 - 120 | 109 | 80 - 120 | <0.050 | mg/L | 0.050 | 20 |
| 9272319 | Dissolved Silver (Ag) | 2018/12/21 | 97 | 80 - 120 | 106 | 80 - 120 | <0.0000050 | mg/L | 19 | 20 |
| 9272319 | Dissolved Strontium (Sr) | 2018/12/21 | 99 | 80 - 120 | 108 | 80 - 120 | <0.000050 | mg/L | 0.27 | 20 |
| 9272319 | Dissolved Sulphur (S) | 2018/12/21 | 98 | 80 - 120 | 106 | 80 - 120 | <0.60 | mg/L | 19 | 20 |
| 9272319 | Dissolved Thallium (Tl) | 2018/12/21 | 96 | 80 - 120 | 104 | 80 - 120 | <0.0000020 | mg/L | 11 | 20 |
| 9272319 | Dissolved Tin (Sn) | 2018/12/21 | 96 | 80 - 120 | 105 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9272319 | Dissolved Titanium (Ti) | 2018/12/21 | 97 | 80 - 120 | 104 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9272319 | Dissolved Uranium (U) | 2018/12/21 | 98 | 80 - 120 | 106 | 80 - 120 | <0.0000020 | mg/L | 1.2 | 20 |
| 9272319 | Dissolved Vanadium (V) | 2018/12/21 | 97 | 80 - 120 | 105 | 80 - 120 | <0.00020 | mg/L | 1.2 | 20 |
| 9272319 | Dissolved Zinc (Zn) | 2018/12/21 | 97 | 80 - 120 | 110 | 80 - 120 | <0.00010 | mg/L | 1.2 | 20 |
| 9272319 | Dissolved Zirconium (Zr) | 2018/12/21 | 98 | 80 - 120 | 107 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9272326 | Dissolved Aluminum (Al) | 2018/12/22 | 98 | 80 - 120 | 107 | 80 - 120 | <0.00050 | mg/L | 3.7 | 20 |
| 9272326 | Dissolved Antimony (Sb) | 2018/12/22 | NC | 80 - 120 | 108 | 80 - 120 | <0.000020 | mg/L | 0.53 | 20 |
| 9272326 | Dissolved Arsenic (As) | 2018/12/22 | NC | 80 - 120 | 110 | 80 - 120 | <0.000020 | mg/L | 1.3 | 20 |



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Maxxam Job #: B8B0538
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## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9272326 | Dissolved Barium (Ba) | 2018/12/22 | 97 | 80 - 120 | 106 | 80 - 120 | <0.000020 | mg/L | 1.5 | 20 |
| 9272326 | Dissolved Beryllium (Be) | 2018/12/22 | 92 | 80 - 120 | 103 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9272326 | Dissolved Bismuth (Bi) | 2018/12/22 | 93 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9272326 | Dissolved Boron (B) | 2018/12/22 | 93 | 80 - 120 | 101 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 9272326 | Dissolved Cadmium (Cd) | 2018/12/22 | 97 | 80 - 120 | 107 | 80 - 120 | <0.0000050 | mg/L | 2.7 | 20 |
| 9272326 | Dissolved Chromium (Cr) | 2018/12/22 | 93 | 80 - 120 | 104 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9272326 | Dissolved Cobalt (Co) | 2018/12/22 | 91 | 80 - 120 | 103 | 80 - 120 | <0.0000050 | mg/L | 1.1 | 20 |
| 9272326 | Dissolved Copper (Cu) | 2018/12/22 | 88 | 80 - 120 | 102 | 80 - 120 | <0.000050 | mg/L | 0.21 | 20 |
| 9272326 | Dissolved Iron (Fe) | 2018/12/22 | 97 | 80 - 120 | 110 | 80 - 120 | <0.0010 | mg/L | 0.13 | 20 |
| 9272326 | Dissolved Lead (Pb) | 2018/12/22 | 95 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | 2.0 | 20 |
| 9272326 | Dissolved Lithium (Li) | 2018/12/22 | 93 | 80 - 120 | 105 | 80 - 120 | <0.00050 | mg/L | 3.0 | 20 |
| 9272326 | Dissolved Manganese (Mn) | 2018/12/22 | NC | 80 - 120 | 106 | 80 - 120 | <0.000050 | mg/L | 0.039 | 20 |
| 9272326 | Dissolved Molybdenum (Mo) | 2018/12/22 | 104 | 80 - 120 | 108 | 80 - 120 | <0.000050 | mg/L | 4.7 | 20 |
| 9272326 | Dissolved Nickel (Ni) | 2018/12/22 | 88 | 80 - 120 | 105 | 80 - 120 | <0.000020 | mg/L | 0.51 | 20 |
| 9272326 | Dissolved Selenium (Se) | 2018/12/22 | 97 | 80 - 120 | 106 | 80 - 120 | <0.000040 | mg/L | 5.1 | 20 |
| 9272326 | Dissolved Silicon (Si) | 2018/12/22 | NC | 80 - 120 | 107 | 80 - 120 | <0.050 | mg/L | 0.98 | 20 |
| 9272326 | Dissolved Silver (Ag) | 2018/12/22 | 96 | 80 - 120 | 106 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9272326 | Dissolved Strontium (Sr) | 2018/12/22 | NC | 80 - 120 | 108 | 80 - 120 | <0.000050 | mg/L | 0.28 | 20 |
| 9272326 | Dissolved Sulphur (S) | 2018/12/22 | NC | 80 - 120 | 107 | 80 - 120 | <0.60 | mg/L | 1.6 | 20 |
| 9272326 | Dissolved Thallium (Tl) | 2018/12/22 | 95 | 80 - 120 | 104 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9272326 | Dissolved Tin (Sn) | 2018/12/22 | 98 | 80 - 120 | 111 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9272326 | Dissolved Titanium (Ti) | 2018/12/22 | 99 | 80 - 120 | 107 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9272326 | Dissolved Uranium (U) | 2018/12/22 | 101 | 80 - 120 | 108 | 80 - 120 | <0.0000020 | mg/L | 0.63 | 20 |
| 9272326 | Dissolved Vanadium (V) | 2018/12/22 | 98 | 80 - 120 | 105 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9272326 | Dissolved Zinc (Zn) | 2018/12/22 | 90 | 80 - 120 | 113 | 80 - 120 | <0.00010 | mg/L | 0.95 | 20 |
| 9272326 | Dissolved Zirconium (Zr) | 2018/12/22 | 103 | 80 - 120 | 108 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9272533 | Dissolved Mercury (Hg) | 2018/12/21 | 92 | 80 - 120 | 98 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9272572 | Dissolved Mercury (Hg) | 2018/12/21 | 95 | 80 - 120 | 99 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |



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## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9274771 | Dissolved Mercury (Hg) | 2018/12/22 | 96 | 80 - 120 | 97 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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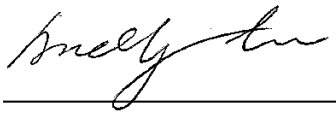
Maxxam Job #: B8B0538
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

## VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist

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



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Maxxam
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Your Project #: MB8X4745
Site#: MONTAGUE
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B8X4745-M058-01-01, B8X4745-M058-02-01

**Report Date: 2019/01/09**
Report #: R2672210
Version: 2 - Revision

# CERTIFICATE OF ANALYSIS – REVISED REPORT

**MAXXAM JOB #: B8B0754**
**Received: 2018/12/18, 09:35**

Sample Matrix: Water
# Samples Received: 17

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) (1) | 17 | N/A | 2018/12/28 | BBY WI-00033 | Auto Calc |
| Mercury (Total) by CVAF | 17 | 2018/12/27 | 2018/12/27 | BBY7SOP-00015 | BCMOE BCLM Oct2013 m |
| Elements by ICPMS Digested LL (total) | 12 | 2018/12/24 | 2018/12/27 | BBY7SOP-00003 | EPA 6020b R2 m |
| Elements by ICPMS Digested LL (total) | 1 | 2018/12/27 | 2018/12/28 | BBY7SOP-00003 | EPA 6020b R2 m |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | 17 | N/A | 2018/12/28 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (total) | 4 | N/A | 2018/12/28 | BBY7SOP-00002 | EPA 6020b R2 m |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).



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Your Project #: MB8X4745
Site#: MONTAGUE
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B8X4745-M058-01-01, B8X4745-M058-02-01

**Report Date: 2019/01/09**
Report #: R2672210
Version: 2 - Revision

# CERTIFICATE OF ANALYSIS – REVISED REPORT

**MAXXAM JOB #: B8B0754**
**Received: 2018/12/18, 09:35**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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



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Maxxam Job #: B8B0754
Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LOW LEVEL TOTAL METALS WITH CV HG (WATER)

| Maxxam ID | | UZ3740 | UZ3745 | | UZ3772 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | 2018/11/26 | | 2018/12/01 | | |
| COC Number | | B8X4745-M058-01-01 | B8X4745-M058-01-01 | | B8X4745-M058-02-01 | | |
| | UNITS | M-2018-SW2 | M-2018-SW10 | RDL | M-2018-SW15 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 23.5 | 28.3 | 0.50 | 6.01 | 0.50 | 9274526 |
| **Elements** | | | | | | | |
| Total Mercury (Hg) | mg/L | 0.0000034 | <0.0000020 | 0.0000020 | 0.0000028 | 0.0000020 | 9277254 |
| **Total Metals by ICPMS** | | | | | | | |
| Total Aluminum (Al) | mg/L | 0.0147 | 0.0301 | 0.00050 | 0.149 | 0.0025 | 9276527 |
| Total Antimony (Sb) | mg/L | 0.000492 | 0.000122 | 0.000020 | 0.00426 | 0.00010 | 9276527 |
| Total Arsenic (As) | mg/L | 0.180 | 0.0171 | 0.000020 | 1.37 | 0.00010 | 9276527 |
| Total Barium (Ba) | mg/L | 0.00348 | 0.00682 | 0.000020 | 0.00162 | 0.00010 | 9276527 |
| Total Beryllium (Be) | mg/L | <0.000010 | <0.000010 | 0.000010 | <0.000050 | 0.000050 | 9276527 |
| Total Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | 0.000065 | 0.000025 | 9276527 |
| Total Boron (B) | mg/L | <0.010 | <0.010 | 0.010 | <0.050 | 0.050 | 9276527 |
| Total Cadmium (Cd) | mg/L | <0.0000050 | 0.0000060 | 0.0000050 | <0.000025 | 0.000025 | 9276527 |
| Total Chromium (Cr) | mg/L | 0.00010 | 0.00020 | 0.00010 | 0.00122 | 0.00050 | 9276527 |
| Total Cobalt (Co) | mg/L | 0.0000971 | 0.0000953 | 0.0000050 | 0.000583 | 0.000025 | 9276527 |
| Total Copper (Cu) | mg/L | 0.00127 | 0.000877 | 0.000050 | 0.00421 | 0.00025 | 9276527 |
| Total Iron (Fe) | mg/L | 0.0114 | 0.0425 | 0.0010 | 0.997 | 0.0050 | 9276527 |
| Total Lead (Pb) | mg/L | 0.0000138 | 0.0000490 | 0.0000050 | 0.00335 | 0.000025 | 9276527 |
| Total Lithium (Li) | mg/L | <0.00050 | 0.00055 | 0.00050 | <0.0025 | 0.0025 | 9276527 |
| Total Manganese (Mn) | mg/L | 0.0111 | 0.0808 | 0.000050 | 0.0235 | 0.00025 | 9276527 |
| Total Molybdenum (Mo) | mg/L | <0.000050 | 0.000445 | 0.000050 | <0.00025 | 0.00025 | 9276527 |
| Total Nickel (Ni) | mg/L | 0.000802 | 0.000551 | 0.000020 | 0.00334 | 0.00010 | 9276527 |
| Total Phosphorus (P) | mg/L | 0.0038 | 0.0068 | 0.0020 | <0.010 | 0.010 | 9276527 |
| Total Selenium (Se) | mg/L | 0.000047 | 0.000056 | 0.000040 | <0.00020 | 0.00020 | 9276527 |
| Total Silicon (Si) | mg/L | 1.16 | 1.15 | 0.050 | 0.35 | 0.25 | 9276527 |
| Total Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | <0.000025 | 0.000025 | 9276527 |
| Total Strontium (Sr) | mg/L | 0.0237 | 0.0410 | 0.000050 | 0.00249 | 0.00025 | 9276527 |
| Total Thallium (Tl) | mg/L | <0.0000020 | <0.0000020 | 0.0000020 | <0.000010 | 0.000010 | 9276527 |
| Total Tin (Sn) | mg/L | <0.00020 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9276527 |
| Total Titanium (Ti) | mg/L | <0.00050 | <0.00050 | 0.00050 | 0.0067 | 0.0025 | 9276527 |
| Total Uranium (U) | mg/L | 0.0000020 | 0.0000646 | 0.0000020 | <0.000010 | 0.000010 | 9276527 |
| Total Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9276527 |
| Total Zinc (Zn) | mg/L | 0.00312 | 0.00116 | 0.00010 | 0.0113 | 0.00050 | 9276527 |

RDL = Reportable Detection Limit



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Maxxam Job #: B8B0754
Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LOW LEVEL TOTAL METALS WITH CV HG (WATER)

| **Maxxam ID** | | UZ3740 | UZ3745 | | UZ3772 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | 2018/11/26 | | 2018/12/01 | | |
| **COC Number** | | B8X4745-M058-01-01 | B8X4745-M058-01-01 | | B8X4745-M058-02-01 | | |
| | **UNITS** | **M-2018-SW2** | **M-2018-SW10** | **RDL** | **M-2018-SW15** | **RDL** | **QC Batch** |
| Total Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | 0.00010 | <0.00050 | 0.00050 | 9276527 |
| Total Calcium (Ca) | mg/L | 6.81 | 9.07 | 0.050 | 1.03 | 0.25 | 9274099 |
| Total Magnesium (Mg) | mg/L | 1.58 | 1.37 | 0.050 | 0.83 | 0.25 | 9274099 |
| Total Potassium (K) | mg/L | 1.00 | 1.34 | 0.050 | 0.88 | 0.25 | 9274099 |
| Total Sodium (Na) | mg/L | 28.7 | 30.7 | 0.050 | 1.22 | 0.25 | 9274099 |
| Total Sulphur (S) | mg/L | 2.92 | 3.57 | 0.60 | <3.0 | 3.0 | 9276527 |
| RDL = Reportable Detection Limit | | | | | | | |



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Maxxam Job #: B8B0754
Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LOW LEVEL TOTAL METALS WITH CV HG (WATER)

| **Maxxam ID** | | UZ3773 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2018/12/01 | | |
| **COC Number** | | B8X4745-M058-02-01 | | |
| | **UNITS** | **M-2018-SW16** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | |
| Total Hardness (CaCO3) | mg/L | 347 | 0.50 | 9274526 |
| **Elements** | | | | |
| Total Mercury (Hg) | mg/L | 0.0000491 | 0.0000020 | 9277254 |
| **Total Metals by ICPMS** | | | | |
| Total Aluminum (Al) | mg/L | 0.246 | 0.0025 | 9276527 |
| Total Antimony (Sb) | mg/L | 0.0147 | 0.00010 | 9276527 |
| Total Arsenic (As) | mg/L | 2.84 | 0.00010 | 9276527 |
| Total Barium (Ba) | mg/L | 0.00030 | 0.00010 | 9276527 |
| Total Beryllium (Be) | mg/L | <0.000050 | 0.000050 | 9276527 |
| Total Bismuth (Bi) | mg/L | <0.000025 | 0.000025 | 9276527 |
| Total Boron (B) | mg/L | <0.050 | 0.050 | 9276527 |
| Total Cadmium (Cd) | mg/L | 0.000042 | 0.000025 | 9276527 |
| Total Chromium (Cr) | mg/L | 0.00309 | 0.00050 | 9276527 |
| Total Cobalt (Co) | mg/L | 0.00946 | 0.000025 | 9276527 |
| Total Copper (Cu) | mg/L | 0.0201 | 0.00025 | 9276527 |
| Total Iron (Fe) | mg/L | 0.0505 | 0.0050 | 9276527 |
| Total Lead (Pb) | mg/L | 0.000131 | 0.000025 | 9276527 |
| Total Lithium (Li) | mg/L | 0.0239 | 0.0025 | 9276527 |
| Total Manganese (Mn) | mg/L | 0.764 | 0.00025 | 9276527 |
| Total Molybdenum (Mo) | mg/L | 0.00047 | 0.00025 | 9276527 |
| Total Nickel (Ni) | mg/L | 0.0513 | 0.00010 | 9276527 |
| Total Phosphorus (P) | mg/L | <0.010 | 0.010 | 9276527 |
| Total Selenium (Se) | mg/L | 0.00026 | 0.00020 | 9276527 |
| Total Silicon (Si) | mg/L | 6.32 | 0.25 | 9276527 |
| Total Silver (Ag) | mg/L | <0.000025 | 0.000025 | 9276527 |
| Total Strontium (Sr) | mg/L | 0.129 | 0.00025 | 9276527 |
| Total Thallium (Tl) | mg/L | <0.000010 | 0.000010 | 9276527 |
| Total Tin (Sn) | mg/L | <0.0010 | 0.0010 | 9276527 |
| Total Titanium (Ti) | mg/L | <0.0025 | 0.0025 | 9276527 |
| Total Uranium (U) | mg/L | 0.000359 | 0.000010 | 9276527 |
| Total Vanadium (V) | mg/L | <0.0010 | 0.0010 | 9276527 |
| Total Zinc (Zn) | mg/L | 0.0561 | 0.00050 | 9276527 |
| RDL = Reportable Detection Limit | | | | |



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Maxxam Job #: B8B0754
Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LOW LEVEL TOTAL METALS WITH CV HG (WATER)

| **Maxxam ID** | | UZ3773 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2018/12/01 | | |
| **COC Number** | | B8X4745-M058-02-01 | | |
| | **UNITS** | **M-2018-SW16** | **RDL** | **QC Batch** |
| Total Zirconium (Zr) | mg/L | <0.00050 | 0.00050 | 9276527 |
| Total Calcium (Ca) | mg/L | 78.2 | 0.25 | 9274099 |
| Total Magnesium (Mg) | mg/L | 36.9 | 0.25 | 9274099 |
| Total Potassium (K) | mg/L | 4.93 | 0.25 | 9274099 |
| Total Sodium (Na) | mg/L | 10.9 | 0.25 | 9274099 |
| Total Sulphur (S) | mg/L | 79.1 | 3.0 | 9276527 |
| RDL = Reportable Detection Limit | | | | |



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Maxxam Job #: B8B0754
Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LL TOTAL METALS (DIGESTED) WITH CV HG

| Maxxam ID | | UZ3739 | | UZ3741 | UZ3742 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/24 | | 2018/11/25 | 2018/11/25 | | |
| COC Number | | B8X4745-M058-01-01 | | B8X4745-M058-01-01 | B8X4745-M058-01-01 | | |
| | UNITS | M-2018-P1SW | RDL | M-2018-SW3 | M-2018-SW4 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 25.6 | 0.50 | 25.5 | 23.1 | 0.50 | 9274526 |
| **Elements** | | | | | | | |
| Total Mercury (Hg) | mg/L | 0.000487 (1) | 0.000020 | 0.0000024 | 0.0000400 | 0.0000020 | 9277254 |
| **Total Metals by ICPMS** | | | | | | | |
| Total Aluminum (Al) | mg/L | 0.153 | 0.0030 | 0.0357 | 0.326 | 0.0030 | 9276498 |
| Total Antimony (Sb) | mg/L | 0.00156 | 0.000020 | 0.000119 | 0.000346 | 0.000020 | 9276498 |
| Total Arsenic (As) | mg/L | 0.790 | 0.000020 | 0.0367 | 0.297 | 0.000020 | 9276498 |
| Total Barium (Ba) | mg/L | 0.0131 | 0.000050 | 0.00499 | 0.0172 | 0.000050 | 9276498 |
| Total Beryllium (Be) | mg/L | <0.000010 | 0.000010 | <0.000010 | 0.000035 | 0.000010 | 9276498 |
| Total Bismuth (Bi) | mg/L | 0.000073 | 0.000010 | <0.000010 | 0.000033 | 0.000010 | 9276498 |
| Total Boron (B) | mg/L | <0.010 | 0.010 | <0.010 | <0.010 | 0.010 | 9276498 |
| Total Cadmium (Cd) | mg/L | 0.0000779 | 0.0000050 | <0.0000050 | 0.000130 | 0.0000050 | 9276498 |
| Total Chromium (Cr) | mg/L | 0.00028 | 0.00010 | <0.00010 | 0.00047 | 0.00010 | 9276498 |
| Total Cobalt (Co) | mg/L | 0.00164 | 0.000010 | 0.000142 | 0.00299 | 0.000010 | 9276498 |
| Total Copper (Cu) | mg/L | 0.0112 | 0.00010 | 0.00085 | 0.00482 | 0.00010 | 9276498 |
| Total Iron (Fe) | mg/L | 1.26 | 0.0050 | 0.0831 | 1.31 | 0.0050 | 9276498 |
| Total Lead (Pb) | mg/L | 0.00365 | 0.000020 | 0.000096 | 0.00259 | 0.000020 | 9276498 |
| Total Lithium (Li) | mg/L | 0.00058 | 0.00050 | 0.00050 | 0.00091 | 0.00050 | 9276498 |
| Total Manganese (Mn) | mg/L | 0.152 | 0.00010 | 0.0161 | 0.823 | 0.00010 | 9276498 |
| Total Molybdenum (Mo) | mg/L | 0.000089 | 0.000050 | 0.000055 | 0.000148 | 0.000050 | 9276498 |
| Total Nickel (Ni) | mg/L | 0.00495 | 0.00010 | 0.00053 | 0.00662 | 0.00010 | 9276498 |
| Total Selenium (Se) | mg/L | 0.000127 | 0.000040 | 0.000048 | 0.000083 | 0.000040 | 9276498 |
| Total Silicon (Si) | mg/L | 2.28 | 0.050 | 0.843 | 1.06 | 0.050 | 9276498 |
| Total Silver (Ag) | mg/L | 0.000043 | 0.000010 | <0.000010 | <0.000010 | 0.000010 | 9276498 |
| Total Strontium (Sr) | mg/L | 0.0198 | 0.000050 | 0.0274 | 0.0249 | 0.000050 | 9276498 |
| Total Thallium (Tl) | mg/L | 0.0000103 | 0.0000020 | <0.0000020 | 0.0000110 | 0.0000020 | 9276498 |
| Total Tin (Sn) | mg/L | <0.00020 | 0.00020 | <0.00020 | <0.00020 | 0.00020 | 9276498 |
| Total Titanium (Ti) | mg/L | 0.0049 | 0.0020 | <0.0020 | 0.0080 | 0.0020 | 9276498 |
| Total Uranium (U) | mg/L | 0.0000207 | 0.0000050 | 0.0000052 | 0.0000218 | 0.0000050 | 9276498 |
| Total Vanadium (V) | mg/L | 0.00072 | 0.00020 | <0.00020 | 0.00113 | 0.00020 | 9276498 |
| Total Zinc (Zn) | mg/L | 0.0217 | 0.0010 | 0.0013 | 0.0251 | 0.0010 | 9276498 |
| Total Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | <0.00010 | <0.00010 | 0.00010 | 9276498 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.



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Maxxam Job #: B8B0754
Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LL TOTAL METALS (DIGESTED) WITH CV HG

| **Maxxam ID** | | UZ3739 | | UZ3741 | UZ3742 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/24 | | 2018/11/25 | 2018/11/25 | | |
| **COC Number** | | B8X4745-M058-01-01 | | B8X4745-M058-01-01 | B8X4745-M058-01-01 | | |
| | **UNITS** | **M-2018-P1SW** | **RDL** | **M-2018-SW3** | **M-2018-SW4** | **RDL** | **QC Batch** |
| Total Calcium (Ca) | mg/L | 6.33 | 0.25 | 7.92 | 6.98 | 0.25 | 9274099 |
| Total Magnesium (Mg) | mg/L | 2.39 | 0.25 | 1.40 | 1.39 | 0.25 | 9274099 |
| Total Potassium (K) | mg/L | 1.60 | 0.25 | 1.01 | 1.08 | 0.25 | 9274099 |
| Total Sodium (Na) | mg/L | 6.09 | 0.25 | 35.0 | 32.0 | 0.25 | 9274099 |
| Total Sulphur (S) | mg/L | 2.94 | 0.60 | 3.12 | 3.42 | 0.60 | 9276498 |
| RDL = Reportable Detection Limit | | | | | | | |



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Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LL TOTAL METALS (DIGESTED) WITH CV HG

| Maxxam ID | | UZ3743 | UZ3744 | UZ3746 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/25 | 2018/11/26 | 2018/11/30 | | |
| COC Number | | B8X4745-M058-01-01 | B8X4745-M058-01-01 | B8X4745-M058-01-01 | | |
| | UNITS | M-2018-C5 SW | M-2018-SW9 | M-2018-SW11 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Total Hardness (CaCO3) | mg/L | 29.8 | 4.10 | 21.6 | 0.50 | 9274526 |
| **Elements** | | | | | | |
| Total Mercury (Hg) | mg/L | 0.0000194 | <0.0000020 | 0.0000023 | 0.0000020 | 9277254 |
| **Total Metals by ICPMS** | | | | | | |
| Total Aluminum (Al) | mg/L | 0.142 | 0.206 | 0.561 | 0.0030 | 9276498 |
| Total Antimony (Sb) | mg/L | 0.000908 | 0.000028 | 0.000101 | 0.000020 | 9276498 |
| Total Arsenic (As) | mg/L | 0.289 | 0.000760 | 0.0260 | 0.000020 | 9276498 |
| Total Barium (Ba) | mg/L | 0.00464 | 0.0231 | 0.0187 | 0.000050 | 9276498 |
| Total Beryllium (Be) | mg/L | <0.000010 | 0.000079 | 0.000092 | 0.000010 | 9276498 |
| Total Bismuth (Bi) | mg/L | 0.000020 | <0.000010 | <0.000010 | 0.000010 | 9276498 |
| Total Boron (B) | mg/L | <0.010 | 0.046 | 0.030 | 0.010 | 9276498 |
| Total Cadmium (Cd) | mg/L | 0.0000158 | 0.0000173 | 0.000133 | 0.0000050 | 9276498 |
| Total Chromium (Cr) | mg/L | 0.00020 | 0.00019 | 0.00016 | 0.00010 | 9276498 |
| Total Cobalt (Co) | mg/L | 0.00123 | 0.000176 | 0.00392 | 0.000010 | 9276498 |
| Total Copper (Cu) | mg/L | 0.00460 | 0.00032 | 0.00072 | 0.00010 | 9276498 |
| Total Iron (Fe) | mg/L | 0.442 | 0.140 | 0.0911 | 0.0050 | 9276498 |
| Total Lead (Pb) | mg/L | 0.00119 | 0.000243 | 0.000347 | 0.000020 | 9276498 |
| Total Lithium (Li) | mg/L | 0.00107 | 0.00137 | 0.00150 | 0.00050 | 9276498 |
| Total Manganese (Mn) | mg/L | 0.0734 | 0.0707 | 0.124 | 0.00010 | 9276498 |
| Total Molybdenum (Mo) | mg/L | 0.000063 | <0.000050 | <0.000050 | 0.000050 | 9276498 |
| Total Nickel (Ni) | mg/L | 0.00335 | 0.00051 | 0.0107 | 0.00010 | 9276498 |
| Total Selenium (Se) | mg/L | 0.000067 | 0.000051 | 0.000049 | 0.000040 | 9276498 |
| Total Silicon (Si) | mg/L | 1.43 | 1.25 | 1.59 | 0.050 | 9276498 |
| Total Silver (Ag) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9276498 |
| Total Strontium (Sr) | mg/L | 0.0273 | 0.00654 | 0.0223 | 0.000050 | 9276498 |
| Total Thallium (Tl) | mg/L | 0.0000043 | 0.0000066 | 0.0000027 | 0.0000020 | 9276498 |
| Total Tin (Sn) | mg/L | 0.00024 | <0.00020 | <0.00020 | 0.00020 | 9276498 |
| Total Titanium (Ti) | mg/L | 0.0050 | <0.0020 | <0.0020 | 0.0020 | 9276498 |
| Total Uranium (U) | mg/L | 0.0000083 | 0.0000818 | 0.0000064 | 0.0000050 | 9276498 |
| Total Vanadium (V) | mg/L | 0.00032 | 0.00051 | 0.00038 | 0.00020 | 9276498 |
| Total Zinc (Zn) | mg/L | 0.0126 | 0.0025 | 0.0138 | 0.0010 | 9276498 |
| Total Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9276498 |

RDL = Reportable Detection Limit



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Maxxam Job #: B8B0754
Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LL TOTAL METALS (DIGESTED) WITH CV HG

| **Maxxam ID** | | UZ3743 | UZ3744 | UZ3746 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/11/25 | 2018/11/26 | 2018/11/30 | | |
| **COC Number** | | B8X4745-M058-01-01 | B8X4745-M058-01-01 | B8X4745-M058-01-01 | | |
| | **UNITS** | **M-2018-C5 SW** | **M-2018-SW9** | **M-2018-SW11** | **RDL** | **QC Batch** |
| Total Calcium (Ca) | mg/L | 8.50 | 0.95 | 6.45 | 0.25 | 9274099 |
| Total Magnesium (Mg) | mg/L | 2.07 | 0.42 | 1.33 | 0.25 | 9274099 |
| Total Potassium (K) | mg/L | 1.14 | 0.27 | 0.71 | 0.25 | 9274099 |
| Total Sodium (Na) | mg/L | 26.2 | 4.01 | 19.6 | 0.25 | 9274099 |
| Total Sulphur (S) | mg/L | 4.72 | 0.76 | 5.36 | 0.60 | 9276498 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LL TOTAL METALS (DIGESTED) WITH CV HG

| Maxxam ID | | UZ3747 | | UZ3748 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/26 | | 2018/12/01 | | |
| COC Number | | B8X4745-M058-01-01 | | B8X4745-M058-01-01 | | |
| | UNITS | M-2018-SW12 | RDL | M-2018-C13 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Total Hardness (CaCO3) | mg/L | 26.6 | 0.50 | 9.21 | 0.50 | 9274526 |
| **Elements** | | | | | | |
| Total Mercury (Hg) | mg/L | <0.0000020 | 0.0000020 | 0.000505 (1) | 0.000020 | 9277254 |
| **Total Metals by ICPMS** | | | | | | |
| Total Aluminum (Al) | mg/L | 0.0330 | 0.0030 | 0.174 | 0.0030 | 9276498 |
| Total Antimony (Sb) | mg/L | 0.000071 | 0.000020 | 0.000144 | 0.000020 | 9276498 |
| Total Arsenic (As) | mg/L | 0.000537 | 0.000020 | 0.456 | 0.000020 | 9276498 |
| Total Barium (Ba) | mg/L | 0.00928 | 0.000050 | 0.00575 | 0.000050 | 9276498 |
| Total Beryllium (Be) | mg/L | <0.000010 | 0.000010 | 0.000015 | 0.000010 | 9276498 |
| Total Bismuth (Bi) | mg/L | <0.000010 | 0.000010 | 0.000077 | 0.000010 | 9276498 |
| Total Boron (B) | mg/L | 0.018 | 0.010 | <0.010 | 0.010 | 9276498 |
| Total Cadmium (Cd) | mg/L | <0.0000050 | 0.0000050 | 0.0000711 | 0.0000050 | 9276498 |
| Total Chromium (Cr) | mg/L | 0.00011 | 0.00010 | 0.00014 | 0.00010 | 9276498 |
| Total Cobalt (Co) | mg/L | 0.000042 | 0.000010 | 0.00158 | 0.000010 | 9276498 |
| Total Copper (Cu) | mg/L | 0.00097 | 0.00010 | 0.0131 | 0.00010 | 9276498 |
| Total Iron (Fe) | mg/L | 0.0548 | 0.0050 | 1.35 | 0.0050 | 9276498 |
| Total Lead (Pb) | mg/L | 0.000075 | 0.000020 | 0.00791 | 0.000020 | 9276498 |
| Total Lithium (Li) | mg/L | 0.00072 | 0.00050 | 0.00084 | 0.00050 | 9276498 |
| Total Manganese (Mn) | mg/L | 0.0131 | 0.00010 | 0.0746 | 0.00010 | 9276498 |
| Total Molybdenum (Mo) | mg/L | 0.000102 | 0.000050 | <0.000050 | 0.000050 | 9276498 |
| Total Nickel (Ni) | mg/L | 0.00043 | 0.00010 | 0.00302 | 0.00010 | 9276498 |
| Total Selenium (Se) | mg/L | 0.000059 | 0.000040 | 0.000064 | 0.000040 | 9276498 |
| Total Silicon (Si) | mg/L | 0.775 | 0.050 | 2.02 | 0.050 | 9276498 |
| Total Silver (Ag) | mg/L | <0.000010 | 0.000010 | <0.000010 | 0.000010 | 9276498 |
| Total Strontium (Sr) | mg/L | 0.0317 | 0.000050 | 0.00970 | 0.000050 | 9276498 |
| Total Thallium (Tl) | mg/L | <0.0000020 | 0.0000020 | 0.0000063 | 0.0000020 | 9276498 |
| Total Tin (Sn) | mg/L | <0.00020 | 0.00020 | <0.00020 | 0.00020 | 9276498 |
| Total Titanium (Ti) | mg/L | <0.0020 | 0.0020 | <0.0020 | 0.0020 | 9276498 |
| Total Uranium (U) | mg/L | 0.0000077 | 0.0000050 | 0.0000180 | 0.0000050 | 9276498 |
| Total Vanadium (V) | mg/L | <0.00020 | 0.00020 | 0.00139 | 0.00020 | 9276498 |
| Total Zinc (Zn) | mg/L | <0.0010 | 0.0010 | 0.0299 | 0.0010 | 9276498 |
| Total Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | <0.00010 | 0.00010 | 9276498 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.



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Maxxam Job #: B8B0754
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MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LL TOTAL METALS (DIGESTED) WITH CV HG

| Maxxam ID | | UZ3747 | | UZ3748 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2018/11/26 | | 2018/12/01 | | |
| COC Number | | B8X4745-M058-01-01 | | B8X4745-M058-01-01 | | |
| | UNITS | M-2018-SW12 | RDL | M-2018-C13 SW | RDL | QC Batch |
| Total Calcium (Ca) | mg/L | 8.49 | 0.25 | 1.90 | 0.25 | 9274099 |
| Total Magnesium (Mg) | mg/L | 1.32 | 0.25 | 1.08 | 0.25 | 9274099 |
| Total Potassium (K) | mg/L | 1.23 | 0.25 | 0.44 | 0.25 | 9274099 |
| Total Sodium (Na) | mg/L | 38.8 | 0.25 | 4.71 | 0.25 | 9274099 |
| Total Sulphur (S) | mg/L | 3.07 | 0.60 | 0.91 | 0.60 | 9276498 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LL TOTAL METALS (DIGESTED) WITH CV HG

| Maxxam ID | | UZ3771 | UZ3774 | | UZ3775 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2018/12/01 | 2018/12/01 | | 2018/12/01 | | |
| COC Number | | B8X4745-M058-02-01 | B8X4745-M058-02-01 | | B8X4745-M058-02-01 | | |
| | UNITS | M-2018-SW14 | M-2018-C17 SW | RDL | M-2018-C18 SW | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Total Hardness (CaCO3) | mg/L | 20.3 | 26.1 | 0.50 | 71.7 | 0.50 | 9274526 |
| **Elements** | | | | | | | |
| Total Mercury (Hg) | mg/L | 0.0000373 | 0.0000030 | 0.0000020 | 0.000084 (1) | 0.000020 | 9277254 |
| **Total Metals by ICPMS** | | | | | | | |
| Total Aluminum (Al) | mg/L | 0.0509 | 0.0646 | 0.0030 | 24.8 | 0.015 | 9276498 |
| Total Antimony (Sb) | mg/L | 0.00121 | 0.000094 | 0.000020 | 0.00120 | 0.00010 | 9276498 |
| Total Arsenic (As) | mg/L | 0.326 | 0.0216 | 0.000020 | 2.65 | 0.00010 | 9276498 |
| Total Barium (Ba) | mg/L | 0.00659 | 0.00878 | 0.000050 | 0.338 | 0.00025 | 9276498 |
| Total Beryllium (Be) | mg/L | <0.000010 | <0.000010 | 0.000010 | 0.00150 | 0.000050 | 9276498 |
| Total Bismuth (Bi) | mg/L | <0.000010 | <0.000010 | 0.000010 | 0.000391 | 0.000050 | 9276498 |
| Total Boron (B) | mg/L | <0.010 | <0.010 | 0.010 | <0.050 | 0.050 | 9276498 |
| Total Cadmium (Cd) | mg/L | 0.0000224 | 0.0000085 | 0.0000050 | 0.00246 | 0.000025 | 9276498 |
| Total Chromium (Cr) | mg/L | 0.00013 | 0.00011 | 0.00010 | 0.0246 | 0.00050 | 9276498 |
| Total Cobalt (Co) | mg/L | 0.000367 | 0.000145 | 0.000010 | 0.0788 | 0.000050 | 9276498 |
| Total Copper (Cu) | mg/L | 0.00553 | 0.00094 | 0.00010 | 0.0746 | 0.00050 | 9276498 |
| Total Iron (Fe) | mg/L | 0.0774 | 0.0905 | 0.0050 | 156 | 0.025 | 9276498 |
| Total Lead (Pb) | mg/L | 0.000138 | 0.000077 | 0.000020 | 0.151 | 0.00010 | 9276498 |
| Total Lithium (Li) | mg/L | <0.00050 | <0.00050 | 0.00050 | 0.0158 | 0.0025 | 9276498 |
| Total Manganese (Mn) | mg/L | 0.0166 | 0.0217 | 0.00010 | 14.6 | 0.00050 | 9276498 |
| Total Molybdenum (Mo) | mg/L | <0.000050 | <0.000050 | 0.000050 | 0.00192 | 0.00025 | 9276498 |
| Total Nickel (Ni) | mg/L | 0.00310 | 0.00136 | 0.00010 | 0.0720 | 0.00050 | 9276498 |
| Total Selenium (Se) | mg/L | 0.000085 | 0.000061 | 0.000040 | 0.00277 | 0.00020 | 9276498 |
| Total Silicon (Si) | mg/L | 1.88 | 1.51 | 0.050 | 17.1 | 0.25 | 9276498 |
| Total Silver (Ag) | mg/L | <0.000010 | <0.000010 | 0.000010 | 0.000232 | 0.000050 | 9276498 |
| Total Strontium (Sr) | mg/L | 0.0159 | 0.0262 | 0.000050 | 0.0780 | 0.00025 | 9276498 |
| Total Thallium (Tl) | mg/L | 0.0000036 | 0.0000032 | 0.0000020 | 0.000459 | 0.000010 | 9276498 |
| Total Tin (Sn) | mg/L | 0.00022 | <0.00020 | 0.00020 | 0.0042 | 0.0010 | 9276498 |
| Total Titanium (Ti) | mg/L | <0.0020 | <0.0020 | 0.0020 | 0.493 | 0.010 | 9276498 |
| Total Uranium (U) | mg/L | 0.0000093 | 0.0000081 | 0.0000050 | 0.00222 | 0.000025 | 9276498 |
| Total Vanadium (V) | mg/L | 0.00024 | <0.00020 | 0.00020 | 0.269 | 0.0010 | 9276498 |
| Total Zinc (Zn) | mg/L | 0.0129 | 0.0033 | 0.0010 | 0.540 | 0.0050 | 9276498 |
| Total Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | 0.00010 | 0.00153 | 0.00050 | 9276498 |

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.



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Maxxam Job #: B8B0754
Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LL TOTAL METALS (DIGESTED) WITH CV HG

| **Maxxam ID** | | UZ3771 | UZ3774 | | UZ3775 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2018/12/01 | 2018/12/01 | | 2018/12/01 | | |
| **COC Number** | | B8X4745-M058-02-01 | B8X4745-M058-02-01 | | B8X4745-M058-02-01 | | |
| | **UNITS** | **M-2018-SW14** | **M-2018-C17 SW** | **RDL** | **M-2018-C18 SW** | **RDL** | **QC Batch** |
| Total Calcium (Ca) | mg/L | 5.12 | 7.14 | 0.25 | 17.3 | 1.3 | 9274099 |
| Total Magnesium (Mg) | mg/L | 1.82 | 1.99 | 0.25 | 6.9 | 1.3 | 9274099 |
| Total Potassium (K) | mg/L | 1.38 | 1.03 | 0.25 | 2.3 | 1.3 | 9274099 |
| Total Sodium (Na) | mg/L | 5.03 | 30.8 | 0.25 | 64.7 | 1.3 | 9274099 |
| Total Sulphur (S) | mg/L | 2.37 | 2.93 | 0.60 | 8.4 | 3.0 | 9276498 |
| RDL = Reportable Detection Limit | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LL TOTAL METALS (DIGESTED) WITH CV HG

| Maxxam ID | | UZ3776 | UZ3777 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2018/12/01 | 2018/11/25 | | |
| COC Number | | B8X4745-M058-02-01 | B8X4745-M058-02-01 | | |
| | UNITS | M-2018-C19 SW | M-2018-MBSW | RDL | QC Batch |
| **Calculated Parameters** | | | | | |
| Total Hardness (CaCO3) | mg/L | 18.5 | 24.4 | 0.50 | 9274526 |
| **Elements** | | | | | |
| Total Mercury (Hg) | mg/L | 0.0000072 | <0.0000020 | 0.0000020 | 9277254 |
| **Total Metals by ICPMS** | | | | | |
| Total Aluminum (Al) | mg/L | 0.0528 | 0.0410 | 0.0030 | 9276498 |
| Total Antimony (Sb) | mg/L | 0.000135 | 0.000082 | 0.000020 | 9276498 |
| Total Arsenic (As) | mg/L | 0.0560 | 0.0124 | 0.000020 | 9276498 |
| Total Barium (Ba) | mg/L | 0.00485 | 0.00659 | 0.000050 | 9276498 |
| Total Beryllium (Be) | mg/L | <0.000010 | <0.000010 | 0.000010 | 9276498 |
| Total Bismuth (Bi) | mg/L | <0.000010 | <0.000010 | 0.000010 | 9276498 |
| Total Boron (B) | mg/L | <0.010 | 0.014 | 0.010 | 9276498 |
| Total Cadmium (Cd) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | 9276498 |
| Total Chromium (Cr) | mg/L | 0.00013 | 0.00013 | 0.00010 | 9276498 |
| Total Cobalt (Co) | mg/L | 0.000134 | 0.000061 | 0.000010 | 9276498 |
| Total Copper (Cu) | mg/L | 0.00077 | 0.00097 | 0.00010 | 9276498 |
| Total Iron (Fe) | mg/L | 0.183 | 0.0755 | 0.0050 | 9276498 |
| Total Lead (Pb) | mg/L | 0.000087 | 0.000120 | 0.000020 | 9276498 |
| Total Lithium (Li) | mg/L | <0.00050 | 0.00053 | 0.00050 | 9276498 |
| Total Manganese (Mn) | mg/L | 0.0138 | 0.0112 | 0.00010 | 9276498 |
| Total Molybdenum (Mo) | mg/L | <0.000050 | 0.000093 | 0.000050 | 9276498 |
| Total Nickel (Ni) | mg/L | 0.00078 | 0.00049 | 0.00010 | 9276498 |
| Total Selenium (Se) | mg/L | 0.000040 | 0.000059 | 0.000040 | 9276498 |
| Total Silicon (Si) | mg/L | 1.63 | 0.743 | 0.050 | 9276498 |
| Total Silver (Ag) | mg/L | <0.000010 | <0.000010 | 0.000010 | 9276498 |
| Total Strontium (Sr) | mg/L | 0.0182 | 0.0275 | 0.000050 | 9276498 |
| Total Thallium (Tl) | mg/L | <0.0000020 | <0.0000020 | 0.0000020 | 9276498 |
| Total Tin (Sn) | mg/L | <0.00020 | <0.00020 | 0.00020 | 9276498 |
| Total Titanium (Ti) | mg/L | <0.0020 | <0.0020 | 0.0020 | 9276498 |
| Total Uranium (U) | mg/L | 0.0000059 | 0.0000063 | 0.0000050 | 9276498 |
| Total Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00020 | 9276498 |
| Total Zinc (Zn) | mg/L | 0.0023 | 0.0011 | 0.0010 | 9276498 |
| Total Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | 0.00010 | 9276498 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## LL TOTAL METALS (DIGESTED) WITH CV HG

| **Maxxam ID** | | UZ3776 | UZ3777 | | |
|---|---|---|---|---|---|
| **Sampling Date** | | 2018/12/01 | 2018/11/25 | | |
| **COC Number** | | B8X4745-M058-02-01 | B8X4745-M058-02-01 | | |
| | **UNITS** | **M-2018-C19 SW** | **M-2018-MBSW** | **RDL** | **QC Batch** |
| Total Calcium (Ca) | mg/L | 4.60 | 7.72 | 0.25 | 9274099 |
| Total Magnesium (Mg) | mg/L | 1.69 | 1.26 | 0.25 | 9274099 |
| Total Potassium (K) | mg/L | 0.77 | 1.12 | 0.25 | 9274099 |
| Total Sodium (Na) | mg/L | 19.5 | 36.1 | 0.25 | 9274099 |
| Total Sulphur (S) | mg/L | 1.91 | 2.72 | 0.60 | 9276498 |
| RDL = Reportable Detection Limit | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ3739 **Collected:** 2018/11/24
**Sample ID:** M-2018-P1SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Automated Statchk |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/27 | 2018/12/28 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |

**Maxxam ID:** UZ3740 **Collected:** 2018/11/25
**Sample ID:** M-2018-SW2 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Andy Lu |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |
| Elements by ICPMS Low Level (total) | ICP/CRCM | 9276527 | N/A | 2018/12/28 | Valentina Balada |

**Maxxam ID:** UZ3741 **Collected:** 2018/11/25
**Sample ID:** M-2018-SW3 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |

**Maxxam ID:** UZ3742 **Collected:** 2018/11/25
**Sample ID:** M-2018-SW4 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Automated Statchk |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |

**Maxxam ID:** UZ3743 **Collected:** 2018/11/25
**Sample ID:** M-2018-C5 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |



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Maxxam Job #: B8B0754
Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ3744 **Collected:** 2018/11/26
**Sample ID:** M-2018-SW9 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |

**Maxxam ID:** UZ3745 **Collected:** 2018/11/26
**Sample ID:** M-2018-SW10 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Andy Lu |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |
| Elements by ICPMS Low Level (total) | ICP/CRCM | 9276527 | N/A | 2018/12/28 | Valentina Balada |

**Maxxam ID:** UZ3746 **Collected:** 2018/11/30
**Sample ID:** M-2018-SW11 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |

**Maxxam ID:** UZ3747 **Collected:** 2018/11/26
**Sample ID:** M-2018-SW12 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |

**Maxxam ID:** UZ3748 **Collected:** 2018/12/01
**Sample ID:** M-2018-C13 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |



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MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ3771 **Collected:** 2018/12/01
**Sample ID:** M-2018-SW14 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |

**Maxxam ID:** UZ3772 **Collected:** 2018/12/01
**Sample ID:** M-2018-SW15 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |
| Elements by ICPMS Low Level (total) | ICP/CRCM | 9276527 | N/A | 2018/12/28 | Valentina Balada |

**Maxxam ID:** UZ3773 **Collected:** 2018/12/01
**Sample ID:** M-2018-SW16 **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |
| Elements by ICPMS Low Level (total) | ICP/CRCM | 9276527 | N/A | 2018/12/28 | Valentina Balada |

**Maxxam ID:** UZ3774 **Collected:** 2018/12/01
**Sample ID:** M-2018-C17 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |

**Maxxam ID:** UZ3775 **Collected:** 2018/12/01
**Sample ID:** M-2018-C18 SW **Shipped:**
**Matrix:** Water **Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |



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MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## TEST SUMMARY

**Maxxam ID:** UZ3776
**Sample ID:** M-2018-C19 SW
**Matrix:** Water

**Collected:** 2018/12/01
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |

**Maxxam ID:** UZ3777
**Sample ID:** M-2018-MBSW
**Matrix:** Water

**Collected:** 2018/11/25
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9274526 | N/A | 2018/12/28 | Report Automation Engine |
| Mercury (Total) by CVAF | CV/AF | 9277254 | 2018/12/27 | 2018/12/27 | Chamila Jayasinghe |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9276498 | 2018/12/24 | 2018/12/27 | Valentina Balada |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/28 | Rob Reinert |



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MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 5.7°C |
| Package 2 | 3.0°C |

Report to include results for Mercury by CVAF for all samples as per client request.

Effective October 1, 2013, the BC MOE SAMPLE PRESERVATION & HOLDING TIME REQUIREMENTS states that Mercury in water requires a glass or PTFE container with Hydrochloric Acid (HCl) preservation. Sample container and preservation received was not in compliance. Maxxam added HCl to stabilize Mercury for all samples prior to analysis.

Version 2: Total Sulphur has been included on this report for all samples.

**LOW LEVEL TOTAL METALS WITH CV HG (WATER) Comments**

Sample UZ3772 [M-2018-SW15] Elements by ICPMS Low Level (total): RDL raised due to concentration over linear range, sample dilution required.
Sample UZ3773 [M-2018-SW16] Elements by ICPMS Low Level (total): RDL raised due to concentration over linear range, sample dilution required.

**LL TOTAL METALS (DIGESTED) WITH CV HG Comments**

Sample UZ3775 [M-2018-C18 SW] Elements by ICPMS Digested LL (total): RDL raised due to concentration over linear range, sample dilution required.

**Results relate only to the items tested.**



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## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9276498 | Total Aluminum (Al) | 2018/12/27 | 105 | 80 - 120 | 102 | 80 - 120 | <0.0030 | mg/L | 8.7 | 20 |
| 9276498 | Total Antimony (Sb) | 2018/12/27 | 106 | 80 - 120 | 106 | 80 - 120 | <0.000020 | mg/L | 4.1 | 20 |
| 9276498 | Total Arsenic (As) | 2018/12/27 | 107 | 80 - 120 | 104 | 80 - 120 | <0.000020 | mg/L | 4.8 | 20 |
| 9276498 | Total Barium (Ba) | 2018/12/27 | 107 | 80 - 120 | 105 | 80 - 120 | <0.000050 | mg/L | 2.0 | 20 |
| 9276498 | Total Beryllium (Be) | 2018/12/27 | 96 | 80 - 120 | 101 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9276498 | Total Bismuth (Bi) | 2018/12/27 | 105 | 80 - 120 | 106 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9276498 | Total Boron (B) | 2018/12/27 | 94 | 80 - 120 | 97 | 80 - 120 | <0.010 | mg/L | 0.21 | 20 |
| 9276498 | Total Cadmium (Cd) | 2018/12/27 | 102 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | 6.8 | 20 |
| 9276498 | Total Chromium (Cr) | 2018/12/27 | 101 | 80 - 120 | 102 | 80 - 120 | <0.00010 | mg/L | 6.4 | 20 |
| 9276498 | Total Cobalt (Co) | 2018/12/27 | 103 | 80 - 120 | 105 | 80 - 120 | <0.000010 | mg/L | 2.2 | 20 |
| 9276498 | Total Copper (Cu) | 2018/12/27 | 100 | 80 - 120 | 102 | 80 - 120 | <0.00010 | mg/L | 1.7 | 20 |
| 9276498 | Total Iron (Fe) | 2018/12/27 | 108 | 80 - 120 | 106 | 80 - 120 | <0.0050 | mg/L | 0.48 | 20 |
| 9276498 | Total Lead (Pb) | 2018/12/27 | 107 | 80 - 120 | 108 | 80 - 120 | <0.000020 | mg/L | 0.73 | 20 |
| 9276498 | Total Lithium (Li) | 2018/12/27 | 93 | 80 - 120 | 97 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9276498 | Total Manganese (Mn) | 2018/12/27 | 102 | 80 - 120 | 105 | 80 - 120 | <0.00010 | mg/L | 0.25 | 20 |
| 9276498 | Total Molybdenum (Mo) | 2018/12/27 | 108 | 80 - 120 | 106 | 80 - 120 | <0.000050 | mg/L | 11 | 20 |
| 9276498 | Total Nickel (Ni) | 2018/12/27 | 103 | 80 - 120 | 105 | 80 - 120 | <0.00010 | mg/L | 11 | 20 |
| 9276498 | Total Selenium (Se) | 2018/12/27 | 103 | 80 - 120 | 103 | 80 - 120 | <0.000040 | mg/L | 2.1 | 20 |
| 9276498 | Total Silicon (Si) | 2018/12/27 | 97 | 80 - 120 | 100 | 80 - 120 | <0.050 | mg/L | 4.2 | 20 |
| 9276498 | Total Silver (Ag) | 2018/12/27 | 102 | 80 - 120 | 104 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9276498 | Total Strontium (Sr) | 2018/12/27 | 105 | 80 - 120 | 106 | 80 - 120 | <0.000050 | mg/L | 1.2 | 20 |
| 9276498 | Total Sulphur (S) | 2018/12/27 | 100 | 80 - 120 | 101 | 80 - 120 | <0.60 | mg/L | | |
| 9276498 | Total Thallium (Tl) | 2018/12/27 | 105 | 80 - 120 | 106 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9276498 | Total Tin (Sn) | 2018/12/27 | 104 | 80 - 120 | 106 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9276498 | Total Titanium (Ti) | 2018/12/27 | 111 | 80 - 120 | 105 | 80 - 120 | <0.0020 | mg/L | 8.1 | 20 |
| 9276498 | Total Uranium (U) | 2018/12/27 | 105 | 80 - 120 | 106 | 80 - 120 | <0.0000050 | mg/L | 5.1 | 20 |
| 9276498 | Total Vanadium (V) | 2018/12/27 | 105 | 80 - 120 | 105 | 80 - 120 | <0.00020 | mg/L | 4.8 | 20 |
| 9276498 | Total Zinc (Zn) | 2018/12/27 | 104 | 80 - 120 | 105 | 80 - 120 | <0.0010 | mg/L | 3.7 | 20 |
| 9276498 | Total Zirconium (Zr) | 2018/12/27 | 106 | 80 - 120 | 106 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9276527 | Total Aluminum (Al) | 2018/12/28 | 98 | 80 - 120 | 98 | 80 - 120 | <0.00050 | mg/L | 16 | 20 |
| 9276527 | Total Antimony (Sb) | 2018/12/28 | 101 | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9276527 | Total Arsenic (As) | 2018/12/28 | 100 | 80 - 120 | 102 | 80 - 120 | <0.000020 | mg/L | NC | 20 |



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## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9276527 | Total Barium (Ba) | 2018/12/28 | 100 | 80 - 120 | 102 | 80 - 120 | <0.000020 | mg/L | 5.0 | 20 |
| 9276527 | Total Beryllium (Be) | 2018/12/28 | 95 | 80 - 120 | 96 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9276527 | Total Bismuth (Bi) | 2018/12/28 | 101 | 80 - 120 | 104 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9276527 | Total Boron (B) | 2018/12/28 | 95 | 80 - 120 | 97 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 9276527 | Total Cadmium (Cd) | 2018/12/28 | 96 | 80 - 120 | 98 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9276527 | Total Chromium (Cr) | 2018/12/28 | 98 | 80 - 120 | 100 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9276527 | Total Cobalt (Co) | 2018/12/28 | 101 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9276527 | Total Copper (Cu) | 2018/12/28 | 98 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | 2.3 | 20 |
| 9276527 | Total Iron (Fe) | 2018/12/28 | 98 | 80 - 120 | 99 | 80 - 120 | <0.0010 | mg/L | NC | 20 |
| 9276527 | Total Lead (Pb) | 2018/12/28 | 102 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | 7.1 | 20 |
| 9276527 | Total Lithium (Li) | 2018/12/28 | 92 | 80 - 120 | 92 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9276527 | Total Manganese (Mn) | 2018/12/28 | 101 | 80 - 120 | 102 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9276527 | Total Molybdenum (Mo) | 2018/12/28 | 101 | 80 - 120 | 103 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9276527 | Total Nickel (Ni) | 2018/12/28 | 102 | 80 - 120 | 103 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9276527 | Total Phosphorus (P) | 2018/12/28 | 98 | 80 - 120 | 100 | 80 - 120 | <0.0020 | mg/L | NC | 20 |
| 9276527 | Total Selenium (Se) | 2018/12/28 | 98 | 80 - 120 | 100 | 80 - 120 | <0.000040 | mg/L | NC | 20 |
| 9276527 | Total Silicon (Si) | 2018/12/28 | 98 | 80 - 120 | 98 | 80 - 120 | <0.050 | mg/L | NC | 20 |
| 9276527 | Total Silver (Ag) | 2018/12/28 | 97 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9276527 | Total Strontium (Sr) | 2018/12/28 | 101 | 80 - 120 | 102 | 80 - 120 | <0.000050 | mg/L | 9.7 | 20 |
| 9276527 | Total Sulphur (S) | 2018/12/28 | 98 | 80 - 120 | 99 | 80 - 120 | <0.60 | mg/L | | |
| 9276527 | Total Thallium (Tl) | 2018/12/28 | 101 | 80 - 120 | 104 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9276527 | Total Tin (Sn) | 2018/12/28 | 99 | 80 - 120 | 102 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9276527 | Total Titanium (Ti) | 2018/12/28 | 100 | 80 - 120 | 103 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9276527 | Total Uranium (U) | 2018/12/28 | 103 | 80 - 120 | 105 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9276527 | Total Vanadium (V) | 2018/12/28 | 101 | 80 - 120 | 102 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9276527 | Total Zinc (Zn) | 2018/12/28 | 105 | 80 - 120 | 106 | 80 - 120 | <0.00010 | mg/L | 3.7 | 20 |
| 9276527 | Total Zirconium (Zr) | 2018/12/28 | 101 | 80 - 120 | 104 | 80 - 120 | <0.00010 | mg/L | NC | 20 |



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## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9277254 | Total Mercury (Hg) | 2018/12/27 | 81 | 80 - 120 | 86 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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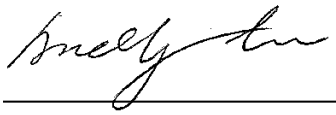
Maxxam Job #: B8B0754
Report Date: 2019/01/09

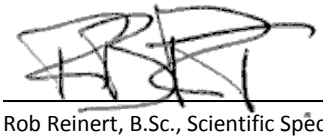
MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

## VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist



Rob Reinert, B.Sc., Scientific Specialist

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Your Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA
Your C.O.C. #: B8X6166-M058-01-01

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

**Report Date: 2018/12/28**
Report #: R2669221
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B8B1007**
**Received: 2018/12/18, 09:35**

Sample Matrix: Water
# Samples Received: 2

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) (1) | 1 | N/A | 2018/12/27 | BBY WI-00033 | Auto Calc |
| Hardness (calculated as CaCO3) | 1 | N/A | 2018/12/24 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 1 | N/A | 2018/12/24 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 1 | N/A | 2018/12/22 | BBY7SOP-00002 | EPA 6020b R2 m |
| Elements by ICPMS Digested LL (total) | 1 | 2018/12/21 | 2018/12/24 | BBY7SOP-00003 | EPA 6020b R2 m |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | 1 | N/A | 2018/12/27 | BBY WI-00033 | Auto Calc |
| Filter and HNO3 Preserve for Metals | 1 | N/A | 2018/12/21 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).


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Your Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA
Your C.O.C. #: B8X6166-M058-01-01

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

**Report Date: 2018/12/28**
Report #: R2669221
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B8B1007**
**Received: 2018/12/18, 09:35**
Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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Maxxam Job #: B8B1007
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

## RESULTS OF CHEMICAL ANALYSES OF WATER

| **Maxxam ID** | | UZ5355 | |
|---|---|---|---|
| **Sampling Date** | | 2018/11/29 | |
| **COC Number** | | B8X6166-M058-01-01 | |
| | **UNITS** | **G-2018-C6** | **QC Batch** |
| **Calculated Parameters** | | | |
| Filter and HNO3 Preservation | N/A | FIELD | ONSITE |



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Maxxam Job #: B8B1007
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | UZ5355 | | |
|---|---|---|---|---|
| Sampling Date | | 2018/11/29 | | |
| COC Number | | B8X6166-M058-01-01 | | |
| | UNITS | G-2018-C6 | RDL | QC Batch |
| **Calculated Parameters** | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 30.4 | 0.50 | 9273291 |
| **Dissolved Metals by ICPMS** | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.192 | 0.00050 | 9273795 |
| Dissolved Antimony (Sb) | mg/L | 0.000213 | 0.000020 | 9273795 |
| Dissolved Arsenic (As) | mg/L | 0.0288 | 0.000020 | 9273795 |
| Dissolved Barium (Ba) | mg/L | 0.00309 | 0.000020 | 9273795 |
| Dissolved Beryllium (Be) | mg/L | 0.000034 | 0.000010 | 9273795 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000062 | 0.0000050 | 9273795 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 9273795 |
| Dissolved Cadmium (Cd) | mg/L | <0.0000050 | 0.0000050 | 9273795 |
| Dissolved Chromium (Cr) | mg/L | 0.00021 | 0.00010 | 9273795 |
| Dissolved Cobalt (Co) | mg/L | 0.000828 | 0.0000050 | 9273795 |
| Dissolved Copper (Cu) | mg/L | 0.00197 | 0.000050 | 9273795 |
| Dissolved Iron (Fe) | mg/L | 1.06 | 0.0010 | 9273795 |
| Dissolved Lead (Pb) | mg/L | 0.000852 | 0.0000050 | 9273795 |
| Dissolved Lithium (Li) | mg/L | 0.00093 | 0.00050 | 9273795 |
| Dissolved Manganese (Mn) | mg/L | 0.302 | 0.000050 | 9273795 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000097 | 0.000050 | 9273795 |
| Dissolved Nickel (Ni) | mg/L | 0.00215 | 0.000020 | 9273795 |
| Dissolved Selenium (Se) | mg/L | 0.000063 | 0.000040 | 9273795 |
| Dissolved Silicon (Si) | mg/L | 1.82 | 0.050 | 9273795 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | 9273795 |
| Dissolved Strontium (Sr) | mg/L | 0.0788 | 0.000050 | 9273795 |
| Dissolved Thallium (Tl) | mg/L | 0.0000021 | 0.0000020 | 9273795 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9273795 |
| Dissolved Titanium (Ti) | mg/L | 0.00130 | 0.00050 | 9273795 |
| Dissolved Uranium (U) | mg/L | 0.0000794 | 0.0000020 | 9273795 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00020 | 9273795 |
| Dissolved Zinc (Zn) | mg/L | 0.00137 | 0.00010 | 9273795 |
| Dissolved Zirconium (Zr) | mg/L | 0.00025 | 0.00010 | 9273795 |
| Dissolved Calcium (Ca) | mg/L | 8.30 | 0.050 | 9274094 |
| Dissolved Magnesium (Mg) | mg/L | 2.34 | 0.050 | 9274094 |
| Dissolved Potassium (K) | mg/L | 0.633 | 0.050 | 9274094 |
| RDL = Reportable Detection Limit | | | | |



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Maxxam Job #: B8B1007
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | UZ5355 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2018/11/29 | | |
| **COC Number** | | B8X6166-M058-01-01 | | |
| | **UNITS** | **G-2018-C6** | **RDL** | **QC Batch** |
| Dissolved Sodium (Na) | mg/L | 3.33 | 0.050 | 9274094 |
| Dissolved Sulphur (S) | mg/L | 1.18 | 0.60 | 9273795 |
| RDL = Reportable Detection Limit | | | | |



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Maxxam Job #: B8B1007
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

## LL TOTAL METALS (DIGESTED) IN WATER

| Maxxam ID | | UZ5354 | | |
|---|---|---|---|---|
| Sampling Date | | 2018/11/28 | | |
| COC Number | | B8X6166-M058-01-01 | | |
| | UNITS | G-2018-C6 | RDL | QC Batch |
| **Calculated Parameters** | | | | |
| Total Hardness (CaCO3) | mg/L | 30.6 | 0.50 | 9273249 |
| **Total Metals by ICPMS** | | | | |
| Total Aluminum (Al) | mg/L | 0.196 | 0.0030 | 9274584 |
| Total Antimony (Sb) | mg/L | 0.000272 | 0.000020 | 9274584 |
| Total Arsenic (As) | mg/L | 0.0303 | 0.000020 | 9274584 |
| Total Barium (Ba) | mg/L | 0.00299 | 0.000050 | 9274584 |
| Total Beryllium (Be) | mg/L | 0.000029 | 0.000010 | 9274584 |
| Total Bismuth (Bi) | mg/L | 0.000018 | 0.000010 | 9274584 |
| Total Boron (B) | mg/L | <0.010 | 0.010 | 9274584 |
| Total Cadmium (Cd) | mg/L | 0.0000050 | 0.0000050 | 9274584 |
| Total Chromium (Cr) | mg/L | 0.00024 | 0.00010 | 9274584 |
| Total Cobalt (Co) | mg/L | 0.000883 | 0.000010 | 9274584 |
| Total Copper (Cu) | mg/L | 0.00573 | 0.00010 | 9274584 |
| Total Iron (Fe) | mg/L | 1.13 | 0.0050 | 9274584 |
| Total Lead (Pb) | mg/L | 0.00186 | 0.000020 | 9274584 |
| Total Lithium (Li) | mg/L | 0.00085 | 0.00050 | 9274584 |
| Total Manganese (Mn) | mg/L | 0.314 | 0.00010 | 9274584 |
| Total Molybdenum (Mo) | mg/L | 0.000106 | 0.000050 | 9274584 |
| Total Nickel (Ni) | mg/L | 0.00233 | 0.00010 | 9274584 |
| Total Selenium (Se) | mg/L | 0.000083 | 0.000040 | 9274584 |
| Total Silicon (Si) | mg/L | 1.75 | 0.050 | 9274584 |
| Total Silver (Ag) | mg/L | <0.000010 | 0.000010 | 9274584 |
| Total Strontium (Sr) | mg/L | 0.0792 | 0.000050 | 9274584 |
| Total Thallium (Tl) | mg/L | 0.0000037 | 0.0000020 | 9274584 |
| Total Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9274584 |
| Total Titanium (Ti) | mg/L | 0.0021 | 0.0020 | 9274584 |
| Total Uranium (U) | mg/L | 0.0000890 | 0.0000050 | 9274584 |
| Total Vanadium (V) | mg/L | <0.00020 | 0.00020 | 9274584 |
| Total Zinc (Zn) | mg/L | 0.0013 | 0.0010 | 9274584 |
| Total Zirconium (Zr) | mg/L | 0.00021 | 0.00010 | 9274584 |
| Total Calcium (Ca) | mg/L | 8.36 | 0.25 | 9274099 |
| Total Magnesium (Mg) | mg/L | 2.37 | 0.25 | 9274099 |
| Total Potassium (K) | mg/L | 0.63 | 0.25 | 9274099 |
| RDL = Reportable Detection Limit | | | | |



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Maxxam Job #: B8B1007
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

## LL TOTAL METALS (DIGESTED) IN WATER

| **Maxxam ID** | | UZ5354 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2018/11/28 | | |
| **COC Number** | | B8X6166-M058-01-01 | | |
| | **UNITS** | **G-2018-C6** | **RDL** | **QC Batch** |
| Total Sodium (Na) | mg/L | 3.39 | 0.25 | 9274099 |
| RDL = Reportable Detection Limit | | | | |



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Maxxam Job #: B8B1007
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

## TEST SUMMARY

**Maxxam ID:** UZ5354
**Sample ID:** G-2018-C6
**Matrix:** Water

**Collected:** 2018/11/28
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness Total (calculated as CaCO3) | CALC | 9273249 | N/A | 2018/12/27 | Report Automation Engine |
| Elements by ICPMS Digested LL (total) | ICP/CRCM | 9274584 | 2018/12/21 | 2018/12/24 | Andrew An |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | CALC | 9274099 | N/A | 2018/12/27 | Report Automation Engine |

**Maxxam ID:** UZ5355
**Sample ID:** G-2018-C6
**Matrix:** Water

**Collected:** 2018/11/29
**Shipped:**
**Received:** 2018/12/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9273291 | N/A | 2018/12/24 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9274094 | N/A | 2018/12/24 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9273795 | N/A | 2018/12/22 | Andrew An |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2018/12/21 | Juvahnne Cris Roy |



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Maxxam Job #: B8B1007
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 5.7°C |
| Package 2 | 3.0°C |

**Results relate only to the items tested.**



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Maxxam Job #: B8B1007
Report Date: 2018/12/28

## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9273795 | Dissolved Aluminum (Al) | 2018/12/22 | 101 | 80 - 120 | 108 | 80 - 120 | <0.00050 | mg/L | 1.5 | 20 |
| 9273795 | Dissolved Antimony (Sb) | 2018/12/22 | 100 | 80 - 120 | 108 | 80 - 120 | <0.000020 | mg/L | 4.3 | 20 |
| 9273795 | Dissolved Arsenic (As) | 2018/12/22 | 104 | 80 - 120 | 109 | 80 - 120 | <0.000020 | mg/L | 0.64 | 20 |
| 9273795 | Dissolved Barium (Ba) | 2018/12/22 | NC | 80 - 120 | 106 | 80 - 120 | <0.000020 | mg/L | 0.38 | 20 |
| 9273795 | Dissolved Beryllium (Be) | 2018/12/22 | 97 | 80 - 120 | 102 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9273795 | Dissolved Bismuth (Bi) | 2018/12/22 | 93 | 80 - 120 | 103 | 80 - 120 | <0.0000050 | mg/L | 5.2 | 20 |
| 9273795 | Dissolved Boron (B) | 2018/12/22 | 95 | 80 - 120 | 101 | 80 - 120 | <0.010 | mg/L | 1.4 | 20 |
| 9273795 | Dissolved Cadmium (Cd) | 2018/12/22 | 99 | 80 - 120 | 107 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9273795 | Dissolved Chromium (Cr) | 2018/12/22 | 95 | 80 - 120 | 104 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9273795 | Dissolved Cobalt (Co) | 2018/12/22 | 92 | 80 - 120 | 103 | 80 - 120 | <0.0000050 | mg/L | 1.9 | 20 |
| 9273795 | Dissolved Copper (Cu) | 2018/12/22 | 88 | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | 0.74 | 20 |
| 9273795 | Dissolved Iron (Fe) | 2018/12/22 | 99 | 80 - 120 | 106 | 80 - 120 | <0.0010 | mg/L | 1.8 | 20 |
| 9273795 | Dissolved Lead (Pb) | 2018/12/22 | 94 | 80 - 120 | 104 | 80 - 120 | <0.0000050 | mg/L | 0.50 | 20 |
| 9273795 | Dissolved Lithium (Li) | 2018/12/22 | 97 | 80 - 120 | 103 | 80 - 120 | <0.00050 | mg/L | 0.34 | 20 |
| 9273795 | Dissolved Manganese (Mn) | 2018/12/22 | 95 | 80 - 120 | 105 | 80 - 120 | <0.000050 | mg/L | 0.21 | 20 |
| 9273795 | Dissolved Molybdenum (Mo) | 2018/12/22 | 104 | 80 - 120 | 108 | 80 - 120 | <0.000050 | mg/L | 1.1 | 20 |
| 9273795 | Dissolved Nickel (Ni) | 2018/12/22 | 92 | 80 - 120 | 104 | 80 - 120 | <0.000020 | mg/L | 3.8 | 20 |
| 9273795 | Dissolved Selenium (Se) | 2018/12/22 | 98 | 80 - 120 | 103 | 80 - 120 | <0.000040 | mg/L | 1.9 | 20 |
| 9273795 | Dissolved Silicon (Si) | 2018/12/22 | 96 | 80 - 120 | 103 | 80 - 120 | <0.050 | mg/L | 2.1 | 20 |
| 9273795 | Dissolved Silver (Ag) | 2018/12/22 | 98 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9273795 | Dissolved Strontium (Sr) | 2018/12/22 | NC | 80 - 120 | 107 | 80 - 120 | <0.000050 | mg/L | 2.2 | 20 |
| 9273795 | Dissolved Sulphur (S) | 2018/12/21 | 100 | 80 - 120 | 106 | 80 - 120 | <0.60 | mg/L | | |
| 9273795 | Dissolved Thallium (Tl) | 2018/12/22 | 95 | 80 - 120 | 103 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9273795 | Dissolved Tin (Sn) | 2018/12/22 | 98 | 80 - 120 | 107 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9273795 | Dissolved Titanium (Ti) | 2018/12/22 | 101 | 80 - 120 | 107 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9273795 | Dissolved Uranium (U) | 2018/12/22 | 98 | 80 - 120 | 104 | 80 - 120 | <0.0000020 | mg/L | 2.1 | 20 |
| 9273795 | Dissolved Vanadium (V) | 2018/12/22 | 98 | 80 - 120 | 105 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9273795 | Dissolved Zinc (Zn) | 2018/12/22 | 96 | 80 - 120 | 112 | 80 - 120 | <0.00010 | mg/L | 1.5 | 20 |
| 9273795 | Dissolved Zirconium (Zr) | 2018/12/22 | 103 | 80 - 120 | 107 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9274584 | Total Aluminum (Al) | 2018/12/24 | 110 | 80 - 120 | 105 | 80 - 120 | 0.0047, RDL=0.0030 (2) | mg/L | 7.5 | 20 |
| 9274584 | Total Antimony (Sb) | 2018/12/24 | 107 | 80 - 120 | 106 | 80 - 120 | <0.000020 | mg/L | 1.4 | 20 |
| 9274584 | Total Arsenic (As) | 2018/12/24 | 109 | 80 - 120 | 105 | 80 - 120 | <0.000020 | mg/L | 0.49 | 20 |



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Maxxam Job #: B8B1007
Report Date: 2018/12/28

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9274584 | Total Barium (Ba) | 2018/12/24 | 99 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | 3.9 | 20 |
| 9274584 | Total Beryllium (Be) | 2018/12/24 | 107 | 80 - 120 | 102 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9274584 | Total Bismuth (Bi) | 2018/12/24 | 102 | 80 - 120 | 101 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9274584 | Total Boron (B) | 2018/12/24 | 103 | 80 - 120 | 101 | 80 - 120 | <0.010 | mg/L | 4.0 | 20 |
| 9274584 | Total Cadmium (Cd) | 2018/12/24 | 106 | 80 - 120 | 103 | 80 - 120 | <0.0000050 | mg/L | 2.4 | 20 |
| 9274584 | Total Chromium (Cr) | 2018/12/24 | 102 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | 2.8 | 20 |
| 9274584 | Total Cobalt (Co) | 2018/12/24 | 106 | 80 - 120 | 105 | 80 - 120 | <0.000010 | mg/L | 4.7 | 20 |
| 9274584 | Total Copper (Cu) | 2018/12/24 | 101 | 80 - 120 | 100 | 80 - 120 | <0.00010 | mg/L | 6.3 | 20 |
| 9274584 | Total Iron (Fe) | 2018/12/24 | 107 | 80 - 120 | 102 | 80 - 120 | <0.0050 | mg/L | 1.9 | 20 |
| 9274584 | Total Lead (Pb) | 2018/12/24 | 106 | 80 - 120 | 103 | 80 - 120 | <0.000020 | mg/L | 2.6 | 20 |
| 9274584 | Total Lithium (Li) | 2018/12/24 | 101 | 80 - 120 | 101 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9274584 | Total Manganese (Mn) | 2018/12/24 | 102 | 80 - 120 | 104 | 80 - 120 | <0.00010 | mg/L | 3.9 | 20 |
| 9274584 | Total Molybdenum (Mo) | 2018/12/24 | 111 | 80 - 120 | 107 | 80 - 120 | <0.000050 | mg/L | 1.1 | 20 |
| 9274584 | Total Nickel (Ni) | 2018/12/24 | 103 | 80 - 120 | 103 | 80 - 120 | <0.00010 | mg/L | 3.4 | 20 |
| 9274584 | Total Selenium (Se) | 2018/12/24 | 109 | 80 - 120 | 106 | 80 - 120 | <0.000040 | mg/L | 17 | 20 |
| 9274584 | Total Silicon (Si) | 2018/12/24 | 93 | 80 - 120 | 93 | 80 - 120 | <0.050 | mg/L | 3.9 | 20 |
| 9274584 | Total Silver (Ag) | 2018/12/24 | 105 | 80 - 120 | 101 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9274584 | Total Strontium (Sr) | 2018/12/24 | 108 | 80 - 120 | 105 | 80 - 120 | 0.000218, RDL=0.000050 (3) | mg/L | 0.66 | 20 |
| 9274584 | Total Thallium (Tl) | 2018/12/24 | 108 | 80 - 120 | 101 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9274584 | Total Tin (Sn) | 2018/12/24 | 107 | 80 - 120 | 103 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9274584 | Total Titanium (Ti) | 2018/12/24 | 114 | 80 - 120 | 104 | 80 - 120 | <0.0020 | mg/L | 4.7 | 20 |
| 9274584 | Total Uranium (U) | 2018/12/24 | 109 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | 5.8 | 20 |
| 9274584 | Total Vanadium (V) | 2018/12/24 | 104 | 80 - 120 | 102 | 80 - 120 | <0.00020 | mg/L | 1.4 | 20 |
| 9274584 | Total Zinc (Zn) | 2018/12/24 | NC | 80 - 120 | 105 | 80 - 120 | <0.0010 | mg/L | 3.5 | 20 |



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Maxxam Job #: B8B1007
Report Date: 2018/12/28

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9274584 | Total Zirconium (Zr) | 2018/12/24 | 124 (1) | 80 - 120 | 103 | 80 - 120 | <0.00010 | mg/L | 6.0 | 20 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Method Blank exceeds acceptance limits for Aluminum. Sample values for Aluminum are >10x the concentration of the method blank and the contamination is considered irrelevant.

(3) Method Blank exceeds acceptance limits for Strontium. Sample values for Strontium are >10x the concentration of the method blank and the contamination is considered irrelevant.



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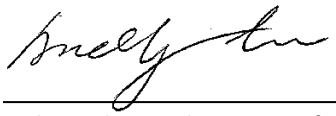
Maxxam Job #: B8B1007
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

## VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist

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Success Through Science®

Your Project #: MB929300
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b929300-m058-01-01, b929300-m058-02-01

**Report Date: 2019/02/12**
Report #: R2685060
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B909556**
**Received: 2019/02/06, 11:30**

Sample Matrix: Water
# Samples Received: 20

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | 20 | N/A | 2019/02/09 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 20 | N/A | 2019/02/09 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 20 | N/A | 2019/02/08 | BBY7SOP-00002 | EPA 6020b R2 m |
| Filter and HNO3 Preserve for Metals | 20 | N/A | 2019/02/07 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



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Your Project #: MB929300
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b929300-m058-01-01, b929300-m058-02-01

**Report Date: 2019/02/12**
Report #: R2685060
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B909556**
**Received: 2019/02/06, 11:30**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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

Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | VE9309 | VE9310 | VE9311 | VE9312 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | 2019/02/01 | |
| COC Number | | b929300-m058-01-01 | b929300-m058-01-01 | b929300-m058-01-01 | b929300-m058-01-01 | |
| | UNITS | M-2018-C5 (30-50) | M-2018-SFC-T25 | M-2018-SFC-T26 | M-2018-SFC-T27 | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VE9313 | VE9314 | VE9315 | VE9316 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | 2019/02/01 | |
| COC Number | | b929300-m058-01-01 | b929300-m058-01-01 | b929300-m058-01-01 | b929300-m058-01-01 | |
| | UNITS | M-2018-SFC-T32 | M-2018-SFC-T17 | M-2018-SFC-T20 | M-2018-SFC-T30 | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VE9317 | VE9318 | VE9319 | VE9320 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | 2019/02/01 | |
| COC Number | | b929300-m058-01-01 | b929300-m058-01-01 | b929300-m058-02-01 | b929300-m058-02-01 | |
| | UNITS | M-2018-C19 (0-5) | M-2018-C19 (20-30) | M-2018-C11 (10-20) | M-2018-C11 (30-40) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VE9321 | VE9322 | VE9323 | VE9324 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | 2019/02/01 | |
| COC Number | | b929300-m058-02-01 | b929300-m058-02-01 | b929300-m058-02-01 | b929300-m058-02-01 | |
| | UNITS | M-2018-C2 (0-5) | M-2018-C2 (10-20) | M-2018-C2 (40-60) | M-2018-C2 (80-100) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VE9325 | VE9326 | VE9327 | VE9328 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | 2019/02/01 | |
| COC Number | | b929300-m058-02-01 | b929300-m058-02-01 | b929300-m058-02-01 | b929300-m058-02-01 | |
| | UNITS | M-2018-C3 (0-5) | M-2018-C3 (40-80) | M-2018-C3 (140-160) | M-2018-C3 (160-180) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |



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Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9309 | VE9310 | | VE9311 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | | 2019/02/01 | | |
| COC Number | | b929300-m058-01-01 | b929300-m058-01-01 | | b929300-m058-01-01 | | |
| | UNITS | M-2018-C5 (30-50) | M-2018-SFC-T25 | RDL | M-2018-SFC-T26 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 129 | 22.9 | 0.50 | 4.76 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.147 | 0.424 | 0.0025 | 0.0856 | 0.00050 | 9317235 |
| Dissolved Antimony (Sb) | mg/L | 0.0149 | 0.00530 | 0.00010 | 0.00258 | 0.000020 | 9317235 |
| Dissolved Arsenic (As) | mg/L | 1.37 | 1.61 | 0.00010 | 0.131 | 0.000020 | 9317235 |
| Dissolved Barium (Ba) | mg/L | 0.0121 | 0.00484 | 0.00010 | 0.00317 | 0.000020 | 9317235 |
| Dissolved Beryllium (Be) | mg/L | <0.000050 | <0.000050 | 0.000050 | 0.000013 | 0.000010 | 9317235 |
| Dissolved Bismuth (Bi) | mg/L | 0.000046 | 0.000221 | 0.000025 | <0.0000050 | 0.0000050 | 9317235 |
| Dissolved Boron (B) | mg/L | <0.050 | <0.050 | 0.050 | <0.010 | 0.010 | 9317235 |
| Dissolved Cadmium (Cd) | mg/L | <0.000025 | 0.000036 | 0.000025 | 0.0000424 | 0.0000050 | 9317235 |
| Dissolved Chromium (Cr) | mg/L | 0.00060 | 0.00118 | 0.00050 | 0.00014 | 0.00010 | 9317235 |
| Dissolved Cobalt (Co) | mg/L | 0.00877 | 0.00193 | 0.000025 | 0.00396 | 0.0000050 | 9317235 |
| Dissolved Copper (Cu) | mg/L | 0.00309 | 0.0125 | 0.00025 | 0.0162 | 0.000050 | 9317235 |
| Dissolved Iron (Fe) | mg/L | 0.370 | 1.83 | 0.0050 | 0.0326 | 0.0010 | 9317235 |
| Dissolved Lead (Pb) | mg/L | 0.00285 | 0.00949 | 0.000025 | 0.000113 | 0.0000050 | 9317235 |
| Dissolved Lithium (Li) | mg/L | <0.0025 | 0.0038 | 0.0025 | 0.00225 | 0.00050 | 9317235 |
| Dissolved Manganese (Mn) | mg/L | 3.12 | 0.121 | 0.00025 | 0.0916 | 0.000050 | 9317235 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00122 | <0.00025 | 0.00025 | <0.000050 | 0.000050 | 9317235 |
| Dissolved Nickel (Ni) | mg/L | 0.0275 | 0.00634 | 0.00010 | 0.00582 | 0.000020 | 9317235 |
| Dissolved Selenium (Se) | mg/L | <0.00020 | <0.00020 | 0.00020 | 0.000048 | 0.000040 | 9317235 |
| Dissolved Silicon (Si) | mg/L | 1.21 | 1.12 | 0.25 | 1.29 | 0.050 | 9317235 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | <0.000025 | 0.000025 | <0.0000050 | 0.0000050 | 9317235 |
| Dissolved Strontium (Sr) | mg/L | 0.0812 | 0.0135 | 0.00025 | 0.00482 | 0.000050 | 9317235 |
| Dissolved Thallium (Tl) | mg/L | <0.000010 | <0.000010 | 0.000010 | 0.0000069 | 0.0000020 | 9317235 |
| Dissolved Tin (Sn) | mg/L | <0.0010 | <0.0010 | 0.0010 | <0.00020 | 0.00020 | 9317235 |
| Dissolved Titanium (Ti) | mg/L | 0.0054 | 0.0119 | 0.0025 | <0.00050 | 0.00050 | 9317235 |
| Dissolved Uranium (U) | mg/L | 0.000027 | 0.000047 | 0.000010 | 0.0000051 | 0.0000020 | 9317235 |
| Dissolved Vanadium (V) | mg/L | <0.0010 | <0.0010 | 0.0010 | <0.00020 | 0.00020 | 9317235 |
| Dissolved Zinc (Zn) | mg/L | 0.0148 | 0.0164 | 0.00050 | 0.0202 | 0.00010 | 9317235 |
| Dissolved Zirconium (Zr) | mg/L | <0.00050 | <0.00050 | 0.00050 | <0.00010 | 0.00010 | 9317235 |
| Dissolved Calcium (Ca) | mg/L | 30.2 | 5.42 | 0.25 | 0.980 | 0.050 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 13.1 | 2.28 | 0.25 | 0.563 | 0.050 | 9316618 |

RDL = Reportable Detection Limit



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Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9309 | VE9310 | | VE9311 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | | 2019/02/01 | | |
| COC Number | | b929300-m058-01-01 | b929300-m058-01-01 | | b929300-m058-01-01 | | |
| | UNITS | M-2018-C5 (30-50) | M-2018-SFC-T25 | RDL | M-2018-SFC-T26 | RDL | QC Batch |
| Dissolved Potassium (K) | mg/L | 6.60 | 3.62 | 0.25 | 0.874 | 0.050 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 4.49 | 6.63 | 0.25 | 1.44 | 0.050 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 47.5 | 8.7 | 3.0 | 3.05 | 0.60 | 9317235 |
| RDL = Reportable Detection Limit | | | | | | | |



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Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9311 | | | VE9312 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | | 2019/02/01 | | |
| COC Number | | b929300-m058-01-01 | | | b929300-m058-01-01 | | |
| | UNITS | M-2018-SFC-T26 Lab-Dup | RDL | QC Batch | M-2018-SFC-T27 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | | | | 17.2 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0866 | 0.00050 | 9317235 | 8.11 | 0.00050 | 9317235 |
| Dissolved Antimony (Sb) | mg/L | 0.00258 | 0.000020 | 9317235 | 0.00173 | 0.000020 | 9317235 |
| Dissolved Arsenic (As) | mg/L | 0.133 | 0.000020 | 9317235 | 0.386 | 0.000020 | 9317235 |
| Dissolved Barium (Ba) | mg/L | 0.00318 | 0.000020 | 9317235 | 0.000203 | 0.000020 | 9317235 |
| Dissolved Beryllium (Be) | mg/L | 0.000019 | 0.000010 | 9317235 | 0.000136 | 0.000010 | 9317235 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000050 | 9317235 | <0.0000050 | 0.0000050 | 9317235 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 9317235 | <0.010 | 0.010 | 9317235 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000418 | 0.0000050 | 9317235 | 0.000168 | 0.0000050 | 9317235 |
| Dissolved Chromium (Cr) | mg/L | 0.00013 | 0.00010 | 9317235 | 0.00132 | 0.00010 | 9317235 |
| Dissolved Cobalt (Co) | mg/L | 0.00402 | 0.0000050 | 9317235 | 0.0168 | 0.0000050 | 9317235 |
| Dissolved Copper (Cu) | mg/L | 0.0166 | 0.000050 | 9317235 | 0.184 | 0.000050 | 9317235 |
| Dissolved Iron (Fe) | mg/L | 0.0331 | 0.0010 | 9317235 | 0.744 | 0.0010 | 9317235 |
| Dissolved Lead (Pb) | mg/L | 0.000114 | 0.0000050 | 9317235 | 0.00126 | 0.0000050 | 9317235 |
| Dissolved Lithium (Li) | mg/L | 0.00223 | 0.00050 | 9317235 | 0.00965 | 0.00050 | 9317235 |
| Dissolved Manganese (Mn) | mg/L | 0.0928 | 0.000050 | 9317235 | 0.508 | 0.000050 | 9317235 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000050 | 9317235 | <0.000050 | 0.000050 | 9317235 |
| Dissolved Nickel (Ni) | mg/L | 0.00587 | 0.000020 | 9317235 | 0.0424 | 0.000020 | 9317235 |
| Dissolved Selenium (Se) | mg/L | 0.000052 | 0.000040 | 9317235 | 0.000556 | 0.000040 | 9317235 |
| Dissolved Silicon (Si) | mg/L | 1.31 | 0.050 | 9317235 | 4.20 | 0.050 | 9317235 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | 9317235 | <0.0000050 | 0.0000050 | 9317235 |
| Dissolved Strontium (Sr) | mg/L | 0.00485 | 0.000050 | 9317235 | 0.0124 | 0.000050 | 9317235 |
| Dissolved Thallium (Tl) | mg/L | 0.0000093 | 0.0000020 | 9317235 | 0.0000420 | 0.0000020 | 9317235 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9317235 | <0.00020 | 0.00020 | 9317235 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00050 | 9317235 | 0.00113 | 0.00050 | 9317235 |
| Dissolved Uranium (U) | mg/L | 0.0000046 | 0.0000020 | 9317235 | 0.0000723 | 0.0000020 | 9317235 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00020 | 9317235 | 0.00026 | 0.00020 | 9317235 |
| Dissolved Zinc (Zn) | mg/L | 0.0206 | 0.00010 | 9317235 | 0.265 | 0.00010 | 9317235 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | 9317235 | <0.00010 | 0.00010 | 9317235 |
| Dissolved Calcium (Ca) | mg/L | | | | 3.26 | 0.050 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | | | | 2.21 | 0.050 | 9316618 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9311 | | | VE9312 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | | 2019/02/01 | | |
| COC Number | | b929300-m058-01-01 | | | b929300-m058-01-01 | | |
| | UNITS | M-2018-SFC-T26 Lab-Dup | RDL | QC Batch | M-2018-SFC-T27 | RDL | QC Batch |
| Dissolved Potassium (K) | mg/L | | | | 2.16 | 0.050 | 9316618 |
| Dissolved Sodium (Na) | mg/L | | | | 1.13 | 0.050 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 3.24 | 0.60 | 9317235 | 38.3 | 0.60 | 9317235 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9313 | | VE9314 | | VE9315 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | 2019/02/01 | | 2019/02/01 | | |
| COC Number | | b929300-m058-01-01 | | b929300-m058-01-01 | | b929300-m058-01-01 | | |
| | UNITS | M-2018-SFC-T32 | RDL | M-2018-SFC-T17 | RDL | M-2018-SFC-T20 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 506 | 0.50 | 13.5 | 0.50 | 11.3 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0146 | 0.0010 | 0.0160 | 0.00050 | 0.160 | 0.0025 | 9317235 |
| Dissolved Antimony (Sb) | mg/L | 0.0269 | 0.000040 | 0.00541 | 0.000020 | 0.00186 | 0.00010 | 9317235 |
| Dissolved Arsenic (As) | mg/L | 0.870 | 0.000040 | 0.0757 | 0.000020 | 1.48 | 0.00010 | 9317235 |
| Dissolved Barium (Ba) | mg/L | 0.00300 | 0.000040 | 0.000256 | 0.000020 | 0.00177 | 0.00010 | 9317235 |
| Dissolved Beryllium (Be) | mg/L | <0.000020 | 0.000020 | <0.000010 | 0.000010 | <0.000050 | 0.000050 | 9317235 |
| Dissolved Bismuth (Bi) | mg/L | <0.000010 | 0.000010 | 0.0000173 | 0.0000050 | 0.000147 | 0.000025 | 9317235 |
| Dissolved Boron (B) | mg/L | <0.020 | 0.020 | 0.010 | 0.010 | <0.050 | 0.050 | 9317235 |
| Dissolved Cadmium (Cd) | mg/L | 0.000311 | 0.000010 | 0.000107 | 0.0000050 | <0.000025 | 0.000025 | 9317235 |
| Dissolved Chromium (Cr) | mg/L | 0.00027 | 0.00020 | 0.00024 | 0.00010 | 0.00076 | 0.00050 | 9317235 |
| Dissolved Cobalt (Co) | mg/L | 0.191 | 0.000010 | 0.0144 | 0.0000050 | 0.00116 | 0.000025 | 9317235 |
| Dissolved Copper (Cu) | mg/L | 0.00825 | 0.00010 | 0.0168 | 0.000050 | 0.00893 | 0.00025 | 9317235 |
| Dissolved Iron (Fe) | mg/L | 0.0245 | 0.0020 | 0.0984 | 0.0010 | 0.906 | 0.0050 | 9317235 |
| Dissolved Lead (Pb) | mg/L | 0.000115 | 0.000010 | 0.000907 | 0.0000050 | 0.00362 | 0.000025 | 9317235 |
| Dissolved Lithium (Li) | mg/L | 0.0096 | 0.0010 | 0.00606 | 0.00050 | <0.0025 | 0.0025 | 9317235 |
| Dissolved Manganese (Mn) | mg/L | 4.18 | 0.00010 | 0.162 | 0.000050 | 0.0217 | 0.00025 | 9317235 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00019 | 0.00010 | <0.000050 | 0.000050 | <0.00025 | 0.00025 | 9317235 |
| Dissolved Nickel (Ni) | mg/L | 0.301 | 0.000040 | 0.0183 | 0.000020 | 0.00287 | 0.00010 | 9317235 |
| Dissolved Selenium (Se) | mg/L | 0.00212 | 0.000080 | 0.000063 | 0.000040 | <0.00020 | 0.00020 | 9317235 |
| Dissolved Silicon (Si) | mg/L | 2.02 | 0.10 | 0.975 | 0.050 | 0.40 | 0.25 | 9317235 |
| Dissolved Silver (Ag) | mg/L | <0.000010 | 0.000010 | <0.0000050 | 0.0000050 | <0.000025 | 0.000025 | 9317235 |
| Dissolved Strontium (Sr) | mg/L | 0.285 | 0.00010 | 0.0112 | 0.000050 | 0.00995 | 0.00025 | 9317235 |
| Dissolved Thallium (Tl) | mg/L | 0.0000199 | 0.0000040 | 0.0000110 | 0.0000020 | <0.000010 | 0.000010 | 9317235 |
| Dissolved Tin (Sn) | mg/L | <0.00040 | 0.00040 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9317235 |
| Dissolved Titanium (Ti) | mg/L | <0.0010 | 0.0010 | 0.00075 | 0.00050 | 0.0075 | 0.0025 | 9317235 |
| Dissolved Uranium (U) | mg/L | <0.0000040 | 0.0000040 | 0.0000021 | 0.0000020 | 0.000024 | 0.000010 | 9317235 |
| Dissolved Vanadium (V) | mg/L | <0.00040 | 0.00040 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9317235 |
| Dissolved Zinc (Zn) | mg/L | 0.498 | 0.00020 | 0.0807 | 0.00010 | 0.0199 | 0.00050 | 9317235 |
| Dissolved Zirconium (Zr) | mg/L | <0.00020 | 0.00020 | <0.00010 | 0.00010 | <0.00050 | 0.00050 | 9317235 |
| Dissolved Calcium (Ca) | mg/L | 152 | 0.10 | 3.88 | 0.050 | 2.51 | 0.25 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 30.5 | 0.10 | 0.918 | 0.050 | 1.21 | 0.25 | 9316618 |

RDL = Reportable Detection Limit



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## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9313 | | VE9314 | | VE9315 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | 2019/02/01 | | 2019/02/01 | | |
| COC Number | | b929300-m058-01-01 | | b929300-m058-01-01 | | b929300-m058-01-01 | | |
| | UNITS | M-2018-SFC-T32 | RDL | M-2018-SFC-T17 | RDL | M-2018-SFC-T20 | RDL | QC Batch |
| Dissolved Potassium (K) | mg/L | 10.7 | 0.10 | 1.73 | 0.050 | 2.37 | 0.25 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 5.06 | 0.10 | 4.03 | 0.050 | 0.94 | 0.25 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 193 | 1.2 | 7.09 | 0.60 | <3.0 | 3.0 | 9317235 |
| RDL = Reportable Detection Limit | | | | | | | | |



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## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9316 | | VE9317 | | VE9318 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | 2019/02/01 | | 2019/02/01 | | |
| COC Number | | b929300-m058-01-01 | | b929300-m058-01-01 | | b929300-m058-01-01 | | |
| | UNITS | M-2018-SFC-T30 | RDL | M-2018-C19 (0-5) | RDL | M-2018-C19 (20-30) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 38.3 | 0.50 | 16.3 | 0.50 | 64.8 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0508 | 0.0010 | 0.130 | 0.00050 | 0.162 | 0.0025 | 9317235 |
| Dissolved Antimony (Sb) | mg/L | 0.0114 | 0.000040 | 0.00186 | 0.000020 | 0.00169 | 0.00010 | 9317235 |
| Dissolved Arsenic (As) | mg/L | 0.955 | 0.000040 | 0.129 | 0.000020 | 3.53 | 0.00010 | 9317235 |
| Dissolved Barium (Ba) | mg/L | 0.000463 | 0.000040 | 0.0223 | 0.000020 | 0.0122 | 0.00010 | 9317235 |
| Dissolved Beryllium (Be) | mg/L | <0.000020 | 0.000020 | 0.000034 | 0.000010 | 0.000492 | 0.000050 | 9317235 |
| Dissolved Bismuth (Bi) | mg/L | 0.000018 | 0.000010 | 0.0000490 | 0.0000050 | <0.000025 | 0.000025 | 9317235 |
| Dissolved Boron (B) | mg/L | <0.020 | 0.020 | 0.013 | 0.010 | <0.050 | 0.050 | 9317235 |
| Dissolved Cadmium (Cd) | mg/L | <0.000010 | 0.000010 | 0.000132 | 0.0000050 | 0.000587 | 0.000025 | 9317235 |
| Dissolved Chromium (Cr) | mg/L | 0.00047 | 0.00020 | 0.00286 | 0.00010 | <0.00050 | 0.00050 | 9317235 |
| Dissolved Cobalt (Co) | mg/L | 0.000402 | 0.000010 | 0.00497 | 0.0000050 | 0.245 | 0.000025 | 9317235 |
| Dissolved Copper (Cu) | mg/L | 0.00212 | 0.00010 | 0.0168 | 0.000050 | 0.00281 | 0.00025 | 9317235 |
| Dissolved Iron (Fe) | mg/L | 0.0987 | 0.0020 | 0.243 | 0.0010 | 5.65 | 0.0050 | 9317235 |
| Dissolved Lead (Pb) | mg/L | 0.000585 | 0.000010 | 0.00201 | 0.0000050 | 0.0281 | 0.000025 | 9317235 |
| Dissolved Lithium (Li) | mg/L | 0.0051 | 0.0010 | 0.00057 | 0.00050 | 0.0119 | 0.0025 | 9317235 |
| Dissolved Manganese (Mn) | mg/L | 0.00983 | 0.00010 | 1.04 | 0.000050 | 10.2 | 0.00025 | 9317235 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00040 | 0.00010 | 0.000098 | 0.000050 | <0.00025 | 0.00025 | 9317235 |
| Dissolved Nickel (Ni) | mg/L | 0.00143 | 0.000040 | 0.0138 | 0.000020 | 0.211 | 0.00010 | 9317235 |
| Dissolved Selenium (Se) | mg/L | 0.000263 | 0.000080 | 0.000047 | 0.000040 | <0.00020 | 0.00020 | 9317235 |
| Dissolved Silicon (Si) | mg/L | 0.62 | 0.10 | 1.97 | 0.050 | 2.73 | 0.25 | 9317235 |
| Dissolved Silver (Ag) | mg/L | <0.000010 | 0.000010 | 0.0000119 | 0.0000050 | <0.000025 | 0.000025 | 9317235 |
| Dissolved Strontium (Sr) | mg/L | 0.0151 | 0.00010 | 0.0184 | 0.000050 | 0.0706 | 0.00025 | 9317235 |
| Dissolved Thallium (Tl) | mg/L | 0.0000051 | 0.0000040 | 0.0000150 | 0.0000020 | 0.000044 | 0.000010 | 9317235 |
| Dissolved Tin (Sn) | mg/L | <0.00040 | 0.00040 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9317235 |
| Dissolved Titanium (Ti) | mg/L | <0.0010 | 0.0010 | 0.00242 | 0.00050 | <0.0025 | 0.0025 | 9317235 |
| Dissolved Uranium (U) | mg/L | 0.0000040 | 0.0000040 | 0.0000182 | 0.0000020 | 0.000023 | 0.000010 | 9317235 |
| Dissolved Vanadium (V) | mg/L | <0.00040 | 0.00040 | 0.00201 | 0.00020 | <0.0010 | 0.0010 | 9317235 |
| Dissolved Zinc (Zn) | mg/L | 0.00571 | 0.00020 | 0.0336 | 0.00010 | 0.640 | 0.00050 | 9317235 |
| Dissolved Zirconium (Zr) | mg/L | <0.00020 | 0.00020 | 0.00014 | 0.00010 | <0.00050 | 0.00050 | 9317235 |
| Dissolved Calcium (Ca) | mg/L | 7.84 | 0.10 | 4.39 | 0.050 | 16.8 | 0.25 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 4.55 | 0.10 | 1.30 | 0.050 | 5.53 | 0.25 | 9316618 |

RDL = Reportable Detection Limit



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## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9316 | | VE9317 | | VE9318 | | |
|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/01 | | 2019/02/01 | | 2019/02/01 | | |
| **COC Number** | | b929300-m058-01-01 | | b929300-m058-01-01 | | b929300-m058-01-01 | | |
| | **UNITS** | **M-2018-SFC-T30** | **RDL** | **M-2018-C19 (0-5)** | **RDL** | **M-2018-C19 (20-30)** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 2.75 | 0.10 | 1.52 | 0.050 | 3.74 | 0.25 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 1.71 | 0.10 | 14.7 | 0.050 | 5.92 | 0.25 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 8.5 | 1.2 | 10.3 | 0.60 | 35.5 | 3.0 | 9317235 |
| RDL = Reportable Detection Limit | | | | | | | | |



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## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9319 | | VE9320 | | VE9321 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | 2019/02/01 | | 2019/02/01 | | |
| COC Number | | b929300-m058-02-01 | | b929300-m058-02-01 | | b929300-m058-02-01 | | |
| | UNITS | M-2018-C11 (10-20) | RDL | M-2018-C11 (30-40) | RDL | M-2018-C2 (0-5) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 94.8 | 0.50 | 29.4 | 0.50 | 25.0 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0788 | 0.00050 | 0.111 | 0.0010 | 0.0667 | 0.0025 | 9317235 |
| Dissolved Antimony (Sb) | mg/L | 0.000037 | 0.000020 | 0.000194 | 0.000040 | 0.00349 | 0.00010 | 9317235 |
| Dissolved Arsenic (As) | mg/L | 0.0553 | 0.000020 | 0.665 | 0.000040 | 3.56 | 0.00010 | 9317235 |
| Dissolved Barium (Ba) | mg/L | 0.0635 | 0.000020 | 0.0182 | 0.000040 | 0.00993 | 0.00010 | 9317235 |
| Dissolved Beryllium (Be) | mg/L | 0.000016 | 0.000010 | <0.000020 | 0.000020 | <0.000050 | 0.000050 | 9317235 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000057 | 0.0000050 | 0.000029 | 0.000010 | 0.000061 | 0.000025 | 9317235 |
| Dissolved Boron (B) | mg/L | 0.010 | 0.010 | <0.020 | 0.020 | <0.050 | 0.050 | 9317235 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000281 | 0.0000050 | 0.000079 | 0.000010 | 0.000097 | 0.000025 | 9317235 |
| Dissolved Chromium (Cr) | mg/L | 0.00180 | 0.00010 | 0.00100 | 0.00020 | <0.00050 | 0.00050 | 9317235 |
| Dissolved Cobalt (Co) | mg/L | 0.00470 | 0.0000050 | 0.000650 | 0.000010 | 0.00257 | 0.000025 | 9317235 |
| Dissolved Copper (Cu) | mg/L | 0.00849 | 0.000050 | 0.00337 | 0.00010 | 0.0173 | 0.00025 | 9317235 |
| Dissolved Iron (Fe) | mg/L | 0.0348 | 0.0010 | 0.0522 | 0.0020 | 1.11 | 0.0050 | 9317235 |
| Dissolved Lead (Pb) | mg/L | 0.000356 | 0.0000050 | 0.000274 | 0.000010 | 0.00303 | 0.000025 | 9317235 |
| Dissolved Lithium (Li) | mg/L | 0.00412 | 0.00050 | 0.0018 | 0.0010 | <0.0025 | 0.0025 | 9317235 |
| Dissolved Manganese (Mn) | mg/L | 1.39 | 0.000050 | 0.316 | 0.00010 | 0.515 | 0.00025 | 9317235 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000050 | <0.00010 | 0.00010 | 0.00102 | 0.00025 | 9317235 |
| Dissolved Nickel (Ni) | mg/L | 0.00574 | 0.000020 | 0.00301 | 0.000040 | 0.00837 | 0.00010 | 9317235 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000040 | <0.000080 | 0.000080 | 0.00023 | 0.00020 | 9317235 |
| Dissolved Silicon (Si) | mg/L | 4.69 | 0.050 | 5.53 | 0.10 | 3.12 | 0.25 | 9317235 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | <0.000010 | 0.000010 | <0.000025 | 0.000025 | 9317235 |
| Dissolved Strontium (Sr) | mg/L | 0.134 | 0.000050 | 0.0363 | 0.00010 | 0.0259 | 0.00025 | 9317235 |
| Dissolved Thallium (Tl) | mg/L | 0.0000035 | 0.0000020 | 0.0000108 | 0.0000040 | 0.000038 | 0.000010 | 9317235 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | <0.00040 | 0.00040 | <0.0010 | 0.0010 | 9317235 |
| Dissolved Titanium (Ti) | mg/L | 0.00056 | 0.00050 | <0.0010 | 0.0010 | <0.0025 | 0.0025 | 9317235 |
| Dissolved Uranium (U) | mg/L | 0.0000031 | 0.0000020 | 0.0000196 | 0.0000040 | 0.000013 | 0.000010 | 9317235 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00020 | <0.00040 | 0.00040 | <0.0010 | 0.0010 | 9317235 |
| Dissolved Zinc (Zn) | mg/L | 0.0169 | 0.00010 | 0.0148 | 0.00020 | 0.00982 | 0.00050 | 9317235 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | <0.00020 | 0.00020 | <0.00050 | 0.00050 | 9317235 |
| Dissolved Calcium (Ca) | mg/L | 25.9 | 0.050 | 8.23 | 0.10 | 7.01 | 0.25 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 7.33 | 0.050 | 2.16 | 0.10 | 1.83 | 0.25 | 9316618 |

RDL = Reportable Detection Limit



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Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9319 | | VE9320 | | VE9321 | | |
|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/01 | | 2019/02/01 | | 2019/02/01 | | |
| **COC Number** | | b929300-m058-02-01 | | b929300-m058-02-01 | | b929300-m058-02-01 | | |
| | **UNITS** | **M-2018-C11 (10-20)** | **RDL** | **M-2018-C11 (30-40)** | **RDL** | **M-2018-C2 (0-5)** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 0.259 | 0.050 | 0.85 | 0.10 | 5.38 | 0.25 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 6.82 | 0.050 | 7.07 | 0.10 | 18.4 | 0.25 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 34.2 | 0.60 | 12.9 | 1.2 | <3.0 | 3.0 | 9317235 |
| RDL = Reportable Detection Limit | | | | | | | | |



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## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9322 | | VE9323 | | VE9324 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | 2019/02/01 | | 2019/02/01 | | |
| COC Number | | b929300-m058-02-01 | | b929300-m058-02-01 | | b929300-m058-02-01 | | |
| | UNITS | M-2018-C2 (10-20) | RDL | M-2018-C2 (40-60) | RDL | M-2018-C2 (80-100) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 145 | 0.50 | 82.0 | 0.50 | 49.4 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0127 | 0.0025 | 0.117 | 0.0010 | 0.0791 | 0.00050 | 9317235 |
| Dissolved Antimony (Sb) | mg/L | 0.0225 | 0.00010 | 0.00913 | 0.000040 | 0.0156 | 0.000020 | 9317235 |
| Dissolved Arsenic (As) | mg/L | 2.26 | 0.00010 | 0.915 | 0.000040 | 0.269 | 0.000020 | 9317235 |
| Dissolved Barium (Ba) | mg/L | 0.0147 | 0.00010 | 0.0146 | 0.000040 | 0.0301 | 0.000020 | 9317235 |
| Dissolved Beryllium (Be) | mg/L | <0.000050 | 0.000050 | <0.000020 | 0.000020 | <0.000010 | 0.000010 | 9317235 |
| Dissolved Bismuth (Bi) | mg/L | <0.000025 | 0.000025 | 0.000026 | 0.000010 | 0.000108 | 0.0000050 | 9317235 |
| Dissolved Boron (B) | mg/L | <0.050 | 0.050 | <0.020 | 0.020 | <0.010 | 0.010 | 9317235 |
| Dissolved Cadmium (Cd) | mg/L | 0.000215 | 0.000025 | 0.000022 | 0.000010 | 0.000135 | 0.0000050 | 9317235 |
| Dissolved Chromium (Cr) | mg/L | <0.00050 | 0.00050 | 0.00085 | 0.00020 | 0.00195 | 0.00010 | 9317235 |
| Dissolved Cobalt (Co) | mg/L | 0.0810 | 0.000025 | 0.0118 | 0.000010 | 0.00699 | 0.0000050 | 9317235 |
| Dissolved Copper (Cu) | mg/L | 0.00130 | 0.00025 | 0.00371 | 0.00010 | 0.0118 | 0.000050 | 9317235 |
| Dissolved Iron (Fe) | mg/L | 1.00 | 0.0050 | 0.265 | 0.0020 | 1.10 | 0.0010 | 9317235 |
| Dissolved Lead (Pb) | mg/L | 0.000401 | 0.000025 | 0.00104 | 0.000010 | 0.0141 | 0.0000050 | 9317235 |
| Dissolved Lithium (Li) | mg/L | 0.0028 | 0.0025 | 0.0019 | 0.0010 | 0.00100 | 0.00050 | 9317235 |
| Dissolved Manganese (Mn) | mg/L | 3.55 | 0.00025 | 4.15 | 0.00010 | 4.67 | 0.000050 | 9317235 |
| Dissolved Molybdenum (Mo) | mg/L | <0.00025 | 0.00025 | 0.00046 | 0.00010 | 0.000082 | 0.000050 | 9317235 |
| Dissolved Nickel (Ni) | mg/L | 0.128 | 0.00010 | 0.0283 | 0.000040 | 0.00850 | 0.000020 | 9317235 |
| Dissolved Selenium (Se) | mg/L | <0.00020 | 0.00020 | <0.000080 | 0.000080 | 0.000042 | 0.000040 | 9317235 |
| Dissolved Silicon (Si) | mg/L | 1.05 | 0.25 | 0.96 | 0.10 | 1.04 | 0.050 | 9317235 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | 0.000025 | <0.000010 | 0.000010 | 0.0000137 | 0.0000050 | 9317235 |
| Dissolved Strontium (Sr) | mg/L | 0.102 | 0.00025 | 0.0457 | 0.00010 | 0.0368 | 0.000050 | 9317235 |
| Dissolved Thallium (Tl) | mg/L | 0.000036 | 0.000010 | 0.0000172 | 0.0000040 | 0.0000163 | 0.0000020 | 9317235 |
| Dissolved Tin (Sn) | mg/L | <0.0010 | 0.0010 | <0.00040 | 0.00040 | <0.00020 | 0.00020 | 9317235 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | 0.0025 | 0.0029 | 0.0010 | 0.00203 | 0.00050 | 9317235 |
| Dissolved Uranium (U) | mg/L | <0.000010 | 0.000010 | 0.0000149 | 0.0000040 | 0.0000179 | 0.0000020 | 9317235 |
| Dissolved Vanadium (V) | mg/L | <0.0010 | 0.0010 | <0.00040 | 0.00040 | <0.00020 | 0.00020 | 9317235 |
| Dissolved Zinc (Zn) | mg/L | 0.516 | 0.00050 | 0.0143 | 0.00020 | 0.0232 | 0.00010 | 9317235 |
| Dissolved Zirconium (Zr) | mg/L | <0.00050 | 0.00050 | 0.00030 | 0.00020 | 0.00016 | 0.00010 | 9317235 |
| Dissolved Calcium (Ca) | mg/L | 31.6 | 0.25 | 18.1 | 0.10 | 12.6 | 0.050 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 16.0 | 0.25 | 8.90 | 0.10 | 4.32 | 0.050 | 9316618 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9322 | | VE9323 | | VE9324 | | |
|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/01 | | 2019/02/01 | | 2019/02/01 | | |
| **COC Number** | | b929300-m058-02-01 | | b929300-m058-02-01 | | b929300-m058-02-01 | | |
| | **UNITS** | **M-2018-C2 (10-20)** | **RDL** | **M-2018-C2 (40-60)** | **RDL** | **M-2018-C2 (80-100)** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 3.82 | 0.25 | 4.79 | 0.10 | 3.75 | 0.050 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 9.88 | 0.25 | 6.69 | 0.10 | 7.25 | 0.050 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 56.6 | 3.0 | 32.5 | 1.2 | 23.4 | 0.60 | 9317235 |
| RDL = Reportable Detection Limit | | | | | | | | |



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## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9325 | VE9326 | VE9327 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | | |
| COC Number | | b929300-m058-02-01 | b929300-m058-02-01 | b929300-m058-02-01 | | |
| | UNITS | M-2018-C3 (0-5) | M-2018-C3 (40-80) | M-2018-C3 (140-160) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 25.8 | 164 | 83.1 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.141 | 0.0691 | 0.0469 | 0.00050 | 9317235 |
| Dissolved Antimony (Sb) | mg/L | 0.000284 | 0.0137 | 0.00430 | 0.000020 | 9317235 |
| Dissolved Arsenic (As) | mg/L | 0.122 | 0.233 | 0.104 | 0.000020 | 9317235 |
| Dissolved Barium (Ba) | mg/L | 0.0199 | 0.0196 | 0.0477 | 0.000020 | 9317235 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | 0.000012 | 0.000010 | 9317235 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000385 | 0.0000148 | 0.0000155 | 0.0000050 | 9317235 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | 0.021 | 0.010 | 9317235 |
| Dissolved Cadmium (Cd) | mg/L | 0.000164 | 0.0000193 | 0.0000661 | 0.0000050 | 9317235 |
| Dissolved Chromium (Cr) | mg/L | 0.00211 | <0.00010 | 0.00207 | 0.00010 | 9317235 |
| Dissolved Cobalt (Co) | mg/L | 0.00228 | 0.00885 | 0.00416 | 0.0000050 | 9317235 |
| Dissolved Copper (Cu) | mg/L | 0.0117 | 0.000367 | 0.0105 | 0.000050 | 9317235 |
| Dissolved Iron (Fe) | mg/L | 0.308 | 0.0570 | 0.0506 | 0.0010 | 9317235 |
| Dissolved Lead (Pb) | mg/L | 0.00159 | 0.00113 | 0.00114 | 0.0000050 | 9317235 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00109 | 0.00158 | 0.00050 | 9317235 |
| Dissolved Manganese (Mn) | mg/L | 2.19 | 2.26 | 1.84 | 0.000050 | 9317235 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000614 | 0.000563 | 0.000104 | 0.000050 | 9317235 |
| Dissolved Nickel (Ni) | mg/L | 0.00649 | 0.0154 | 0.00532 | 0.000020 | 9317235 |
| Dissolved Selenium (Se) | mg/L | 0.000231 | <0.000040 | 0.000059 | 0.000040 | 9317235 |
| Dissolved Silicon (Si) | mg/L | 1.30 | 1.40 | 2.40 | 0.050 | 9317235 |
| Dissolved Silver (Ag) | mg/L | 0.0000070 | <0.0000050 | 0.0000078 | 0.0000050 | 9317235 |
| Dissolved Strontium (Sr) | mg/L | 0.0330 | 0.0757 | 0.0757 | 0.000050 | 9317235 |
| Dissolved Thallium (Tl) | mg/L | 0.0000181 | 0.0000173 | 0.0000103 | 0.0000020 | 9317235 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9317235 |
| Dissolved Titanium (Ti) | mg/L | 0.00178 | 0.00090 | 0.00104 | 0.00050 | 9317235 |
| Dissolved Uranium (U) | mg/L | 0.0000173 | 0.0000099 | 0.0000105 | 0.0000020 | 9317235 |
| Dissolved Vanadium (V) | mg/L | 0.00156 | 0.00082 | 0.00020 | 0.00020 | 9317235 |
| Dissolved Zinc (Zn) | mg/L | 0.0146 | 0.00642 | 0.0269 | 0.00010 | 9317235 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9317235 |
| Dissolved Calcium (Ca) | mg/L | 7.91 | 36.9 | 23.8 | 0.050 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 1.47 | 17.4 | 5.77 | 0.050 | 9316618 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9325 | VE9326 | VE9327 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/01 | 2019/02/01 | 2019/02/01 | | |
| **COC Number** | | b929300-m058-02-01 | b929300-m058-02-01 | b929300-m058-02-01 | | |
| | **UNITS** | **M-2018-C3 (0-5)** | **M-2018-C3 (40-80)** | **M-2018-C3 (140-160)** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 6.70 | 4.98 | 2.53 | 0.050 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 23.5 | 10.8 | 18.2 | 0.050 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 4.22 | 60.2 | 34.0 | 0.60 | 9317235 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9328 | | |
|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | |
| COC Number | | b929300-m058-02-01 | | |
| | UNITS | M-2018-C3 (160-180) | RDL | QC Batch |
| **Calculated Parameters** | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 124 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.158 | 0.00050 | 9317235 |
| Dissolved Antimony (Sb) | mg/L | 0.00645 | 0.000020 | 9317235 |
| Dissolved Arsenic (As) | mg/L | 0.158 | 0.000020 | 9317235 |
| Dissolved Barium (Ba) | mg/L | 0.0568 | 0.000020 | 9317235 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000010 | 9317235 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000689 | 0.0000050 | 9317235 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 9317235 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000608 | 0.0000050 | 9317235 |
| Dissolved Chromium (Cr) | mg/L | 0.00138 | 0.00010 | 9317235 |
| Dissolved Cobalt (Co) | mg/L | 0.00477 | 0.0000050 | 9317235 |
| Dissolved Copper (Cu) | mg/L | 0.00859 | 0.000050 | 9317235 |
| Dissolved Iron (Fe) | mg/L | 0.530 | 0.0010 | 9317235 |
| Dissolved Lead (Pb) | mg/L | 0.00313 | 0.0000050 | 9317235 |
| Dissolved Lithium (Li) | mg/L | 0.00119 | 0.00050 | 9317235 |
| Dissolved Manganese (Mn) | mg/L | 2.42 | 0.000050 | 9317235 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000184 | 0.000050 | 9317235 |
| Dissolved Nickel (Ni) | mg/L | 0.00490 | 0.000020 | 9317235 |
| Dissolved Selenium (Se) | mg/L | 0.000091 | 0.000040 | 9317235 |
| Dissolved Silicon (Si) | mg/L | 1.94 | 0.050 | 9317235 |
| Dissolved Silver (Ag) | mg/L | 0.0000231 | 0.0000050 | 9317235 |
| Dissolved Strontium (Sr) | mg/L | 0.105 | 0.000050 | 9317235 |
| Dissolved Thallium (Tl) | mg/L | 0.0000120 | 0.0000020 | 9317235 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9317235 |
| Dissolved Titanium (Ti) | mg/L | 0.00410 | 0.00050 | 9317235 |
| Dissolved Uranium (U) | mg/L | 0.0000364 | 0.0000020 | 9317235 |
| Dissolved Vanadium (V) | mg/L | 0.00037 | 0.00020 | 9317235 |
| Dissolved Zinc (Zn) | mg/L | 0.0194 | 0.00010 | 9317235 |
| Dissolved Zirconium (Zr) | mg/L | 0.00011 | 0.00010 | 9317235 |
| Dissolved Calcium (Ca) | mg/L | 32.0 | 0.050 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 10.7 | 0.050 | 9316618 |
| RDL = Reportable Detection Limit | | | | |



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MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9328 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2019/02/01 | | |
| **COC Number** | | b929300-m058-02-01 | | |
| | **UNITS** | **M-2018-C3 (160-180)** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 3.91 | 0.050 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 18.0 | 0.050 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 47.5 | 0.60 | 9317235 |
| RDL = Reportable Detection Limit | | | | |



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MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VE9309
**Sample ID:** M-2018-C5 (30-50)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9310
**Sample ID:** M-2018-SFC-T25
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9311
**Sample ID:** M-2018-SFC-T26
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9311 Dup
**Sample ID:** M-2018-SFC-T26
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |

**Maxxam ID:** VE9312
**Sample ID:** M-2018-SFC-T27
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |



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## TEST SUMMARY

**Maxxam ID:** VE9313 **Collected:** 2019/02/01
**Sample ID:** M-2018-SFC-T32 **Shipped:**
**Matrix:** Water **Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9314 **Collected:** 2019/02/01
**Sample ID:** M-2018-SFC-T17 **Shipped:**
**Matrix:** Water **Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9315 **Collected:** 2019/02/01
**Sample ID:** M-2018-SFC-T20 **Shipped:**
**Matrix:** Water **Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9316 **Collected:** 2019/02/01
**Sample ID:** M-2018-SFC-T30 **Shipped:**
**Matrix:** Water **Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9317 **Collected:** 2019/02/01
**Sample ID:** M-2018-C19 (0-5) **Shipped:**
**Matrix:** Water **Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |



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Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VE9318
**Sample ID:** M-2018-C19 (20-30)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9319
**Sample ID:** M-2018-C11 (10-20)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9320
**Sample ID:** M-2018-C11 (30-40)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9321
**Sample ID:** M-2018-C2 (0-5)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9322
**Sample ID:** M-2018-C2 (10-20)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |



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Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VE9323
**Sample ID:** M-2018-C2 (40-60)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9324
**Sample ID:** M-2018-C2 (80-100)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9325
**Sample ID:** M-2018-C3 (0-5)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9326
**Sample ID:** M-2018-C3 (40-80)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9327
**Sample ID:** M-2018-C3 (140-160)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |



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Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VE9328
**Sample ID:** M-2018-C3 (160-180)
**Matrix:** Water

**Collected:** 2019/02/01
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/09 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/09 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317235 | N/A | 2019/02/08 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |



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Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 2.0°C |

**LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments**

Sample VE9309 [M-2018-C5 (30-50)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE9310 [M-2018-SFC-T25] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE9313 [M-2018-SFC-T32] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE9315 [M-2018-SFC-T20] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE9316 [M-2018-SFC-T30] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE9318 [M-2018-C19 (20-30)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE9320 [M-2018-C11 (30-40)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE9321 [M-2018-C2 (0-5)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE9322 [M-2018-C2 (10-20)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE9323 [M-2018-C2 (40-60)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.

**Results relate only to the items tested.**



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Maxxam Job #: B909556
Report Date: 2019/02/12

## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9317235 | Dissolved Aluminum (Al) | 2019/02/08 | 97 | 80 - 120 | 99 | 80 - 120 | <0.00050 | mg/L | 1.1 | 20 |
| 9317235 | Dissolved Antimony (Sb) | 2019/02/08 | 96 | 80 - 120 | 99 | 80 - 120 | <0.000020 | mg/L | 0.0039 | 20 |
| 9317235 | Dissolved Arsenic (As) | 2019/02/08 | NC | 80 - 120 | 100 | 80 - 120 | <0.000020 | mg/L | 1.5 | 20 |
| 9317235 | Dissolved Barium (Ba) | 2019/02/08 | 96 | 80 - 120 | 98 | 80 - 120 | <0.000020 | mg/L | 0.22 | 20 |
| 9317235 | Dissolved Beryllium (Be) | 2019/02/08 | 96 | 80 - 120 | 98 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9317235 | Dissolved Bismuth (Bi) | 2019/02/08 | 98 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9317235 | Dissolved Boron (B) | 2019/02/08 | 98 | 80 - 120 | 99 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 9317235 | Dissolved Cadmium (Cd) | 2019/02/08 | 96 | 80 - 120 | 99 | 80 - 120 | <0.0000050 | mg/L | 1.4 | 20 |
| 9317235 | Dissolved Chromium (Cr) | 2019/02/08 | 95 | 80 - 120 | 98 | 80 - 120 | <0.00010 | mg/L | 6.6 | 20 |
| 9317235 | Dissolved Cobalt (Co) | 2019/02/08 | 95 | 80 - 120 | 97 | 80 - 120 | <0.0000050 | mg/L | 1.7 | 20 |
| 9317235 | Dissolved Copper (Cu) | 2019/02/08 | 92 | 80 - 120 | 97 | 80 - 120 | <0.000050 | mg/L | 2.5 | 20 |
| 9317235 | Dissolved Iron (Fe) | 2019/02/08 | 97 | 80 - 120 | 101 | 80 - 120 | <0.0010 | mg/L | 1.7 | 20 |
| 9317235 | Dissolved Lead (Pb) | 2019/02/08 | 97 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | 0.88 | 20 |
| 9317235 | Dissolved Lithium (Li) | 2019/02/08 | 97 | 80 - 120 | 99 | 80 - 120 | <0.00050 | mg/L | 0.54 | 20 |
| 9317235 | Dissolved Manganese (Mn) | 2019/02/08 | NC | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | 1.3 | 20 |
| 9317235 | Dissolved Molybdenum (Mo) | 2019/02/08 | 97 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9317235 | Dissolved Nickel (Ni) | 2019/02/08 | 94 | 80 - 120 | 97 | 80 - 120 | <0.000020 | mg/L | 0.87 | 20 |
| 9317235 | Dissolved Selenium (Se) | 2019/02/08 | 96 | 80 - 120 | 99 | 80 - 120 | <0.000040 | mg/L | 6.4 | 20 |
| 9317235 | Dissolved Silicon (Si) | 2019/02/08 | 95 | 80 - 120 | 98 | 80 - 120 | <0.050 | mg/L | 1.5 | 20 |
| 9317235 | Dissolved Silver (Ag) | 2019/02/08 | 96 | 80 - 120 | 99 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9317235 | Dissolved Strontium (Sr) | 2019/02/08 | 101 | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | 0.50 | 20 |
| 9317235 | Dissolved Sulphur (S) | 2019/02/08 | 97 | 80 - 120 | 99 | 80 - 120 | <0.60 | mg/L | 6.0 | 20 |
| 9317235 | Dissolved Thallium (Tl) | 2019/02/08 | 97 | 80 - 120 | 104 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9317235 | Dissolved Tin (Sn) | 2019/02/08 | 97 | 80 - 120 | 100 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9317235 | Dissolved Titanium (Ti) | 2019/02/08 | 95 | 80 - 120 | 101 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9317235 | Dissolved Uranium (U) | 2019/02/08 | 97 | 80 - 120 | 100 | 80 - 120 | <0.0000020 | mg/L | 10 | 20 |
| 9317235 | Dissolved Vanadium (V) | 2019/02/08 | 95 | 80 - 120 | 98 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9317235 | Dissolved Zinc (Zn) | 2019/02/08 | 98 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | 2.3 | 20 |



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Maxxam Job #: B909556
Report Date: 2019/02/12

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9317235 | Dissolved Zirconium (Zr) | 2019/02/08 | 99 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | NC | 20 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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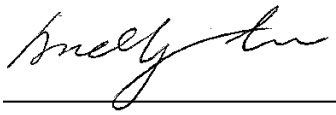
Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist

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



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Maxxam
A Bureau Veritas Group Company

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/08**
Report #: R5587438
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B927885**
**Received: 2019/01/31, 17:47**

Sample Matrix: Water
# Samples Received: 15

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Acidity (CaCO3) in water (1, 2) | 14 | N/A | 2019/02/06 | | SM 22 2310 |
| Alkalinity | 1 | N/A | 2019/02/04 | CAM SOP-00448 | SM 23 2320 B m |
| Dissolved Mercury (low level) | 15 | 2019/02/04 | 2019/02/04 | CAM SOP-00453 | EPA 7470 m |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Bedford
(2) Non-accredited test method

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/08**
Report #: R5587438
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B927885**
**Received: 2019/01/31, 17:47**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B927885
Report Date: 2019/02/08

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IWS673 | | IWS674 | | | IWS675 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | | 2019/01/31 12:00 | | | 2019/01/31 12:00 | | |
| COC Number | | n/a | | n/a | | | n/a | | |
| | **UNITS** | **M-2018-C1 (10-20)** | **RDL** | **M-2018-C1 (40-60)** | **RDL** | **QC Batch** | **M-2018-C1 (140-160)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | <5.0 | 5.0 | <6.3 | 6.3 | 5962467 | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | | | | 12 | 1.0 | 5957904 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWS676 | | IWS677 | | IWS678 | IWS679 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | | 2019/01/31 12:00 | | 2019/01/31 12:00 | 2019/01/31 12:00 | | |
| COC Number | | n/a | | n/a | | n/a | n/a | | |
| | **UNITS** | **M-2018-C1 (180-200)** | **RDL** | **M-2018-SFC-T3** | **RDL** | **M-2018-SFC-T7** | **M-2018-SFC-T2** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | <5.0 | 5.0 | <6.3 | 6.3 | 5.0 | <5.0 | 5.0 | 5962467 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWS680 | IWS681 | IWS682 | IWS683 | IWS684 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | | |
| COC Number | | n/a | n/a | n/a | n/a | n/a | | |
| | **UNITS** | **M-2018-SFC-T14** | **M-2018-SFC-T28AHP** | **M-2018-SFC-12** | **M-2018-SFC-13** | **M-2018-SFC-15** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Acidity | mg/L | <5.0 | 53 | 8.4 | <5.0 | <5.0 | 5.0 | 5962467 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWS685 | IWS686 | IWS687 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | | |
| COC Number | | n/a | n/a | n/a | | |
| | **UNITS** | **M-2018-SW12-CORE (2.5-10)** | **M-2018-SW12-CORE (30-40)** | **M-2018-C13 (20-30)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | |
| Acidity | mg/L | 63 | 17 | 6.6 | 5.0 | 5962467 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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

Maxxam Job #: B927885
Report Date: 2019/02/08

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IWS673 | IWS674 | | IWS675 | | IWS676 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | | 2019/01/31 12:00 | | 2019/01/31 12:00 | | |
| COC Number | | n/a | n/a | | n/a | | n/a | | |
| | **UNITS** | **M-2018-C1 (10-20)** | **M-2018-C1 (40-60)** | **RDL** | **M-2018-C1 (140-160)** | **RDL** | **M-2018-C1 (180-200)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.12 | 0.16 | 0.01 | 3.5 | 0.1 | 1.91 | 0.05 | 5958750 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWS677 | | IWS678 | | IWS679 | IWS680 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | | 2019/01/31 12:00 | | 2019/01/31 12:00 | 2019/01/31 12:00 | | |
| COC Number | | n/a | | n/a | | n/a | n/a | | |
| | **UNITS** | **M-2018-SFC-T3** | **RDL** | **M-2018-SFC-T7** | **RDL** | **M-2018-SFC-T2** | **M-2018-SFC-T14** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.57 | 0.02 | 0.72 | 0.05 | 0.48 | 0.30 | 0.01 | 5958750 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWS681 | IWS682 | IWS683 | | IWS684 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | | 2019/01/31 12:00 | | |
| COC Number | | n/a | n/a | n/a | | n/a | | |
| | **UNITS** | **M-2018-SFC-T28AHP** | **M-2018-SFC-12** | **M-2018-SFC-13** | **RDL** | **M-2018-SFC-15** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.02 | 0.16 | 0.33 | 0.01 | 0.72 | 0.02 | 5958750 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWS685 | IWS686 | IWS687 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | | |
| COC Number | | n/a | n/a | n/a | | |
| | **UNITS** | **M-2018-SW12-CORE (2.5-10)** | **M-2018-SW12-CORE (30-40)** | **M-2018-C13 (20-30)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | |
| Dissolved Mercury (Hg) | ug/L | <0.01 | <0.01 | 0.18 | 0.01 | 5958750 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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

Maxxam Job #: B927885
Report Date: 2019/02/08

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 14.7°C |

**Results relate only to the items tested.**



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Maxxam Job #: B927885
Report Date: 2019/02/08

## QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5957904 | Alkalinity (Total as CaCO3) | 2019/02/04 | | | 97 | 85 - 115 | <1.0 | mg/L | 0.23 | 20 |
| 5958750 | Dissolved Mercury (Hg) | 2019/02/04 | 77 | 75 - 125 | 95 | 80 - 120 | <0.01 | ug/L | NC | 20 |
| 5962467 | Acidity | 2019/02/06 | 107 | 80 - 120 | 102 | 80 - 120 | <5.0 | mg/L | | |

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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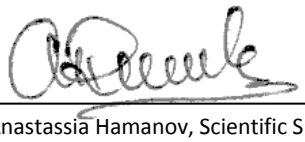
Maxxam Job #: B927885
Report Date: 2019/02/08

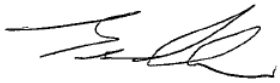
EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist



Brad Newman, Scientific Service Specialist

Gina Thompson, Inorganics General Chemistry Supervisor

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



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31-Jan-19 17:47

Kyle Reinhart

B927885

ORD

FCN ENV-685

Page _1_ of _2_

**Maxxam** A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

| Invoice Information | | Report Information (if differs from invoice | | | |
|---|---|---|---|---|---|
| Company Name: | EcoMetrix Inc | Company Name: | | Quotation #: | |
| Contact Name: | Daniel Skruch | Contact Name: | | P.O. #/ AFE#: | |
| Address: | 6800 Campobello Road | Address: | | Project #: | 18-2525 |
| | | | | Site Location: | NS Lands |
| Phone: | 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: | Fax: | Site #: | |
| Email: | dskruch@ecometrix.ca | Email: | | Sampled By: | ALC+FL+CL |

**Turnaround Time (TAT) Required**

X Regular TAT (5-7 days) Most analyses

**PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS**

Rush TAT (Surcharges will be applied)

☐ 1 Day ☐ 2 Days ☐ 3-4 Days

Date Required:

Rush Confirmation #:

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

**Regulation 153**

☐ Table 1 ☐ Res/Park ☐ Med/ Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/ Other
☐ Table ____

FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**

☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☐ PWQO Region
☐ Other (Specify)
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

**SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM**

**LABORATORY USE ONLY**

CUSTODY SEAL Y / (N)

COOLER TEMPERATURES

| Present | Intact | |
|---|---|---|
| | | 15\|15\|14 |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / (N)

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED, to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M-2018-C1 (10-20) | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | M-2018-C1 (40-60) | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | M-2018-C1 (140-160) | 31/01/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 4 | M-2018-C1 (180-200) | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 5 | M-2018-SFC-T3 | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 6 | M-2018-SFC-T7 | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 7 | M-2018-SFC-T2 | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 8 | M-2018-SFC-T14 | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 9 | M-2018-SFC-T28AHP | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 10 | M-2018-SFC-12 | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |

**COMMENTS**

***NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); ****Mercury 0.000002 mg/L**

***PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) | MAXXAM JOB # |
|---|---|---|---|---|---|---|
| Amanda Ciosek | 31/01/2019 | 17:46 | | 2019/01/31 | 17:47 | |
| | | | | | | |

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Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | Report Information (if differs from invoice) | Project Information (where applicable) | Turnaround Time (TAT) Required |
|---|---|---|---|
| Company Name: EcoMetrix Inc | Company Name: | Quotation #: | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: Daniel Skruch | Contact Name: | P.O. #/ AFE#: | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: 6800 Campobello Road | Address: | Project #: 18-2525 | Rush TAT (Surcharges will be applied) |
| | | Site Location: NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: Fax: | Site #: | Date Required: |
| Email: dskruch@ecometrix.ca | Email: | Sampled By: ALC+FL+CL | Rush Confirmation #: |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

| Regulation 153 | Other Regulations |
|---|---|
| [ ] Table 1 [ ] Res/Park [ ] Med/ Fine | [ ] CCME [ ] Sanitary Sewer Bylaw |
| [ ] Table 2 [ ] Ind/Comm [ ] Coarse | [ ] MISA [ ] Storm Sewer Bylaw |
| [ ] Table 3 [ ] Agri/ Other | [ ] PWQO Region |
| [ ] Table ____ | [ ] Other (Specify) |
| FOR RSC (PLEASE CIRCLE) Y / N | [ ] REG 558 (MIN. 3 DAY TAT REQUIRED) |

Include Criteria on Certificate of Analysis: Y / N

**SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM**

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED, to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M-2018-SFC-13 | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | M-2018-SFC-15 | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | M-2018-SW12-CORE (2.5-10) | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 4 | M-2018-SW12-CORE (30-40) | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 5 | M-2018-C13 (20-30) | 31/01/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 6 | | 31/01/2019 | 12:00 | Water | | | | | | | | |
| 7 | | 31/01/2019 | 12:00 | Water | | | | | | | | |
| 8 | | 31/01/2019 | 12:00 | Water | | | | | | | | |
| 9 | | 31/01/2019 | 12:00 | Water | | | | | | | | |
| 10 | | 31/01/2019 | 12:00 | Water | | | | | | | | |

LABORATORY USE ONLY

| CUSTODY SEAL Y / N | | COOLER TEMPERATURES |
|---|---|---|
| Present | Intact | |
| | | |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / N

COMMENTS

***NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); ****Mercury 0.000002 mg/L**

***PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) | MAXXAM JOB # |
|---|---|---|---|---|---|---|
| Amanda Closek | 31/01/2019 | 17:40 | See page 1 | | | |
| | | | | | | |

Success Through Science®

Your Project #: MB927885
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B927885-M058-01-01, B927885-M058-02-01

**Report Date: 2019/02/06**
Report #: R2683186
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B908276**
**Received: 2019/02/02, 14:56**

Sample Matrix: Water
# Samples Received: 15

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | 15 | N/A | 2019/02/06 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 15 | N/A | 2019/02/06 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 15 | N/A | 2019/02/05 | BBY7SOP-00002 | EPA 6020b R2 m |
| Filter and HNO3 Preserve for Metals | 15 | N/A | 2019/02/02 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: MB927885
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B927885-M058-01-01, B927885-M058-02-01

**Report Date: 2019/02/06**
Report #: R2683186
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B908276**
**Received: 2019/02/02, 14:56**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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

Maxxam Job #: B908276
Report Date: 2019/02/06

MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | VE3858 | VE3859 | VE3860 | VE3861 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | |
| COC Number | | B927885-M058-01-01 | B927885-M058-01-01 | B927885-M058-01-01 | B927885-M058-01-01 | |
| | UNITS | M-2018-C1 (10-20) | M-2018-C1 (40-60) | M-2018-C1 (140-160) | M-2018-C1 (180-200) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VE3862 | VE3863 | VE3864 | VE3865 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | |
| COC Number | | B927885-M058-01-01 | B927885-M058-01-01 | B927885-M058-01-01 | B927885-M058-01-01 | |
| | UNITS | M-2018-SFC-T3 | M-2018-SFC-T7 | M-2018-SFC-T2 | M-2018-SFC-T14 | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VE3866 | VE3867 | VE3868 | VE3869 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | |
| COC Number | | B927885-M058-01-01 | B927885-M058-01-01 | B927885-M058-02-01 | B927885-M058-02-01 | |
| | UNITS | M-2018-SFC-T28AHP | M-2018-SFC-12 | M-2018-SFC-13 | M-2018-SFC-15 | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VE3870 | VE3871 | VE3872 | |
|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | |
| COC Number | | B927885-M058-02-01 | B927885-M058-02-01 | B927885-M058-02-01 | |
| | UNITS | M-2018-SW12-CORE (2.5-10) | M-2018-SW12-CORE (30-40) | M-2018-C13- (20-30) | QC Batch |
| **Calculated Parameters** | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | ONSITE |



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B908276
Report Date: 2019/02/06

MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE3858 | VE3859 | VE3860 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | | |
| COC Number | | B927885-M058-01-01 | B927885-M058-01-01 | B927885-M058-01-01 | | |
| | UNITS | M-2018-C1 (10-20) | M-2018-C1 (40-60) | M-2018-C1 (140-160) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 15.5 | 77.3 | 60.7 | 0.50 | 9311840 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0381 | 0.102 | 0.134 | 0.00050 | 9312781 |
| Dissolved Antimony (Sb) | mg/L | 0.00738 | 0.0293 | 0.00572 | 0.000020 | 9312781 |
| Dissolved Arsenic (As) | mg/L | 0.754 | 0.395 | 0.190 | 0.000020 | 9312781 |
| Dissolved Barium (Ba) | mg/L | 0.0145 | 0.0176 | 0.0222 | 0.000020 | 9312781 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9312781 |
| Dissolved Bismuth (Bi) | mg/L | 0.000116 | 0.0000892 | 0.000189 | 0.0000050 | 9312781 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9312781 |
| Dissolved Cadmium (Cd) | mg/L | 0.000218 | 0.0000742 | 0.0000113 | 0.0000050 | 9312781 |
| Dissolved Chromium (Cr) | mg/L | 0.00010 | 0.00018 | 0.00020 | 0.00010 | 9312781 |
| Dissolved Cobalt (Co) | mg/L | 0.00470 | 0.0157 | 0.00164 | 0.0000050 | 9312781 |
| Dissolved Copper (Cu) | mg/L | 0.0110 | 0.00239 | 0.00285 | 0.000050 | 9312781 |
| Dissolved Iron (Fe) | mg/L | 0.350 | 0.173 | 0.244 | 0.0010 | 9312781 |
| Dissolved Lead (Pb) | mg/L | 0.00518 | 0.00250 | 0.00755 | 0.0000050 | 9312781 |
| Dissolved Lithium (Li) | mg/L | 0.00127 | 0.00147 | 0.00070 | 0.00050 | 9312781 |
| Dissolved Manganese (Mn) | mg/L | 0.572 | 0.602 | 0.296 | 0.000050 | 9312781 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000238 | 0.000674 | 0.000050 | 9312781 |
| Dissolved Nickel (Ni) | mg/L | 0.0103 | 0.103 | 0.00537 | 0.000020 | 9312781 |
| Dissolved Selenium (Se) | mg/L | 0.000113 | 0.000135 | 0.000063 | 0.000040 | 9312781 |
| Dissolved Silicon (Si) | mg/L | 0.692 | 0.884 | 0.823 | 0.050 | 9312781 |
| Dissolved Silver (Ag) | mg/L | 0.0000165 | 0.0000062 | 0.0000121 | 0.0000050 | 9312781 |
| Dissolved Strontium (Sr) | mg/L | 0.0145 | 0.0339 | 0.0336 | 0.000050 | 9312781 |
| Dissolved Thallium (Tl) | mg/L | 0.0000461 | 0.0000496 | 0.0000199 | 0.0000020 | 9312781 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9312781 |
| Dissolved Titanium (Ti) | mg/L | 0.00120 | 0.00291 | 0.00333 | 0.00050 | 9312781 |
| Dissolved Uranium (U) | mg/L | 0.0000114 | 0.0000181 | 0.0000183 | 0.0000020 | 9312781 |
| Dissolved Vanadium (V) | mg/L | 0.00049 | 0.00052 | 0.00050 | 0.00020 | 9312781 |
| Dissolved Zinc (Zn) | mg/L | 0.0309 | 0.0191 | 0.00398 | 0.00010 | 9312781 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00042 | 0.00022 | 0.00010 | 9312781 |
| Dissolved Calcium (Ca) | mg/L | 4.04 | 16.4 | 19.9 | 0.050 | 9312018 |

RDL = Reportable Detection Limit



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Maxxam Job #: B908276
Report Date: 2019/02/06

MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE3858 | VE3859 | VE3860 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/01/31 12:00 | 2019/01/31 12:00 | 2019/01/31 12:00 | | |
| **COC Number** | | B927885-M058-01-01 | B927885-M058-01-01 | B927885-M058-01-01 | | |
| | **UNITS** | **M-2018-C1 (10-20)** | **M-2018-C1 (40-60)** | **M-2018-C1 (140-160)** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 1.32 | 8.79 | 2.66 | 0.050 | 9312018 |
| Dissolved Potassium (K) | mg/L | 2.85 | 5.18 | 4.78 | 0.050 | 9312018 |
| Dissolved Sodium (Na) | mg/L | 2.74 | 2.77 | 1.64 | 0.050 | 9312018 |
| Dissolved Sulphur (S) | mg/L | 6.55 | 24.4 | 17.5 | 0.60 | 9312781 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE3861 | | VE3862 | VE3863 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | | 2019/01/31 12:00 | 2019/01/31 12:00 | | |
| COC Number | | B927885-M058-01-01 | | B927885-M058-01-01 | B927885-M058-01-01 | | |
| | UNITS | M-2018-C1 (180-200) | RDL | M-2018-SFC-T3 | M-2018-SFC-T7 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 74.7 | 0.50 | 32.6 | 110 | 0.50 | 9311840 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0962 | 0.00050 | 0.410 | 0.119 | 0.0010 | 9312781 |
| Dissolved Antimony (Sb) | mg/L | 0.00496 | 0.000020 | 0.00669 | 0.0147 | 0.000040 | 9312781 |
| Dissolved Arsenic (As) | mg/L | 0.0788 | 0.000020 | 2.80 | 1.76 | 0.000040 | 9312781 |
| Dissolved Barium (Ba) | mg/L | 0.0352 | 0.000020 | 0.00219 | 0.000571 | 0.000040 | 9312781 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000010 | 0.000023 | <0.000020 | 0.000020 | 9312781 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000631 | 0.0000050 | 0.000322 | 0.000063 | 0.000010 | 9312781 |
| Dissolved Boron (B) | mg/L | 0.013 | 0.010 | <0.020 | <0.020 | 0.020 | 9312781 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000131 | 0.0000050 | 0.000262 | 0.000376 | 0.000010 | 9312781 |
| Dissolved Chromium (Cr) | mg/L | <0.00010 | 0.00010 | 0.00064 | 0.00021 | 0.00020 | 9312781 |
| Dissolved Cobalt (Co) | mg/L | 0.00143 | 0.0000050 | 0.0138 | 0.0204 | 0.000010 | 9312781 |
| Dissolved Copper (Cu) | mg/L | 0.00130 | 0.000050 | 0.0196 | 0.00701 | 0.00010 | 9312781 |
| Dissolved Iron (Fe) | mg/L | 0.143 | 0.0010 | 1.68 | 0.224 | 0.0020 | 9312781 |
| Dissolved Lead (Pb) | mg/L | 0.00266 | 0.0000050 | 0.0114 | 0.00336 | 0.000010 | 9312781 |
| Dissolved Lithium (Li) | mg/L | 0.00102 | 0.00050 | 0.0024 | 0.0037 | 0.0010 | 9312781 |
| Dissolved Manganese (Mn) | mg/L | 0.233 | 0.000050 | 2.42 | 6.46 | 0.00010 | 9312781 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000200 | 0.000050 | 0.00011 | 0.00013 | 0.00010 | 9312781 |
| Dissolved Nickel (Ni) | mg/L | 0.00276 | 0.000020 | 0.0234 | 0.0793 | 0.000040 | 9312781 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000040 | 0.000105 | 0.000253 | 0.000080 | 9312781 |
| Dissolved Silicon (Si) | mg/L | 1.05 | 0.050 | 1.42 | 1.37 | 0.10 | 9312781 |
| Dissolved Silver (Ag) | mg/L | 0.0000079 | 0.0000050 | 0.000022 | 0.000019 | 0.000010 | 9312781 |
| Dissolved Strontium (Sr) | mg/L | 0.0529 | 0.000050 | 0.0316 | 0.132 | 0.00010 | 9312781 |
| Dissolved Thallium (Tl) | mg/L | 0.0000165 | 0.0000020 | 0.0000350 | 0.0000218 | 0.0000040 | 9312781 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | <0.00040 | <0.00040 | 0.00040 | 9312781 |
| Dissolved Titanium (Ti) | mg/L | 0.00201 | 0.00050 | 0.0130 | 0.0030 | 0.0010 | 9312781 |
| Dissolved Uranium (U) | mg/L | 0.0000109 | 0.0000020 | 0.0000545 | 0.0000114 | 0.0000040 | 9312781 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00020 | 0.00104 | <0.00040 | 0.00040 | 9312781 |
| Dissolved Zinc (Zn) | mg/L | 0.00451 | 0.00010 | 0.0454 | 0.122 | 0.00020 | 9312781 |
| Dissolved Zirconium (Zr) | mg/L | 0.00022 | 0.00010 | 0.00054 | 0.00023 | 0.00020 | 9312781 |
| Dissolved Calcium (Ca) | mg/L | 22.2 | 0.050 | 8.75 | 29.8 | 0.10 | 9312018 |

RDL = Reportable Detection Limit



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Maxxam Job #: B908276
Report Date: 2019/02/06

MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE3861 | | VE3862 | VE3863 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/01/31 12:00 | | 2019/01/31 12:00 | 2019/01/31 12:00 | | |
| **COC Number** | | B927885-M058-01-01 | | B927885-M058-01-01 | B927885-M058-01-01 | | |
| | **UNITS** | **M-2018-C1 (180-200)** | **RDL** | **M-2018-SFC-T3** | **M-2018-SFC-T7** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 4.69 | 0.050 | 2.60 | 8.62 | 0.10 | 9312018 |
| Dissolved Potassium (K) | mg/L | 6.10 | 0.050 | 4.59 | 7.49 | 0.10 | 9312018 |
| Dissolved Sodium (Na) | mg/L | 2.46 | 0.050 | 4.37 | 22.8 | 0.10 | 9312018 |
| Dissolved Sulphur (S) | mg/L | 24.1 | 0.60 | 14.2 | 53.7 | 1.2 | 9312781 |
| RDL = Reportable Detection Limit | | | | | | | |



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Maxxam Job #: B908276
Report Date: 2019/02/06

MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE3864 | VE3865 | | VE3866 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | | 2019/01/31 12:00 | | |
| COC Number | | B927885-M058-01-01 | B927885-M058-01-01 | | B927885-M058-01-01 | | |
| | UNITS | M-2018-SFC-T2 | M-2018-SFC-T14 | RDL | M-2018-SFC-T28AHP | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 46.3 | 104 | 0.50 | 24.1 | 0.50 | 9311840 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.366 | 0.171 | 0.0010 | 1.69 | 0.00050 | 9312781 |
| Dissolved Antimony (Sb) | mg/L | 0.00945 | 0.00907 | 0.000040 | 0.00244 | 0.000020 | 9312781 |
| Dissolved Arsenic (As) | mg/L | 1.49 | 1.16 | 0.000040 | 0.416 | 0.000020 | 9312781 |
| Dissolved Barium (Ba) | mg/L | 0.0169 | 0.0107 | 0.000040 | 0.00368 | 0.000020 | 9312781 |
| Dissolved Beryllium (Be) | mg/L | 0.000022 | <0.000020 | 0.000020 | 0.000075 | 0.000010 | 9312781 |
| Dissolved Bismuth (Bi) | mg/L | 0.000181 | 0.000060 | 0.000010 | <0.0000050 | 0.0000050 | 9312781 |
| Dissolved Boron (B) | mg/L | <0.020 | <0.020 | 0.020 | <0.010 | 0.010 | 9312781 |
| Dissolved Cadmium (Cd) | mg/L | 0.000058 | 0.000184 | 0.000010 | 0.000298 | 0.0000050 | 9312781 |
| Dissolved Chromium (Cr) | mg/L | 0.00062 | 0.00029 | 0.00020 | 0.00024 | 0.00010 | 9312781 |
| Dissolved Cobalt (Co) | mg/L | 0.0100 | 0.0298 | 0.000010 | 0.0126 | 0.0000050 | 9312781 |
| Dissolved Copper (Cu) | mg/L | 0.00629 | 0.00185 | 0.00010 | 0.141 | 0.000050 | 9312781 |
| Dissolved Iron (Fe) | mg/L | 0.834 | 0.338 | 0.0020 | 0.233 | 0.0010 | 9312781 |
| Dissolved Lead (Pb) | mg/L | 0.00655 | 0.00379 | 0.000010 | 0.000925 | 0.0000050 | 9312781 |
| Dissolved Lithium (Li) | mg/L | 0.0027 | 0.0032 | 0.0010 | 0.00396 | 0.00050 | 9312781 |
| Dissolved Manganese (Mn) | mg/L | 2.49 | 4.06 | 0.00010 | 0.922 | 0.000050 | 9312781 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00060 | 0.00011 | 0.00010 | <0.000050 | 0.000050 | 9312781 |
| Dissolved Nickel (Ni) | mg/L | 0.0276 | 0.0352 | 0.000040 | 0.0259 | 0.000020 | 9312781 |
| Dissolved Selenium (Se) | mg/L | 0.000102 | 0.000097 | 0.000080 | 0.000569 | 0.000040 | 9312781 |
| Dissolved Silicon (Si) | mg/L | 1.41 | 1.17 | 0.10 | 2.95 | 0.050 | 9312781 |
| Dissolved Silver (Ag) | mg/L | <0.000010 | <0.000010 | 0.000010 | <0.0000050 | 0.0000050 | 9312781 |
| Dissolved Strontium (Sr) | mg/L | 0.0421 | 0.0566 | 0.00010 | 0.0236 | 0.000050 | 9312781 |
| Dissolved Thallium (Tl) | mg/L | 0.0000201 | 0.0000445 | 0.0000040 | 0.0000460 | 0.0000020 | 9312781 |
| Dissolved Tin (Sn) | mg/L | <0.00040 | <0.00040 | 0.00040 | <0.00020 | 0.00020 | 9312781 |
| Dissolved Titanium (Ti) | mg/L | 0.0116 | 0.0053 | 0.0010 | <0.00050 | 0.00050 | 9312781 |
| Dissolved Uranium (U) | mg/L | 0.0000768 | 0.0000216 | 0.0000040 | 0.0000309 | 0.0000020 | 9312781 |
| Dissolved Vanadium (V) | mg/L | 0.00068 | 0.00049 | 0.00040 | <0.00020 | 0.00020 | 9312781 |
| Dissolved Zinc (Zn) | mg/L | 0.0186 | 0.0510 | 0.00020 | 0.129 | 0.00010 | 9312781 |
| Dissolved Zirconium (Zr) | mg/L | 0.00057 | 0.00034 | 0.00020 | <0.00010 | 0.00010 | 9312781 |
| Dissolved Calcium (Ca) | mg/L | 11.9 | 22.8 | 0.10 | 6.57 | 0.050 | 9312018 |

RDL = Reportable Detection Limit



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Maxxam Job #: B908276
Report Date: 2019/02/06

MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE3864 | VE3865 | | VE3866 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/01/31 12:00 | 2019/01/31 12:00 | | 2019/01/31 12:00 | | |
| **COC Number** | | B927885-M058-01-01 | B927885-M058-01-01 | | B927885-M058-01-01 | | |
| | **UNITS** | **M-2018-SFC-T2** | **M-2018-SFC-T14** | **RDL** | **M-2018-SFC-T28AHP** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 4.04 | 11.5 | 0.10 | 1.87 | 0.050 | 9312018 |
| Dissolved Potassium (K) | mg/L | 5.94 | 4.25 | 0.10 | 1.11 | 0.050 | 9312018 |
| Dissolved Sodium (Na) | mg/L | 3.35 | 6.78 | 0.10 | 3.06 | 0.050 | 9312018 |
| Dissolved Sulphur (S) | mg/L | 13.3 | 40.5 | 1.2 | 21.6 | 0.60 | 9312781 |
| RDL = Reportable Detection Limit | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE3867 | VE3868 | | VE3869 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | | 2019/01/31 12:00 | | |
| COC Number | | B927885-M058-01-01 | B927885-M058-02-01 | | B927885-M058-02-01 | | |
| | UNITS | M-2018-SFC-12 | M-2018-SFC-13 | RDL | M-2018-SFC-15 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 130 | 275 | 0.50 | 172 | 0.50 | 9311840 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0850 | 0.0413 | 0.0025 | 0.125 | 0.0010 | 9312781 |
| Dissolved Antimony (Sb) | mg/L | 0.0101 | 0.0131 | 0.00010 | 0.0196 | 0.000040 | 9312781 |
| Dissolved Arsenic (As) | mg/L | 0.470 | 1.66 | 0.00010 | 1.46 | 0.000040 | 9312781 |
| Dissolved Barium (Ba) | mg/L | 0.0236 | 0.0183 | 0.00010 | 0.0164 | 0.000040 | 9312781 |
| Dissolved Beryllium (Be) | mg/L | <0.000050 | <0.000050 | 0.000050 | <0.000020 | 0.000020 | 9312781 |
| Dissolved Bismuth (Bi) | mg/L | 0.000029 | 0.000033 | 0.000025 | 0.000034 | 0.000010 | 9312781 |
| Dissolved Boron (B) | mg/L | <0.050 | <0.050 | 0.050 | <0.020 | 0.020 | 9312781 |
| Dissolved Cadmium (Cd) | mg/L | 0.000348 | <0.000025 | 0.000025 | 0.000087 | 0.000010 | 9312781 |
| Dissolved Chromium (Cr) | mg/L | <0.00050 | <0.00050 | 0.00050 | 0.00026 | 0.00020 | 9312781 |
| Dissolved Cobalt (Co) | mg/L | 0.0318 | 0.0557 | 0.000025 | 0.0310 | 0.000010 | 9312781 |
| Dissolved Copper (Cu) | mg/L | 0.00122 | 0.00080 | 0.00025 | 0.00168 | 0.00010 | 9312781 |
| Dissolved Iron (Fe) | mg/L | 0.0939 | 0.225 | 0.0050 | 0.148 | 0.0020 | 9312781 |
| Dissolved Lead (Pb) | mg/L | 0.00264 | 0.00255 | 0.000025 | 0.00171 | 0.000010 | 9312781 |
| Dissolved Lithium (Li) | mg/L | 0.0026 | 0.0042 | 0.0025 | 0.0068 | 0.0010 | 9312781 |
| Dissolved Manganese (Mn) | mg/L | 18.7 | 17.4 | 0.00025 | 3.17 | 0.00010 | 9312781 |
| Dissolved Molybdenum (Mo) | mg/L | <0.00025 | 0.00045 | 0.00025 | 0.00040 | 0.00010 | 9312781 |
| Dissolved Nickel (Ni) | mg/L | 0.0855 | 0.0602 | 0.00010 | 0.0870 | 0.000040 | 9312781 |
| Dissolved Selenium (Se) | mg/L | <0.00020 | <0.00020 | 0.00020 | 0.000203 | 0.000080 | 9312781 |
| Dissolved Silicon (Si) | mg/L | 2.03 | 1.67 | 0.25 | 2.10 | 0.10 | 9312781 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | <0.000025 | 0.000025 | 0.000012 | 0.000010 | 9312781 |
| Dissolved Strontium (Sr) | mg/L | 0.0978 | 0.142 | 0.00025 | 0.0887 | 0.00010 | 9312781 |
| Dissolved Thallium (Tl) | mg/L | 0.000050 | 0.000020 | 0.000010 | 0.0000260 | 0.0000040 | 9312781 |
| Dissolved Tin (Sn) | mg/L | <0.0010 | <0.0010 | 0.0010 | <0.00040 | 0.00040 | 9312781 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | <0.0025 | 0.0025 | 0.0027 | 0.0010 | 9312781 |
| Dissolved Uranium (U) | mg/L | 0.000013 | 0.000026 | 0.000010 | 0.0000328 | 0.0000040 | 9312781 |
| Dissolved Vanadium (V) | mg/L | <0.0010 | <0.0010 | 0.0010 | 0.00062 | 0.00040 | 9312781 |
| Dissolved Zinc (Zn) | mg/L | 0.170 | 0.0363 | 0.00050 | 0.0750 | 0.00020 | 9312781 |
| Dissolved Zirconium (Zr) | mg/L | <0.00050 | <0.00050 | 0.00050 | 0.00027 | 0.00020 | 9312781 |
| Dissolved Calcium (Ca) | mg/L | 33.3 | 61.3 | 0.25 | 40.4 | 0.10 | 9312018 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE3867 | VE3868 | | VE3869 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | | 2019/01/31 12:00 | | |
| COC Number | | B927885-M058-01-01 | B927885-M058-02-01 | | B927885-M058-02-01 | | |
| | UNITS | M-2018-SFC-12 | M-2018-SFC-13 | RDL | M-2018-SFC-15 | RDL | QC Batch |
| Dissolved Magnesium (Mg) | mg/L | 11.5 | 29.5 | 0.25 | 17.3 | 0.10 | 9312018 |
| Dissolved Potassium (K) | mg/L | 3.86 | 9.49 | 0.25 | 7.67 | 0.10 | 9312018 |
| Dissolved Sodium (Na) | mg/L | 17.8 | 16.0 | 0.25 | 2.97 | 0.10 | 9312018 |
| Dissolved Sulphur (S) | mg/L | 58.6 | 109 | 3.0 | 62.7 | 1.2 | 9312781 |
| RDL = Reportable Detection Limit | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE3870 | VE3871 | | VE3872 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/01/31 12:00 | 2019/01/31 12:00 | | 2019/01/31 12:00 | | |
| COC Number | | B927885-M058-02-01 | B927885-M058-02-01 | | B927885-M058-02-01 | | |
| | UNITS | M-2018-SW12-CORE (2.5-10) | M-2018-SW12-CORE (30-40) | RDL | M-2018-C13- (20-30) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 295 | 214 | 0.50 | 11.2 | 0.50 | 9311840 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 6.59 | 1.07 | 0.0025 | 0.364 | 0.00050 | 9312781 |
| Dissolved Antimony (Sb) | mg/L | <0.00010 | <0.00010 | 0.00010 | 0.000443 | 0.000020 | 9312781 |
| Dissolved Arsenic (As) | mg/L | 0.00150 | 0.00235 | 0.00010 | 0.331 | 0.000020 | 9312781 |
| Dissolved Barium (Ba) | mg/L | 0.0303 | 0.0387 | 0.00010 | 0.00782 | 0.000020 | 9312781 |
| Dissolved Beryllium (Be) | mg/L | 0.00331 | 0.000479 | 0.000050 | 0.000012 | 0.000010 | 9312781 |
| Dissolved Bismuth (Bi) | mg/L | <0.000025 | <0.000025 | 0.000025 | 0.000160 | 0.0000050 | 9312781 |
| Dissolved Boron (B) | mg/L | <0.050 | <0.050 | 0.050 | <0.010 | 0.010 | 9312781 |
| Dissolved Cadmium (Cd) | mg/L | 0.0424 | 0.00366 | 0.000025 | 0.0000784 | 0.0000050 | 9312781 |
| Dissolved Chromium (Cr) | mg/L | 0.00058 | <0.00050 | 0.00050 | 0.00030 | 0.00010 | 9312781 |
| Dissolved Cobalt (Co) | mg/L | 0.186 | 0.0236 | 0.000025 | 0.000365 | 0.0000050 | 9312781 |
| Dissolved Copper (Cu) | mg/L | 0.0144 | 0.00031 | 0.00025 | 0.00649 | 0.000050 | 9312781 |
| Dissolved Iron (Fe) | mg/L | 0.102 | 0.0355 | 0.0050 | 0.154 | 0.0010 | 9312781 |
| Dissolved Lead (Pb) | mg/L | 0.0171 | 0.000691 | 0.000025 | 0.00423 | 0.0000050 | 9312781 |
| Dissolved Lithium (Li) | mg/L | 0.0107 | 0.0025 | 0.0025 | <0.00050 | 0.00050 | 9312781 |
| Dissolved Manganese (Mn) | mg/L | 32.2 | 15.0 | 0.00025 | 0.0700 | 0.000050 | 9312781 |
| Dissolved Molybdenum (Mo) | mg/L | <0.00025 | <0.00025 | 0.00025 | 0.000070 | 0.000050 | 9312781 |
| Dissolved Nickel (Ni) | mg/L | 0.425 | 0.0282 | 0.00010 | 0.00108 | 0.000020 | 9312781 |
| Dissolved Selenium (Se) | mg/L | <0.00020 | <0.00020 | 0.00020 | 0.000150 | 0.000040 | 9312781 |
| Dissolved Silicon (Si) | mg/L | 8.72 | 5.96 | 0.25 | 3.61 | 0.050 | 9312781 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | <0.000025 | 0.000025 | 0.0000609 | 0.0000050 | 9312781 |
| Dissolved Strontium (Sr) | mg/L | 0.269 | 0.226 | 0.00025 | 0.00880 | 0.000050 | 9312781 |
| Dissolved Thallium (Tl) | mg/L | 0.000096 | 0.000092 | 0.000010 | 0.0000236 | 0.0000020 | 9312781 |
| Dissolved Tin (Sn) | mg/L | <0.0010 | <0.0010 | 0.0010 | <0.00020 | 0.00020 | 9312781 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | <0.0025 | 0.0025 | 0.00460 | 0.00050 | 9312781 |
| Dissolved Uranium (U) | mg/L | 0.000092 | <0.000010 | 0.000010 | 0.0000375 | 0.0000020 | 9312781 |
| Dissolved Vanadium (V) | mg/L | <0.0010 | <0.0010 | 0.0010 | 0.00056 | 0.00020 | 9312781 |
| Dissolved Zinc (Zn) | mg/L | 1.92 | 0.191 | 0.00050 | 0.0198 | 0.00010 | 9312781 |
| Dissolved Zirconium (Zr) | mg/L | <0.00050 | <0.00050 | 0.00050 | 0.00022 | 0.00010 | 9312781 |
| Dissolved Calcium (Ca) | mg/L | 104 | 74.4 | 0.25 | 2.95 | 0.050 | 9312018 |

RDL = Reportable Detection Limit



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Maxxam Job #: B908276
Report Date: 2019/02/06

MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE3870 | VE3871 | | VE3872 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/01/31 12:00 | 2019/01/31 12:00 | | 2019/01/31 12:00 | | |
| **COC Number** | | B927885-M058-02-01 | B927885-M058-02-01 | | B927885-M058-02-01 | | |
| | **UNITS** | **M-2018-SW12-CORE (2.5-10)** | **M-2018-SW12-CORE (30-40)** | **RDL** | **M-2018-C13- (20-30)** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 8.95 | 6.90 | 0.25 | 0.925 | 0.050 | 9312018 |
| Dissolved Potassium (K) | mg/L | 3.46 | 1.86 | 0.25 | 0.097 | 0.050 | 9312018 |
| Dissolved Sodium (Na) | mg/L | 35.4 | 36.6 | 0.25 | 2.97 | 0.050 | 9312018 |
| Dissolved Sulphur (S) | mg/L | 147 | 93.2 | 3.0 | 3.61 | 0.60 | 9312781 |
| RDL = Reportable Detection Limit | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VE3858
**Sample ID:** M-2018-C1 (10-20)
**Matrix:** Water

**Collected:** 2019/01/31
**Shipped:**
**Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3859
**Sample ID:** M-2018-C1 (40-60)
**Matrix:** Water

**Collected:** 2019/01/31
**Shipped:**
**Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3860
**Sample ID:** M-2018-C1 (140-160)
**Matrix:** Water

**Collected:** 2019/01/31
**Shipped:**
**Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3861
**Sample ID:** M-2018-C1 (180-200)
**Matrix:** Water

**Collected:** 2019/01/31
**Shipped:**
**Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3862
**Sample ID:** M-2018-SFC-T3
**Matrix:** Water

**Collected:** 2019/01/31
**Shipped:**
**Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |



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MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VE3863 **Collected:** 2019/01/31
**Sample ID:** M-2018-SFC-T7 **Shipped:**
**Matrix:** Water **Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3864 **Collected:** 2019/01/31
**Sample ID:** M-2018-SFC-T2 **Shipped:**
**Matrix:** Water **Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3865 **Collected:** 2019/01/31
**Sample ID:** M-2018-SFC-T14 **Shipped:**
**Matrix:** Water **Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3866 **Collected:** 2019/01/31
**Sample ID:** M-2018-SFC-T28AHP **Shipped:**
**Matrix:** Water **Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3867 **Collected:** 2019/01/31
**Sample ID:** M-2018-SFC-12 **Shipped:**
**Matrix:** Water **Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |



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MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VE3868
**Sample ID:** M-2018-SFC-13
**Matrix:** Water

**Collected:** 2019/01/31
**Shipped:**
**Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3869
**Sample ID:** M-2018-SFC-15
**Matrix:** Water

**Collected:** 2019/01/31
**Shipped:**
**Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3870
**Sample ID:** M-2018-SW12-CORE (2.5-10)
**Matrix:** Water

**Collected:** 2019/01/31
**Shipped:**
**Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3871
**Sample ID:** M-2018-SW12-CORE (30-40)
**Matrix:** Water

**Collected:** 2019/01/31
**Shipped:**
**Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |

**Maxxam ID:** VE3872
**Sample ID:** M-2018-C13- (20-30)
**Matrix:** Water

**Collected:** 2019/01/31
**Shipped:**
**Received:** 2019/02/02

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9311840 | N/A | 2019/02/06 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9312018 | N/A | 2019/02/06 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9312781 | N/A | 2019/02/05 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/02 | Aldean Alicando |



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Maxxam Job #: B908276
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MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 3.7°C |

**LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments**

Sample VE3862 [M-2018-SFC-T3] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE3863 [M-2018-SFC-T7] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE3864 [M-2018-SFC-T2] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE3865 [M-2018-SFC-T14] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE3867 [M-2018-SFC-12] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE3868 [M-2018-SFC-13] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE3869 [M-2018-SFC-15] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE3870 [M-2018-SW12-CORE (2.5-10)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VE3871 [M-2018-SW12-CORE (30-40)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.

**Results relate only to the items tested.**



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## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9312781 | Dissolved Aluminum (Al) | 2019/02/05 | 91 | 80 - 120 | 95 | 80 - 120 | <0.00050 | mg/L | 0.40 | 20 |
| 9312781 | Dissolved Antimony (Sb) | 2019/02/05 | 97 | 80 - 120 | 99 | 80 - 120 | <0.000020 | mg/L | 3.0 | 20 |
| 9312781 | Dissolved Arsenic (As) | 2019/02/05 | NC | 80 - 120 | 99 | 80 - 120 | <0.000020 | mg/L | 0.82 | 20 |
| 9312781 | Dissolved Barium (Ba) | 2019/02/05 | NC | 80 - 120 | 98 | 80 - 120 | <0.000020 | mg/L | 0.52 | 20 |
| 9312781 | Dissolved Beryllium (Be) | 2019/02/05 | 91 | 80 - 120 | 96 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9312781 | Dissolved Bismuth (Bi) | 2019/02/05 | 94 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9312781 | Dissolved Boron (B) | 2019/02/05 | 92 | 80 - 120 | 99 | 80 - 120 | <0.010 | mg/L | 1.8 | 20 |
| 9312781 | Dissolved Cadmium (Cd) | 2019/02/05 | 95 | 80 - 120 | 98 | 80 - 120 | <0.0000050 | mg/L | 0.78 | 20 |
| 9312781 | Dissolved Chromium (Cr) | 2019/02/05 | 97 | 80 - 120 | 102 | 80 - 120 | <0.00010 | mg/L | 13 | 20 |
| 9312781 | Dissolved Cobalt (Co) | 2019/02/05 | 94 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | 1.5 | 20 |
| 9312781 | Dissolved Copper (Cu) | 2019/02/05 | NC | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | 0.69 | 20 |
| 9312781 | Dissolved Iron (Fe) | 2019/02/05 | 96 | 80 - 120 | 103 | 80 - 120 | <0.0010 | mg/L | 7.5 | 20 |
| 9312781 | Dissolved Lead (Pb) | 2019/02/05 | 97 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | 1.3 | 20 |
| 9312781 | Dissolved Lithium (Li) | 2019/02/05 | 87 | 80 - 120 | 94 | 80 - 120 | <0.00050 | mg/L | 0.98 | 20 |
| 9312781 | Dissolved Manganese (Mn) | 2019/02/05 | 93 | 80 - 120 | 100 | 80 - 120 | <0.000050 | mg/L | 0.066 | 20 |
| 9312781 | Dissolved Molybdenum (Mo) | 2019/02/05 | 101 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | 1.9 | 20 |
| 9312781 | Dissolved Nickel (Ni) | 2019/02/05 | 93 | 80 - 120 | 103 | 80 - 120 | <0.000020 | mg/L | 1.2 | 20 |
| 9312781 | Dissolved Selenium (Se) | 2019/02/05 | NC | 80 - 120 | 94 | 80 - 120 | <0.000040 | mg/L | 1.6 | 20 |
| 9312781 | Dissolved Silicon (Si) | 2019/02/05 | 87 | 80 - 120 | 89 | 80 - 120 | <0.050 | mg/L | 0.50 | 20 |
| 9312781 | Dissolved Silver (Ag) | 2019/02/05 | 95 | 80 - 120 | 99 | 80 - 120 | <0.0000050 | mg/L | 11 | 20 |
| 9312781 | Dissolved Strontium (Sr) | 2019/02/05 | NC | 80 - 120 | 93 | 80 - 120 | <0.000050 | mg/L | 1.7 | 20 |
| 9312781 | Dissolved Sulphur (S) | 2019/02/05 | NC | 80 - 120 | 97 | 80 - 120 | <0.60 | mg/L | | |
| 9312781 | Dissolved Thallium (Tl) | 2019/02/05 | 96 | 80 - 120 | 101 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9312781 | Dissolved Tin (Sn) | 2019/02/05 | 97 | 80 - 120 | 100 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9312781 | Dissolved Titanium (Ti) | 2019/02/05 | 97 | 80 - 120 | 100 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9312781 | Dissolved Uranium (U) | 2019/02/05 | 100 | 80 - 120 | 101 | 80 - 120 | <0.0000020 | mg/L | 0.78 | 20 |
| 9312781 | Dissolved Vanadium (V) | 2019/02/05 | 98 | 80 - 120 | 100 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9312781 | Dissolved Zinc (Zn) | 2019/02/05 | NC | 80 - 120 | 105 | 80 - 120 | <0.00010 | mg/L | 0.35 | 20 |



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## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9312781 | Dissolved Zirconium (Zr) | 2019/02/05 | 100 | 80 - 120 | 97 | 80 - 120 | <0.00010 | mg/L | NC | 20 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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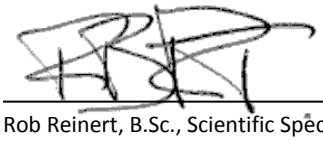
MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Rob Reinert, B.Sc., Scientific Specialist

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Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: N/A

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/13**
Report #: R5592501
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B929300**
**Received: 2019/02/01, 19:40**

Sample Matrix: Water
# Samples Received: 20

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Acidity (CaCO3) in water (1, 2) | 15 | N/A | 2019/02/11 | | SM 22 2310 |
| Alkalinity | 5 | N/A | 2019/02/05 | CAM SOP-00448 | SM 23 2320 B m |
| Free (WAD) Cyanide | 4 | N/A | 2019/02/07 | CAM SOP-00457 | OMOE E3015 m |
| Total Cyanide | 4 | 2019/02/05 | 2019/02/07 | CAM SOP-00457 | OMOE E3015 5 m |
| Dissolved Mercury (low level) | 20 | 2019/02/05 | 2019/02/05 | CAM SOP-00453 | EPA 7470 m |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Bedford
(2) Non-accredited test method

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: N/A

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/13**
Report #: R5592501
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B929300**
**Received: 2019/02/01, 19:40**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700
==========
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Maxxam Job #: B929300
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IWZ944 | | | IWZ945 | | | IWZ946 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | | 2019/02/01 | | | 2019/02/01 | | |
| COC Number | | N/A | | | N/A | | | N/A | | |
| | **UNITS** | **M-2018-C5 (30-50)** | **RDL** | **QC Batch** | **M-2018-SFC-T25** | **RDL** | **QC Batch** | **M-2018-SFC-T26** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | | |
| Acidity | mg/L | 6.4 | 5.0 | 5968900 | | | | 6.6 | 5.0 | 5968900 |
| Alkalinity (Total as CaCO3) | mg/L | | | | 6.3 | 1.0 | 5960295 | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWZ947 | IWZ948 | IWZ949 | | | IWZ950 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | | | 2019/02/01 | | |
| COC Number | | N/A | N/A | N/A | | | N/A | | |
| | **UNITS** | **M-2018-SFC-T27** | **M-2018-SFC-T32** | **M-2018-SFC-T17** | **RDL** | **QC Batch** | **M-2018-SFC-T20** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | 110 | 8.4 | <5.0 | 5.0 | 5968900 | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | | | | 11 | 1.0 | 5960295 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWZ951 | | | IWZ952 | IWZ953 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | | 2019/02/01 | 2019/02/01 | | |
| COC Number | | N/A | | | N/A | N/A | | |
| | **UNITS** | **M-2018-SFC-T30** | **RDL** | **QC Batch** | **M-2018-C19 (0-5)** | **M-2018-C19 (20-30)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Acidity | mg/L | | | | 17 | 24 | 5.0 | 5968900 |
| Alkalinity (Total as CaCO3) | mg/L | 22 | 1.0 | 5960295 | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWZ954 | | | IWZ955 | | | IWZ956 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | | 2019/02/01 | | | 2019/02/01 | | |
| COC Number | | N/A | | | N/A | | | N/A | | |
| | **UNITS** | **M-2018-C11 (10-20)** | **RDL** | **QC Batch** | **M-2018-C11 (30-40)** | **RDL** | **QC Batch** | **M-2018-C2 (0-5)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | | |
| Acidity | mg/L | 11 | 5.0 | 5968900 | 5.8 | 5.0 | 5968900 | | | |
| Total Cyanide (CN) | mg/L | <0.0050 | 0.0050 | 5961233 | | | | | | |
| WAD Cyanide (Free) | mg/L | <0.0010 | 0.0010 | 5961249 | | | | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | | | | | 52 | 1.0 | 5960295 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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

Maxxam Job #: B929300
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IWZ957 | IWZ958 | IWZ959 | | | IWZ960 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | | | 2019/02/01 | | |
| COC Number | | N/A | N/A | N/A | | | N/A | | |
| | **UNITS** | **M-2018-C2 (10-20)** | **M-2018-C2 (40-60)** | **M-2018-C2 (80-100)** | **RDL** | **QC Batch** | **M-2018-C3 (0-5)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | 7.2 | 8.2 | 9.0 | 5.0 | 5968900 | | | |
| Total Cyanide (CN) | mg/L | <0.0050 | <0.0050 | <0.0050 | 0.0050 | 5961233 | | | |
| WAD Cyanide (Free) | mg/L | <0.0010 | <0.0010 | <0.0010 | 0.0010 | 5961249 | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | | | | 43 | 1.0 | 5960295 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWZ961 | IWZ962 | IWZ963 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | | |
| COC Number | | N/A | N/A | N/A | | |
| | **UNITS** | **M-2018-C3 (40-80)** | **M-2018-C3 (140-160)** | **M-2018-C3 (160-180)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | |
| Acidity | mg/L | <5.0 | 9.4 | 9.8 | 5.0 | 5968900 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B929300
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IWZ944 | IWZ945 | | IWZ946 | IWZ947 | IWZ948 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | | 2019/02/01 | 2019/02/01 | 2019/02/01 | | |
| COC Number | | N/A | N/A | | N/A | N/A | N/A | | |
| | **UNITS** | **M-2018-C5 (30-50)** | **M-2018-SFC-T25** | **RDL** | **M-2018-SFC-T26** | **M-2018-SFC-T27** | **M-2018-SFC-T32** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.95 | 0.94 | 0.05 | <0.01 | 0.01 | 0.03 | 0.01 | 5960412 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWZ949 | | IWZ950 | | IWZ951 | IWZ952 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | | 2019/02/01 | | 2019/02/01 | 2019/02/01 | | |
| COC Number | | N/A | | N/A | | N/A | N/A | | |
| | **UNITS** | **M-2018-SFC-T17** | **RDL** | **M-2018-SFC-T20** | **RDL** | **M-2018-SFC-T30** | **M-2018-C19 (0-5)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.24 | 0.01 | 0.53 | 0.05 | 0.06 | 0.12 | 0.01 | 5960412 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IWZ953 | IWZ953 | IWZ954 | IWZ955 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | 2019/02/01 | | |
| COC Number | | N/A | N/A | N/A | N/A | | |
| | **UNITS** | **M-2018-C19 (20-30)** | **M-2018-C19 (20-30) Lab-Dup** | **M-2018-C11 (10-20)** | **M-2018-C11 (30-40)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.02 | 0.02 | <0.01 | <0.01 | 0.01 | 5960412 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

| Maxxam ID | | IWZ956 | IWZ957 | IWZ958 | | IWZ959 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | 2019/02/01 | | 2019/02/01 | | |
| COC Number | | N/A | N/A | N/A | | N/A | | |
| | **UNITS** | **M-2018-C2 (0-5)** | **M-2018-C2 (10-20)** | **M-2018-C2 (40-60)** | **RDL** | **M-2018-C2 (80-100)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.24 | <0.01 | 0.19 | 0.01 | 0.97 | 0.05 | 5960412 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B929300
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IWZ960 | IWZ961 | | IWZ962 | | IWZ963 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/01 | 2019/02/01 | | 2019/02/01 | | 2019/02/01 | | |
| COC Number | | N/A | N/A | | N/A | | N/A | | |
| | **UNITS** | **M-2018-C3 (0-5)** | **M-2018-C3 (40-80)** | **RDL** | **M-2018-C3 (140-160)** | **RDL** | **M-2018-C3 (160-180)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.09 | 0.13 | 0.01 | 0.77 | 0.02 | 0.14 | 0.01 | 5960412 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B929300
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
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## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 15.0°C |

**Results relate only to the items tested.**



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Maxxam Job #: B929300
Report Date: 2019/02/13

## QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5960295 | Alkalinity (Total as CaCO3) | 2019/02/05 | | | 98 | 85 - 115 | <1.0 | mg/L | 1.6 | 20 |
| 5960412 | Dissolved Mercury (Hg) | 2019/02/05 | 96 | 75 - 125 | 92 | 80 - 120 | <0.01 | ug/L | 0.82 | 20 |
| 5961233 | Total Cyanide (CN) | 2019/02/06 | 97 | 80 - 120 | 103 | 80 - 120 | <0.0050 | mg/L | NC | 20 |
| 5961249 | WAD Cyanide (Free) | 2019/02/06 | 96 | 80 - 120 | 97 | 80 - 120 | <0.0010 | mg/L | NC | 20 |
| 5968900 | Acidity | 2019/02/11 | 100 | 80 - 120 | 102 | 80 - 120 | <5.0 | mg/L | NC | 25 |

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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Maxxam Job #: B929300
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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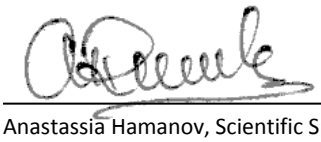
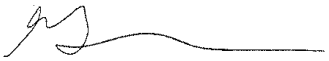


Anastassia Hamanov, Scientific Specialist



Gina Thompson, Inorganics General Chemistry Supervisor

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Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD

Page 1 of 2

| Invoice Information | | Report Information (if differs from invoice) | | Project Information (where applicable) | | Turnaround Time (TAT) Required |
|---|---|---|---|---|---|---|
| Company Name: | EcoMetrix Inc | Company Name: | | Quotation #: | | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: | Daniel Skruch | Contact Name: | | P.O. #/ AFE#: | | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: | 6800 Campobello Road | Address: | | Project #: | 18-2525 | Rush TAT (Surcharges will be applied) |
| Phone: | 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: | Fax: | Site Location: | NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Email: | dskruch@ecometrix.ca | Email: | | Site #: | | Date Required: |
| | | | | Sampled By: | ALC+FL+CL | Rush Confirmation #: |

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

**Regulation 153**
[ ] Table 1 [ ] Res/Park [ ] Med/ Fine
[ ] Table 2 [ ] Ind/Comm [ ] Coarse
[ ] Table 3 [ ] Agri/ Other
[ ] Table ____
FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**
[ ] CCME [ ] Sanitary Sewer Bylaw
[ ] MISA [ ] Storm Sewer Bylaw
[ ] PWQO Region ____
[ ] Other (Specify) ____
[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

**Analysis Requested**

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED; to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M-2018-C5 (30-50) | 01/02/2019 | | Water | 3 | X | X | | X | | X | |
| 2 | M-2018-SFC-T25 | 02/02/2019 | | Water | 3 | | X | X | | | X | |
| 3 | M-2018-SFC-T26 | 03/02/2019 | | Water | 3 | | X | | X | | X | |
| 4 | M-2018-SFC-T27 | 04/02/2019 | | Water | 3 | | X | | X | | X | |
| 5 | M-2018-SFC-T32 | 05/02/2019 | | Water | 3 | | X | | X | | X | |
| 6 | M-2018-SFC-T17 | 06/02/2019 | | Water | 3 | | X | | X | | X | |
| 7 | M-2018-SFC-T20 | 07/02/2019 | | Water | 3 | | X | X | | | X | |
| 8 | M-2018-SFC-T30 | 08/02/2019 | | Water | 3 | | X | X | | | X | |
| 9 | M-2018-C19 (0-5) | 09/02/2019 | | Water | 3 | | X | | X | | X | |
| 10 | M-2018-C19 (20-30) | 10/02/2019 | | Water | 3 | | X | | X | | X | |

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) |
|---|---|---|---|---|---|
| Fei Luo | 01/02/2019 | 19:40 | Roeep Roeep Rnewal | 2019/02/01 | 19:40 |
| | | | | | |

| LABORATORY USE ONLY | | |
|---|---|---|
| CUSTODY SEAL Y / N | | COOLER TEMPERATURES |
| Present | Intact | |
| N | N | 15 \| 15 \| 15 |
| | | |
| | | |
| COOLING MEDIA PRESENT: Y / (N) | | |

COMMENTS

***NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); ****Mercury 0.00001 mg/L**

***PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

01-Feb-19 19:40
Kyle Reinhart
B929300
KVG ENV-838

Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD

Page 2 of 2

| Invoice Information | | Report Information (if differs from invoice) | | Project Information (where applicable) | | Turnaround Time (TAT) Required |
|---|---|---|---|---|---|---|
| Company Name: | EcoMetrix Inc | Company Name: | | Quotation #: | | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: | Daniel Skruch | Contact Name: | | P.O. #/ AFE#: | | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: | 6800 Campobello Road | Address: | | Project #: | 18-2525 | Rush TAT (Surcharges will be applied) |
| Phone: | 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: | Fax: | Site Location: | NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Email: | dskruch@ecometrix.ca | Email: | | Site #: | | Date Required: |
| | | | | Sampled By: | ALC+FL+CL | Rush Confirmation #: |

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

**Regulation 153**

[ ] Table 1 [ ] Res/Park [ ] Med/ Fine
[ ] Table 2 [ ] Ind/Comm [ ] Coarse
[ ] Table 3 [ ] Agri/ Other
[ ] Table ____

FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**

[ ] CCME [ ] Sanitary Sewer Bylaw
[ ] MISA [ ] Storm Sewer Bylaw
[ ] PWQO Region ____
[ ] Other (Specify) ____
[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

**Analysis Requested**

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED; to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M-2018-C11 (10-20) | 01/02/2019 | | Water | 4 | X | X | | X | X | X | |
| 2 | M-2018-C11 (30-40) | 01/02/2019 | | Water | 3 | X | X | | X | | X | |
| 3 | M-2018-C2 (0-5) | 01/02/2019 | | Water | 3 | X | X | X | | | X | |
| 4 | M-2018-C2 (10-20) | 01/02/2019 | | Water | 4 | X | X | | X | X | X | |
| 5 | M-2018-C2 (40-60) | 01/02/2019 | | Water | 4 | X | X | | X | X | X | |
| 6 | M-2018-C2 (80-100) | 01/02/2019 | | Water | 4 | X | X | | X | X | X | |
| 7 | M-2018-C3 (0-5) | 01/02/2019 | | Water | 3 | X | X | X | | | X | |
| 8 | M-2018-C3 (40-80) | 01/02/2019 | | Water | 3 | X | X | | X | | X | |
| 9 | M-2018-C3 (140-160) | 01/02/2019 | | Water | 3 | X | X | | X | | X | |
| 10 | M-2018-C3 (160-180) | 01/02/2019 | | Water | 3 | X | X | | X | | X | |

LABORATORY USE ONLY

| CUSTODY SEAL Y / N | | COOLER TEMPERATURES |
|---|---|---|
| Present | Intact | |
| | | |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / N

COMMENTS

**NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); ****Mercury 0.00001 mg/L**

***PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) | MAXXAM JOB # |
|---|---|---|---|---|---|---|
| Fei Luo | 01/02/2019 | 19:40 | See P91 | | | |
| | | | | | | |

Maxxam
A Bureau Veritas Group Company

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: N/A

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/13**
Report #: R5592502
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B930148**
**Received: 2019/02/04, 14:15**

Sample Matrix: Water
# Samples Received: 14

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Acidity (CaCO3) in water (1, 2) | 14 | N/A | 2019/02/11 | | SM 22 2310 |
| Free (WAD) Cyanide | 2 | N/A | 2019/02/07 | CAM SOP-00457 | OMOE E3015 m |
| Total Cyanide | 2 | 2019/02/05 | 2019/02/07 | CAM SOP-00457 | OMOE E3015 5 m |
| Dissolved Mercury (low level) | 14 | 2019/02/06 | 2019/02/07 | CAM SOP-00453 | EPA 7470 m |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Bedford
(2) Non-accredited test method


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

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: N/A

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/13**
Report #: R5592502
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B930148**
**Received: 2019/02/04, 14:15**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700

==========

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

Maxxam Job #: B930148
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IXE820 | | IXE821 | | | IXE822 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | | 2019/02/04 12:00 | | | 2019/02/04 12:00 | | |
| COC Number | | N/A | | N/A | | | N/A | | |
| | **UNITS** | **M-2018-C4 (40-60)** | **RDL** | **M-2018-C4 (60-100)** | **RDL** | **QC Batch** | **M-2018-C18 (2.5-10)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | 25 | 5.0 | 8.3 | 6.3 | 5968900 | 12 | 5.0 | 5969114 |
| Total Cyanide (CN) | mg/L | | | | | | <0.0050 | 0.0050 | 5961233 |
| WAD Cyanide (Free) | mg/L | | | | | | <0.0010 | 0.0010 | 5961249 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IXE823 | | | IXE824 | | IXE825 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | | | 2019/02/04 12:00 | | 2019/02/04 12:00 | | |
| COC Number | | N/A | | | N/A | | N/A | | |
| | **UNITS** | **M-2018-C18 (10-20)** | **RDL** | **QC Batch** | **M-2018-C18 (20-30)** | **RDL** | **M-2018-SFC SOIL C.MOORE** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | 17 | 6.3 | 5969114 | 15 | 5.0 | 11 | 5.6 | 5969114 |
| Total Cyanide (CN) | mg/L | <0.0050 | 0.0050 | 5961233 | | | | | |
| WAD Cyanide (Free) | mg/L | <0.0010 | 0.0010 | 5961249 | | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IXE826 | IXE827 | IXE828 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | | |
| COC Number | | N/A | N/A | N/A | | |
| | **UNITS** | **M-2018-SW9-CORE (0-7.5)** | **M-2018-SW9-CORE (15-20)** | **M-2018-SW9-CORE (20-40)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | |
| Acidity | mg/L | 6.4 | 12 | 9.4 | 5.0 | 5969114 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B930148
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IXE829 | IXE830 | IXE831 | IXE832 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | | |
| COC Number | | N/A | N/A | N/A | N/A | | |
| | **UNITS** | **M-2018-SW10-CORE (0-5)** | **M-2018-SW10-CORE (15-20)** | **M-2018-SW10-CORE (30-40)** | **M-2018-C17 (15-20)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Acidity | mg/L | 17 | 11 | 14 | <5.0 | 5.0 | 5969114 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IXE833 | | |
|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | | |
| COC Number | | N/A | | |
| | **UNITS** | **M-2018-C17 (30-40)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | |
| Acidity | mg/L | 12 | 5.0 | 5969114 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B930148
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IXE820 | | IXE821 | | IXE822 | IXE823 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | | 2019/02/04 12:00 | | 2019/02/04 12:00 | 2019/02/04 12:00 | | |
| COC Number | | N/A | | N/A | | N/A | N/A | | |
| | **UNITS** | **M-2018-C4 (40-60)** | **RDL** | **M-2018-C4 (60-100)** | **RDL** | **M-2018-C18 (2.5-10)** | **M-2018-C18 (10-20)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.04 | 0.01 | 0.61 | 0.05 | 0.01 | <0.01 | 0.01 | 5962394 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IXE824 | | IXE825 | | IXE826 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | | 2019/02/04 12:00 | | 2019/02/04 12:00 | | |
| COC Number | | N/A | | N/A | | N/A | | |
| | **UNITS** | **M-2018-C18 (20-30)** | **RDL** | **M-2018-SFC SOIL C.MOORE** | **RDL** | **M-2018-SW9-CORE (0-7.5)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.03 | 0.01 | 130 | 4 | <0.01 | 0.01 | 5962394 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IXE827 | IXE828 | IXE829 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | | |
| COC Number | | N/A | N/A | N/A | | |
| | **UNITS** | **M-2018-SW9-CORE (15-20)** | **M-2018-SW9-CORE (20-40)** | **M-2018-SW10-CORE (0-5)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | |
| Dissolved Mercury (Hg) | ug/L | <0.01 | <0.01 | <0.01 | 0.01 | 5962394 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IXE830 | IXE831 | | IXE832 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | | 2019/02/04 12:00 | | |
| COC Number | | N/A | N/A | | N/A | | |
| | **UNITS** | **M-2018-SW10-CORE (15-20)** | **M-2018-SW10-CORE (30-40)** | **RDL** | **M-2018-C17 (15-20)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | <0.01 | <0.01 | 0.01 | 3.1 | 0.1 | 5962394 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B930148
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IXE833 | IXE833 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | | |
| COC Number | | N/A | N/A | | |
| | **UNITS** | **M-2018-C17 (30-40)** | **M-2018-C17 (30-40) Lab-Dup** | **RDL** | **QC Batch** |
| **Metals** | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.05 | 0.05 | 0.01 | 5962394 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B930148
Report Date: 2019/02/13

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 15.3°C |

**Results relate only to the items tested.**



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Maxxam Job #: B930148
Report Date: 2019/02/13

## QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5961233 | Total Cyanide (CN) | 2019/02/06 | 97 | 80 - 120 | 103 | 80 - 120 | <0.0050 | mg/L | NC | 20 |
| 5961249 | WAD Cyanide (Free) | 2019/02/06 | 96 | 80 - 120 | 97 | 80 - 120 | <0.0010 | mg/L | NC | 20 |
| 5962394 | Dissolved Mercury (Hg) | 2019/02/07 | 97 | 75 - 125 | 99 | 80 - 120 | <0.01 | ug/L | 2.4 | 20 |
| 5968900 | Acidity | 2019/02/11 | 100 | 80 - 120 | 102 | 80 - 120 | <5.0 | mg/L | NC | 25 |
| 5969114 | Acidity | 2019/02/11 | 91 | 80 - 120 | 104 | 80 - 120 | <5.0 | mg/L | NC | 25 |

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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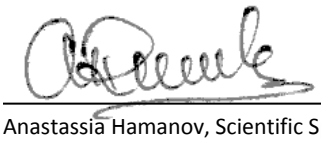
Maxxam Job #: B930148
Report Date: 2019/02/13

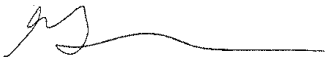
EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist



Gina Thompson, Inorganics General Chemistry Supervisor

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



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Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | Report Information (if differs from invoice) | Project Information (where applicable) | Turnaround Time (TAT) Required |
|---|---|---|---|
| Company Name: EcoMetrix Inc | Company Name: | Quotation #: | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: Daniel Skruch | Contact Name: | P.O. #/ AFE#: | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: 6800 Campobello Road | Address: | Project #: 18-2525 | Rush TAT (Surcharges will be applied) |
| Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: Fax: | Site Location: NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Email: dskruch@ecometrix.ca | Email: | Site #: | Date Required: |
| | | Sampled By: ALC+FL+CL | Rush Confirmation #: |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

**Regulation 153**

[ ] Table 1 [ ] Res/Park [ ] Med/ Fine
[ ] Table 2 [ ] Ind/Comm [ ] Coarse
[ ] Table 3 [ ] Agri/ Other
[ ] Table ____
FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**

[ ] CCME [ ] Sanitary Sewer Bylaw
[ ] MISA [ ] Storm Sewer Bylaw
[ ] PWQO Region
[ ] Other (Specify)
[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

**SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM**

**LABORATORY USE ONLY**

| CUSTODY SEAL Y / N | | COOLER TEMPERATURES |
|---|---|---|
| Present | Intact | |
| N | N | 15/15/16 |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / (N)

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, Include Sulphur) FILTERED, to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M-2018-C4 (40-60) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | M-2018-C4 (60-100) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | M-2018-C18 (2.5-10) | 04/02/2019 | 12:00 | Water | 4 | X | X | | X | X | X | |
| 4 | M-2018-C18 (10-20) | 04/02/2019 | 12:00 | Water | 4 | X | X | | X | X | X | |
| 5 | M-2018-C18 (20-30) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 6 | M-2018-SFC SOIL C.MOORE | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 7 | M-2018-SW9-CORE (0-7.5) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 8 | M-2018-SW9-CORE (15-20) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 9 | M-2018-SW9-CORE (20-40) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 10 | M-2018-SW10-CORE (0-5) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |

COMMENTS

*NOTE Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); **Mercury 0.00001 mg/L

*PLEASE CONTACT IF SAMPLE VOLUME CONCERNS*

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) |
|---|---|---|---|---|---|
| Amanda Cicek | 04/02/2019 | 2:15PM | | W4/02/19 | 14:15 |
| | | | | | |

04-Feb-19 14:15
Kyle Reinhart
B930148
GID ENV-983

Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | Report Information (if differs from invoice) | Project Information (where applicable) | Turnaround Time (TAT) Required |
|---|---|---|---|
| Company Name: EcoMetrix Inc | Company Name: | Quotation #: | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: Daniel Skruch | Contact Name: | P.O. #/ AFE#: | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: 6800 Campobello Road | Address: | Project #: 18-2525 | Rush TAT (Surcharges will be applied) |
| Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: Fax: | Site Location: NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Email: dskruch@ecometrix.ca | Email: | Site #: | Date Required: |
| | | Sampled By: ALC+FL+CL | Rush Confirmation #: |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

| Regulation 153 | Other Regulations |
|---|---|
| [ ] Table 1 [ ] Res/Park [ ] Med/ Fine | [ ] CCME [ ] Sanitary Sewer Bylaw |
| [ ] Table 2 [ ] Ind/Comm [ ] Coarse | [ ] MISA [ ] Storm Sewer Bylaw |
| [ ] Table 3 [ ] Agri/ Other | [ ] PWQO Region |
| [ ] Table ____ | [ ] Other (Specify) |
| FOR RSC (PLEASE CIRCLE) Y / N | [ ] REG 558 (MIN. 3 DAY TAT REQUIRED) |

Include Criteria on Certificate of Analysis: Y / N

**SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM**

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED; to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M-2018-SW10-CORE (15-20) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | M-2018-SW10-CORE (30-40) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | M-2018-C17 (15-20) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 4 | M-2018-C17 (30-40) | 04/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 5 | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |

LABORATORY USE ONLY

| CUSTODY SEAL Y / N | | COOLER TEMPERATURES |
|---|---|---|
| Present | Intact | |
| N | N | 15/15/16 |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / N

COMMENTS

*NOTE Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); **Mercury 0.00001 mg/L

*PLEASE CONTACT IF SAMPLE VOLUME CONCERNS*

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) | MAXXAM JOB # |
|---|---|---|---|---|---|---|
| Amanda Closen | 04/02/2019 | 14:15 | | 04/10/19 | 1415 | |
| | | | | | | |

Your Project #: MB930148
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b930148-m058-01-01, b930148-m058-02-01

**Report Date: 2019/02/12**
Report #: R2685059
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B909554**
**Received: 2019/02/06, 11:30**

Sample Matrix: Water
# Samples Received: 14

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | 14 | N/A | 2019/02/11 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 14 | N/A | 2019/02/11 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 14 | N/A | 2019/02/10 | BBY7SOP-00002 | EPA 6020b R2 m |
| Filter and HNO3 Preserve for Metals | 14 | N/A | 2019/02/07 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your Project #: MB930148
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b930148-m058-01-01, b930148-m058-02-01

**Report Date: 2019/02/12**
Report #: R2685059
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B909554**
**Received: 2019/02/06, 11:30**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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

Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | VE9289 | VE9290 | VE9291 | VE9292 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | |
| COC Number | | b930148-m058-01-01 | b930148-m058-01-01 | b930148-m058-01-01 | b930148-m058-01-01 | |
| | UNITS | M-2018-C4 (40-60) | M-2018-C4 (60-100) | M-2018-C18 (2.5-10) | M-2018-C18 (10-20) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VE9293 | VE9294 | VE9295 | VE9296 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | |
| COC Number | | b930148-m058-01-01 | b930148-m058-01-01 | b930148-m058-01-01 | b930148-m058-01-01 | |
| | UNITS | M-2018-C18 (20-30) | M-2018-SFC SOIL C.MOORE | M-2018-SW9-CORE (0-7.5) | M-2018-SW9-CORE-(15-20) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VE9297 | VE9298 | VE9299 | VE9300 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | |
| COC Number | | b930148-m058-01-01 | b930148-m058-01-01 | b930148-m058-02-01 | b930148-m058-02-01 | |
| | UNITS | M-2018-SW9-CORE-(20-40) | M-2018-SW10-CORE (0-5) | M-2018-SW10-CORE (15-20) | M-2018-SW10-CORE (30-40) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VE9301 | VE9302 | |
|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | |
| COC Number | | b930148-m058-02-01 | b930148-m058-02-01 | |
| | UNITS | M-2018-C17 (15-20) | M-2018-C17 (30-40) | QC Batch |
| **Calculated Parameters** | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | ONSITE |



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9289 | | VE9290 | | VE9291 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | | 2019/02/04 12:00 | | 2019/02/04 12:00 | | |
| COC Number | | b930148-m058-01-01 | | b930148-m058-01-01 | | b930148-m058-01-01 | | |
| | UNITS | M-2018-C4 (40-60) | RDL | M-2018-C4 (60-100) | RDL | M-2018-C18 (2.5-10) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 29.2 | 0.50 | 346 | 0.50 | 129 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 5.49 | 0.00050 | 0.0513 | 0.0025 | 0.185 | 0.00050 | 9317234 |
| Dissolved Antimony (Sb) | mg/L | 0.000325 | 0.000020 | 0.0375 | 0.00010 | 0.000465 | 0.000020 | 9317234 |
| Dissolved Arsenic (As) | mg/L | 0.477 | 0.000020 | 3.49 | 0.00010 | 0.175 | 0.000020 | 9317234 |
| Dissolved Barium (Ba) | mg/L | 0.00517 | 0.000020 | 0.0262 | 0.00010 | 0.0593 | 0.000020 | 9317234 |
| Dissolved Beryllium (Be) | mg/L | 0.000128 | 0.000010 | <0.000050 | 0.000050 | 0.000064 | 0.000010 | 9317234 |
| Dissolved Bismuth (Bi) | mg/L | 0.000950 | 0.0000050 | <0.000025 | 0.000025 | <0.0000050 | 0.0000050 | 9317234 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | <0.050 | 0.050 | 0.012 | 0.010 | 9317234 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000276 | 0.0000050 | <0.000025 | 0.000025 | 0.000125 | 0.0000050 | 9317234 |
| Dissolved Chromium (Cr) | mg/L | 0.0108 | 0.00010 | 0.00228 | 0.00050 | 0.00013 | 0.00010 | 9317234 |
| Dissolved Cobalt (Co) | mg/L | 0.00130 | 0.0000050 | 0.0201 | 0.000025 | 0.0153 | 0.0000050 | 9317234 |
| Dissolved Copper (Cu) | mg/L | 0.0200 | 0.000050 | 0.0119 | 0.00025 | 0.00140 | 0.000050 | 9317234 |
| Dissolved Iron (Fe) | mg/L | 10.2 | 0.0010 | 0.0656 | 0.0050 | 2.75 | 0.0010 | 9317234 |
| Dissolved Lead (Pb) | mg/L | 0.00613 | 0.0000050 | 0.000769 | 0.000025 | 0.0116 | 0.0000050 | 9317234 |
| Dissolved Lithium (Li) | mg/L | 0.00080 | 0.00050 | 0.0040 | 0.0025 | 0.00061 | 0.00050 | 9317234 |
| Dissolved Manganese (Mn) | mg/L | 1.91 | 0.000050 | 8.96 | 0.00025 | 4.41 | 0.000050 | 9317234 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000071 | 0.000050 | 0.00118 | 0.00025 | <0.000050 | 0.000050 | 9317234 |
| Dissolved Nickel (Ni) | mg/L | 0.00365 | 0.000020 | 0.0234 | 0.00010 | 0.0125 | 0.000020 | 9317234 |
| Dissolved Selenium (Se) | mg/L | 0.000208 | 0.000040 | <0.00020 | 0.00020 | <0.000040 | 0.000040 | 9317234 |
| Dissolved Silicon (Si) | mg/L | 2.19 | 0.050 | 2.82 | 0.25 | 1.93 | 0.050 | 9317234 |
| Dissolved Silver (Ag) | mg/L | 0.0000249 | 0.0000050 | <0.000025 | 0.000025 | <0.0000050 | 0.0000050 | 9317234 |
| Dissolved Strontium (Sr) | mg/L | 0.0250 | 0.000050 | 0.205 | 0.00025 | 0.136 | 0.000050 | 9317234 |
| Dissolved Thallium (Tl) | mg/L | 0.0000519 | 0.0000020 | 0.000050 | 0.000010 | 0.0000186 | 0.0000020 | 9317234 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | <0.0010 | 0.0010 | <0.00020 | 0.00020 | 9317234 |
| Dissolved Titanium (Ti) | mg/L | 0.308 | 0.00050 | <0.0025 | 0.0025 | 0.00233 | 0.00050 | 9317234 |
| Dissolved Uranium (U) | mg/L | 0.000154 | 0.0000020 | 0.000026 | 0.000010 | 0.0000162 | 0.0000020 | 9317234 |
| Dissolved Vanadium (V) | mg/L | 0.0233 | 0.00020 | <0.0010 | 0.0010 | 0.00309 | 0.00020 | 9317234 |
| Dissolved Zinc (Zn) | mg/L | 0.0138 | 0.00010 | 0.0249 | 0.00050 | 0.0436 | 0.00010 | 9317234 |
| Dissolved Zirconium (Zr) | mg/L | 0.00089 | 0.00010 | <0.00050 | 0.00050 | <0.00010 | 0.00010 | 9317234 |

RDL = Reportable Detection Limit



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9289 | | VE9290 | | VE9291 | | |
|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/04 12:00 | | 2019/02/04 12:00 | | 2019/02/04 12:00 | | |
| **COC Number** | | b930148-m058-01-01 | | b930148-m058-01-01 | | b930148-m058-01-01 | | |
| | **UNITS** | **M-2018-C4 (40-60)** | **RDL** | **M-2018-C4 (60-100)** | **RDL** | **M-2018-C18 (2.5-10)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 7.79 | 0.050 | 82.6 | 0.25 | 36.7 | 0.050 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 2.35 | 0.050 | 33.9 | 0.25 | 9.11 | 0.050 | 9316618 |
| Dissolved Potassium (K) | mg/L | 1.68 | 0.050 | 11.0 | 0.25 | 2.25 | 0.050 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 18.0 | 0.050 | 14.8 | 0.25 | 56.5 | 0.050 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 18.6 | 0.60 | 135 | 3.0 | 66.9 | 0.60 | 9317234 |
| RDL = Reportable Detection Limit | | | | | | | | |



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9292 | VE9293 | | VE9294 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | | 2019/02/04 12:00 | | |
| COC Number | | b930148-m058-01-01 | b930148-m058-01-01 | | b930148-m058-01-01 | | |
| | UNITS | M-2018-C18 (10-20) | M-2018-C18 (20-30) | RDL | M-2018-SFC SOIL C.MOORE | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 207 | 231 | 0.50 | 3.78 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.251 | 0.245 | 0.00050 | 1.21 | 0.0025 | 9317234 |
| Dissolved Antimony (Sb) | mg/L | 0.000393 | 0.000890 | 0.000020 | 0.00433 | 0.00010 | 9317234 |
| Dissolved Arsenic (As) | mg/L | 0.237 | 0.0863 | 0.000020 | 2.13 | 0.00010 | 9317234 |
| Dissolved Barium (Ba) | mg/L | 0.0413 | 0.0586 | 0.000020 | 0.0117 | 0.00010 | 9317234 |
| Dissolved Beryllium (Be) | mg/L | 0.000102 | 0.000036 | 0.000010 | <0.000050 | 0.000050 | 9317234 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000105 | 0.0000050 | 0.000542 | 0.000025 | 9317234 |
| Dissolved Boron (B) | mg/L | 0.013 | 0.018 | 0.010 | <0.050 | 0.050 | 9317234 |
| Dissolved Cadmium (Cd) | mg/L | 0.000113 | 0.000160 | 0.0000050 | 0.000154 | 0.000025 | 9317234 |
| Dissolved Chromium (Cr) | mg/L | 0.00079 | 0.00126 | 0.00010 | 0.00484 | 0.00050 | 9317234 |
| Dissolved Cobalt (Co) | mg/L | 0.0215 | 0.00891 | 0.0000050 | 0.00399 | 0.000025 | 9317234 |
| Dissolved Copper (Cu) | mg/L | 0.0113 | 0.0158 | 0.000050 | 0.0377 | 0.00025 | 9317234 |
| Dissolved Iron (Fe) | mg/L | 4.02 | 1.28 | 0.0010 | 4.04 | 0.0050 | 9317234 |
| Dissolved Lead (Pb) | mg/L | 0.00795 | 0.00295 | 0.0000050 | 0.0651 | 0.000025 | 9317234 |
| Dissolved Lithium (Li) | mg/L | 0.00060 | 0.00058 | 0.00050 | <0.0025 | 0.0025 | 9317234 |
| Dissolved Manganese (Mn) | mg/L | 6.71 | 6.60 | 0.000050 | 0.209 | 0.00025 | 9317234 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | <0.000050 | 0.000050 | <0.00025 | 0.00025 | 9317234 |
| Dissolved Nickel (Ni) | mg/L | 0.0133 | 0.00525 | 0.000020 | 0.00728 | 0.00010 | 9317234 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000043 | 0.000040 | <0.00020 | 0.00020 | 9317234 |
| Dissolved Silicon (Si) | mg/L | 2.09 | 1.87 | 0.050 | 1.12 | 0.25 | 9317234 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | <0.000025 | 0.000025 | 9317234 |
| Dissolved Strontium (Sr) | mg/L | 0.215 | 0.248 | 0.000050 | 0.00429 | 0.00025 | 9317234 |
| Dissolved Thallium (Tl) | mg/L | 0.0000207 | 0.0000369 | 0.0000020 | 0.000017 | 0.000010 | 9317234 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9317234 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00080 | 0.00050 | 0.0227 | 0.0025 | 9317234 |
| Dissolved Uranium (U) | mg/L | 0.0000210 | 0.0000188 | 0.0000020 | 0.000200 | 0.000010 | 9317234 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00020 | 0.0036 | 0.0010 | 9317234 |
| Dissolved Zinc (Zn) | mg/L | 0.0491 | 0.0316 | 0.00010 | 0.0334 | 0.00050 | 9317234 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | 0.00010 | 0.00108 | 0.00050 | 9317234 |

RDL = Reportable Detection Limit



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9292 | VE9293 | | VE9294 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/04 12:00 | 2019/02/04 12:00 | | 2019/02/04 12:00 | | |
| **COC Number** | | b930148-m058-01-01 | b930148-m058-01-01 | | b930148-m058-01-01 | | |
| | **UNITS** | **M-2018-C18 (10-20)** | **M-2018-C18 (20-30)** | **RDL** | **M-2018-SFC SOIL C.MOORE** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 60.7 | 64.3 | 0.050 | 1.03 | 0.25 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 13.4 | 17.1 | 0.050 | 0.29 | 0.25 | 9316618 |
| Dissolved Potassium (K) | mg/L | 2.54 | 1.60 | 0.050 | 0.37 | 0.25 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 56.5 | 66.7 | 0.050 | 5.86 | 0.25 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 93.1 | 103 | 0.60 | <3.0 | 3.0 | 9317234 |
| RDL = Reportable Detection Limit | | | | | | | |



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9295 | | | VE9295 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | | | 2019/02/04 12:00 | | |
| COC Number | | b930148-m058-01-01 | | | b930148-m058-01-01 | | |
| | UNITS | M-2018-SW9-CORE (0-7.5) | RDL | QC Batch | M-2018-SW9-CORE (0-7.5) Lab-Dup | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 32.1 | 0.50 | 9316212 | | | |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.133 | 0.00050 | 9317234 | 0.133 | 0.00050 | 9317234 |
| Dissolved Antimony (Sb) | mg/L | 0.000106 | 0.000020 | 9317234 | 0.000111 | 0.000020 | 9317234 |
| Dissolved Arsenic (As) | mg/L | 0.00132 | 0.000020 | 9317234 | 0.00129 | 0.000020 | 9317234 |
| Dissolved Barium (Ba) | mg/L | 0.0667 | 0.000020 | 9317234 | 0.0657 | 0.000020 | 9317234 |
| Dissolved Beryllium (Be) | mg/L | 0.000212 | 0.000010 | 9317234 | 0.000217 | 0.000010 | 9317234 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000066 | 0.0000050 | 9317234 | 0.0000080 | 0.0000050 | 9317234 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 9317234 | <0.010 | 0.010 | 9317234 |
| Dissolved Cadmium (Cd) | mg/L | 0.000140 | 0.0000050 | 9317234 | 0.000137 | 0.0000050 | 9317234 |
| Dissolved Chromium (Cr) | mg/L | 0.00048 | 0.00010 | 9317234 | 0.00046 | 0.00010 | 9317234 |
| Dissolved Cobalt (Co) | mg/L | 0.000389 | 0.0000050 | 9317234 | 0.000400 | 0.0000050 | 9317234 |
| Dissolved Copper (Cu) | mg/L | 0.00648 | 0.000050 | 9317234 | 0.00647 | 0.000050 | 9317234 |
| Dissolved Iron (Fe) | mg/L | 0.0200 | 0.0010 | 9317234 | 0.0198 | 0.0010 | 9317234 |
| Dissolved Lead (Pb) | mg/L | 0.000736 | 0.0000050 | 9317234 | 0.000732 | 0.0000050 | 9317234 |
| Dissolved Lithium (Li) | mg/L | 0.00201 | 0.00050 | 9317234 | 0.00202 | 0.00050 | 9317234 |
| Dissolved Manganese (Mn) | mg/L | 0.0461 | 0.000050 | 9317234 | 0.0464 | 0.000050 | 9317234 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000050 | 9317234 | <0.000050 | 0.000050 | 9317234 |
| Dissolved Nickel (Ni) | mg/L | 0.00206 | 0.000020 | 9317234 | 0.00207 | 0.000020 | 9317234 |
| Dissolved Selenium (Se) | mg/L | 0.000074 | 0.000040 | 9317234 | 0.000067 | 0.000040 | 9317234 |
| Dissolved Silicon (Si) | mg/L | 2.92 | 0.050 | 9317234 | 2.92 | 0.050 | 9317234 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | 9317234 | <0.0000050 | 0.0000050 | 9317234 |
| Dissolved Strontium (Sr) | mg/L | 0.0665 | 0.000050 | 9317234 | 0.0660 | 0.000050 | 9317234 |
| Dissolved Thallium (Tl) | mg/L | 0.0000070 | 0.0000020 | 9317234 | 0.0000089 | 0.0000020 | 9317234 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9317234 | <0.00020 | 0.00020 | 9317234 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00050 | 9317234 | <0.00050 | 0.00050 | 9317234 |
| Dissolved Uranium (U) | mg/L | 0.0000230 | 0.0000020 | 9317234 | 0.0000213 | 0.0000020 | 9317234 |
| Dissolved Vanadium (V) | mg/L | 0.00054 | 0.00020 | 9317234 | 0.00057 | 0.00020 | 9317234 |
| Dissolved Zinc (Zn) | mg/L | 0.0191 | 0.00010 | 9317234 | 0.0194 | 0.00010 | 9317234 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | 9317234 | <0.00010 | 0.00010 | 9317234 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9295 | | | VE9295 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/04 12:00 | | | 2019/02/04 12:00 | | |
| **COC Number** | | b930148-m058-01-01 | | | b930148-m058-01-01 | | |
| | **UNITS** | **M-2018-SW9-CORE (0-7.5)** | **RDL** | **QC Batch** | **M-2018-SW9-CORE (0-7.5) Lab-Dup** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 9.73 | 0.050 | 9316618 | | | |
| Dissolved Magnesium (Mg) | mg/L | 1.89 | 0.050 | 9316618 | | | |
| Dissolved Potassium (K) | mg/L | 0.521 | 0.050 | 9316618 | | | |
| Dissolved Sodium (Na) | mg/L | 4.76 | 0.050 | 9316618 | | | |
| Dissolved Sulphur (S) | mg/L | 11.6 | 0.60 | 9317234 | 11.4 | 0.60 | 9317234 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9296 | VE9297 | VE9298 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | | |
| COC Number | | b930148-m058-01-01 | b930148-m058-01-01 | b930148-m058-01-01 | | |
| | UNITS | M-2018-SW9-CORE-(15-20) | M-2018-SW9-CORE-(20-40) | M-2018-SW10-CORE (0-5) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 57.9 | 32.8 | 62.4 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.273 | 0.0928 | 0.0421 | 0.00050 | 9317234 |
| Dissolved Antimony (Sb) | mg/L | 0.000089 | 0.000308 | 0.000576 | 0.000020 | 9317234 |
| Dissolved Arsenic (As) | mg/L | 0.00114 | 0.00278 | 0.0105 | 0.000020 | 9317234 |
| Dissolved Barium (Ba) | mg/L | 0.101 | 0.0698 | 0.0804 | 0.000020 | 9317234 |
| Dissolved Beryllium (Be) | mg/L | 0.000589 | 0.000340 | <0.000010 | 0.000010 | 9317234 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9317234 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | 0.019 | 0.010 | 9317234 |
| Dissolved Cadmium (Cd) | mg/L | 0.000290 | 0.000463 | 0.0000498 | 0.0000050 | 9317234 |
| Dissolved Chromium (Cr) | mg/L | 0.00072 | 0.00093 | 0.00076 | 0.00010 | 9317234 |
| Dissolved Cobalt (Co) | mg/L | 0.00577 | 0.00689 | 0.0000714 | 0.0000050 | 9317234 |
| Dissolved Copper (Cu) | mg/L | 0.00347 | 0.00346 | 0.00308 | 0.000050 | 9317234 |
| Dissolved Iron (Fe) | mg/L | 0.0349 | 0.0225 | 0.0395 | 0.0010 | 9317234 |
| Dissolved Lead (Pb) | mg/L | 0.000575 | 0.000330 | 0.000337 | 0.0000050 | 9317234 |
| Dissolved Lithium (Li) | mg/L | 0.00262 | 0.00313 | 0.00086 | 0.00050 | 9317234 |
| Dissolved Manganese (Mn) | mg/L | 1.62 | 2.05 | 0.00732 | 0.000050 | 9317234 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000350 | <0.000050 | 0.000050 | 9317234 |
| Dissolved Nickel (Ni) | mg/L | 0.00562 | 0.00236 | 0.00208 | 0.000020 | 9317234 |
| Dissolved Selenium (Se) | mg/L | 0.000058 | 0.000145 | 0.000055 | 0.000040 | 9317234 |
| Dissolved Silicon (Si) | mg/L | 1.84 | 1.37 | 3.58 | 0.050 | 9317234 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9317234 |
| Dissolved Strontium (Sr) | mg/L | 0.129 | 0.0747 | 0.0965 | 0.000050 | 9317234 |
| Dissolved Thallium (Tl) | mg/L | 0.0000387 | 0.000206 | 0.0000144 | 0.0000020 | 9317234 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9317234 |
| Dissolved Titanium (Ti) | mg/L | 0.00052 | 0.00058 | 0.00081 | 0.00050 | 9317234 |
| Dissolved Uranium (U) | mg/L | 0.0000420 | 0.0000688 | 0.0000078 | 0.0000020 | 9317234 |
| Dissolved Vanadium (V) | mg/L | 0.00042 | 0.00113 | 0.00081 | 0.00020 | 9317234 |
| Dissolved Zinc (Zn) | mg/L | 0.0577 | 0.0909 | 0.0107 | 0.00010 | 9317234 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9317234 |

RDL = Reportable Detection Limit



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9296 | VE9297 | VE9298 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/04 12:00 | 2019/02/04 12:00 | 2019/02/04 12:00 | | |
| **COC Number** | | b930148-m058-01-01 | b930148-m058-01-01 | b930148-m058-01-01 | | |
| | **UNITS** | **M-2018-SW9-CORE-(15-20)** | **M-2018-SW9-CORE-(20-40)** | **M-2018-SW10-CORE (0-5)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 17.6 | 9.47 | 21.0 | 0.050 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 3.42 | 2.21 | 2.40 | 0.050 | 9316618 |
| Dissolved Potassium (K) | mg/L | 0.504 | 0.588 | 2.14 | 0.050 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 4.15 | 4.03 | 21.8 | 0.050 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 21.4 | 13.7 | 24.3 | 0.60 | 9317234 |
| RDL = Reportable Detection Limit | | | | | | |



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Maxxam Job #: B909554
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MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9299 | VE9300 | | VE9301 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | 2019/02/04 12:00 | | 2019/02/04 12:00 | | |
| COC Number | | b930148-m058-02-01 | b930148-m058-02-01 | | b930148-m058-02-01 | | |
| | UNITS | M-2018-SW10-CORE (15-20) | M-2018-SW10-CORE (30-40) | RDL | M-2018-C17 (15-20) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 133 | 55.5 | 0.50 | 28.3 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0558 | 0.0603 | 0.00050 | 0.0675 | 0.0050 | 9317234 |
| Dissolved Antimony (Sb) | mg/L | 0.000382 | 0.000386 | 0.000020 | 0.0120 | 0.00020 | 9317234 |
| Dissolved Arsenic (As) | mg/L | 0.0141 | 0.0152 | 0.000020 | 7.54 | 0.00020 | 9317234 |
| Dissolved Barium (Ba) | mg/L | 0.0616 | 0.0460 | 0.000020 | 0.00583 | 0.00020 | 9317234 |
| Dissolved Beryllium (Be) | mg/L | 0.000039 | 0.000019 | 0.000010 | <0.00010 | 0.00010 | 9317234 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000300 | 0.0000050 | 0.000244 | 0.000050 | 9317234 |
| Dissolved Boron (B) | mg/L | 0.021 | 0.017 | 0.010 | <0.10 | 0.10 | 9317234 |
| Dissolved Cadmium (Cd) | mg/L | 0.000107 | 0.0000856 | 0.0000050 | <0.000050 | 0.000050 | 9317234 |
| Dissolved Chromium (Cr) | mg/L | 0.00088 | 0.00098 | 0.00010 | 0.0034 | 0.0010 | 9317234 |
| Dissolved Cobalt (Co) | mg/L | 0.000414 | 0.0000827 | 0.0000050 | 0.00379 | 0.000050 | 9317234 |
| Dissolved Copper (Cu) | mg/L | 0.00351 | 0.00371 | 0.000050 | 0.00368 | 0.00050 | 9317234 |
| Dissolved Iron (Fe) | mg/L | 0.0162 | 0.0289 | 0.0010 | 1.62 | 0.010 | 9317234 |
| Dissolved Lead (Pb) | mg/L | 0.000234 | 0.000280 | 0.0000050 | 0.0155 | 0.000050 | 9317234 |
| Dissolved Lithium (Li) | mg/L | 0.00102 | 0.00059 | 0.00050 | <0.0050 | 0.0050 | 9317234 |
| Dissolved Manganese (Mn) | mg/L | 0.379 | 0.0899 | 0.000050 | 0.572 | 0.00050 | 9317234 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000057 | 0.000143 | 0.000050 | <0.00050 | 0.00050 | 9317234 |
| Dissolved Nickel (Ni) | mg/L | 0.00270 | 0.00222 | 0.000020 | 0.00489 | 0.00020 | 9317234 |
| Dissolved Selenium (Se) | mg/L | 0.000061 | 0.000349 | 0.000040 | <0.00040 | 0.00040 | 9317234 |
| Dissolved Silicon (Si) | mg/L | 3.23 | 2.92 | 0.050 | 1.64 | 0.50 | 9317234 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | <0.000050 | 0.000050 | 9317234 |
| Dissolved Strontium (Sr) | mg/L | 0.182 | 0.0807 | 0.000050 | 0.0387 | 0.00050 | 9317234 |
| Dissolved Thallium (Tl) | mg/L | 0.0000082 | 0.0000092 | 0.0000020 | <0.000020 | 0.000020 | 9317234 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | 0.00020 | <0.0020 | 0.0020 | 9317234 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00060 | 0.00050 | <0.0050 | 0.0050 | 9317234 |
| Dissolved Uranium (U) | mg/L | 0.0000034 | 0.0000080 | 0.0000020 | <0.000020 | 0.000020 | 9317234 |
| Dissolved Vanadium (V) | mg/L | 0.00045 | 0.00117 | 0.00020 | <0.0020 | 0.0020 | 9317234 |
| Dissolved Zinc (Zn) | mg/L | 0.0208 | 0.0204 | 0.00010 | 0.0050 | 0.0010 | 9317234 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | 0.00010 | <0.0010 | 0.0010 | 9317234 |

RDL = Reportable Detection Limit



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9299 | VE9300 | | VE9301 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/04 12:00 | 2019/02/04 12:00 | | 2019/02/04 12:00 | | |
| **COC Number** | | b930148-m058-02-01 | b930148-m058-02-01 | | b930148-m058-02-01 | | |
| | **UNITS** | **M-2018-SW10-CORE (15-20)** | **M-2018-SW10-CORE (30-40)** | **RDL** | **M-2018-C17 (15-20)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 45.7 | 18.2 | 0.050 | 9.42 | 0.50 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 4.70 | 2.40 | 0.050 | 1.17 | 0.50 | 9316618 |
| Dissolved Potassium (K) | mg/L | 1.46 | 1.18 | 0.050 | 3.42 | 0.50 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 24.8 | 23.5 | 0.050 | 10.7 | 0.50 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 49.7 | 23.7 | 0.60 | 11.0 | 6.0 | 9317234 |
| RDL = Reportable Detection Limit | | | | | | | |



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Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VE9302 | | |
|---|---|---|---|---|
| Sampling Date | | 2019/02/04 12:00 | | |
| COC Number | | b930148-m058-02-01 | | |
| | UNITS | M-2018-C17 (30-40) | RDL | QC Batch |
| **Calculated Parameters** | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 98.0 | 0.50 | 9316212 |
| **Dissolved Metals by ICPMS** | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0112 | 0.0025 | 9317234 |
| Dissolved Antimony (Sb) | mg/L | 0.00504 | 0.00010 | 9317234 |
| Dissolved Arsenic (As) | mg/L | 2.99 | 0.00010 | 9317234 |
| Dissolved Barium (Ba) | mg/L | 0.0190 | 0.00010 | 9317234 |
| Dissolved Beryllium (Be) | mg/L | <0.000050 | 0.000050 | 9317234 |
| Dissolved Bismuth (Bi) | mg/L | <0.000025 | 0.000025 | 9317234 |
| Dissolved Boron (B) | mg/L | <0.050 | 0.050 | 9317234 |
| Dissolved Cadmium (Cd) | mg/L | <0.000025 | 0.000025 | 9317234 |
| Dissolved Chromium (Cr) | mg/L | 0.00163 | 0.00050 | 9317234 |
| Dissolved Cobalt (Co) | mg/L | 0.0368 | 0.000025 | 9317234 |
| Dissolved Copper (Cu) | mg/L | 0.00056 | 0.00025 | 9317234 |
| Dissolved Iron (Fe) | mg/L | 3.81 | 0.0050 | 9317234 |
| Dissolved Lead (Pb) | mg/L | 0.000495 | 0.000025 | 9317234 |
| Dissolved Lithium (Li) | mg/L | 0.0044 | 0.0025 | 9317234 |
| Dissolved Manganese (Mn) | mg/L | 1.61 | 0.00025 | 9317234 |
| Dissolved Molybdenum (Mo) | mg/L | <0.00025 | 0.00025 | 9317234 |
| Dissolved Nickel (Ni) | mg/L | 0.0470 | 0.00010 | 9317234 |
| Dissolved Selenium (Se) | mg/L | <0.00020 | 0.00020 | 9317234 |
| Dissolved Silicon (Si) | mg/L | 1.82 | 0.25 | 9317234 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | 0.000025 | 9317234 |
| Dissolved Strontium (Sr) | mg/L | 0.117 | 0.00025 | 9317234 |
| Dissolved Thallium (Tl) | mg/L | 0.000012 | 0.000010 | 9317234 |
| Dissolved Tin (Sn) | mg/L | <0.0010 | 0.0010 | 9317234 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | 0.0025 | 9317234 |
| Dissolved Uranium (U) | mg/L | <0.000010 | 0.000010 | 9317234 |
| Dissolved Vanadium (V) | mg/L | <0.0010 | 0.0010 | 9317234 |
| Dissolved Zinc (Zn) | mg/L | 0.0222 | 0.00050 | 9317234 |
| Dissolved Zirconium (Zr) | mg/L | <0.00050 | 0.00050 | 9317234 |
| RDL = Reportable Detection Limit | | | | |



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VE9302 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2019/02/04 12:00 | | |
| **COC Number** | | b930148-m058-02-01 | | |
| | **UNITS** | **M-2018-C17 (30-40)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 22.3 | 0.25 | 9316618 |
| Dissolved Magnesium (Mg) | mg/L | 10.3 | 0.25 | 9316618 |
| Dissolved Potassium (K) | mg/L | 3.89 | 0.25 | 9316618 |
| Dissolved Sodium (Na) | mg/L | 6.84 | 0.25 | 9316618 |
| Dissolved Sulphur (S) | mg/L | 38.4 | 3.0 | 9317234 |
| RDL = Reportable Detection Limit | | | | |



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VE9289
**Sample ID:** M-2018-C4 (40-60)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9290
**Sample ID:** M-2018-C4 (60-100)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9291
**Sample ID:** M-2018-C18 (2.5-10)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9292
**Sample ID:** M-2018-C18 (10-20)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9293
**Sample ID:** M-2018-C18 (20-30)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VE9294
**Sample ID:** M-2018-SFC SOIL C.MOORE
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9295
**Sample ID:** M-2018-SW9-CORE (0-7.5)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9295 Dup
**Sample ID:** M-2018-SW9-CORE (0-7.5)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |

**Maxxam ID:** VE9296
**Sample ID:** M-2018-SW9-CORE-(15-20)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9297
**Sample ID:** M-2018-SW9-CORE-(20-40)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VE9298
**Sample ID:** M-2018-SW10-CORE (0-5)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9299
**Sample ID:** M-2018-SW10-CORE (15-20)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9300
**Sample ID:** M-2018-SW10-CORE (30-40)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9301
**Sample ID:** M-2018-C17 (15-20)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |

**Maxxam ID:** VE9302
**Sample ID:** M-2018-C17 (30-40)
**Matrix:** Water

**Collected:** 2019/02/04
**Shipped:**
**Received:** 2019/02/06

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9316212 | N/A | 2019/02/11 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9316618 | N/A | 2019/02/11 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9317234 | N/A | 2019/02/10 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/07 | Aldean Alicando |



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Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 2.0°C |

**LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments**

Sample VE9290 [M-2018-C4 (60-100)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required
Sample VE9294 [M-2018-SFC SOIL C.MOORE] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required
Sample VE9301 [M-2018-C17 (15-20)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required
Sample VE9302 [M-2018-C17 (30-40)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required

**Results relate only to the items tested.**



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Maxxam Job #: B909554
Report Date: 2019/02/12

## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9317234 | Dissolved Aluminum (Al) | 2019/02/10 | 96 | 80 - 120 | 100 | 80 - 120 | <0.00050 | mg/L | 0.049 | 20 |
| 9317234 | Dissolved Antimony (Sb) | 2019/02/10 | 98 | 80 - 120 | 100 | 80 - 120 | <0.000020 | mg/L | 4.0 | 20 |
| 9317234 | Dissolved Arsenic (As) | 2019/02/10 | 97 | 80 - 120 | 98 | 80 - 120 | <0.000020 | mg/L | 2.4 | 20 |
| 9317234 | Dissolved Barium (Ba) | 2019/02/10 | NC | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | 1.5 | 20 |
| 9317234 | Dissolved Beryllium (Be) | 2019/02/10 | 95 | 80 - 120 | 97 | 80 - 120 | <0.000010 | mg/L | 2.2 | 20 |
| 9317234 | Dissolved Bismuth (Bi) | 2019/02/10 | 99 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | 19 | 20 |
| 9317234 | Dissolved Boron (B) | 2019/02/10 | 98 | 80 - 120 | 98 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 9317234 | Dissolved Cadmium (Cd) | 2019/02/10 | 97 | 80 - 120 | 100 | 80 - 120 | <0.0000050 | mg/L | 2.2 | 20 |
| 9317234 | Dissolved Chromium (Cr) | 2019/02/10 | 96 | 80 - 120 | 98 | 80 - 120 | <0.00010 | mg/L | 4.2 | 20 |
| 9317234 | Dissolved Cobalt (Co) | 2019/02/10 | 96 | 80 - 120 | 98 | 80 - 120 | <0.0000050 | mg/L | 2.9 | 20 |
| 9317234 | Dissolved Copper (Cu) | 2019/02/10 | 93 | 80 - 120 | 97 | 80 - 120 | <0.000050 | mg/L | 0.11 | 20 |
| 9317234 | Dissolved Iron (Fe) | 2019/02/10 | 102 | 80 - 120 | 104 | 80 - 120 | <0.0010 | mg/L | 0.74 | 20 |
| 9317234 | Dissolved Lead (Pb) | 2019/02/10 | 100 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | 0.64 | 20 |
| 9317234 | Dissolved Lithium (Li) | 2019/02/10 | 95 | 80 - 120 | 97 | 80 - 120 | <0.00050 | mg/L | 0.089 | 20 |
| 9317234 | Dissolved Manganese (Mn) | 2019/02/10 | 93 | 80 - 120 | 100 | 80 - 120 | <0.000050 | mg/L | 0.73 | 20 |
| 9317234 | Dissolved Molybdenum (Mo) | 2019/02/10 | 99 | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9317234 | Dissolved Nickel (Ni) | 2019/02/10 | 96 | 80 - 120 | 98 | 80 - 120 | <0.000020 | mg/L | 0.51 | 20 |
| 9317234 | Dissolved Selenium (Se) | 2019/02/10 | 95 | 80 - 120 | 97 | 80 - 120 | <0.000040 | mg/L | 11 | 20 |
| 9317234 | Dissolved Silicon (Si) | 2019/02/10 | 96 | 80 - 120 | 100 | 80 - 120 | <0.050 | mg/L | 0.16 | 20 |
| 9317234 | Dissolved Silver (Ag) | 2019/02/10 | 96 | 80 - 120 | 100 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9317234 | Dissolved Strontium (Sr) | 2019/02/10 | NC | 80 - 120 | 98 | 80 - 120 | <0.000050 | mg/L | 0.68 | 20 |
| 9317234 | Dissolved Sulphur (S) | 2019/02/10 | 97 | 80 - 120 | 99 | 80 - 120 | <0.60 | mg/L | 1.3 | 20 |
| 9317234 | Dissolved Thallium (Tl) | 2019/02/10 | 98 | 80 - 120 | 103 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9317234 | Dissolved Tin (Sn) | 2019/02/10 | 98 | 80 - 120 | 102 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9317234 | Dissolved Titanium (Ti) | 2019/02/10 | 97 | 80 - 120 | 99 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9317234 | Dissolved Uranium (U) | 2019/02/10 | 100 | 80 - 120 | 101 | 80 - 120 | <0.0000020 | mg/L | 7.7 | 20 |
| 9317234 | Dissolved Vanadium (V) | 2019/02/10 | 97 | 80 - 120 | 98 | 80 - 120 | <0.00020 | mg/L | 5.5 | 20 |
| 9317234 | Dissolved Zinc (Zn) | 2019/02/10 | 101 | 80 - 120 | 103 | 80 - 120 | <0.00010 | mg/L | 1.4 | 20 |



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Maxxam Job #: B909554
Report Date: 2019/02/12

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9317234 | Dissolved Zirconium (Zr) | 2019/02/10 | 97 | 80 - 120 | 98 | 80 - 120 | <0.00010 | mg/L | NC | 20 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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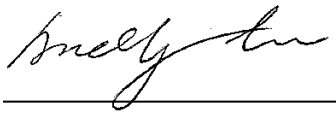
Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist

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



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: na

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/15**
Report #: R5596036
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B932246**
**Received: 2019/02/05, 17:46**

Sample Matrix: Water
# Samples Received: 17

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Acidity (CaCO3) in water (1, 2) | 13 | N/A | 2019/02/14 | | SM 22 2310 |
| Alkalinity | 4 | N/A | 2019/02/08 | CAM SOP-00448 | SM 23 2320 B m |
| Free (WAD) Cyanide | 1 | N/A | 2019/02/08 | CAM SOP-00457 | OMOE E3015 m |
| Total Cyanide | 1 | 2019/02/07 | 2019/02/08 | CAM SOP-00457 | OMOE E3015 5 m |
| Dissolved Mercury (low level) | 16 | 2019/02/07 | 2019/02/08 | CAM SOP-00453 | EPA 7470 m |
| Dissolved Mercury (low level) | 1 | 2019/02/07 | 2019/02/13 | CAM SOP-00453 | EPA 7470 m |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Bedford
(2) Non-accredited test method

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: na

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/15**
Report #: R5596036
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B932246**
**Received: 2019/02/05, 17:46**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B932246
Report Date: 2019/02/15

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IXQ882 | | | IXQ883 | | IXQ884 | IXQ885 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | | | 2019/02/05 12:00 | | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| COC Number | | na | | | na | | na | na | | |
| | **UNITS** | **M-2018-C1 (0-5)** | **RDL** | **QC Batch** | **M-2018-SFC-T9** | **RDL** | **M-2018-C13 (2.5-10)** | **M-2018-C5 (2.5-10)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | | |
| Acidity | mg/L | | | | 32 | 5.6 | 38 | 5.8 | 5.0 | 5974514 |
| Alkalinity (Total as CaCO3) | mg/L | 56 | 1.0 | 5965370 | | | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IXQ886 | IXQ887 | | | IXQ888 | IXQ889 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | | | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| COC Number | | na | na | | | na | na | | |
| | **UNITS** | **M-2018-SFC-T23** | **M-2018-SFC-T35** | **RDL** | **QC Batch** | **M-2018-C4 (0-10)** | **M-2018-C18 (0-2.5)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | | | | | 25 | 15 | 5.0 | 5974514 |
| Alkalinity (Total as CaCO3) | mg/L | 25 | 9.5 | 1.0 | 5965370 | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IXQ890 | IXQ891 | IXQ892 | IXQ893 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| COC Number | | na | na | na | na | | |
| | **UNITS** | **G-2018-C3 (0-5)** | **G-2018-C6 (28NOV) (2.5-10)** | **G-2018-C9 (0-7.5)** | **G-2018-SFC-3** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Acidity | mg/L | 41 | 21 | 27 | 15 | 5.0 | 5974514 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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

Maxxam Job #: B932246
Report Date: 2019/02/15

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IXQ894 | | | IXQ895 | IXQ896 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | | | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| COC Number | | na | | | na | na | | |
| | **UNITS** | **G-2018-SFC-8** | **RDL** | **QC Batch** | **G-2018-SFC-11** | **G-2018-C4 (0-5)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Acidity | mg/L | | | | 32 | 26 | 5.0 | 5974514 |
| Alkalinity (Total as CaCO3) | mg/L | 37 | 1.0 | 5965370 | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IXQ897 | | | IXQ898 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | | | 2019/02/05 12:00 | | |
| COC Number | | na | | | na | | |
| | **UNITS** | **M-2018-C11 (2.5-10)** | **RDL** | **QC Batch** | **M-2018-C17 (2.5-10)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Acidity | mg/L | 25 | 5.0 | 5974514 | 25 | 5.0 | 5974514 |
| Total Cyanide (CN) | mg/L | <0.0050 | 0.0050 | 5965213 | | | |
| WAD Cyanide (Free) | mg/L | <0.0010 | 0.0010 | 5965230 | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B932246
Report Date: 2019/02/15

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IXQ882 | IXQ883 | IXQ884 | IXQ885 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| COC Number | | na | na | na | na | | |
| | **UNITS** | **M-2018-C1 (0-5)** | **M-2018-SFC-T9** | **M-2018-C13 (2.5-10)** | **M-2018-C5 (2.5-10)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.22 | 0.05 | 0.14 | 0.21 | 0.01 | 5964916 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IXQ886 | | | IXQ887 | IXQ887 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | | | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| COC Number | | na | | | na | na | | |
| | **UNITS** | **M-2018-SFC-T23** | **RDL** | **QC Batch** | **M-2018-SFC-T35** | **M-2018-SFC-T35 Lab-Dup** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.62 | 0.02 | 5964916 | 0.11 | 0.11 | 0.01 | 5970873 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

| Maxxam ID | | IXQ888 | IXQ889 | IXQ890 | IXQ891 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| COC Number | | na | na | na | na | | |
| | **UNITS** | **M-2018-C4 (0-10)** | **M-2018-C18 (0-2.5)** | **G-2018-C3 (0-5)** | **G-2018-C6 (28NOV) (2.5-10)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.08 | <0.01 | 0.25 | 0.07 | 0.01 | 5964916 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B932246
Report Date: 2019/02/15

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IXQ892 | IXQ892 | IXQ893 | IXQ894 | IXQ895 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| COC Number | | na | na | na | na | na | | |
| | **UNITS** | **G-2018-C9 (0-7.5)** | **G-2018-C9 (0-7.5) Lab-Dup** | **G-2018-SFC-3** | **G-2018-SFC-8** | **G-2018-SFC-11** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.15 | 0.15 | 0.02 | 0.01 | <0.01 | 0.01 | 5964916 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

| Maxxam ID | | IXQ896 | IXQ897 | IXQ898 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| COC Number | | na | na | na | | |
| | **UNITS** | **G-2018-C4 (0-5)** | **M-2018-C11 (2.5-10)** | **M-2018-C17 (2.5-10)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.01 | <0.01 | 0.35 | 0.01 | 5964916 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B932246
Report Date: 2019/02/15

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 16.0°C |

**Results relate only to the items tested.**



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Maxxam Job #: B932246
Report Date: 2019/02/15

## QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5964916 | Dissolved Mercury (Hg) | 2019/02/08 | NC | 75 - 125 | 86 | 80 - 120 | <0.01 | ug/L | 1.7 | 20 |
| 5965213 | Total Cyanide (CN) | 2019/02/08 | 108 | 80 - 120 | 101 | 80 - 120 | <0.0050 | mg/L | NC | 20 |
| 5965230 | WAD Cyanide (Free) | 2019/02/08 | 108 | 80 - 120 | 99 | 80 - 120 | <0.0010 | mg/L | NC | 20 |
| 5965370 | Alkalinity (Total as CaCO3) | 2019/02/08 | | | 96 | 85 - 115 | <1.0 | mg/L | 1.6 | 20 |
| 5970873 | Dissolved Mercury (Hg) | 2019/02/13 | NC | 75 - 125 | 103 | 80 - 120 | <0.01 | ug/L | 0.85 | 20 |
| 5974514 | Acidity | 2019/02/14 | 101 | 80 - 120 | 106 | 80 - 120 | <5.0 | mg/L | 0.49 | 25 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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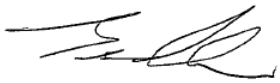
Maxxam Job #: B932246
Report Date: 2019/02/15

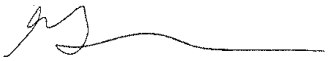
EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Brad Newman, Scientific Service Specialist



Gina Thompson, Inorganics General Chemistry Supervisor

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



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Maxxam
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6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | Report Information (if differs from invoice) | Project Information (where applicable) | Turnaround Time (TAT) Required |
|---|---|---|---|
| Company Name: EcoMetrix Inc | Company Name: | Quotation #: | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: Daniel Skruch | Contact Name: | P.O. #/ AFE#: | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: 6800 Campobello Road | Address: | Project #: 18-2525 | Rush TAT (Surcharges will be applied) |
| | | Site Location: NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: Fax: | Site #: | Date Required: |
| Email: dskruch@ecometrix.ca | Email: | Sampled By: ALC+FL+CL | Rush Confirmation #: |

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

**Regulation 153**

[ ] Table 1 [ ] Res/Park [ ] Med/ Fine
[ ] Table 2 [ ] Ind/Comm [ ] Coarse
[ ] Table 3 [ ] Agri/ Other
[ ] Table ____
FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**

[ ] CCME [ ] Sanitary Sewer Bylaw
[ ] MISA [ ] Storm Sewer Bylaw
[ ] PWQO Region
[ ] Other (Specify)
[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED; to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M-2018-C1 (0-5) | 05/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 2 | M-2018-SFC-T9 | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | M-2018-C13 (2.5-10) | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 4 | M-2018-C5 (2.5-10) | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 5 | M-2018-SFC-T23 | 05/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 6 | M-2018-SFC-T35 | 05/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 7 | M-2018-C4 (0-10) | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 8 | M-2018-C18 (0-2.5) | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 9 | G-2018-C3 (0-5) | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 10 | G-2018-C6 (28NOV) (2.5-10) | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) |
|---|---|---|---|---|---|
| Amanda Ciosek | 05/02/2019 | 17:45 | FRANCINE CHONG | 2019/02/05 | 17:46 |
| | | | | | |

**LABORATORY USE ONLY**

| CUSTODY SEAL Y / (N) | | COOLER TEMPERATURES |
|---|---|---|
| Present | Intact | |
| | | 16 \| 16 \| 16 |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / (N)

COMMENTS

*NOTE Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); **Mercury 0.00001 mg/L

*PLEASE CONTACT IF SAMPLE VOLUME CONCERNS*

05-Feb-19 17:46
Kyle Reinhart
B932246
MAF ENV-879

Maxxam
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6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | Report Information (if differs from invoice) | Project Information (where applicable) | Turnaround Time (TAT) Required |
|---|---|---|---|
| Company Name: EcoMetrix Inc | Company Name: | Quotation #: | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: Daniel Skruch | Contact Name: | P.O. #/ AFE#: | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: 6800 Campobello Road | Address: | Project #: 18-2525 | Rush TAT (Surcharges will be applied) |
| | | Site Location: NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: Fax: | Site #: | |
| Email: dskruch@ecometrix.ca | Email: | Sampled By: ALC+FL+CL | Date Required: |

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Rush Confirmation #:

**Regulation 153**

[ ] Table 1 [ ] Res/Park [ ] Med/ Fine
[ ] Table 2 [ ] Ind/Comm [ ] Coarse
[ ] Table 3 [ ] Agri/ Other
[ ] Table ____
FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**

[ ] CCME [ ] Sanitary Sewer Bylaw
[ ] MISA [ ] Storm Sewer Bylaw
[ ] PWQO Region
[ ] Other (Specify)
[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

**Analysis Requested**

**LABORATORY USE ONLY**

CUSTODY SEAL Y / N (Present / Intact) — COOLER TEMPERATURES

COOLING MEDIA PRESENT: Y / N

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED; to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G-2018-C9 (0-7.5) | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | G-2018-SFC-3 | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | G-2018-SFC-8 | 05/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 4 | G-2018-SFC-11 | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 5 | G-2018-C4 (0-5) | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 6 | M-2018-C11 (2.5-10) | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 7 | M-2018-C17 (2.5-10) | 05/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |

COMMENTS

*NOTE Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); **Mercury 0.00001 mg/L

*PLEASE CONTACT IF SAMPLE VOLUME CONCERNS*

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) | MAXXAM JOB # |
|---|---|---|---|---|---|---|
| Amanda Ciosek | 05/02/2019 | 17:45 | see page 1 | | | B932246 |
| | | | | | | |

Maxxam
A Bureau Veritas Group Company

Sent to: **Maxxam Bedford**
**200 Bluewater Rd Suite 105**
**Bedford, NS, B4B 1G9**
**Tel: (902) 832-4852**

# MAXXAM INTERLAB CHAIN OF CUSTODY RECORD



**COC #** B932246-301-02-01

| REPORT INFORMATION | |
|---|---|
| **Company:** | Maxxam |
| **Address:** | 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 |
| **Contact Name:** | Kyle Reinhart |
| **Email:** | kreinhart@maxxam.ca, scontractor@maxxam.ca |
| **Phone:** | |
| **Maxxam Project #:** | B932246 |
| **Client Invoice To:** | EcoMetrix Incorporated (12046) |
| **Client Report To:** | EcoMetrix Incorporated (12046) |

**Incl. on Report? Yes / No**

| # | SAMPLE ID | MATRIX | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | SAMPLER INITIALS | # CONT. | ANALYSIS REQUESTED: Acidity (CaCO3) in water | ADDITIONAL SAMPLE INFORMATION |
|---|---|---|---|---|---|---|---|---|
| 1 | IXQ896-G-2018-C4 (0-5) | W | 2019/02/05 | 12:00 | ALC | 1 | X | (P: 01) |
| 2 | IXQ897-M-2018-C11 (2.5-10) | W | 2019/02/05 | 12:00 | ALC | 1 | X | (P: 01) |
| 3 | IXQ898-M-2018-C17 (2.5-10) | W | 2019/02/05 | 12:00 | ALC | 1 | X | (P: 01) |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |

Job Barcode Label

B932246

**SITE LOCATION:** NS-LANDS

**SITE #:**

**PROJECT #:** 18-2525

**PO/AFE, TASK ORDER/SERVICE ORDER, LINE ITEM:**

**REGULATORY CRITERIA**

**SPECIAL INSTRUCTIONS**

Please inform Maxxam immediately if you are not accredited for the requested test(s).
**Please return a copy of this form with the report.**
PLEASE REPORT IN MG/L.
SUBCONTRACT: ACIDITY-W TO BEDFORD. SUBCCMEMED TO BURNABY INCLUDING SULPHUR AT 0.6 MG/L

**REQUIRED EDDs**

National Excel (N001)
EcoMetrix Excel (NX435)

**TURNAROUND TIME**

☐ Rush Required

**2019/02/13**
Date Required

*Please inform us if rush charges will be incurred.*

**COOLER ID:**

| | YES | NO |
|---|---|---|
| Custody Seal Present | ✓ | |
| Custody Seal Intact | ✓ | |
| Cooling Media Present | ✓ | |

Temp: (°C) 5 7 5

**COOLER ID:**

| | YES | NO |
|---|---|---|
| Custody Seal Present | | |
| Custody Seal Intact | | |
| Cooling Media Present | | |

Temp: (°C)

**COOLER ID:**

| | YES | NO |
|---|---|---|
| Custody Seal Present | | |
| Custody Seal Intact | | |
| Cooling Media Present | | |

Temp: (°C)

**RECEIVING LAB USE ONLY**

**Maxxam Job #**

**B932246**

| RELINQUISHED BY: (SIGN & PRINT) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (SIGN & PRINT) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | Samples Labelled By: | Labels Verified By: |
|---|---|---|---|---|---|---|---|
| 1. SEE PAGE 1 | | | 1. | 2019/02/08 | 13:38 | | |
| 2. | | | 2. | | | | |

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your Project #: MB932246
Site#: NS-LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B932246-M058-01-01, B932246-M058-02-01

**Report Date: 2019/02/14**
Report #: R2686126
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B909907**
**Received: 2019/02/08, 09:25**

Sample Matrix: Water
# Samples Received: 17

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | 17 | N/A | 2019/02/13 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 17 | N/A | 2019/02/13 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 17 | N/A | 2019/02/13 | BBY7SOP-00002 | EPA 6020b R2 m |
| Filter and HNO3 Preserve for Metals | 17 | N/A | 2019/02/08 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



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Your Project #: MB932246
Site#: NS-LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B932246-M058-01-01, B932246-M058-02-01

**Report Date: 2019/02/14**
Report #: R2686126
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B909907**
**Received: 2019/02/08, 09:25**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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

Maxxam Job #: B909907
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | VF1253 | VF1254 | VF1255 | VF1256 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | |
| COC Number | | B932246-M058-01-01 | B932246-M058-01-01 | B932246-M058-01-01 | B932246-M058-01-01 | |
| | UNITS | M-2018-C1 (0-5) | M-2018-SFC-T9 | M-2018-C13 (2.5-10) | M-2018-C5 (2.5-10) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF1257 | VF1258 | VF1259 | VF1260 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | |
| COC Number | | B932246-M058-01-01 | B932246-M058-01-01 | B932246-M058-01-01 | B932246-M058-01-01 | |
| | UNITS | M-2018-SFC-T23 | M-2018-SFC-T35 | M-2018-C4 (0-10) | M-2018-C18 (0-2.5) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF1261 | VF1262 | VF1263 | VF1264 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | |
| COC Number | | B932246-M058-01-01 | B932246-M058-01-01 | B932246-M058-02-01 | B932246-M058-02-01 | |
| | UNITS | G-2018-C3 (0-5) | G-2018-C6 (28NOV) (2.5-10) | G-2018-C9 (0-7.5) | G-2018-SFC-3 | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF1265 | VF1266 | VF1267 | VF1268 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | 2019/02/05 12:00 | |
| COC Number | | B932246-M058-02-01 | B932246-M058-02-01 | B932246-M058-02-01 | B932246-M058-02-01 | |
| | UNITS | G-2018-SFC-8 | G-2018-SFC-11 | G-2018-C4 (0-5) | M-2018-C11 (2.5-10) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |



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Maxxam Job #: B909907
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| **Maxxam ID** | | VF1269 | |
|---|---|---|---|
| **Sampling Date** | | 2019/02/05 12:00 | |
| **COC Number** | | B932246-M058-02-01 | |
| | **UNITS** | **M-2018-C17 (2.5-10)** | **QC Batch** |
| **Calculated Parameters** | | | |
| Filter and HNO3 Preservation | N/A | FIELD | ONSITE |



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Maxxam Job #: B909907
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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1253 | | VF1254 | VF1255 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| COC Number | | B932246-M058-01-01 | | B932246-M058-01-01 | B932246-M058-01-01 | | |
| | UNITS | M-2018-C1 (0-5) | RDL | M-2018-SFC-T9 | M-2018-C13 (2.5-10) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 52.4 | 0.50 | 86.6 | 21.0 | 0.50 | 9317722 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0513 | 0.0025 | 0.482 | 0.223 | 0.00050 | 9318900 |
| Dissolved Antimony (Sb) | mg/L | 0.00264 | 0.00010 | 0.00855 | 0.00134 | 0.000020 | 9318900 |
| Dissolved Arsenic (As) | mg/L | 4.39 | 0.00010 | 0.450 | 0.0491 | 0.000020 | 9318900 |
| Dissolved Barium (Ba) | mg/L | 0.0331 | 0.00010 | 0.0502 | 0.0147 | 0.000020 | 9318900 |
| Dissolved Beryllium (Be) | mg/L | <0.000050 | 0.000050 | 0.000070 | 0.000034 | 0.000010 | 9318900 |
| Dissolved Bismuth (Bi) | mg/L | <0.000025 | 0.000025 | 0.0000660 | 0.0000416 | 0.0000050 | 9318900 |
| Dissolved Boron (B) | mg/L | <0.050 | 0.050 | <0.010 | 0.030 | 0.010 | 9318900 |
| Dissolved Cadmium (Cd) | mg/L | 0.000265 | 0.000025 | 0.000299 | 0.0000919 | 0.0000050 | 9318900 |
| Dissolved Chromium (Cr) | mg/L | 0.00281 | 0.00050 | 0.00043 | 0.00256 | 0.00010 | 9318900 |
| Dissolved Cobalt (Co) | mg/L | 0.0123 | 0.000025 | 0.0329 | 0.00125 | 0.0000050 | 9318900 |
| Dissolved Copper (Cu) | mg/L | 0.0159 | 0.00025 | 0.00671 | 0.0111 | 0.000050 | 9318900 |
| Dissolved Iron (Fe) | mg/L | 0.187 | 0.0050 | 0.351 | 0.154 | 0.0010 | 9318900 |
| Dissolved Lead (Pb) | mg/L | 0.00114 | 0.000025 | 0.00452 | 0.00118 | 0.0000050 | 9318900 |
| Dissolved Lithium (Li) | mg/L | <0.0025 | 0.0025 | 0.00230 | <0.00050 | 0.00050 | 9318900 |
| Dissolved Manganese (Mn) | mg/L | 3.25 | 0.00025 | 5.44 | 0.176 | 0.000050 | 9318900 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00050 | 0.00025 | 0.000192 | 0.000058 | 0.000050 | 9318900 |
| Dissolved Nickel (Ni) | mg/L | 0.0152 | 0.00010 | 0.0361 | 0.00655 | 0.000020 | 9318900 |
| Dissolved Selenium (Se) | mg/L | <0.00020 | 0.00020 | 0.000176 | 0.000154 | 0.000040 | 9318900 |
| Dissolved Silicon (Si) | mg/L | 1.16 | 0.25 | 1.78 | 3.63 | 0.050 | 9318900 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | 0.000025 | 0.0000237 | 0.0000111 | 0.0000050 | 9318900 |
| Dissolved Strontium (Sr) | mg/L | 0.0463 | 0.00025 | 0.0913 | 0.0241 | 0.000050 | 9318900 |
| Dissolved Thallium (Tl) | mg/L | <0.000010 | 0.000010 | 0.0000485 | 0.0000120 | 0.0000020 | 9318900 |
| Dissolved Tin (Sn) | mg/L | <0.0010 | 0.0010 | <0.00020 | <0.00020 | 0.00020 | 9318900 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | 0.0025 | 0.00351 | 0.00229 | 0.00050 | 9318900 |
| Dissolved Uranium (U) | mg/L | 0.000016 | 0.000010 | 0.0000465 | 0.0000223 | 0.0000020 | 9318900 |
| Dissolved Vanadium (V) | mg/L | <0.0010 | 0.0010 | 0.00510 | 0.00049 | 0.00020 | 9318900 |
| Dissolved Zinc (Zn) | mg/L | 0.0369 | 0.00050 | 0.136 | 0.0825 | 0.00010 | 9318900 |
| Dissolved Zirconium (Zr) | mg/L | <0.00050 | 0.00050 | 0.00016 | <0.00010 | 0.00010 | 9318900 |

RDL = Reportable Detection Limit



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Maxxam Job #: B909907
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF1253 | | VF1254 | VF1255 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/05 12:00 | | 2019/02/05 12:00 | 2019/02/05 12:00 | | |
| **COC Number** | | B932246-M058-01-01 | | B932246-M058-01-01 | B932246-M058-01-01 | | |
| | **UNITS** | **M-2018-C1 (0-5)** | **RDL** | **M-2018-SFC-T9** | **M-2018-C13 (2.5-10)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 13.3 | 0.25 | 25.0 | 5.56 | 0.050 | 9318082 |
| Dissolved Magnesium (Mg) | mg/L | 4.62 | 0.25 | 5.86 | 1.73 | 0.050 | 9318082 |
| Dissolved Potassium (K) | mg/L | 5.25 | 0.25 | 3.07 | 0.278 | 0.050 | 9318082 |
| Dissolved Sodium (Na) | mg/L | 7.53 | 0.25 | 24.5 | 8.00 | 0.050 | 9318082 |
| Dissolved Sulphur (S) | mg/L | <3.0 | 3.0 | 42.7 | 7.84 | 0.60 | 9318900 |
| RDL = Reportable Detection Limit | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1255 | | | VF1256 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | | | 2019/02/05 12:00 | | |
| COC Number | | B932246-M058-01-01 | | | B932246-M058-01-01 | | |
| | UNITS | M-2018-C13 (2.5-10) Lab-Dup | RDL | QC Batch | M-2018-C5 (2.5-10) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | | | | 178 | 0.50 | 9317722 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.227 | 0.00050 | 9318900 | 0.0621 | 0.00050 | 9318900 |
| Dissolved Antimony (Sb) | mg/L | 0.00136 | 0.000020 | 9318900 | 0.0163 | 0.000020 | 9318900 |
| Dissolved Arsenic (As) | mg/L | 0.0491 | 0.000020 | 9318900 | 1.11 | 0.000020 | 9318900 |
| Dissolved Barium (Ba) | mg/L | 0.0148 | 0.000020 | 9318900 | 0.00808 | 0.000020 | 9318900 |
| Dissolved Beryllium (Be) | mg/L | 0.000043 | 0.000010 | 9318900 | <0.000010 | 0.000010 | 9318900 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000452 | 0.0000050 | 9318900 | 0.0000316 | 0.0000050 | 9318900 |
| Dissolved Boron (B) | mg/L | 0.028 | 0.010 | 9318900 | <0.010 | 0.010 | 9318900 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000971 | 0.0000050 | 9318900 | 0.0000434 | 0.0000050 | 9318900 |
| Dissolved Chromium (Cr) | mg/L | 0.00252 | 0.00010 | 9318900 | <0.00010 | 0.00010 | 9318900 |
| Dissolved Cobalt (Co) | mg/L | 0.00122 | 0.0000050 | 9318900 | 0.00397 | 0.0000050 | 9318900 |
| Dissolved Copper (Cu) | mg/L | 0.0109 | 0.000050 | 9318900 | 0.00319 | 0.000050 | 9318900 |
| Dissolved Iron (Fe) | mg/L | 0.153 | 0.0010 | 9318900 | 0.144 | 0.0010 | 9318900 |
| Dissolved Lead (Pb) | mg/L | 0.00121 | 0.0000050 | 9318900 | 0.00140 | 0.0000050 | 9318900 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00050 | 9318900 | 0.00387 | 0.00050 | 9318900 |
| Dissolved Manganese (Mn) | mg/L | 0.175 | 0.000050 | 9318900 | 0.651 | 0.000050 | 9318900 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000054 | 0.000050 | 9318900 | 0.000131 | 0.000050 | 9318900 |
| Dissolved Nickel (Ni) | mg/L | 0.00646 | 0.000020 | 9318900 | 0.0222 | 0.000020 | 9318900 |
| Dissolved Selenium (Se) | mg/L | 0.000133 | 0.000040 | 9318900 | 0.000287 | 0.000040 | 9318900 |
| Dissolved Silicon (Si) | mg/L | 3.18 | 0.050 | 9318900 | 1.79 | 0.050 | 9318900 |
| Dissolved Silver (Ag) | mg/L | 0.0000153 | 0.0000050 | 9318900 | 0.0000066 | 0.0000050 | 9318900 |
| Dissolved Strontium (Sr) | mg/L | 0.0233 | 0.000050 | 9318900 | 0.112 | 0.000050 | 9318900 |
| Dissolved Thallium (Tl) | mg/L | 0.0000133 | 0.0000020 | 9318900 | 0.0000220 | 0.0000020 | 9318900 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9318900 | <0.00020 | 0.00020 | 9318900 |
| Dissolved Titanium (Ti) | mg/L | 0.00217 | 0.00050 | 9318900 | 0.00130 | 0.00050 | 9318900 |
| Dissolved Uranium (U) | mg/L | 0.0000212 | 0.0000020 | 9318900 | 0.0000064 | 0.0000020 | 9318900 |
| Dissolved Vanadium (V) | mg/L | 0.00050 | 0.00020 | 9318900 | 0.00030 | 0.00020 | 9318900 |
| Dissolved Zinc (Zn) | mg/L | 0.0823 | 0.00010 | 9318900 | 0.0191 | 0.00010 | 9318900 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | 9318900 | 0.00010 | 0.00010 | 9318900 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B909907
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF1255 | | | VF1256 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/05 12:00 | | | 2019/02/05 12:00 | | |
| **COC Number** | | B932246-M058-01-01 | | | B932246-M058-01-01 | | |
| | **UNITS** | **M-2018-C13 (2.5-10) Lab-Dup** | **RDL** | **QC Batch** | **M-2018-C5 (2.5-10)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | | | | 44.8 | 0.050 | 9318082 |
| Dissolved Magnesium (Mg) | mg/L | | | | 16.1 | 0.050 | 9318082 |
| Dissolved Potassium (K) | mg/L | | | | 8.61 | 0.050 | 9318082 |
| Dissolved Sodium (Na) | mg/L | | | | 15.3 | 0.050 | 9318082 |
| Dissolved Sulphur (S) | mg/L | 7.64 | 0.60 | 9318900 | 69.0 | 0.60 | 9318900 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B909907
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1257 | | VF1258 | | VF1259 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | | 2019/02/05 12:00 | | 2019/02/05 12:00 | | |
| COC Number | | B932246-M058-01-01 | | B932246-M058-01-01 | | B932246-M058-01-01 | | |
| | UNITS | M-2018-SFC-T23 | RDL | M-2018-SFC-T35 | RDL | M-2018-C4 (0-10) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 18.9 | 0.50 | 106 | 0.50 | 98.4 | 0.50 | 9317722 |
| **Dissolved Metals by ICPMS** | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0943 | 0.0025 | 0.0634 | 0.00050 | 0.0343 | 0.0025 | 9318900 |
| Dissolved Antimony (Sb) | mg/L | 0.0145 | 0.00010 | 0.00300 | 0.000020 | 0.00330 | 0.00010 | 9318900 |
| Dissolved Arsenic (As) | mg/L | 2.93 | 0.00010 | 0.523 | 0.000020 | 0.270 | 0.00010 | 9318900 |
| Dissolved Barium (Ba) | mg/L | 0.00124 | 0.00010 | 0.000839 | 0.000020 | 0.0297 | 0.00010 | 9318900 |
| Dissolved Beryllium (Be) | mg/L | <0.000050 | 0.000050 | <0.000010 | 0.000010 | <0.000050 | 0.000050 | 9318900 |
| Dissolved Bismuth (Bi) | mg/L | 0.000055 | 0.000025 | 0.0000272 | 0.0000050 | <0.000025 | 0.000025 | 9318900 |
| Dissolved Boron (B) | mg/L | <0.050 | 0.050 | <0.010 | 0.010 | <0.050 | 0.050 | 9318900 |
| Dissolved Cadmium (Cd) | mg/L | <0.000025 | 0.000025 | 0.0000096 | 0.0000050 | 0.000801 | 0.000025 | 9318900 |
| Dissolved Chromium (Cr) | mg/L | 0.00067 | 0.00050 | <0.00010 | 0.00010 | 0.00142 | 0.00050 | 9318900 |
| Dissolved Cobalt (Co) | mg/L | 0.000324 | 0.000025 | 0.00284 | 0.0000050 | 0.00584 | 0.000025 | 9318900 |
| Dissolved Copper (Cu) | mg/L | 0.00382 | 0.00025 | 0.00111 | 0.000050 | 0.00675 | 0.00025 | 9318900 |
| Dissolved Iron (Fe) | mg/L | 0.432 | 0.0050 | 0.178 | 0.0010 | 0.0336 | 0.0050 | 9318900 |
| Dissolved Lead (Pb) | mg/L | 0.00167 | 0.000025 | 0.000872 | 0.0000050 | 0.000273 | 0.000025 | 9318900 |
| Dissolved Lithium (Li) | mg/L | <0.0025 | 0.0025 | 0.0241 | 0.00050 | 0.0052 | 0.0025 | 9318900 |
| Dissolved Manganese (Mn) | mg/L | 0.00943 | 0.00025 | 0.207 | 0.000050 | 14.5 | 0.00025 | 9318900 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00033 | 0.00025 | 0.000292 | 0.000050 | <0.00025 | 0.00025 | 9318900 |
| Dissolved Nickel (Ni) | mg/L | 0.00201 | 0.00010 | 0.0151 | 0.000020 | 0.0564 | 0.00010 | 9318900 |
| Dissolved Selenium (Se) | mg/L | 0.00027 | 0.00020 | 0.000333 | 0.000040 | 0.00020 | 0.00020 | 9318900 |
| Dissolved Silicon (Si) | mg/L | 0.51 | 0.25 | 1.03 | 0.050 | 2.82 | 0.25 | 9318900 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | 0.000025 | <0.0000050 | 0.0000050 | <0.000025 | 0.000025 | 9318900 |
| Dissolved Strontium (Sr) | mg/L | 0.00463 | 0.00025 | 0.0424 | 0.000050 | 0.113 | 0.00025 | 9318900 |
| Dissolved Thallium (Tl) | mg/L | <0.000010 | 0.000010 | 0.0000067 | 0.0000020 | 0.000015 | 0.000010 | 9318900 |
| Dissolved Tin (Sn) | mg/L | <0.0010 | 0.0010 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9318900 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | 0.0025 | 0.00128 | 0.00050 | <0.0025 | 0.0025 | 9318900 |
| Dissolved Uranium (U) | mg/L | <0.000010 | 0.000010 | <0.0000020 | 0.0000020 | <0.000010 | 0.000010 | 9318900 |
| Dissolved Vanadium (V) | mg/L | <0.0010 | 0.0010 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9318900 |
| Dissolved Zinc (Zn) | mg/L | 0.00967 | 0.00050 | 0.00331 | 0.00010 | 0.183 | 0.00050 | 9318900 |
| Dissolved Zirconium (Zr) | mg/L | <0.00050 | 0.00050 | <0.00010 | 0.00010 | <0.00050 | 0.00050 | 9318900 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1257 | | VF1258 | | VF1259 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | | 2019/02/05 12:00 | | 2019/02/05 12:00 | | |
| COC Number | | B932246-M058-01-01 | | B932246-M058-01-01 | | B932246-M058-01-01 | | |
| | UNITS | M-2018-SFC-T23 | RDL | M-2018-SFC-T35 | RDL | M-2018-C4 (0-10) | RDL | QC Batch |
| Dissolved Calcium (Ca) | mg/L | 3.43 | 0.25 | 17.4 | 0.050 | 29.1 | 0.25 | 9318082 |
| Dissolved Magnesium (Mg) | mg/L | 2.51 | 0.25 | 15.1 | 0.050 | 6.26 | 0.25 | 9318082 |
| Dissolved Potassium (K) | mg/L | 3.11 | 0.25 | 4.62 | 0.050 | 4.00 | 0.25 | 9318082 |
| Dissolved Sodium (Na) | mg/L | 3.28 | 0.25 | 4.06 | 0.050 | 25.6 | 0.25 | 9318082 |
| Dissolved Sulphur (S) | mg/L | <3.0 | 3.0 | 36.8 | 0.60 | 51.2 | 3.0 | 9318900 |
| RDL = Reportable Detection Limit | | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1260 | | VF1261 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | | 2019/02/05 12:00 | | |
| COC Number | | B932246-M058-01-01 | | B932246-M058-01-01 | | |
| | UNITS | M-2018-C18 (0-2.5) | RDL | G-2018-C3 (0-5) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 72.7 | 0.50 | 8.05 | 0.50 | 9317722 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0688 | 0.00050 | 0.195 | 0.0050 | 9318900 |
| Dissolved Antimony (Sb) | mg/L | 0.000230 | 0.000020 | 0.00346 | 0.00020 | 9318900 |
| Dissolved Arsenic (As) | mg/L | 0.0232 | 0.000020 | 9.68 | 0.00020 | 9318900 |
| Dissolved Barium (Ba) | mg/L | 0.0672 | 0.000020 | 0.00747 | 0.00020 | 9318900 |
| Dissolved Beryllium (Be) | mg/L | 0.000034 | 0.000010 | <0.00010 | 0.00010 | 9318900 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000050 | 0.000340 | 0.000050 | 9318900 |
| Dissolved Boron (B) | mg/L | 0.015 | 0.010 | <0.10 | 0.10 | 9318900 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000807 | 0.0000050 | 0.000076 | 0.000050 | 9318900 |
| Dissolved Chromium (Cr) | mg/L | 0.00124 | 0.00010 | 0.0040 | 0.0010 | 9318900 |
| Dissolved Cobalt (Co) | mg/L | 0.00870 | 0.0000050 | 0.0126 | 0.000050 | 9318900 |
| Dissolved Copper (Cu) | mg/L | 0.00487 | 0.000050 | 0.0275 | 0.00050 | 9318900 |
| Dissolved Iron (Fe) | mg/L | 0.0906 | 0.0010 | 4.37 | 0.010 | 9318900 |
| Dissolved Lead (Pb) | mg/L | 0.000474 | 0.0000050 | 0.0184 | 0.000050 | 9318900 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00050 | <0.0050 | 0.0050 | 9318900 |
| Dissolved Manganese (Mn) | mg/L | 1.40 | 0.000050 | 0.829 | 0.00050 | 9318900 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000050 | 0.00213 | 0.00050 | 9318900 |
| Dissolved Nickel (Ni) | mg/L | 0.00651 | 0.000020 | 0.0215 | 0.00020 | 9318900 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000040 | <0.00040 | 0.00040 | 9318900 |
| Dissolved Silicon (Si) | mg/L | 1.84 | 0.050 | 2.28 | 0.50 | 9318900 |
| Dissolved Silver (Ag) | mg/L | 0.0000063 | 0.0000050 | <0.000050 | 0.000050 | 9318900 |
| Dissolved Strontium (Sr) | mg/L | 0.0798 | 0.000050 | 0.0180 | 0.00050 | 9318900 |
| Dissolved Thallium (Tl) | mg/L | 0.0000274 | 0.0000020 | <0.000020 | 0.000020 | 9318900 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | <0.0020 | 0.0020 | 9318900 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00050 | <0.0050 | 0.0050 | 9318900 |
| Dissolved Uranium (U) | mg/L | 0.0000035 | 0.0000020 | 0.000056 | 0.000020 | 9318900 |
| Dissolved Vanadium (V) | mg/L | 0.00169 | 0.00020 | <0.0020 | 0.0020 | 9318900 |
| Dissolved Zinc (Zn) | mg/L | 0.0737 | 0.00010 | 0.0343 | 0.0010 | 9318900 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | <0.0010 | 0.0010 | 9318900 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF1260 | | VF1261 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/05 12:00 | | 2019/02/05 12:00 | | |
| **COC Number** | | B932246-M058-01-01 | | B932246-M058-01-01 | | |
| | **UNITS** | **M-2018-C18 (0-2.5)** | **RDL** | **G-2018-C3 (0-5)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 19.9 | 0.050 | 2.25 | 0.50 | 9318082 |
| Dissolved Magnesium (Mg) | mg/L | 5.59 | 0.050 | 0.59 | 0.50 | 9318082 |
| Dissolved Potassium (K) | mg/L | 2.18 | 0.050 | 5.50 | 0.50 | 9318082 |
| Dissolved Sodium (Na) | mg/L | 54.7 | 0.050 | 3.99 | 0.50 | 9318082 |
| Dissolved Sulphur (S) | mg/L | 42.6 | 0.60 | <6.0 | 6.0 | 9318900 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1262 | VF1263 | | VF1264 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | | 2019/02/05 12:00 | | |
| COC Number | | B932246-M058-01-01 | B932246-M058-02-01 | | B932246-M058-02-01 | | |
| | UNITS | G-2018-C6 (28NOV) (2.5-10) | G-2018-C9 (0-7.5) | RDL | G-2018-SFC-3 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 23.7 | 21.4 | 0.50 | 3.23 | 0.50 | 9317722 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.170 | 0.0663 | 0.00050 | 0.355 | 0.0025 | 9318900 |
| Dissolved Antimony (Sb) | mg/L | 0.00116 | 0.00351 | 0.000020 | 0.00478 | 0.00010 | 9318900 |
| Dissolved Arsenic (As) | mg/L | 1.13 | 0.115 | 0.000020 | 2.11 | 0.00010 | 9318900 |
| Dissolved Barium (Ba) | mg/L | 0.0441 | 0.00456 | 0.000020 | 0.00567 | 0.00010 | 9318900 |
| Dissolved Beryllium (Be) | mg/L | 0.000015 | 0.000017 | 0.000010 | <0.000050 | 0.000050 | 9318900 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000471 | 0.0000755 | 0.0000050 | 0.000453 | 0.000025 | 9318900 |
| Dissolved Boron (B) | mg/L | 0.029 | 0.011 | 0.010 | <0.050 | 0.050 | 9318900 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000261 | 0.0000225 | 0.0000050 | 0.000090 | 0.000025 | 9318900 |
| Dissolved Chromium (Cr) | mg/L | 0.00250 | 0.00346 | 0.00010 | 0.00162 | 0.00050 | 9318900 |
| Dissolved Cobalt (Co) | mg/L | 0.0136 | 0.000597 | 0.0000050 | 0.00208 | 0.000025 | 9318900 |
| Dissolved Copper (Cu) | mg/L | 0.0110 | 0.0107 | 0.000050 | 0.0203 | 0.00025 | 9318900 |
| Dissolved Iron (Fe) | mg/L | 6.30 | 0.535 | 0.0010 | 4.09 | 0.0050 | 9318900 |
| Dissolved Lead (Pb) | mg/L | 0.00434 | 0.00348 | 0.0000050 | 0.0374 | 0.000025 | 9318900 |
| Dissolved Lithium (Li) | mg/L | 0.00080 | 0.00118 | 0.00050 | <0.0025 | 0.0025 | 9318900 |
| Dissolved Manganese (Mn) | mg/L | 4.60 | 0.202 | 0.000050 | 0.0691 | 0.00025 | 9318900 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000059 | 0.000101 | 0.000050 | 0.00069 | 0.00025 | 9318900 |
| Dissolved Nickel (Ni) | mg/L | 0.0136 | 0.00595 | 0.000020 | 0.00614 | 0.00010 | 9318900 |
| Dissolved Selenium (Se) | mg/L | 0.000067 | 0.000046 | 0.000040 | <0.00020 | 0.00020 | 9318900 |
| Dissolved Silicon (Si) | mg/L | 3.47 | 1.85 | 0.050 | 1.08 | 0.25 | 9318900 |
| Dissolved Silver (Ag) | mg/L | 0.0000066 | 0.0000146 | 0.0000050 | 0.000052 | 0.000025 | 9318900 |
| Dissolved Strontium (Sr) | mg/L | 0.0601 | 0.0522 | 0.000050 | 0.00655 | 0.00025 | 9318900 |
| Dissolved Thallium (Tl) | mg/L | 0.0000080 | 0.0000100 | 0.0000020 | <0.000010 | 0.000010 | 9318900 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9318900 |
| Dissolved Titanium (Ti) | mg/L | 0.00191 | 0.00175 | 0.00050 | 0.0084 | 0.0025 | 9318900 |
| Dissolved Uranium (U) | mg/L | 0.0000117 | 0.0000170 | 0.0000020 | 0.000075 | 0.000010 | 9318900 |
| Dissolved Vanadium (V) | mg/L | 0.00033 | 0.00028 | 0.00020 | <0.0010 | 0.0010 | 9318900 |
| Dissolved Zinc (Zn) | mg/L | 0.0403 | 0.0219 | 0.00010 | 0.0132 | 0.00050 | 9318900 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00016 | 0.00010 | 0.00068 | 0.00050 | 9318900 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF1262 | VF1263 | | VF1264 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/05 12:00 | 2019/02/05 12:00 | | 2019/02/05 12:00 | | |
| **COC Number** | | B932246-M058-01-01 | B932246-M058-02-01 | | B932246-M058-02-01 | | |
| | **UNITS** | **G-2018-C6 (28NOV) (2.5-10)** | **G-2018-C9 (0-7.5)** | **RDL** | **G-2018-SFC-3** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 7.89 | 5.69 | 0.050 | 1.03 | 0.25 | 9318082 |
| Dissolved Magnesium (Mg) | mg/L | 0.984 | 1.74 | 0.050 | <0.25 | 0.25 | 9318082 |
| Dissolved Potassium (K) | mg/L | 0.446 | 0.808 | 0.050 | 1.94 | 0.25 | 9318082 |
| Dissolved Sodium (Na) | mg/L | 6.20 | 5.04 | 0.050 | 1.23 | 0.25 | 9318082 |
| Dissolved Sulphur (S) | mg/L | 13.8 | 7.46 | 0.60 | <3.0 | 3.0 | 9318900 |
| RDL = Reportable Detection Limit | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1265 | VF1266 | | VF1267 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | | 2019/02/05 12:00 | | |
| COC Number | | B932246-M058-02-01 | B932246-M058-02-01 | | B932246-M058-02-01 | | |
| | UNITS | G-2018-SFC-8 | G-2018-SFC-11 | RDL | G-2018-C4 (0-5) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 110 | 3.51 | 0.50 | 19.6 | 0.50 | 9317722 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0181 | 0.366 | 0.00050 | 0.0676 | 0.0025 | 9318900 |
| Dissolved Antimony (Sb) | mg/L | 0.00555 | 0.000729 | 0.000020 | 0.00064 | 0.00010 | 9318900 |
| Dissolved Arsenic (As) | mg/L | 0.134 | 0.223 | 0.000020 | 3.74 | 0.00010 | 9318900 |
| Dissolved Barium (Ba) | mg/L | 0.00390 | 0.0199 | 0.000020 | 0.00937 | 0.00010 | 9318900 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000046 | 0.000010 | <0.000050 | 0.000050 | 9318900 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000246 | 0.0000050 | <0.000025 | 0.000025 | 9318900 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | 0.010 | <0.050 | 0.050 | 9318900 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000170 | 0.0000887 | 0.0000050 | 0.000029 | 0.000025 | 9318900 |
| Dissolved Chromium (Cr) | mg/L | <0.00010 | 0.00019 | 0.00010 | 0.00186 | 0.00050 | 9318900 |
| Dissolved Cobalt (Co) | mg/L | 0.000154 | 0.00282 | 0.0000050 | 0.00688 | 0.000025 | 9318900 |
| Dissolved Copper (Cu) | mg/L | 0.000687 | 0.0134 | 0.000050 | 0.00551 | 0.00025 | 9318900 |
| Dissolved Iron (Fe) | mg/L | 0.0213 | 0.621 | 0.0010 | 1.70 | 0.0050 | 9318900 |
| Dissolved Lead (Pb) | mg/L | 0.000195 | 0.00496 | 0.0000050 | 0.00122 | 0.000025 | 9318900 |
| Dissolved Lithium (Li) | mg/L | 0.00386 | 0.00347 | 0.00050 | <0.0025 | 0.0025 | 9318900 |
| Dissolved Manganese (Mn) | mg/L | 0.0146 | 0.143 | 0.000050 | 2.41 | 0.00025 | 9318900 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00411 | <0.000050 | 0.000050 | <0.00025 | 0.00025 | 9318900 |
| Dissolved Nickel (Ni) | mg/L | 0.00413 | 0.00965 | 0.000020 | 0.00608 | 0.00010 | 9318900 |
| Dissolved Selenium (Se) | mg/L | 0.000069 | 0.000053 | 0.000040 | <0.00020 | 0.00020 | 9318900 |
| Dissolved Silicon (Si) | mg/L | 0.895 | 1.32 | 0.050 | 1.19 | 0.25 | 9318900 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | 0.0000050 | <0.000025 | 0.000025 | 9318900 |
| Dissolved Strontium (Sr) | mg/L | 0.242 | 0.00763 | 0.000050 | 0.0441 | 0.00025 | 9318900 |
| Dissolved Thallium (Tl) | mg/L | 0.0000165 | 0.0000432 | 0.0000020 | <0.000010 | 0.000010 | 9318900 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9318900 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | <0.00050 | 0.00050 | <0.0025 | 0.0025 | 9318900 |
| Dissolved Uranium (U) | mg/L | 0.0000602 | 0.0000115 | 0.0000020 | <0.000010 | 0.000010 | 9318900 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00020 | <0.0010 | 0.0010 | 9318900 |
| Dissolved Zinc (Zn) | mg/L | 0.00058 | 0.0428 | 0.00010 | 0.0131 | 0.00050 | 9318900 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | 0.00010 | <0.00050 | 0.00050 | 9318900 |

RDL = Reportable Detection Limit



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Maxxam Job #: B909907
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1265 | VF1266 | | VF1267 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | 2019/02/05 12:00 | | 2019/02/05 12:00 | | |
| COC Number | | B932246-M058-02-01 | B932246-M058-02-01 | | B932246-M058-02-01 | | |
| | UNITS | G-2018-SFC-8 | G-2018-SFC-11 | RDL | G-2018-C4 (0-5) | RDL | QC Batch |
| Dissolved Calcium (Ca) | mg/L | 41.3 | 0.828 | 0.050 | 5.69 | 0.25 | 9318082 |
| Dissolved Magnesium (Mg) | mg/L | 1.68 | 0.350 | 0.050 | 1.30 | 0.25 | 9318082 |
| Dissolved Potassium (K) | mg/L | 4.82 | 1.28 | 0.050 | 1.03 | 0.25 | 9318082 |
| Dissolved Sodium (Na) | mg/L | 0.694 | 0.468 | 0.050 | 3.92 | 0.25 | 9318082 |
| Dissolved Sulphur (S) | mg/L | 28.7 | 10.0 | 0.60 | <3.0 | 3.0 | 9318900 |
| RDL = Reportable Detection Limit | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1268 | | VF1269 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/05 12:00 | | 2019/02/05 12:00 | | |
| COC Number | | B932246-M058-02-01 | | B932246-M058-02-01 | | |
| | UNITS | M-2018-C11 (2.5-10) | RDL | M-2018-C17 (2.5-10) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 329 | 0.50 | 24.2 | 0.50 | 9317722 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.456 | 0.0025 | 0.0132 | 0.0050 | 9318900 |
| Dissolved Antimony (Sb) | mg/L | <0.00010 | 0.00010 | 0.00595 | 0.00020 | 9318900 |
| Dissolved Arsenic (As) | mg/L | 0.0221 | 0.00010 | 12.4 | 0.00020 | 9318900 |
| Dissolved Barium (Ba) | mg/L | 0.0339 | 0.00010 | 0.00157 | 0.00020 | 9318900 |
| Dissolved Beryllium (Be) | mg/L | 0.000274 | 0.000050 | <0.00010 | 0.00010 | 9318900 |
| Dissolved Bismuth (Bi) | mg/L | <0.000025 | 0.000025 | 0.000054 | 0.000050 | 9318900 |
| Dissolved Boron (B) | mg/L | <0.050 | 0.050 | <0.10 | 0.10 | 9318900 |
| Dissolved Cadmium (Cd) | mg/L | 0.000351 | 0.000025 | <0.000050 | 0.000050 | 9318900 |
| Dissolved Chromium (Cr) | mg/L | 0.00084 | 0.00050 | <0.0010 | 0.0010 | 9318900 |
| Dissolved Cobalt (Co) | mg/L | 0.142 | 0.000025 | 0.00771 | 0.000050 | 9318900 |
| Dissolved Copper (Cu) | mg/L | 0.00235 | 0.00025 | 0.00232 | 0.00050 | 9318900 |
| Dissolved Iron (Fe) | mg/L | 0.0987 | 0.0050 | 4.45 | 0.010 | 9318900 |
| Dissolved Lead (Pb) | mg/L | 0.000675 | 0.000025 | 0.00465 | 0.000050 | 9318900 |
| Dissolved Lithium (Li) | mg/L | 0.0105 | 0.0025 | <0.0050 | 0.0050 | 9318900 |
| Dissolved Manganese (Mn) | mg/L | 12.6 | 0.00025 | 0.949 | 0.00050 | 9318900 |
| Dissolved Molybdenum (Mo) | mg/L | <0.00025 | 0.00025 | <0.00050 | 0.00050 | 9318900 |
| Dissolved Nickel (Ni) | mg/L | 0.0648 | 0.00010 | 0.00590 | 0.00020 | 9318900 |
| Dissolved Selenium (Se) | mg/L | <0.00020 | 0.00020 | <0.00040 | 0.00040 | 9318900 |
| Dissolved Silicon (Si) | mg/L | 5.42 | 0.25 | 3.45 | 0.50 | 9318900 |
| Dissolved Silver (Ag) | mg/L | <0.000025 | 0.000025 | <0.000050 | 0.000050 | 9318900 |
| Dissolved Strontium (Sr) | mg/L | 0.447 | 0.00025 | 0.0256 | 0.00050 | 9318900 |
| Dissolved Thallium (Tl) | mg/L | 0.000036 | 0.000010 | <0.000020 | 0.000020 | 9318900 |
| Dissolved Tin (Sn) | mg/L | <0.0010 | 0.0010 | <0.0020 | 0.0020 | 9318900 |
| Dissolved Titanium (Ti) | mg/L | <0.0025 | 0.0025 | <0.0050 | 0.0050 | 9318900 |
| Dissolved Uranium (U) | mg/L | <0.000010 | 0.000010 | <0.000020 | 0.000020 | 9318900 |
| Dissolved Vanadium (V) | mg/L | <0.0010 | 0.0010 | <0.0020 | 0.0020 | 9318900 |
| Dissolved Zinc (Zn) | mg/L | 0.237 | 0.00050 | 0.0092 | 0.0010 | 9318900 |
| Dissolved Zirconium (Zr) | mg/L | <0.00050 | 0.00050 | <0.0010 | 0.0010 | 9318900 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF1268 | | VF1269 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/05 12:00 | | 2019/02/05 12:00 | | |
| **COC Number** | | B932246-M058-02-01 | | B932246-M058-02-01 | | |
| | **UNITS** | **M-2018-C11 (2.5-10)** | **RDL** | **M-2018-C17 (2.5-10)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 102 | 0.25 | 8.06 | 0.50 | 9318082 |
| Dissolved Magnesium (Mg) | mg/L | 17.9 | 0.25 | 1.00 | 0.50 | 9318082 |
| Dissolved Potassium (K) | mg/L | 0.81 | 0.25 | 3.12 | 0.50 | 9318082 |
| Dissolved Sodium (Na) | mg/L | 9.00 | 0.25 | 16.8 | 0.50 | 9318082 |
| Dissolved Sulphur (S) | mg/L | 123 | 3.0 | 8.5 | 6.0 | 9318900 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
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Site Location: 18-2525
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## TEST SUMMARY

**Maxxam ID:** VF1253 **Collected:** 2019/02/05
**Sample ID:** M-2018-C1 (0-5) **Shipped:**
**Matrix:** Water **Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1254 **Collected:** 2019/02/05
**Sample ID:** M-2018-SFC-T9 **Shipped:**
**Matrix:** Water **Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1255 **Collected:** 2019/02/05
**Sample ID:** M-2018-C13 (2.5-10) **Shipped:**
**Matrix:** Water **Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1255 Dup **Collected:** 2019/02/05
**Sample ID:** M-2018-C13 (2.5-10) **Shipped:**
**Matrix:** Water **Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |

**Maxxam ID:** VF1256 **Collected:** 2019/02/05
**Sample ID:** M-2018-C5 (2.5-10) **Shipped:**
**Matrix:** Water **Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |



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Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF1257
**Sample ID:** M-2018-SFC-T23
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1258
**Sample ID:** M-2018-SFC-T35
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1259
**Sample ID:** M-2018-C4 (0-10)
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1260
**Sample ID:** M-2018-C18 (0-2.5)
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1261
**Sample ID:** G-2018-C3 (0-5)
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF1262
**Sample ID:** G-2018-C6 (28NOV) (2.5-10)
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1263
**Sample ID:** G-2018-C9 (0-7.5)
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1264
**Sample ID:** G-2018-SFC-3
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1265
**Sample ID:** G-2018-SFC-8
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1266
**Sample ID:** G-2018-SFC-11
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |



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MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF1267
**Sample ID:** G-2018-C4 (0-5)
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1268
**Sample ID:** M-2018-C11 (2.5-10)
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |

**Maxxam ID:** VF1269
**Sample ID:** M-2018-C17 (2.5-10)
**Matrix:** Water

**Collected:** 2019/02/05
**Shipped:**
**Received:** 2019/02/08

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9317722 | N/A | 2019/02/13 | Andy Lu |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318082 | N/A | 2019/02/13 | Andy Lu |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318900 | N/A | 2019/02/13 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/08 | Aldean Alicando |



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Site Location: 18-2525
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 6.0°C |

**LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments**

Sample VF1253 [M-2018-C1 (0-5)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF1257 [M-2018-SFC-T23] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF1259 [M-2018-C4 (0-10)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF1261 [G-2018-C3 (0-5)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF1264 [G-2018-SFC-3] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF1267 [G-2018-C4 (0-5)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF1268 [M-2018-C11 (2.5-10)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF1269 [M-2018-C17 (2.5-10)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.

**Results relate only to the items tested.**



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## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9318900 | Dissolved Aluminum (Al) | 2019/02/13 | 96 | 80 - 120 | 101 | 80 - 120 | <0.00050 | mg/L | 1.6 | 20 |
| 9318900 | Dissolved Antimony (Sb) | 2019/02/13 | 99 | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | 1.5 | 20 |
| 9318900 | Dissolved Arsenic (As) | 2019/02/13 | 97 | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | 0.023 | 20 |
| 9318900 | Dissolved Barium (Ba) | 2019/02/13 | 98 | 80 - 120 | 103 | 80 - 120 | <0.000020 | mg/L | 0.30 | 20 |
| 9318900 | Dissolved Beryllium (Be) | 2019/02/13 | 101 | 80 - 120 | 104 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9318900 | Dissolved Bismuth (Bi) | 2019/02/13 | 99 | 80 - 120 | 104 | 80 - 120 | <0.0000050 | mg/L | 8.3 | 20 |
| 9318900 | Dissolved Boron (B) | 2019/02/13 | 103 | 80 - 120 | 105 | 80 - 120 | <0.010 | mg/L | 5.3 | 20 |
| 9318900 | Dissolved Cadmium (Cd) | 2019/02/13 | 99 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | 5.5 | 20 |
| 9318900 | Dissolved Chromium (Cr) | 2019/02/13 | 97 | 80 - 120 | 99 | 80 - 120 | <0.00010 | mg/L | 1.7 | 20 |
| 9318900 | Dissolved Cobalt (Co) | 2019/02/13 | 99 | 80 - 120 | 100 | 80 - 120 | <0.0000050 | mg/L | 1.8 | 20 |
| 9318900 | Dissolved Copper (Cu) | 2019/02/13 | 96 | 80 - 120 | 98 | 80 - 120 | <0.000050 | mg/L | 2.0 | 20 |
| 9318900 | Dissolved Iron (Fe) | 2019/02/13 | 98 | 80 - 120 | 103 | 80 - 120 | <0.0010 | mg/L | 0.50 | 20 |
| 9318900 | Dissolved Lead (Pb) | 2019/02/13 | 100 | 80 - 120 | 103 | 80 - 120 | <0.0000050 | mg/L | 2.6 | 20 |
| 9318900 | Dissolved Lithium (Li) | 2019/02/13 | 99 | 80 - 120 | 104 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9318900 | Dissolved Manganese (Mn) | 2019/02/13 | NC | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | 0.92 | 20 |
| 9318900 | Dissolved Molybdenum (Mo) | 2019/02/13 | 101 | 80 - 120 | 102 | 80 - 120 | <0.000050 | mg/L | 6.4 | 20 |
| 9318900 | Dissolved Nickel (Ni) | 2019/02/13 | 97 | 80 - 120 | 99 | 80 - 120 | <0.000020 | mg/L | 1.5 | 20 |
| 9318900 | Dissolved Selenium (Se) | 2019/02/13 | 99 | 80 - 120 | 100 | 80 - 120 | <0.000040 | mg/L | 15 | 20 |
| 9318900 | Dissolved Silicon (Si) | 2019/02/13 | 98 | 80 - 120 | 103 | 80 - 120 | <0.050 | mg/L | 13 | 20 |
| 9318900 | Dissolved Silver (Ag) | 2019/02/13 | 98 | 80 - 120 | 100 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9318900 | Dissolved Strontium (Sr) | 2019/02/13 | 100 | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | 3.6 | 20 |
| 9318900 | Dissolved Sulphur (S) | 2019/02/13 | 102 | 80 - 120 | 102 | 80 - 120 | <0.60 | mg/L | 2.6 | 20 |
| 9318900 | Dissolved Thallium (Tl) | 2019/02/13 | 92 | 80 - 120 | 104 | 80 - 120 | <0.0000020 | mg/L | 10 | 20 |
| 9318900 | Dissolved Tin (Sn) | 2019/02/13 | 100 | 80 - 120 | 103 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9318900 | Dissolved Titanium (Ti) | 2019/02/13 | 103 | 80 - 120 | 106 | 80 - 120 | <0.00050 | mg/L | 5.6 | 20 |
| 9318900 | Dissolved Uranium (U) | 2019/02/13 | 101 | 80 - 120 | 104 | 80 - 120 | <0.0000020 | mg/L | 5.1 | 20 |
| 9318900 | Dissolved Vanadium (V) | 2019/02/13 | 99 | 80 - 120 | 100 | 80 - 120 | <0.00020 | mg/L | 1.6 | 20 |
| 9318900 | Dissolved Zinc (Zn) | 2019/02/13 | NC | 80 - 120 | 102 | 80 - 120 | <0.00010 | mg/L | 0.20 | 20 |



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## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9318900 | Dissolved Zirconium (Zr) | 2019/02/13 | 99 | 80 - 120 | 103 | 80 - 120 | <0.00010 | mg/L | NC | 20 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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MAXXAM ANALYTICS
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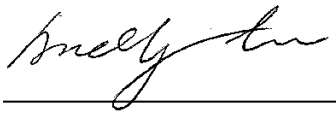
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist

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



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/19**
Report #: R5599522
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B934454**
**Received: 2019/02/07, 15:18**

Sample Matrix: Water
# Samples Received: 16

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Acidity (CaCO3) in water (1, 2) | 15 | N/A | 2019/02/15 | | SM 22 2310 |
| Alkalinity | 1 | N/A | 2019/02/11 | CAM SOP-00448 | SM 23 2320 B m |
| Free (WAD) Cyanide | 4 | N/A | 2019/02/11 | CAM SOP-00457 | OMOE E3015 m |
| Total Cyanide | 4 | 2019/02/11 | 2019/02/11 | CAM SOP-00457 | OMOE E3015 5 m |
| Dissolved Mercury (low level) | 16 | 2019/02/12 | 2019/02/13 | CAM SOP-00453 | EPA 7470 m |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Bedford
(2) Non-accredited test method

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/19**
Report #: R5599522
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B934454**
**Received: 2019/02/07, 15:18**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B934454
Report Date: 2019/02/19

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IYC667 | | | IYC668 | IYC669 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | | | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| COC Number | | n/a | | | n/a | n/a | | |
| | **UNITS** | **G-2018-C2 (0-5)** | **RDL** | **QC Batch** | **G-2018-C2 (20-40)** | **G-2018-C2 (60-80)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Acidity | mg/L | 13 | 5.0 | 5976453 | 43 | 50 | 5.0 | 5976453 |
| Total Cyanide (CN) | mg/L | | | | <0.0050 | <0.0050 | 0.0050 | 5969897 |
| WAD Cyanide (Free) | mg/L | | | | <0.0010 | <0.0010 | 0.0010 | 5969976 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYC670 | | | IYC671 | | IYC672 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | | | 2019/02/07 12:00 | | 2019/02/07 12:00 | | |
| COC Number | | n/a | | | n/a | | n/a | | |
| | **UNITS** | **G-2018-C3 (20-40)** | **RDL** | **QC Batch** | **G-2018-C3 (60-80)** | **RDL** | **G-2018-C3 (100-120)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | | | | 16 | 5.0 | 14 | 5.6 | 5976453 |
| Alkalinity (Total as CaCO3) | mg/L | 20 | 1.0 | 5967258 | | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYC673 | IYC674 | IYC675 | IYC676 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| COC Number | | n/a | n/a | n/a | n/a | | |
| | **UNITS** | **G-2018-C5 (2.5-10)** | **G-2018-C5 (15-20)** | **G-2018-C11 (0-7.5)** | **G-2018-C11 (15-20)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Acidity | mg/L | 41 | 33 | 12 | 11 | 5.0 | 5976453 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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

Maxxam Job #: B934454
Report Date: 2019/02/19

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IYC677 | | | IYC678 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | | | 2019/02/07 12:00 | | |
| COC Number | | n/a | | | n/a | | |
| | **UNITS** | **G-2018-C12 (2.5-10)** | **RDL** | **QC Batch** | **G-2018-C12 (10-20)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Acidity | mg/L | 7.6 | 5.6 | 5976453 | <5.6 | 5.6 | 5976453 |
| Total Cyanide (CN) | mg/L | <0.0050 | 0.0050 | 5969897 | | | |
| WAD Cyanide (Free) | mg/L | <0.0010 | 0.0010 | 5969976 | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYC679 | | | IYC680 | | IYC681 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | | | 2019/02/07 12:00 | | 2019/02/07 12:00 | | |
| COC Number | | n/a | | | n/a | | n/a | | |
| | **UNITS** | **G-2018-C12 (20-40)** | **RDL** | **QC Batch** | **G-2018-C13 (2.5-10)** | **RDL** | **G-2018-C13 (15-20)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | 19 | 5.0 | 5976453 | 6.2 | 5.6 | 11 | 5.0 | 5976453 |
| Total Cyanide (CN) | mg/L | <0.0050 | 0.0050 | 5969897 | | | | | |
| WAD Cyanide (Free) | mg/L | <0.0010 | 0.0010 | 5969976 | | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYC682 | | |
|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | | |
| COC Number | | n/a | | |
| | **UNITS** | **G-2018-C13 (20-40)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | |
| Acidity | mg/L | 12 | 5.0 | 5976453 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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

Maxxam Job #: B934454
Report Date: 2019/02/19

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IYC667 | IYC668 | IYC669 | IYC670 | IYC671 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| COC Number | | n/a | n/a | n/a | n/a | n/a | | |
| | **UNITS** | **G-2018-C2 (0-5)** | **G-2018-C2 (20-40)** | **G-2018-C2 (60-80)** | **G-2018-C3 (20-40)** | **G-2018-C3 (60-80)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.06 | 0.05 | <0.01 | 0.05 | 0.08 | 0.01 | 5970873 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYC672 | IYC673 | IYC674 | IYC675 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| COC Number | | n/a | n/a | n/a | n/a | | |
| | **UNITS** | **G-2018-C3 (100-120)** | **G-2018-C5 (2.5-10)** | **G-2018-C5 (15-20)** | **G-2018-C11 (0-7.5)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.07 | 0.02 | 0.04 | 0.01 | 0.01 | 5970873 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYC676 | IYC677 | IYC678 | IYC679 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| COC Number | | n/a | n/a | n/a | n/a | | |
| | **UNITS** | **G-2018-C11 (15-20)** | **G-2018-C12 (2.5-10)** | **G-2018-C12 (10-20)** | **G-2018-C12 (20-40)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.03 | 0.02 | 0.05 | <0.01 | 0.01 | 5970873 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYC680 | IYC681 | IYC682 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| COC Number | | n/a | n/a | n/a | | |
| | **UNITS** | **G-2018-C13 (2.5-10)** | **G-2018-C13 (15-20)** | **G-2018-C13 (20-40)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.06 | <0.01 | <0.01 | 0.01 | 5970873 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B934454
Report Date: 2019/02/19

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 15.3°C |

**Results relate only to the items tested.**



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Maxxam Job #: B934454
Report Date: 2019/02/19

## QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5967258 | Alkalinity (Total as CaCO3) | 2019/02/11 | | | 96 | 85 - 115 | <1.0 | mg/L | 0.67 | 20 |
| 5969897 | Total Cyanide (CN) | 2019/02/11 | 106 | 80 - 120 | 105 | 80 - 120 | <0.0050 | mg/L | NC | 20 |
| 5969976 | WAD Cyanide (Free) | 2019/02/11 | 105 | 80 - 120 | 102 | 80 - 120 | <0.0010 | mg/L | NC | 20 |
| 5970873 | Dissolved Mercury (Hg) | 2019/02/13 | NC | 75 - 125 | 103 | 80 - 120 | <0.01 | ug/L | 0.85 | 20 |
| 5976453 | Acidity | 2019/02/15 | 82 | 80 - 120 | 104 | 80 - 120 | <5.0 | mg/L | 2.5 | 25 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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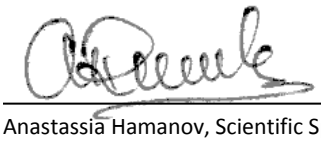
Maxxam Job #: B934454
Report Date: 2019/02/19

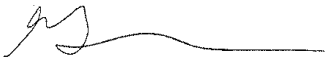
EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist



Gina Thompson, Inorganics General Chemistry Supervisor

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Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | Report Information (if differs from invoice) | Project information (where applicable) | Turnaround Time (TAT) Required |
|---|---|---|---|
| Company Name: EcoMetrix Inc | Company Name: | Quotation #: | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: Daniel Skruch | Contact Name: | P.O. #/ AFE#: | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: 6800 Campobello Road | Address: | Project #: 18-2525 | Rush TAT (Surcharges will be applied) |
| | | Site Location: NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: Fax: | Site #: | |
| Email: dskruch@ecometrix.ca | Email: | Sampled By: ALC+FL+CL | Date Required: |

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Rush Confirmation #:

**Regulation 153**

[ ] Table 1 [ ] Res/Park [ ] Med/ Fine
[ ] Table 2 [ ] Ind/Comm [ ] Coarse
[ ] Table 3 [ ] Agri/ Other
[ ] Table _____
FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**

[ ] CCME [ ] Sanitary Sewer Bylaw
[ ] MISA [ ] Storm Sewer Bylaw
[ ] PWQO Region
[ ] Other (Specify)
[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

**LABORATORY USE ONLY**

CUSTODY SEAL Y / (N) | COOLER TEMPERATURES

| Present | Intact | |
|---|---|---|
| | | 15 \| 15 \| 16 |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / (N)

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED; to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G-2018-C2 (0-5) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | **G-2018-C2 (20-40)** | 07/02/2019 | 12:00 | Water | 4 | X | X | | X | X | X | |
| 3 | **G-2018-C2 (60-80)** | 07/02/2019 | 12:00 | Water | 4 | X | X | | X | X | X | |
| 4 | G-2018-C3 (20-40) | 07/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 5 | G-2018-C3 (60-80) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 6 | G-2018-C3 (100-120) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 7 | G-2018-C5 (2.5-10) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 8 | G-2018-C5 (15-20) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 9 | G-2018-C11 (0-7.5) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 10 | G-2018-C11 (15-20) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |

COMMENTS

***NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); **Mercury 0.00001 mg/L

***PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) |
|---|---|---|---|---|---|
| Fei Luo | 07/02/2019 | 15:20 | [signature] | 2019/02/07 | 15:18 |
| | | | | | |

07-Feb-19 15:18
Kyle Reinhart

B934454

CA2 ENV-1370

Maxxam
A Bureau Veritas Group Company

he

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | Report Information (if differs from invoice) | Project Information (where applicable) | Turnaround Time (TAT) Required |
|---|---|---|---|
| Company Name: EcoMetrix Inc | Company Name: | Quotation #: | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: Daniel Skruch | Contact Name: | P.O. #/ AFE#: | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: 6800 Campobello Road | Address: | Project #: 18-2525 | Rush TAT (Surcharges will be applied) |
| | | Site Location: NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: Fax: | Site #: | |
| Email: dskruch@ecometrix.ca | Email: | Sampled By: ALC+FL+CL | Date Required: |

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Rush Confirmation #:

**Regulation 153**

[ ] Table 1 [ ] Res/Park [ ] Med/ Fine
[ ] Table 2 [ ] Ind/Comm [ ] Coarse
[ ] Table 3 [ ] Agri/ Other
[ ] Table ____
FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**

[ ] CCME [ ] Sanitary Sewer Bylaw
[ ] MISA [ ] Storm Sewer Bylaw
[ ] PWQO Region
[ ] Other (Specify)
[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

**Analysis Requested**

LABORATORY USE ONLY

CUSTODY SEAL Y / N (Present / Intact) | COOLER TEMPERATURES

COOLING MEDIA PRESENT: Y / N

COMMENTS

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED: to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **G-2018-C12 (2.5-10)** | 07/02/2019 | 12:00 | Water | 4 | X | X | | X | X | X | |
| 2 | G-2018-C12 (10-20) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | **G-2018-C12 (20-40)** | 07/02/2019 | 12:00 | Water | 4 | X | X | | X | X | X | |
| 4 | G-2018-C13 (2.5-10) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 5 | G-2018-C13 (15-20) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 6 | G-2018-C13 (20-40) | 07/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |

***NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); ****Mercury 0.00001 mg/L**

***PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) | MAXXAM JOB # |
|---|---|---|---|---|---|---|
| Fei Luo | 07/02/2019 | 15:20 | See page 1 | | | |
| | | | | | | |

Success Through Science®

Your Project #: MB934454
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B934454-M058-01-01, B934454-M058-02-01

**Report Date: 2019/02/14**
Report #: R2686125
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B909974**
**Received: 2019/02/09, 12:32**

Sample Matrix: Water
# Samples Received: 16

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | 16 | N/A | 2019/02/13 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 16 | N/A | 2019/02/13 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 16 | N/A | 2019/02/12 | BBY7SOP-00002 | EPA 6020b R2 m |
| Filter and HNO3 Preserve for Metals | 16 | N/A | 2019/02/09 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



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Your Project #: MB934454
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B934454-M058-01-01, B934454-M058-02-01

**Report Date: 2019/02/14**
Report #: R2686125
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B909974**
**Received: 2019/02/09, 12:32**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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

Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | VF1560 | VF1561 | VF1562 | VF1563 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | |
| COC Number | | B934454-M058-01-01 | B934454-M058-01-01 | B934454-M058-01-01 | B934454-M058-01-01 | |
| | UNITS | G-2018-C2 (0-5) | G-2018-C2 (20-40) | G-2018-C2 (60-80) | G-2018-C3 (20-40) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF1564 | VF1565 | VF1566 | VF1567 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | |
| COC Number | | B934454-M058-01-01 | B934454-M058-01-01 | B934454-M058-01-01 | B934454-M058-01-01 | |
| | UNITS | G-2018-C3 (60-80) | G-2018-C3 (100-120) | G-2018-C5 (2.5-10) | G-2018-C5 (15-20) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF1568 | VF1569 | VF1570 | VF1571 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | |
| COC Number | | B934454-M058-01-01 | B934454-M058-01-01 | B934454-M058-02-01 | B934454-M058-02-01 | |
| | UNITS | G-2018-C11 (0-7.5) | G-2018-C11 (15-20) | G-2018-C12 (2.5-10) | G-2018-C12 (10-20) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF1572 | VF1573 | VF1574 | VF1575 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | |
| COC Number | | B934454-M058-02-01 | B934454-M058-02-01 | B934454-M058-02-01 | B934454-M058-02-01 | |
| | UNITS | G-2018-C12 (20-40) | G-2018-C13 (2.5-10) | G-2018-C13 (10-20) | G-2018-C13 (20-40) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |



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Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1560 | | VF1561 | | VF1562 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | | 2019/02/07 12:00 | | 2019/02/07 12:00 | | |
| COC Number | | B934454-M058-01-01 | | B934454-M058-01-01 | | B934454-M058-01-01 | | |
| | UNITS | G-2018-C2 (0-5) | RDL | G-2018-C2 (20-40) | RDL | G-2018-C2 (60-80) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 16.5 | 0.50 | 110 | 0.50 | 160 | 0.50 | 9318669 |
| **Dissolved Metals by ICPMS** | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0539 | 0.0050 | 0.0674 | 0.00050 | 0.408 | 0.010 | 9318901 |
| Dissolved Antimony (Sb) | mg/L | 0.00239 | 0.00020 | 0.00566 | 0.000020 | 0.00303 | 0.00040 | 9318901 |
| Dissolved Arsenic (As) | mg/L | 4.31 | 0.00020 | 0.668 | 0.000020 | 11.2 | 0.00040 | 9318901 |
| Dissolved Barium (Ba) | mg/L | 0.00985 | 0.00020 | 0.0357 | 0.000020 | 0.0203 | 0.00040 | 9318901 |
| Dissolved Beryllium (Be) | mg/L | <0.00010 | 0.00010 | 0.000035 | 0.000010 | 0.00029 | 0.00020 | 9318901 |
| Dissolved Bismuth (Bi) | mg/L | <0.000050 | 0.000050 | 0.0000467 | 0.0000050 | <0.00010 | 0.00010 | 9318901 |
| Dissolved Boron (B) | mg/L | <0.10 | 0.10 | <0.010 | 0.010 | <0.20 | 0.20 | 9318901 |
| Dissolved Cadmium (Cd) | mg/L | <0.000050 | 0.000050 | 0.0000236 | 0.0000050 | <0.00010 | 0.00010 | 9318901 |
| Dissolved Chromium (Cr) | mg/L | 0.0013 | 0.0010 | 0.00053 | 0.00010 | <0.0020 | 0.0020 | 9318901 |
| Dissolved Cobalt (Co) | mg/L | 0.00600 | 0.000050 | 0.0907 | 0.0000050 | 3.14 | 0.00010 | 9318901 |
| Dissolved Copper (Cu) | mg/L | 0.00914 | 0.00050 | 0.00309 | 0.000050 | 0.0034 | 0.0010 | 9318901 |
| Dissolved Iron (Fe) | mg/L | 2.53 | 0.010 | 17.5 | 0.0010 | 12.9 | 0.020 | 9318901 |
| Dissolved Lead (Pb) | mg/L | 0.00412 | 0.000050 | 0.00414 | 0.0000050 | 0.00127 | 0.00010 | 9318901 |
| Dissolved Lithium (Li) | mg/L | <0.0050 | 0.0050 | 0.0133 | 0.00050 | 0.023 | 0.010 | 9318901 |
| Dissolved Manganese (Mn) | mg/L | 0.696 | 0.00050 | 6.19 | 0.000050 | 11.4 | 0.0010 | 9318901 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00089 | 0.00050 | 0.000188 | 0.000050 | <0.0010 | 0.0010 | 9318901 |
| Dissolved Nickel (Ni) | mg/L | 0.0157 | 0.00020 | 0.0808 | 0.000020 | 3.47 | 0.00040 | 9318901 |
| Dissolved Selenium (Se) | mg/L | <0.00040 | 0.00040 | <0.000040 | 0.000040 | <0.00080 | 0.00080 | 9318901 |
| Dissolved Silicon (Si) | mg/L | 1.32 | 0.50 | 1.38 | 0.050 | 3.7 | 1.0 | 9318901 |
| Dissolved Silver (Ag) | mg/L | <0.000050 | 0.000050 | 0.0000054 | 0.0000050 | <0.00010 | 0.00010 | 9318901 |
| Dissolved Strontium (Sr) | mg/L | 0.0406 | 0.00050 | 0.261 | 0.000050 | 0.400 | 0.0010 | 9318901 |
| Dissolved Thallium (Tl) | mg/L | <0.000020 | 0.000020 | <0.0000020 | 0.0000020 | <0.000040 | 0.000040 | 9318901 |
| Dissolved Tin (Sn) | mg/L | <0.0020 | 0.0020 | <0.00020 | 0.00020 | <0.0040 | 0.0040 | 9318901 |
| Dissolved Titanium (Ti) | mg/L | <0.0050 | 0.0050 | 0.00071 | 0.00050 | <0.010 | 0.010 | 9318901 |
| Dissolved Uranium (U) | mg/L | <0.000020 | 0.000020 | 0.0000056 | 0.0000020 | <0.000040 | 0.000040 | 9318901 |
| Dissolved Vanadium (V) | mg/L | <0.0020 | 0.0020 | 0.00024 | 0.00020 | <0.0040 | 0.0040 | 9318901 |
| Dissolved Zinc (Zn) | mg/L | 0.0268 | 0.0010 | 0.0417 | 0.00010 | 0.753 | 0.0020 | 9318901 |
| Dissolved Zirconium (Zr) | mg/L | <0.0010 | 0.0010 | <0.00010 | 0.00010 | <0.0020 | 0.0020 | 9318901 |
| Dissolved Calcium (Ca) | mg/L | 5.20 | 0.50 | 36.4 | 0.050 | 45.5 | 1.0 | 9318765 |

RDL = Reportable Detection Limit



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Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF1560 | | VF1561 | | VF1562 | | |
|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/07 12:00 | | 2019/02/07 12:00 | | 2019/02/07 12:00 | | |
| **COC Number** | | B934454-M058-01-01 | | B934454-M058-01-01 | | B934454-M058-01-01 | | |
| | **UNITS** | **G-2018-C2 (0-5)** | **RDL** | **G-2018-C2 (20-40)** | **RDL** | **G-2018-C2 (60-80)** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 0.84 | 0.50 | 4.71 | 0.050 | 11.4 | 1.0 | 9318765 |
| Dissolved Potassium (K) | mg/L | 7.24 | 0.50 | 2.75 | 0.050 | 4.5 | 1.0 | 9318765 |
| Dissolved Sodium (Na) | mg/L | 5.62 | 0.50 | 3.31 | 0.050 | 2.2 | 1.0 | 9318765 |
| Dissolved Sulphur (S) | mg/L | <6.0 | 6.0 | 53.4 | 0.60 | 72 | 12 | 9318901 |
| RDL = Reportable Detection Limit | | | | | | | | |



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Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1563 | VF1564 | VF1565 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| COC Number | | B934454-M058-01-01 | B934454-M058-01-01 | B934454-M058-01-01 | | |
| | UNITS | G-2018-C3 (20-40) | G-2018-C3 (60-80) | G-2018-C3 (100-120) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 72.9 | 265 | 430 | 0.50 | 9318669 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0357 | 0.00868 | 0.0212 | 0.00050 | 9318901 |
| Dissolved Antimony (Sb) | mg/L | 0.0115 | 0.00721 | 0.00431 | 0.000020 | 9318901 |
| Dissolved Arsenic (As) | mg/L | 0.245 | 0.174 | 0.261 | 0.000020 | 9318901 |
| Dissolved Barium (Ba) | mg/L | 0.0205 | 0.0309 | 0.0493 | 0.000020 | 9318901 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | <0.000010 | 0.000010 | 9318901 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000816 | 0.0000135 | 0.0000058 | 0.0000050 | 9318901 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | 0.023 | 0.010 | 9318901 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000313 | 0.0000103 | 0.0000287 | 0.0000050 | 9318901 |
| Dissolved Chromium (Cr) | mg/L | 0.00054 | 0.00023 | 0.00093 | 0.00010 | 9318901 |
| Dissolved Cobalt (Co) | mg/L | 0.00269 | 0.0101 | 0.00216 | 0.0000050 | 9318901 |
| Dissolved Copper (Cu) | mg/L | 0.00418 | 0.00143 | 0.00588 | 0.000050 | 9318901 |
| Dissolved Iron (Fe) | mg/L | 0.453 | 1.89 | 0.696 | 0.0010 | 9318901 |
| Dissolved Lead (Pb) | mg/L | 0.00576 | 0.00130 | 0.000617 | 0.0000050 | 9318901 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00114 | <0.00050 | 0.00050 | 9318901 |
| Dissolved Manganese (Mn) | mg/L | 0.726 | 5.03 | 2.08 | 0.000050 | 9318901 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000411 | 0.000362 | 0.000300 | 0.000050 | 9318901 |
| Dissolved Nickel (Ni) | mg/L | 0.00718 | 0.0175 | 0.00304 | 0.000020 | 9318901 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | <0.000040 | <0.000040 | 0.000040 | 9318901 |
| Dissolved Silicon (Si) | mg/L | 0.721 | 0.679 | 2.31 | 0.050 | 9318901 |
| Dissolved Silver (Ag) | mg/L | 0.0000070 | <0.0000050 | <0.0000050 | 0.0000050 | 9318901 |
| Dissolved Strontium (Sr) | mg/L | 0.175 | 0.640 | 1.09 | 0.000050 | 9318901 |
| Dissolved Thallium (Tl) | mg/L | 0.0000056 | <0.0000020 | <0.0000020 | 0.0000020 | 9318901 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9318901 |
| Dissolved Titanium (Ti) | mg/L | 0.00115 | <0.00050 | 0.00119 | 0.00050 | 9318901 |
| Dissolved Uranium (U) | mg/L | 0.0000092 | 0.0000025 | 0.0000055 | 0.0000020 | 9318901 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00034 | 0.00020 | 9318901 |
| Dissolved Zinc (Zn) | mg/L | 0.00715 | 0.0121 | 0.0123 | 0.00010 | 9318901 |
| Dissolved Zirconium (Zr) | mg/L | 0.00013 | <0.00010 | 0.00012 | 0.00010 | 9318901 |
| Dissolved Calcium (Ca) | mg/L | 27.4 | 98.6 | 153 | 0.050 | 9318765 |

RDL = Reportable Detection Limit



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Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF1563 | VF1564 | VF1565 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| **COC Number** | | B934454-M058-01-01 | B934454-M058-01-01 | B934454-M058-01-01 | | |
| | **UNITS** | **G-2018-C3 (20-40)** | **G-2018-C3 (60-80)** | **G-2018-C3 (100-120)** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 1.08 | 4.48 | 11.7 | 0.050 | 9318765 |
| Dissolved Potassium (K) | mg/L | 2.26 | 3.68 | 5.74 | 0.050 | 9318765 |
| Dissolved Sodium (Na) | mg/L | 2.09 | 1.75 | 5.35 | 0.050 | 9318765 |
| Dissolved Sulphur (S) | mg/L | 19.3 | 95.3 | 152 | 0.60 | 9318901 |
| RDL = Reportable Detection Limit | | | | | | |



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Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1566 | VF1567 | | VF1568 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | | 2019/02/07 12:00 | | |
| COC Number | | B934454-M058-01-01 | B934454-M058-01-01 | | B934454-M058-01-01 | | |
| | UNITS | G-2018-C5 (2.5-10) | G-2018-C5 (15-20) | RDL | G-2018-C11 (0-7.5) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 142 | 164 | 0.50 | 9.33 | 0.50 | 9318669 |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0285 | 0.0377 | 0.0050 | 0.164 | 0.00050 | 9318901 |
| Dissolved Antimony (Sb) | mg/L | 0.00071 | 0.00146 | 0.00020 | 0.000757 | 0.000020 | 9318901 |
| Dissolved Arsenic (As) | mg/L | 1.89 | 0.336 | 0.00020 | 0.0899 | 0.000020 | 9318901 |
| Dissolved Barium (Ba) | mg/L | 0.103 | 0.0714 | 0.00020 | 0.00607 | 0.000020 | 9318901 |
| Dissolved Beryllium (Be) | mg/L | <0.00010 | <0.00010 | 0.00010 | 0.000014 | 0.000010 | 9318901 |
| Dissolved Bismuth (Bi) | mg/L | <0.000050 | <0.000050 | 0.000050 | 0.0000132 | 0.0000050 | 9318901 |
| Dissolved Boron (B) | mg/L | <0.10 | <0.10 | 0.10 | <0.010 | 0.010 | 9318901 |
| Dissolved Cadmium (Cd) | mg/L | <0.000050 | 0.000091 | 0.000050 | 0.0000431 | 0.0000050 | 9318901 |
| Dissolved Chromium (Cr) | mg/L | 0.0025 | <0.0010 | 0.0010 | 0.00378 | 0.00010 | 9318901 |
| Dissolved Cobalt (Co) | mg/L | 0.0519 | 0.143 | 0.000050 | 0.00234 | 0.0000050 | 9318901 |
| Dissolved Copper (Cu) | mg/L | 0.00674 | 0.00289 | 0.00050 | 0.0242 | 0.000050 | 9318901 |
| Dissolved Iron (Fe) | mg/L | 18.6 | 8.62 | 0.010 | 0.148 | 0.0010 | 9318901 |
| Dissolved Lead (Pb) | mg/L | 0.000274 | 0.00227 | 0.000050 | 0.00122 | 0.0000050 | 9318901 |
| Dissolved Lithium (Li) | mg/L | <0.0050 | <0.0050 | 0.0050 | 0.00051 | 0.00050 | 9318901 |
| Dissolved Manganese (Mn) | mg/L | 15.0 | 19.3 | 0.00050 | 0.429 | 0.000050 | 9318901 |
| Dissolved Molybdenum (Mo) | mg/L | <0.00050 | <0.00050 | 0.00050 | 0.000142 | 0.000050 | 9318901 |
| Dissolved Nickel (Ni) | mg/L | 0.0510 | 0.172 | 0.00020 | 0.00460 | 0.000020 | 9318901 |
| Dissolved Selenium (Se) | mg/L | <0.00040 | <0.00040 | 0.00040 | 0.000061 | 0.000040 | 9318901 |
| Dissolved Silicon (Si) | mg/L | 4.04 | 4.04 | 0.50 | 3.05 | 0.050 | 9318901 |
| Dissolved Silver (Ag) | mg/L | <0.000050 | <0.000050 | 0.000050 | 0.0000051 | 0.0000050 | 9318901 |
| Dissolved Strontium (Sr) | mg/L | 0.326 | 0.368 | 0.00050 | 0.0187 | 0.000050 | 9318901 |
| Dissolved Thallium (Tl) | mg/L | <0.000020 | <0.000020 | 0.000020 | 0.0000026 | 0.0000020 | 9318901 |
| Dissolved Tin (Sn) | mg/L | <0.0020 | <0.0020 | 0.0020 | <0.00020 | 0.00020 | 9318901 |
| Dissolved Titanium (Ti) | mg/L | <0.0050 | <0.0050 | 0.0050 | 0.00361 | 0.00050 | 9318901 |
| Dissolved Uranium (U) | mg/L | <0.000020 | <0.000020 | 0.000020 | 0.0000111 | 0.0000020 | 9318901 |
| Dissolved Vanadium (V) | mg/L | <0.0020 | <0.0020 | 0.0020 | 0.00179 | 0.00020 | 9318901 |
| Dissolved Zinc (Zn) | mg/L | 0.0517 | 0.187 | 0.0010 | 0.0335 | 0.00010 | 9318901 |
| Dissolved Zirconium (Zr) | mg/L | <0.0010 | <0.0010 | 0.0010 | 0.00024 | 0.00010 | 9318901 |
| Dissolved Calcium (Ca) | mg/L | 49.1 | 57.4 | 0.50 | 2.48 | 0.050 | 9318765 |

RDL = Reportable Detection Limit



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Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1566 | VF1567 | | VF1568 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | | 2019/02/07 12:00 | | |
| COC Number | | B934454-M058-01-01 | B934454-M058-01-01 | | B934454-M058-01-01 | | |
| | UNITS | G-2018-C5 (2.5-10) | G-2018-C5 (15-20) | RDL | G-2018-C11 (0-7.5) | RDL | QC Batch |
| Dissolved Magnesium (Mg) | mg/L | 4.79 | 5.11 | 0.50 | 0.759 | 0.050 | 9318765 |
| Dissolved Potassium (K) | mg/L | 1.48 | 2.50 | 0.50 | 1.17 | 0.050 | 9318765 |
| Dissolved Sodium (Na) | mg/L | 6.73 | 5.42 | 0.50 | 9.97 | 0.050 | 9318765 |
| Dissolved Sulphur (S) | mg/L | 65.6 | 72.3 | 6.0 | 6.12 | 0.60 | 9318901 |
| RDL = Reportable Detection Limit | | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1569 | VF1570 | VF1571 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| COC Number | | B934454-M058-01-01 | B934454-M058-02-01 | B934454-M058-02-01 | | |
| | UNITS | G-2018-C11 (15-20) | G-2018-C12 (2.5-10) | G-2018-C12 (10-20) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 9.77 | 22.8 | 13.4 | 0.50 | 9318669 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.117 | 0.0814 | 0.196 | 0.00050 | 9318901 |
| Dissolved Antimony (Sb) | mg/L | 0.00124 | 0.00121 | 0.00135 | 0.000020 | 9318901 |
| Dissolved Arsenic (As) | mg/L | 0.0504 | 0.0439 | 0.0440 | 0.000020 | 9318901 |
| Dissolved Barium (Ba) | mg/L | 0.00837 | 0.0105 | 0.00677 | 0.000020 | 9318901 |
| Dissolved Beryllium (Be) | mg/L | 0.000015 | 0.000016 | <0.000010 | 0.000010 | 9318901 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000090 | 0.0000060 | <0.0000050 | 0.0000050 | 9318901 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 0.013 | 0.010 | 9318901 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000423 | 0.0000256 | 0.0000161 | 0.0000050 | 9318901 |
| Dissolved Chromium (Cr) | mg/L | 0.00252 | 0.00230 | 0.00020 | 0.00010 | 9318901 |
| Dissolved Cobalt (Co) | mg/L | 0.00181 | 0.000785 | 0.000360 | 0.0000050 | 9318901 |
| Dissolved Copper (Cu) | mg/L | 0.0119 | 0.0108 | 0.00161 | 0.000050 | 9318901 |
| Dissolved Iron (Fe) | mg/L | 0.0885 | 0.0687 | 0.145 | 0.0010 | 9318901 |
| Dissolved Lead (Pb) | mg/L | 0.00100 | 0.000513 | 0.000313 | 0.0000050 | 9318901 |
| Dissolved Lithium (Li) | mg/L | 0.00057 | 0.00053 | <0.00050 | 0.00050 | 9318901 |
| Dissolved Manganese (Mn) | mg/L | 0.785 | 0.382 | 0.351 | 0.000050 | 9318901 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000110 | 0.000110 | 0.000265 | 0.000050 | 9318901 |
| Dissolved Nickel (Ni) | mg/L | 0.00447 | 0.00324 | 0.000683 | 0.000020 | 9318901 |
| Dissolved Selenium (Se) | mg/L | 0.000045 | <0.000040 | 0.000103 | 0.000040 | 9318901 |
| Dissolved Silicon (Si) | mg/L | 4.36 | 3.99 | 4.66 | 0.050 | 9318901 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | 0.0000078 | 0.0000050 | 9318901 |
| Dissolved Strontium (Sr) | mg/L | 0.0210 | 0.0517 | 0.0248 | 0.000050 | 9318901 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | <0.0000020 | 0.0000079 | 0.0000020 | 9318901 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9318901 |
| Dissolved Titanium (Ti) | mg/L | 0.00278 | 0.00224 | 0.00909 | 0.00050 | 9318901 |
| Dissolved Uranium (U) | mg/L | 0.0000106 | 0.0000084 | 0.0000203 | 0.0000020 | 9318901 |
| Dissolved Vanadium (V) | mg/L | 0.00069 | 0.00028 | 0.00087 | 0.00020 | 9318901 |
| Dissolved Zinc (Zn) | mg/L | 0.0210 | 0.0193 | 0.00537 | 0.00010 | 9318901 |
| Dissolved Zirconium (Zr) | mg/L | 0.00012 | 0.00013 | 0.00011 | 0.00010 | 9318901 |
| Dissolved Calcium (Ca) | mg/L | 2.75 | 6.44 | 4.02 | 0.050 | 9318765 |

RDL = Reportable Detection Limit



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Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF1569 | VF1570 | VF1571 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| **COC Number** | | B934454-M058-01-01 | B934454-M058-02-01 | B934454-M058-02-01 | | |
| | **UNITS** | **G-2018-C11 (15-20)** | **G-2018-C12 (2.5-10)** | **G-2018-C12 (10-20)** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 0.705 | 1.63 | 0.821 | 0.050 | 9318765 |
| Dissolved Potassium (K) | mg/L | 0.854 | 0.271 | 0.319 | 0.050 | 9318765 |
| Dissolved Sodium (Na) | mg/L | 7.06 | 6.74 | 3.35 | 0.050 | 9318765 |
| Dissolved Sulphur (S) | mg/L | 6.67 | 9.85 | 6.21 | 0.60 | 9318901 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB934454
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Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1572 | VF1573 | VF1574 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| COC Number | | B934454-M058-02-01 | B934454-M058-02-01 | B934454-M058-02-01 | | |
| | UNITS | G-2018-C12 (20-40) | G-2018-C13 (2.5-10) | G-2018-C13 (10-20) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 7.31 | 19.6 | 9.60 | 0.50 | 9318669 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.120 | 0.219 | 0.0878 | 0.00050 | 9318901 |
| Dissolved Antimony (Sb) | mg/L | 0.00133 | 0.00149 | 0.000169 | 0.000020 | 9318901 |
| Dissolved Arsenic (As) | mg/L | 0.0492 | 0.123 | 0.0184 | 0.000020 | 9318901 |
| Dissolved Barium (Ba) | mg/L | 0.00306 | 0.0177 | 0.00480 | 0.000020 | 9318901 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000027 | <0.000010 | 0.000010 | 9318901 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000289 | <0.0000050 | 0.0000050 | 9318901 |
| Dissolved Boron (B) | mg/L | 0.011 | <0.010 | <0.010 | 0.010 | 9318901 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000092 | 0.0000674 | 0.0000108 | 0.0000050 | 9318901 |
| Dissolved Chromium (Cr) | mg/L | 0.00352 | 0.00389 | 0.00272 | 0.00010 | 9318901 |
| Dissolved Cobalt (Co) | mg/L | 0.000149 | 0.00413 | 0.000630 | 0.0000050 | 9318901 |
| Dissolved Copper (Cu) | mg/L | 0.0163 | 0.0162 | 0.00874 | 0.000050 | 9318901 |
| Dissolved Iron (Fe) | mg/L | 0.0893 | 0.164 | 0.0770 | 0.0010 | 9318901 |
| Dissolved Lead (Pb) | mg/L | 0.000562 | 0.00161 | 0.000568 | 0.0000050 | 9318901 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | <0.00050 | <0.00050 | 0.00050 | 9318901 |
| Dissolved Manganese (Mn) | mg/L | 0.113 | 1.22 | 0.716 | 0.000050 | 9318901 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000507 | 0.000169 | 0.000171 | 0.000050 | 9318901 |
| Dissolved Nickel (Ni) | mg/L | 0.00332 | 0.00625 | 0.00374 | 0.000020 | 9318901 |
| Dissolved Selenium (Se) | mg/L | 0.000163 | 0.000042 | 0.000058 | 0.000040 | 9318901 |
| Dissolved Silicon (Si) | mg/L | 5.07 | 4.68 | 5.84 | 0.050 | 9318901 |
| Dissolved Silver (Ag) | mg/L | 0.0000063 | 0.0000113 | 0.0000060 | 0.0000050 | 9318901 |
| Dissolved Strontium (Sr) | mg/L | 0.0146 | 0.0462 | 0.0227 | 0.000050 | 9318901 |
| Dissolved Thallium (Tl) | mg/L | 0.0000040 | 0.0000064 | <0.0000020 | 0.0000020 | 9318901 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9318901 |
| Dissolved Titanium (Ti) | mg/L | 0.00602 | 0.00573 | 0.00264 | 0.00050 | 9318901 |
| Dissolved Uranium (U) | mg/L | 0.0000136 | 0.0000239 | 0.0000077 | 0.0000020 | 9318901 |
| Dissolved Vanadium (V) | mg/L | 0.00171 | 0.00077 | 0.00079 | 0.00020 | 9318901 |
| Dissolved Zinc (Zn) | mg/L | 0.0193 | 0.0240 | 0.0182 | 0.00010 | 9318901 |
| Dissolved Zirconium (Zr) | mg/L | 0.00011 | 0.00035 | <0.00010 | 0.00010 | 9318901 |
| Dissolved Calcium (Ca) | mg/L | 2.05 | 5.89 | 2.91 | 0.050 | 9318765 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF1572 | VF1573 | VF1574 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/07 12:00 | 2019/02/07 12:00 | 2019/02/07 12:00 | | |
| **COC Number** | | B934454-M058-02-01 | B934454-M058-02-01 | B934454-M058-02-01 | | |
| | **UNITS** | **G-2018-C12 (20-40)** | **G-2018-C13 (2.5-10)** | **G-2018-C13 (10-20)** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 0.534 | 1.18 | 0.567 | 0.050 | 9318765 |
| Dissolved Potassium (K) | mg/L | 0.258 | 1.23 | 0.280 | 0.050 | 9318765 |
| Dissolved Sodium (Na) | mg/L | 7.21 | 9.21 | 5.59 | 0.050 | 9318765 |
| Dissolved Sulphur (S) | mg/L | 7.03 | 10.8 | 5.19 | 0.60 | 9318901 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF1575 | | |
|---|---|---|---|---|
| Sampling Date | | 2019/02/07 12:00 | | |
| COC Number | | B934454-M058-02-01 | | |
| | UNITS | G-2018-C13 (20-40) | RDL | QC Batch |
| **Calculated Parameters** | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 8.60 | 0.50 | 9318669 |
| **Dissolved Metals by ICPMS** | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0832 | 0.00050 | 9318901 |
| Dissolved Antimony (Sb) | mg/L | 0.000118 | 0.000020 | 9318901 |
| Dissolved Arsenic (As) | mg/L | 0.0155 | 0.000020 | 9318901 |
| Dissolved Barium (Ba) | mg/L | 0.00382 | 0.000020 | 9318901 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000010 | 9318901 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000116 | 0.0000050 | 9318901 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 9318901 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000092 | 0.0000050 | 9318901 |
| Dissolved Chromium (Cr) | mg/L | 0.00269 | 0.00010 | 9318901 |
| Dissolved Cobalt (Co) | mg/L | 0.000326 | 0.0000050 | 9318901 |
| Dissolved Copper (Cu) | mg/L | 0.0132 | 0.000050 | 9318901 |
| Dissolved Iron (Fe) | mg/L | 0.0651 | 0.0010 | 9318901 |
| Dissolved Lead (Pb) | mg/L | 0.000403 | 0.0000050 | 9318901 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00050 | 9318901 |
| Dissolved Manganese (Mn) | mg/L | 0.450 | 0.000050 | 9318901 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000197 | 0.000050 | 9318901 |
| Dissolved Nickel (Ni) | mg/L | 0.00309 | 0.000020 | 9318901 |
| Dissolved Selenium (Se) | mg/L | 0.000061 | 0.000040 | 9318901 |
| Dissolved Silicon (Si) | mg/L | 6.15 | 0.050 | 9318901 |
| Dissolved Silver (Ag) | mg/L | 0.0000063 | 0.0000050 | 9318901 |
| Dissolved Strontium (Sr) | mg/L | 0.0197 | 0.000050 | 9318901 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | 0.0000020 | 9318901 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9318901 |
| Dissolved Titanium (Ti) | mg/L | 0.00309 | 0.00050 | 9318901 |
| Dissolved Uranium (U) | mg/L | 0.0000089 | 0.0000020 | 9318901 |
| Dissolved Vanadium (V) | mg/L | 0.00099 | 0.00020 | 9318901 |
| Dissolved Zinc (Zn) | mg/L | 0.0165 | 0.00010 | 9318901 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | 9318901 |
| Dissolved Calcium (Ca) | mg/L | 2.56 | 0.050 | 9318765 |
| RDL = Reportable Detection Limit | | | | |



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MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF1575 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2019/02/07 12:00 | | |
| **COC Number** | | B934454-M058-02-01 | | |
| | **UNITS** | **G-2018-C13 (20-40)** | **RDL** | **QC Batch** |
| Dissolved Magnesium (Mg) | mg/L | 0.536 | 0.050 | 9318765 |
| Dissolved Potassium (K) | mg/L | 0.259 | 0.050 | 9318765 |
| Dissolved Sodium (Na) | mg/L | 6.46 | 0.050 | 9318765 |
| Dissolved Sulphur (S) | mg/L | 5.82 | 0.60 | 9318901 |
| RDL = Reportable Detection Limit | | | | |



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MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF1560
**Sample ID:** G-2018-C2 (0-5)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1561
**Sample ID:** G-2018-C2 (20-40)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1562
**Sample ID:** G-2018-C2 (60-80)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1563
**Sample ID:** G-2018-C3 (20-40)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1564
**Sample ID:** G-2018-C3 (60-80)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF1565
**Sample ID:** G-2018-C3 (100-120)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1566
**Sample ID:** G-2018-C5 (2.5-10)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1567
**Sample ID:** G-2018-C5 (15-20)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1568
**Sample ID:** G-2018-C11 (0-7.5)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1569
**Sample ID:** G-2018-C11 (15-20)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |



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Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF1570
**Sample ID:** G-2018-C12 (2.5-10)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1571
**Sample ID:** G-2018-C12 (10-20)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1572
**Sample ID:** G-2018-C12 (20-40)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1573
**Sample ID:** G-2018-C13 (2.5-10)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |

**Maxxam ID:** VF1574
**Sample ID:** G-2018-C13 (10-20)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |



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Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF1575
**Sample ID:** G-2018-C13 (20-40)
**Matrix:** Water

**Collected:** 2019/02/07
**Shipped:**
**Received:** 2019/02/09

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9318669 | N/A | 2019/02/13 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9318765 | N/A | 2019/02/13 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9318901 | N/A | 2019/02/12 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/09 | Aldean Alicando |



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Maxxam Job #: B909974
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 3.3°C |

**LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments**

Sample VF1560 [G-2018-C2 (0-5)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF1562 [G-2018-C2 (60-80)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF1566 [G-2018-C5 (2.5-10)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF1567 [G-2018-C5 (15-20)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.

**Results relate only to the items tested.**



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Maxxam Job #: B909974
Report Date: 2019/02/14

## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9318901 | Dissolved Aluminum (Al) | 2019/02/12 | 99 | 80 - 120 | 101 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9318901 | Dissolved Antimony (Sb) | 2019/02/12 | 96 | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9318901 | Dissolved Arsenic (As) | 2019/02/12 | 97 | 80 - 120 | 100 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9318901 | Dissolved Barium (Ba) | 2019/02/12 | 96 | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | 3.3 | 20 |
| 9318901 | Dissolved Beryllium (Be) | 2019/02/12 | 96 | 80 - 120 | 97 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9318901 | Dissolved Bismuth (Bi) | 2019/02/12 | 95 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9318901 | Dissolved Boron (B) | 2019/02/12 | 102 | 80 - 120 | 100 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 9318901 | Dissolved Cadmium (Cd) | 2019/02/12 | 95 | 80 - 120 | 99 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9318901 | Dissolved Chromium (Cr) | 2019/02/12 | 95 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9318901 | Dissolved Cobalt (Co) | 2019/02/12 | 95 | 80 - 120 | 100 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9318901 | Dissolved Copper (Cu) | 2019/02/12 | 94 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9318901 | Dissolved Iron (Fe) | 2019/02/12 | 100 | 80 - 120 | 103 | 80 - 120 | <0.0010 | mg/L | NC | 20 |
| 9318901 | Dissolved Lead (Pb) | 2019/02/12 | 95 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | 0 | 20 |
| 9318901 | Dissolved Lithium (Li) | 2019/02/12 | 96 | 80 - 120 | 97 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9318901 | Dissolved Manganese (Mn) | 2019/02/12 | 96 | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9318901 | Dissolved Molybdenum (Mo) | 2019/02/12 | 97 | 80 - 120 | 100 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9318901 | Dissolved Nickel (Ni) | 2019/02/12 | 95 | 80 - 120 | 100 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9318901 | Dissolved Selenium (Se) | 2019/02/12 | 96 | 80 - 120 | 97 | 80 - 120 | <0.000040 | mg/L | NC | 20 |
| 9318901 | Dissolved Silicon (Si) | 2019/02/12 | 94 | 80 - 120 | 97 | 80 - 120 | <0.050 | mg/L | NC | 20 |
| 9318901 | Dissolved Silver (Ag) | 2019/02/12 | 95 | 80 - 120 | 99 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9318901 | Dissolved Strontium (Sr) | 2019/02/12 | 97 | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | 1.5 | 20 |
| 9318901 | Dissolved Sulphur (S) | 2019/02/12 | 98 | 80 - 120 | 101 | 80 - 120 | <0.60 | mg/L | | |
| 9318901 | Dissolved Thallium (Tl) | 2019/02/12 | 96 | 80 - 120 | 103 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9318901 | Dissolved Tin (Sn) | 2019/02/12 | 95 | 80 - 120 | 100 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9318901 | Dissolved Titanium (Ti) | 2019/02/12 | 97 | 80 - 120 | 103 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9318901 | Dissolved Uranium (U) | 2019/02/12 | 94 | 80 - 120 | 100 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9318901 | Dissolved Vanadium (V) | 2019/02/12 | 96 | 80 - 120 | 101 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9318901 | Dissolved Zinc (Zn) | 2019/02/12 | 99 | 80 - 120 | 103 | 80 - 120 | <0.00010 | mg/L | 4.1 | 20 |



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Maxxam Job #: B909974
Report Date: 2019/02/14

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9318901 | Dissolved Zirconium (Zr) | 2019/02/12 | 96 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | NC | 20 |

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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Maxxam Job #: B909974
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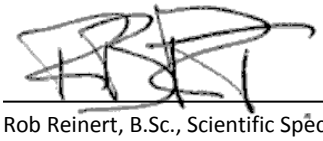
MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Rob Reinert, B.Sc., Scientific Specialist

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



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/21**
Report #: R5601788
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B936155**
**Received: 2019/02/08, 17:54**

Sample Matrix: Water
# Samples Received: 17

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Acidity (CaCO3) in water (1, 2) | 15 | N/A | 2019/02/19 | | SM 22 2310 |
| Alkalinity | 2 | N/A | 2019/02/13 | CAM SOP-00448 | SM 23 2320 B m |
| Free (WAD) Cyanide | 2 | N/A | 2019/02/14 | CAM SOP-00457 | OMOE E3015 m |
| Total Cyanide | 2 | 2019/02/14 | 2019/02/14 | CAM SOP-00457 | OMOE E3015 5 m |
| Dissolved Mercury (low level) | 17 | 2019/02/14 | 2019/02/14 | CAM SOP-00453 | EPA 7470 m |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Bedford
(2) Non-accredited test method

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/21**
Report #: R5601788
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B936155**
**Received: 2019/02/08, 17:54**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700
==========

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

Maxxam Job #: B936155
Report Date: 2019/02/21

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IYL293 | IYL294 | IYL295 | IYL296 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | n/a | n/a | n/a | n/a | | |
| | **UNITS** | **G-2018-C6 (28NOV) (10-20)** | **G-2018-C6 (28NOV) (20-30)** | **G-2018-C7 (2.5-10)** | **G-2018-C7 (15-20)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Acidity | mg/L | 38 | 39 | 8.6 | <5.0 | 5.0 | 5979768 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYL297 | | | IYL298 | | | IYL299 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | | | 2019/02/08 12:00 | | | 2019/02/08 12:00 | | |
| COC Number | | n/a | | | n/a | | | n/a | | |
| | **UNITS** | **G-2018-C7 (20-30)** | **RDL** | **QC Batch** | **G-2018-C8 (0-5)** | **RDL** | **QC Batch** | **G-2018-C8 (15-20)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | | |
| Acidity | mg/L | <5.0 | 5.0 | 5979768 | | | | <5.0 | 5.0 | 5979768 |
| Alkalinity (Total as CaCO3) | mg/L | | | | 66 | 1.0 | 5972973 | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYL300 | IYL301 | IYL302 | IYL303 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | n/a | n/a | n/a | n/a | | |
| | **UNITS** | **G-2018-C8 (40-50)** | **G-2018-C9 (20-30)** | **G-2018-C9 (30-40)** | **G-2018-C10 (2.5-10)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | |
| Acidity | mg/L | <5.0 | <5.0 | <5.0 | <5.0 | 5.0 | 5979768 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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

Maxxam Job #: B936155
Report Date: 2019/02/21

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IYL304 | | | IYL305 | | | IYL306 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | | | 2019/02/08 12:00 | | | 2019/02/08 12:00 | | |
| COC Number | | n/a | | | n/a | | | n/a | | |
| | **UNITS** | **G-2018-C10 (15-20)** | **RDL** | **QC Batch** | **G-2018-C10 (40-50)** | **RDL** | **QC Batch** | **G-2018-C14 (2.5-10)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | | |
| Acidity | mg/L | <5.0 | 5.0 | 5979768 | | | | <5.0 | 5.0 | 5979768 |
| Total Cyanide (CN) | mg/L | | | | | | | <0.0050 | 0.0050 | 5973776 |
| WAD Cyanide (Free) | mg/L | | | | | | | <0.0010 | 0.0010 | 5973782 |
| Alkalinity (Total as CaCO3) | mg/L | | | | 2.9 | 1.0 | 5972973 | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYL307 | | | IYL308 | | | IYL309 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | | | 2019/02/08 12:00 | | | 2019/02/08 12:00 | | |
| COC Number | | n/a | | | n/a | | | n/a | | |
| | **UNITS** | **G-2018-C14 (15-20)** | **RDL** | **QC Batch** | **G-2018-C14 (40-50)** | **RDL** | **QC Batch** | **G-2018-C15 (2.5-10)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | | |
| Acidity | mg/L | 7.8 | 5.0 | 5979768 | 46 | 5.0 | 5979768 | 18 | 5.0 | 5979768 |
| Total Cyanide (CN) | mg/L | | | | <0.0050 | 0.0050 | 5973776 | | | |
| WAD Cyanide (Free) | mg/L | | | | <0.0010 | 0.0010 | 5973782 | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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

Maxxam Job #: B936155
Report Date: 2019/02/21

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IYL293 | IYL293 | IYL294 | IYL295 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | n/a | n/a | n/a | n/a | | |
| | **UNITS** | **G-2018-C6 (28NOV) (10-20)** | **G-2018-C6 (28NOV) (10-20) Lab-Dup** | **G-2018-C6 (28NOV) (20-30)** | **G-2018-C7 (2.5-10)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.12 | 0.12 | 0.16 | 0.02 | 0.01 | 5974918 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

| Maxxam ID | | IYL296 | IYL297 | IYL298 | | IYL299 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | 2019/02/08 12:00 | | |
| COC Number | | n/a | n/a | n/a | | n/a | | |
| | **UNITS** | **G-2018-C7 (15-20)** | **G-2018-C7 (20-30)** | **G-2018-C8 (0-5)** | **RDL** | **G-2018-C8 (15-20)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.02 | 0.01 | 0.02 | 0.01 | 1.32 | 0.05 | 5974918 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYL300 | IYL301 | | IYL302 | IYL303 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | n/a | n/a | | n/a | n/a | | |
| | **UNITS** | **G-2018-C8 (40-50)** | **G-2018-C9 (20-30)** | **RDL** | **G-2018-C9 (30-40)** | **G-2018-C10 (2.5-10)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.69 | 0.59 | 0.02 | 0.24 | 0.29 | 0.01 | 5974918 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B936155
Report Date: 2019/02/21

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IYL304 | IYL305 | IYL306 | IYL307 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | n/a | n/a | n/a | n/a | | |
| | **UNITS** | **G-2018-C10 (15-20)** | **G-2018-C10 (40-50)** | **G-2018-C14 (2.5-10)** | **G-2018-C14 (15-20)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.01 | <0.01 | 0.02 | 0.05 | 0.01 | 5974918 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYL308 | IYL309 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | n/a | n/a | | |
| | **UNITS** | **G-2018-C14 (40-50)** | **G-2018-C15 (2.5-10)** | **RDL** | **QC Batch** |
| **Metals** | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.07 | <0.01 | 0.01 | 5974918 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B936155
Report Date: 2019/02/21

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 16.3°C |

**Results relate only to the items tested.**



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Maxxam Job #: B936155
Report Date: 2019/02/21

## QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5972973 | Alkalinity (Total as CaCO3) | 2019/02/13 | | | 95 | 85 - 115 | <1.0 | mg/L | 0.52 | 20 |
| 5973776 | Total Cyanide (CN) | 2019/02/14 | 93 | 80 - 120 | 98 | 80 - 120 | <0.0050 | mg/L | NC | 20 |
| 5973782 | WAD Cyanide (Free) | 2019/02/14 | 97 | 80 - 120 | 98 | 80 - 120 | <0.0010 | mg/L | NC | 20 |
| 5974918 | Dissolved Mercury (Hg) | 2019/02/14 | 81 | 75 - 125 | 97 | 80 - 120 | <0.01 | ug/L | 2.0 | 20 |
| 5979768 | Acidity | 2019/02/19 | 102 | 80 - 120 | 104 | 80 - 120 | <5.0 | mg/L | NC | 25 |

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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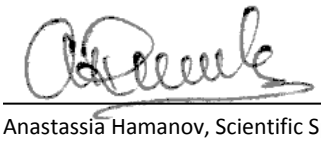
Maxxam Job #: B936155
Report Date: 2019/02/21

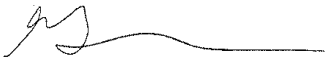
EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist



Gina Thompson, Inorganics General Chemistry Supervisor

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



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IMMEDIATE

Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | | Report Information (if differs from invoice) | | Project Information (where applicable) | |
|---|---|---|---|---|---|
| Company Name: | EcoMetrix Inc | Company Name: | | Quotation #: | |
| Contact Name: | Daniel Skruch | Contact Name: | | P.O. #/ AFE#: | |
| Address: | 6800 Campobello Road | Address: | | Project #: | 18-2525 |
| Phone: | 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: | Fax: | Site Location: | NS Lands |
| Email: | dskruch@ecometrix.ca | Email: | | Site #: | |
| | | | | Sampled By: | ALC+FL+CL |

**Turnaround Time (TAT) Required**

[X] **Regular TAT (5-7 days)** Most analyses

**PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS**

Rush TAT (Surcharges will be applied)
[ ] 1 Day [ ] 2 Days [ ] 3-4 Days

Date Required:

Rush Confirmation #:

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

**Regulation 153**
[ ] Table 1 [ ] Res/Park [ ] Med/ Fine
[ ] Table 2 [ ] Ind/Comm [ ] Coarse
[ ] Table 3 [ ] Agri/ Other
[ ] Table ____
FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**
[ ] CCME [ ] Sanitary Sewer Bylaw
[ ] MISA [ ] Storm Sewer Bylaw
[ ] PWQO Region ____
[ ] Other (Specify) ____
[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

**SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM**

**Analysis Requested**

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED, to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G-2018-C6 (28NOV) (10-20) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | G-2018-C6 (28NOV) (20-30) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | G-2018-C7 (2.5-10) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 4 | G-2018-C7 (15-20) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 5 | G-2018-C7 (20-30) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 6 | G-2018-C8 (0-5) | 08/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 7 | G-2018-C8 (15-20) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 8 | G-2018-C8 (40-50) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 9 | G-2018-C9 (20-30) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 10 | G-2018-C9 (30-40) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) |
|---|---|---|---|---|---|
| Amanda Ciosek | 08/02/2019 | 17:53 | Cynthia Ozi Cynthia Ozi | 19102108 | 17:54 |
| | | | | | |

**LABORATORY USE ONLY**

| CUSTODY SEAL Y (N) Present | Intact | COOLER TEMPERATURES |
|---|---|---|
| | | 17/16/16 |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / (N)

COMMENTS

***NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); ****Mercury 0.00001 mg/L**

***PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

08-Feb-19 17:54
Kyle Reinhart
B936155

URE ENV-729

Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | Report Information (if differs from invoice) | Project Information (where applicable) | Turnaround Time (TAT) Required |
|---|---|---|---|
| Company Name: EcoMetrix Inc | Company Name: | Quotation #: | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: Daniel Skruch | Contact Name: | P.O. #/ AFE#: | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: 6800 Campobello Road | Address: | Project #: 18-2525 | Rush TAT (Surcharges will be applied) |
| Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: Fax: | Site Location: NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Email: dskruch@ecometrix.ca | Email: | Site #: | Date Required: |
| | | Sampled By: ALC+FL+CL | Rush Confirmation #: |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

| Regulation 153 | Other Regulations |
|---|---|
| [ ] Table 1 [ ] Res/Park [ ] Med/ Fine | [ ] CCME [ ] Sanitary Sewer Bylaw |
| [ ] Table 2 [ ] Ind/Comm [ ] Coarse | [ ] MISA [ ] Storm Sewer Bylaw |
| [ ] Table 3 [ ] Agri/ Other | [ ] PWQO Region |
| [ ] Table ____ | [ ] Other (Specify) |
| FOR RSC (PLEASE CIRCLE) Y / N | [ ] REG 558 (MIN. 3 DAY TAT REQUIRED) |

Include Criteria on Certificate of Analysis: Y / N

**SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM**

Analysis Requested

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED, to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G-2018-C10 (2.5-10) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | G-2018-C10 (15-20) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | G-2018-C10 (40-50) | 08/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 4 | **G-2018-C14 (2.5-10)** | 08/02/2019 | 12:00 | Water | 4 | X | X | | X | X | X | |
| 5 | G-2018-C14 (15-20) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 6 | **G-2018-C14 (40-50)** | 08/02/2019 | 12:00 | Water | 4 | X | X | | X | X | X | |
| 7 | G-2018-C15 (2.5-10) | 08/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |

LABORATORY USE ONLY

| CUSTODY SEAL Y / N | | COOLER TEMPERATURES |
|---|---|---|
| Present | Intact | |
| | | 17/16/16 |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / N

COMMENTS

***NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); ****Mercury 0.00001 mg/L**

***PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) | MAXXAM JOB # |
|---|---|---|---|---|---|---|
| Amanda Closek | 08/02/2019 | 17:53 | Cynthia Chy Cynthia Mera | 19102108 | 17:54 | |
| | | | | | | |

Success Through Science®

Your Project #: MB936155
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B936155-M058-01-01, b936155-m058-02-01

**Report Date: 2019/02/19**
Report #: R2687169
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B911268**
**Received: 2019/02/14, 08:50**

Sample Matrix: Water
# Samples Received: 17

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | 17 | N/A | 2019/02/19 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 17 | N/A | 2019/02/19 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 17 | N/A | 2019/02/17 | BBY7SOP-00002 | EPA 6020b R2 m |
| Filter and HNO3 Preserve for Metals | 17 | N/A | 2019/02/15 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: MB936155
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B936155-M058-01-01, b936155-m058-02-01

**Report Date: 2019/02/19**
Report #: R2687169
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B911268**
**Received: 2019/02/14, 08:50**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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

Maxxam Job #: B911268
Report Date: 2019/02/19

MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | VF7394 | VF7395 | VF7396 | VF7397 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | |
| COC Number | | B936155-M058-01-01 | B936155-M058-01-01 | B936155-M058-01-01 | B936155-M058-01-01 | |
| | UNITS | G-2018-C6 (28NOV) (10-20) | G-2018-C6 (28NOV) (20-30) | G-2018-C7 (2.5-10) | G-2018-C7 (15-20) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF7398 | VF7399 | VF7400 | VF7401 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | |
| COC Number | | B936155-M058-01-01 | B936155-M058-01-01 | B936155-M058-01-01 | B936155-M058-01-01 | |
| | UNITS | G-2018-C7 (20-30) | G-2018-C8 (0-5) | G-2018-C8 (15-20) | G-2018-C8 (40-50) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF7402 | VF7403 | VF7406 | VF7407 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | |
| COC Number | | B936155-M058-01-01 | B936155-M058-01-01 | b936155-m058-02-01 | b936155-m058-02-01 | |
| | UNITS | G-2018-C9 (20-30) | G-2018-C9 (30-40) | G-2018-C10 (2.5-10) | G-2018-C10 (15-20) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF7408 | VF7409 | VF7410 | VF7411 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | |
| COC Number | | b936155-m058-02-01 | b936155-m058-02-01 | b936155-m058-02-01 | b936155-m058-02-01 | |
| | UNITS | G-2018-C10 (40-50) | G-2018-C14(2.5-10) | G-2018-C14 (15-20) | G-2018-C14 (40-50) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| **Maxxam ID** | | VF7412 | |
|---|---|---|---|
| **Sampling Date** | | 2019/02/08 12:00 | |
| **COC Number** | | b936155-m058-02-01 | |
| | **UNITS** | **G-2018-C15 (2.5-10)** | **QC Batch** |
| **Calculated Parameters** | | | |
| Filter and HNO3 Preservation | N/A | FIELD | ONSITE |



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7394 | | | VF7394 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | | | 2019/02/08 12:00 | | |
| COC Number | | B936155-M058-01-01 | | | B936155-M058-01-01 | | |
| | UNITS | G-2018-C6 (28NOV) (10-20) | RDL | QC Batch | G-2018-C6 (28NOV) (10-20) Lab-Dup | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 72.8 | 0.50 | 9323406 | | | |
| **Dissolved Metals by ICPMS** | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0280 | 0.00050 | 9324444 | 0.0282 | 0.00050 | 9324444 |
| Dissolved Antimony (Sb) | mg/L | 0.00667 | 0.000020 | 9324444 | 0.00677 | 0.000020 | 9324444 |
| Dissolved Arsenic (As) | mg/L | 0.623 | 0.000020 | 9324444 | 0.626 | 0.000020 | 9324444 |
| Dissolved Barium (Ba) | mg/L | 0.0639 | 0.000020 | 9324444 | 0.0644 | 0.000020 | 9324444 |
| Dissolved Beryllium (Be) | mg/L | 0.000027 | 0.000010 | 9324444 | 0.000027 | 0.000010 | 9324444 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000269 | 0.0000050 | 9324444 | 0.0000262 | 0.0000050 | 9324444 |
| Dissolved Boron (B) | mg/L | 0.011 | 0.010 | 9324444 | 0.011 | 0.010 | 9324444 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000706 | 0.0000050 | 9324444 | 0.0000698 | 0.0000050 | 9324444 |
| Dissolved Chromium (Cr) | mg/L | 0.00052 | 0.00010 | 9324444 | 0.00049 | 0.00010 | 9324444 |
| Dissolved Cobalt (Co) | mg/L | 0.0462 | 0.0000050 | 9324444 | 0.0462 | 0.0000050 | 9324444 |
| Dissolved Copper (Cu) | mg/L | 0.00384 | 0.000050 | 9324444 | 0.00380 | 0.000050 | 9324444 |
| Dissolved Iron (Fe) | mg/L | 15.7 | 0.0010 | 9324444 | 15.5 | 0.0010 | 9324444 |
| Dissolved Lead (Pb) | mg/L | 0.00374 | 0.0000050 | 9324444 | 0.00373 | 0.0000050 | 9324444 |
| Dissolved Lithium (Li) | mg/L | 0.00274 | 0.00050 | 9324444 | 0.00279 | 0.00050 | 9324444 |
| Dissolved Manganese (Mn) | mg/L | 9.26 | 0.000050 | 9324444 | 9.20 | 0.000050 | 9324444 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000050 | 9324444 | <0.000050 | 0.000050 | 9324444 |
| Dissolved Nickel (Ni) | mg/L | 0.0368 | 0.000020 | 9324444 | 0.0369 | 0.000020 | 9324444 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000040 | 9324444 | <0.000040 | 0.000040 | 9324444 |
| Dissolved Silicon (Si) | mg/L | 3.01 | 0.050 | 9324444 | 3.05 | 0.050 | 9324444 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | 9324444 | <0.0000050 | 0.0000050 | 9324444 |
| Dissolved Strontium (Sr) | mg/L | 0.181 | 0.000050 | 9324444 | 0.182 | 0.000050 | 9324444 |
| Dissolved Thallium (Tl) | mg/L | 0.0000199 | 0.0000020 | 9324444 | 0.0000170 | 0.0000020 | 9324444 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9324444 | <0.00020 | 0.00020 | 9324444 |
| Dissolved Titanium (Ti) | mg/L | 0.00081 | 0.00050 | 9324444 | 0.00087 | 0.00050 | 9324444 |
| Dissolved Uranium (U) | mg/L | 0.0000037 | 0.0000020 | 9324444 | 0.0000034 | 0.0000020 | 9324444 |
| Dissolved Vanadium (V) | mg/L | 0.00028 | 0.00020 | 9324444 | 0.00027 | 0.00020 | 9324444 |
| Dissolved Zinc (Zn) | mg/L | 0.0399 | 0.00010 | 9324444 | 0.0393 | 0.00010 | 9324444 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | 9324444 | <0.00010 | 0.00010 | 9324444 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7394 | | | VF7394 | | |
|---|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/08 12:00 | | | 2019/02/08 12:00 | | |
| **COC Number** | | B936155-M058-01-01 | | | B936155-M058-01-01 | | |
| | **UNITS** | **G-2018-C6 (28NOV) (10-20)** | **RDL** | **QC Batch** | **G-2018-C6 (28NOV) (10-20) Lab-Dup** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 24.1 | 0.050 | 9323408 | | | |
| Dissolved Magnesium (Mg) | mg/L | 3.05 | 0.050 | 9323408 | | | |
| Dissolved Potassium (K) | mg/L | 0.851 | 0.050 | 9323408 | | | |
| Dissolved Sodium (Na) | mg/L | 4.60 | 0.050 | 9323408 | | | |
| Dissolved Sulphur (S) | mg/L | 40.3 | 0.60 | 9324444 | 40.1 | 0.60 | 9324444 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7395 | VF7396 | VF7397 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | B936155-M058-01-01 | B936155-M058-01-01 | B936155-M058-01-01 | | |
| | UNITS | G-2018-C6 (28NOV) (20-30) | G-2018-C7 (2.5-10) | G-2018-C7 (15-20) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 161 | 10.3 | 10.5 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0329 | 0.377 | 0.384 | 0.00050 | 9324444 |
| Dissolved Antimony (Sb) | mg/L | 0.0227 | 0.000592 | 0.000470 | 0.000020 | 9324444 |
| Dissolved Arsenic (As) | mg/L | 1.42 | 0.0106 | 0.00805 | 0.000020 | 9324444 |
| Dissolved Barium (Ba) | mg/L | 0.0299 | 0.00554 | 0.00597 | 0.000020 | 9324444 |
| Dissolved Beryllium (Be) | mg/L | 0.000047 | 0.000017 | 0.000015 | 0.000010 | 9324444 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000094 | 0.0000177 | 0.0000158 | 0.0000050 | 9324444 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324444 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000575 | 0.0000316 | 0.0000350 | 0.0000050 | 9324444 |
| Dissolved Chromium (Cr) | mg/L | 0.00048 | 0.00476 | 0.00306 | 0.00010 | 9324444 |
| Dissolved Cobalt (Co) | mg/L | 0.0567 | 0.000503 | 0.000307 | 0.0000050 | 9324444 |
| Dissolved Copper (Cu) | mg/L | 0.00203 | 0.0245 | 0.0168 | 0.000050 | 9324444 |
| Dissolved Iron (Fe) | mg/L | 15.0 | 0.274 | 0.267 | 0.0010 | 9324444 |
| Dissolved Lead (Pb) | mg/L | 0.00496 | 0.00119 | 0.00152 | 0.0000050 | 9324444 |
| Dissolved Lithium (Li) | mg/L | 0.00318 | 0.00053 | 0.00057 | 0.00050 | 9324444 |
| Dissolved Manganese (Mn) | mg/L | 8.40 | 0.110 | 0.0760 | 0.000050 | 9324444 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000227 | 0.000161 | 0.000147 | 0.000050 | 9324444 |
| Dissolved Nickel (Ni) | mg/L | 0.0522 | 0.00537 | 0.00385 | 0.000020 | 9324444 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000097 | 0.000087 | 0.000040 | 9324444 |
| Dissolved Silicon (Si) | mg/L | 1.40 | 4.28 | 2.89 | 0.050 | 9324444 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000168 | 0.0000431 | 0.0000050 | 9324444 |
| Dissolved Strontium (Sr) | mg/L | 0.295 | 0.0234 | 0.0276 | 0.000050 | 9324444 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | 0.0000073 | 0.0000053 | 0.0000020 | 9324444 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324444 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.0284 | 0.0272 | 0.00050 | 9324444 |
| Dissolved Uranium (U) | mg/L | 0.0000036 | 0.0000671 | 0.0000916 | 0.0000020 | 9324444 |
| Dissolved Vanadium (V) | mg/L | 0.00035 | 0.00163 | 0.00089 | 0.00020 | 9324444 |
| Dissolved Zinc (Zn) | mg/L | 0.0366 | 0.0270 | 0.0217 | 0.00010 | 9324444 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00031 | 0.00022 | 0.00010 | 9324444 |

RDL = Reportable Detection Limit



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Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7395 | VF7396 | VF7397 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | B936155-M058-01-01 | B936155-M058-01-01 | B936155-M058-01-01 | | |
| | UNITS | G-2018-C6 (28NOV) (20-30) | G-2018-C7 (2.5-10) | G-2018-C7 (15-20) | RDL | QC Batch |
| Dissolved Calcium (Ca) | mg/L | 42.6 | 3.07 | 3.11 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 13.3 | 0.641 | 0.668 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 1.17 | 0.166 | 0.100 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 3.01 | 8.66 | 6.65 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 69.1 | 6.28 | 5.64 | 0.60 | 9324444 |
| RDL = Reportable Detection Limit | | | | | | |



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Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7398 | VF7399 | VF7400 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | B936155-M058-01-01 | B936155-M058-01-01 | B936155-M058-01-01 | | |
| | UNITS | G-2018-C7 (20-30) | G-2018-C8 (0-5) | G-2018-C8 (15-20) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 14.4 | 116 | 145 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.318 | 0.0225 | 0.161 | 0.00050 | 9324444 |
| Dissolved Antimony (Sb) | mg/L | 0.000572 | 0.00229 | 0.0195 | 0.000020 | 9324444 |
| Dissolved Arsenic (As) | mg/L | 0.00983 | 0.264 | 0.431 | 0.000020 | 9324444 |
| Dissolved Barium (Ba) | mg/L | 0.00874 | 0.0229 | 0.0147 | 0.000020 | 9324444 |
| Dissolved Beryllium (Be) | mg/L | 0.000022 | <0.000010 | 0.000034 | 0.000010 | 9324444 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000109 | 0.0000401 | 0.0000889 | 0.0000050 | 9324444 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324444 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000180 | 0.0000097 | 0.0000226 | 0.0000050 | 9324444 |
| Dissolved Chromium (Cr) | mg/L | 0.00201 | 0.00085 | 0.00016 | 0.00010 | 9324444 |
| Dissolved Cobalt (Co) | mg/L | 0.000443 | 0.00647 | 0.0258 | 0.0000050 | 9324444 |
| Dissolved Copper (Cu) | mg/L | 0.00558 | 0.00475 | 0.00148 | 0.000050 | 9324444 |
| Dissolved Iron (Fe) | mg/L | 0.131 | 0.341 | 0.270 | 0.0010 | 9324444 |
| Dissolved Lead (Pb) | mg/L | 0.000695 | 0.00139 | 0.00574 | 0.0000050 | 9324444 |
| Dissolved Lithium (Li) | mg/L | 0.00057 | 0.00149 | 0.00499 | 0.00050 | 9324444 |
| Dissolved Manganese (Mn) | mg/L | 0.117 | 3.43 | 3.56 | 0.000050 | 9324444 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000149 | 0.000560 | 0.000218 | 0.000050 | 9324444 |
| Dissolved Nickel (Ni) | mg/L | 0.00377 | 0.00923 | 0.0953 | 0.000020 | 9324444 |
| Dissolved Selenium (Se) | mg/L | 0.000106 | 0.000096 | 0.000058 | 0.000040 | 9324444 |
| Dissolved Silicon (Si) | mg/L | 2.91 | 2.17 | 0.635 | 0.050 | 9324444 |
| Dissolved Silver (Ag) | mg/L | 0.0000321 | 0.0000099 | 0.0000117 | 0.0000050 | 9324444 |
| Dissolved Strontium (Sr) | mg/L | 0.0398 | 0.310 | 0.316 | 0.000050 | 9324444 |
| Dissolved Thallium (Tl) | mg/L | 0.0000058 | 0.0000112 | 0.0000322 | 0.0000020 | 9324444 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324444 |
| Dissolved Titanium (Ti) | mg/L | 0.0230 | 0.00098 | 0.00204 | 0.00050 | 9324444 |
| Dissolved Uranium (U) | mg/L | 0.0000596 | 0.0000723 | 0.0000467 | 0.0000020 | 9324444 |
| Dissolved Vanadium (V) | mg/L | 0.00085 | <0.00020 | 0.00028 | 0.00020 | 9324444 |
| Dissolved Zinc (Zn) | mg/L | 0.0125 | 0.0157 | 0.0129 | 0.00010 | 9324444 |
| Dissolved Zirconium (Zr) | mg/L | 0.00044 | <0.00010 | 0.00047 | 0.00010 | 9324444 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7398 | VF7399 | VF7400 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| **COC Number** | | B936155-M058-01-01 | B936155-M058-01-01 | B936155-M058-01-01 | | |
| | **UNITS** | **G-2018-C7 (20-30)** | **G-2018-C8 (0-5)** | **G-2018-C8 (15-20)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 4.28 | 30.1 | 36.6 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 0.902 | 10.1 | 13.0 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 0.097 | 10.6 | 4.59 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 5.79 | 5.85 | 1.09 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 5.70 | 1.34 | 48.9 | 0.60 | 9324444 |
| RDL = Reportable Detection Limit | | | | | | |



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Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7401 | VF7402 | VF7403 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | B936155-M058-01-01 | B936155-M058-01-01 | B936155-M058-01-01 | | |
| | UNITS | G-2018-C8 (40-50) | G-2018-C9 (20-30) | G-2018-C9 (30-40) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 114 | 52.7 | 19.3 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.145 | 0.0756 | 0.257 | 0.00050 | 9324444 |
| Dissolved Antimony (Sb) | mg/L | 0.0121 | 0.00426 | 0.00118 | 0.000020 | 9324444 |
| Dissolved Arsenic (As) | mg/L | 0.200 | 0.0832 | 0.0192 | 0.000020 | 9324444 |
| Dissolved Barium (Ba) | mg/L | 0.0239 | 0.0187 | 0.00574 | 0.000020 | 9324444 |
| Dissolved Beryllium (Be) | mg/L | 0.000028 | 0.000014 | <0.000010 | 0.000010 | 9324444 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000738 | 0.0000372 | 0.0000120 | 0.0000050 | 9324444 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | 0.016 | 0.010 | 9324444 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000074 | 0.0000216 | 0.0000067 | 0.0000050 | 9324444 |
| Dissolved Chromium (Cr) | mg/L | 0.00013 | 0.00024 | 0.00106 | 0.00010 | 9324444 |
| Dissolved Cobalt (Co) | mg/L | 0.0243 | 0.00204 | 0.000210 | 0.0000050 | 9324444 |
| Dissolved Copper (Cu) | mg/L | 0.000906 | 0.00114 | 0.000657 | 0.000050 | 9324444 |
| Dissolved Iron (Fe) | mg/L | 0.252 | 0.661 | 0.154 | 0.0010 | 9324444 |
| Dissolved Lead (Pb) | mg/L | 0.00409 | 0.00243 | 0.000547 | 0.0000050 | 9324444 |
| Dissolved Lithium (Li) | mg/L | 0.00304 | 0.00130 | <0.00050 | 0.00050 | 9324444 |
| Dissolved Manganese (Mn) | mg/L | 3.88 | 0.738 | 0.269 | 0.000050 | 9324444 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000746 | 0.000195 | 0.000181 | 0.000050 | 9324444 |
| Dissolved Nickel (Ni) | mg/L | 0.0776 | 0.00361 | 0.00226 | 0.000020 | 9324444 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | <0.000040 | 0.000071 | 0.000040 | 9324444 |
| Dissolved Silicon (Si) | mg/L | 0.852 | 1.37 | 2.30 | 0.050 | 9324444 |
| Dissolved Silver (Ag) | mg/L | 0.0000144 | 0.0000084 | 0.0000206 | 0.0000050 | 9324444 |
| Dissolved Strontium (Sr) | mg/L | 0.251 | 0.140 | 0.0581 | 0.000050 | 9324444 |
| Dissolved Thallium (Tl) | mg/L | 0.0000088 | 0.0000094 | 0.0000055 | 0.0000020 | 9324444 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324444 |
| Dissolved Titanium (Ti) | mg/L | 0.00233 | 0.00150 | 0.0343 | 0.00050 | 9324444 |
| Dissolved Uranium (U) | mg/L | 0.0000651 | 0.0000248 | 0.0000438 | 0.0000020 | 9324444 |
| Dissolved Vanadium (V) | mg/L | 0.00026 | <0.00020 | 0.00068 | 0.00020 | 9324444 |
| Dissolved Zinc (Zn) | mg/L | 0.00698 | 0.00837 | 0.00502 | 0.00010 | 9324444 |
| Dissolved Zirconium (Zr) | mg/L | 0.00108 | 0.00068 | 0.00033 | 0.00010 | 9324444 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7401 | VF7402 | VF7403 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| **COC Number** | | B936155-M058-01-01 | B936155-M058-01-01 | B936155-M058-01-01 | | |
| | **UNITS** | **G-2018-C8 (40-50)** | **G-2018-C9 (20-30)** | **G-2018-C9 (30-40)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 30.0 | 12.9 | 5.03 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 9.51 | 4.94 | 1.63 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 4.76 | 2.27 | 1.63 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 0.936 | 3.50 | 5.06 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 37.4 | 18.2 | 7.81 | 0.60 | 9324444 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7406 | VF7407 | VF7408 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | b936155-m058-02-01 | b936155-m058-02-01 | b936155-m058-02-01 | | |
| | UNITS | G-2018-C10 (2.5-10) | G-2018-C10 (15-20) | G-2018-C10 (40-50) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 2.80 | 2.43 | 3.87 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.259 | 0.857 | 0.452 | 0.00050 | 9324444 |
| Dissolved Antimony (Sb) | mg/L | 0.000329 | 0.000102 | 0.000140 | 0.000020 | 9324444 |
| Dissolved Arsenic (As) | mg/L | 0.0128 | 0.0133 | 0.0178 | 0.000020 | 9324444 |
| Dissolved Barium (Ba) | mg/L | 0.00258 | 0.00317 | 0.00356 | 0.000020 | 9324444 |
| Dissolved Beryllium (Be) | mg/L | 0.000018 | 0.000037 | 0.000031 | 0.000010 | 9324444 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000266 | 0.0000156 | 0.0000321 | 0.0000050 | 9324444 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324444 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000154 | 0.0000052 | 0.0000062 | 0.0000050 | 9324444 |
| Dissolved Chromium (Cr) | mg/L | 0.00088 | 0.00095 | 0.00065 | 0.00010 | 9324444 |
| Dissolved Cobalt (Co) | mg/L | 0.000231 | 0.000216 | 0.000610 | 0.0000050 | 9324444 |
| Dissolved Copper (Cu) | mg/L | 0.00366 | 0.00118 | 0.00525 | 0.000050 | 9324444 |
| Dissolved Iron (Fe) | mg/L | 0.429 | 0.134 | 0.271 | 0.0010 | 9324444 |
| Dissolved Lead (Pb) | mg/L | 0.0190 | 0.00427 | 0.00117 | 0.0000050 | 9324444 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | <0.00050 | 0.00060 | 0.00050 | 9324444 |
| Dissolved Manganese (Mn) | mg/L | 0.0377 | 0.0520 | 0.00530 | 0.000050 | 9324444 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000175 | <0.000050 | 0.000103 | 0.000050 | 9324444 |
| Dissolved Nickel (Ni) | mg/L | 0.00209 | 0.00113 | 0.00152 | 0.000020 | 9324444 |
| Dissolved Selenium (Se) | mg/L | 0.000163 | 0.000055 | <0.000040 | 0.000040 | 9324444 |
| Dissolved Silicon (Si) | mg/L | 1.78 | 1.13 | 1.07 | 0.050 | 9324444 |
| Dissolved Silver (Ag) | mg/L | 0.0000143 | <0.0000050 | 0.0000086 | 0.0000050 | 9324444 |
| Dissolved Strontium (Sr) | mg/L | 0.00627 | 0.00639 | 0.0142 | 0.000050 | 9324444 |
| Dissolved Thallium (Tl) | mg/L | 0.0000098 | <0.0000020 | <0.0000020 | 0.0000020 | 9324444 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324444 |
| Dissolved Titanium (Ti) | mg/L | 0.0334 | 0.0150 | 0.00988 | 0.00050 | 9324444 |
| Dissolved Uranium (U) | mg/L | 0.0000408 | 0.000173 | 0.0000855 | 0.0000020 | 9324444 |
| Dissolved Vanadium (V) | mg/L | 0.00135 | 0.00126 | 0.00468 | 0.00020 | 9324444 |
| Dissolved Zinc (Zn) | mg/L | 0.00883 | 0.00311 | 0.00323 | 0.00010 | 9324444 |
| Dissolved Zirconium (Zr) | mg/L | 0.00050 | 0.00021 | 0.00019 | 0.00010 | 9324444 |

RDL = Reportable Detection Limit



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7406 | VF7407 | VF7408 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| **COC Number** | | b936155-m058-02-01 | b936155-m058-02-01 | b936155-m058-02-01 | | |
| | **UNITS** | **G-2018-C10 (2.5-10)** | **G-2018-C10 (15-20)** | **G-2018-C10 (40-50)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 0.839 | 0.709 | 1.12 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 0.172 | 0.160 | 0.257 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 0.539 | 0.075 | 0.298 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 3.85 | 1.80 | 2.02 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 2.38 | <0.60 | <0.60 | 0.60 | 9324444 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7409 | VF7410 | VF7411 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| COC Number | | b936155-m058-02-01 | b936155-m058-02-01 | b936155-m058-02-01 | | |
| | UNITS | G-2018-C14(2.5-10) | G-2018-C14 (15-20) | G-2018-C14 (40-50) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 98.9 | 53.6 | 46.1 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0376 | 0.0680 | 0.0520 | 0.00050 | 9324444 |
| Dissolved Antimony (Sb) | mg/L | 0.00388 | 0.00222 | 0.00343 | 0.000020 | 9324444 |
| Dissolved Arsenic (As) | mg/L | 0.353 | 1.09 | 1.78 | 0.000020 | 9324444 |
| Dissolved Barium (Ba) | mg/L | 0.0291 | 0.0229 | 0.0637 | 0.000020 | 9324444 |
| Dissolved Beryllium (Be) | mg/L | 0.000015 | 0.000013 | 0.000065 | 0.000010 | 9324444 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000262 | 0.0000557 | <0.0000050 | 0.0000050 | 9324444 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324444 |
| Dissolved Cadmium (Cd) | mg/L | 0.000201 | 0.000113 | 0.000176 | 0.0000050 | 9324444 |
| Dissolved Chromium (Cr) | mg/L | <0.00010 | 0.00013 | 0.00106 | 0.00010 | 9324444 |
| Dissolved Cobalt (Co) | mg/L | 0.0202 | 0.0168 | 0.0545 | 0.0000050 | 9324444 |
| Dissolved Copper (Cu) | mg/L | 0.00114 | 0.00110 | 0.000429 | 0.000050 | 9324444 |
| Dissolved Iron (Fe) | mg/L | 0.615 | 3.27 | 19.9 | 0.0010 | 9324444 |
| Dissolved Lead (Pb) | mg/L | 0.00208 | 0.00454 | 0.00318 | 0.0000050 | 9324444 |
| Dissolved Lithium (Li) | mg/L | 0.00416 | 0.00217 | 0.00412 | 0.00050 | 9324444 |
| Dissolved Manganese (Mn) | mg/L | 0.796 | 1.32 | 2.56 | 0.000050 | 9324444 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | <0.000050 | <0.000050 | 0.000050 | 9324444 |
| Dissolved Nickel (Ni) | mg/L | 0.0245 | 0.0139 | 0.0327 | 0.000020 | 9324444 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | <0.000040 | <0.000040 | 0.000040 | 9324444 |
| Dissolved Silicon (Si) | mg/L | 1.25 | 1.24 | 4.83 | 0.050 | 9324444 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9324444 |
| Dissolved Strontium (Sr) | mg/L | 0.306 | 0.150 | 0.152 | 0.000050 | 9324444 |
| Dissolved Thallium (Tl) | mg/L | 0.0000173 | 0.0000157 | 0.0000068 | 0.0000020 | 9324444 |
| Dissolved Tin (Sn) | mg/L | 0.00024 | <0.00020 | <0.00020 | 0.00020 | 9324444 |
| Dissolved Titanium (Ti) | mg/L | 0.00081 | 0.00160 | <0.00050 | 0.00050 | 9324444 |
| Dissolved Uranium (U) | mg/L | 0.0000028 | 0.0000073 | 0.0000020 | 0.0000020 | 9324444 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324444 |
| Dissolved Zinc (Zn) | mg/L | 0.0490 | 0.0284 | 0.0782 | 0.00010 | 9324444 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9324444 |
| RDL = Reportable Detection Limit | | | | | | |



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Report Date: 2019/02/19

MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7409 | VF7410 | VF7411 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/08 12:00 | 2019/02/08 12:00 | 2019/02/08 12:00 | | |
| **COC Number** | | b936155-m058-02-01 | b936155-m058-02-01 | b936155-m058-02-01 | | |
| | **UNITS** | **G-2018-C14(2.5-10)** | **G-2018-C14 (15-20)** | **G-2018-C14 (40-50)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 34.5 | 18.5 | 14.9 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 3.12 | 1.76 | 2.15 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 1.98 | 1.58 | 1.16 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 3.54 | 3.57 | 3.15 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 32.9 | 21.1 | 27.8 | 0.60 | 9324444 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7412 | | |
|---|---|---|---|---|
| Sampling Date | | 2019/02/08 12:00 | | |
| COC Number | | b936155-m058-02-01 | | |
| | UNITS | G-2018-C15 (2.5-10) | RDL | QC Batch |
| **Calculated Parameters** | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 118 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.503 | 0.00050 | 9324444 |
| Dissolved Antimony (Sb) | mg/L | 0.00135 | 0.000020 | 9324444 |
| Dissolved Arsenic (As) | mg/L | 0.0291 | 0.000020 | 9324444 |
| Dissolved Barium (Ba) | mg/L | 0.0280 | 0.000020 | 9324444 |
| Dissolved Beryllium (Be) | mg/L | 0.00106 | 0.000010 | 9324444 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000050 | 9324444 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 9324444 |
| Dissolved Cadmium (Cd) | mg/L | 0.00450 | 0.0000050 | 9324444 |
| Dissolved Chromium (Cr) | mg/L | 0.00010 | 0.00010 | 9324444 |
| Dissolved Cobalt (Co) | mg/L | 0.547 | 0.0000050 | 9324444 |
| Dissolved Copper (Cu) | mg/L | 0.0332 | 0.000050 | 9324444 |
| Dissolved Iron (Fe) | mg/L | 1.86 | 0.0010 | 9324444 |
| Dissolved Lead (Pb) | mg/L | 0.00149 | 0.0000050 | 9324444 |
| Dissolved Lithium (Li) | mg/L | 0.0161 | 0.00050 | 9324444 |
| Dissolved Manganese (Mn) | mg/L | 8.02 | 0.000050 | 9324444 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000050 | 9324444 |
| Dissolved Nickel (Ni) | mg/L | 0.690 | 0.000020 | 9324444 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000040 | 9324444 |
| Dissolved Silicon (Si) | mg/L | 4.53 | 0.050 | 9324444 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | 9324444 |
| Dissolved Strontium (Sr) | mg/L | 0.454 | 0.000050 | 9324444 |
| Dissolved Thallium (Tl) | mg/L | 0.000158 | 0.0000020 | 9324444 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9324444 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00050 | 9324444 |
| Dissolved Uranium (U) | mg/L | 0.0000479 | 0.0000020 | 9324444 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00020 | 9324444 |
| Dissolved Zinc (Zn) | mg/L | 0.981 | 0.00010 | 9324444 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | 9324444 |
| RDL = Reportable Detection Limit | | | | |



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7412 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2019/02/08 12:00 | | |
| **COC Number** | | b936155-m058-02-01 | | |
| | **UNITS** | **G-2018-C15 (2.5-10)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 39.2 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 4.84 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 3.98 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 3.72 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 49.9 | 0.60 | 9324444 |
| RDL = Reportable Detection Limit | | | | |



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Maxxam Job #: B911268
Report Date: 2019/02/19

MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7394
**Sample ID:** G-2018-C6 (28NOV) (10-20)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7394 Dup
**Sample ID:** G-2018-C6 (28NOV) (10-20)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |

**Maxxam ID:** VF7395
**Sample ID:** G-2018-C6 (28NOV) (20-30)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7396
**Sample ID:** G-2018-C7 (2.5-10)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7397
**Sample ID:** G-2018-C7 (15-20)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7398
**Sample ID:** G-2018-C7 (20-30)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7399
**Sample ID:** G-2018-C8 (0-5)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7400
**Sample ID:** G-2018-C8 (15-20)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7401
**Sample ID:** G-2018-C8 (40-50)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7402
**Sample ID:** G-2018-C9 (20-30)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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Maxxam Job #: B911268
Report Date: 2019/02/19

MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7403
**Sample ID:** G-2018-C9 (30-40)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7406
**Sample ID:** G-2018-C10 (2.5-10)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7407
**Sample ID:** G-2018-C10 (15-20)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7408
**Sample ID:** G-2018-C10 (40-50)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7409
**Sample ID:** G-2018-C14(2.5-10)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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Maxxam Job #: B911268
Report Date: 2019/02/19

MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7410
**Sample ID:** G-2018-C14 (15-20)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7411
**Sample ID:** G-2018-C14 (40-50)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7412
**Sample ID:** G-2018-C15 (2.5-10)
**Matrix:** Water

**Collected:** 2019/02/08
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/19 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/19 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324444 | N/A | 2019/02/17 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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Maxxam Job #: B911268
Report Date: 2019/02/19

MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 6.0°C |

**LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments**

Sample VF7395 [G-2018-C6 (28NOV) (20-30)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF7411 [G-2018-C14 (40-50)] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.

**Results relate only to the items tested.**



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Maxxam Job #: B911268
Report Date: 2019/02/19

## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9324444 | Dissolved Aluminum (Al) | 2019/02/17 | 99 | 80 - 120 | 101 | 80 - 120 | <0.00050 | mg/L | 0.61 | 20 |
| 9324444 | Dissolved Antimony (Sb) | 2019/02/17 | NC | 80 - 120 | 102 | 80 - 120 | <0.000020 | mg/L | 1.5 | 20 |
| 9324444 | Dissolved Arsenic (As) | 2019/02/17 | NC | 80 - 120 | 103 | 80 - 120 | 0.000052, RDL=0.000020 (1) | mg/L | 0.48 | 20 |
| 9324444 | Dissolved Barium (Ba) | 2019/02/17 | NC | 80 - 120 | 102 | 80 - 120 | <0.000020 | mg/L | 0.74 | 20 |
| 9324444 | Dissolved Beryllium (Be) | 2019/02/17 | 100 | 80 - 120 | 105 | 80 - 120 | <0.000010 | mg/L | 1.1 | 20 |
| 9324444 | Dissolved Bismuth (Bi) | 2019/02/17 | 99 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | 2.6 | 20 |
| 9324444 | Dissolved Boron (B) | 2019/02/17 | 103 | 80 - 120 | 106 | 80 - 120 | <0.010 | mg/L | 3.5 | 20 |
| 9324444 | Dissolved Cadmium (Cd) | 2019/02/17 | 98 | 80 - 120 | 100 | 80 - 120 | <0.0000050 | mg/L | 1.1 | 20 |
| 9324444 | Dissolved Chromium (Cr) | 2019/02/17 | 97 | 80 - 120 | 100 | 80 - 120 | <0.00010 | mg/L | 6.0 | 20 |
| 9324444 | Dissolved Cobalt (Co) | 2019/02/17 | 91 | 80 - 120 | 97 | 80 - 120 | <0.0000050 | mg/L | 0.0026 | 20 |
| 9324444 | Dissolved Copper (Cu) | 2019/02/17 | 94 | 80 - 120 | 98 | 80 - 120 | <0.000050 | mg/L | 0.91 | 20 |
| 9324444 | Dissolved Iron (Fe) | 2019/02/17 | NC | 80 - 120 | 106 | 80 - 120 | <0.0010 | mg/L | 1.4 | 20 |
| 9324444 | Dissolved Lead (Pb) | 2019/02/17 | 102 | 80 - 120 | 105 | 80 - 120 | <0.0000050 | mg/L | 0.35 | 20 |
| 9324444 | Dissolved Lithium (Li) | 2019/02/17 | 100 | 80 - 120 | 106 | 80 - 120 | <0.00050 | mg/L | 1.5 | 20 |
| 9324444 | Dissolved Manganese (Mn) | 2019/02/17 | NC | 80 - 120 | 101 | 80 - 120 | <0.000050 | mg/L | 0.58 | 20 |
| 9324444 | Dissolved Molybdenum (Mo) | 2019/02/17 | 101 | 80 - 120 | 102 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9324444 | Dissolved Nickel (Ni) | 2019/02/17 | 92 | 80 - 120 | 99 | 80 - 120 | <0.000020 | mg/L | 0.38 | 20 |
| 9324444 | Dissolved Selenium (Se) | 2019/02/17 | 98 | 80 - 120 | 101 | 80 - 120 | <0.000040 | mg/L | NC | 20 |
| 9324444 | Dissolved Silicon (Si) | 2019/02/17 | 96 | 80 - 120 | 104 | 80 - 120 | <0.050 | mg/L | 1.6 | 20 |
| 9324444 | Dissolved Silver (Ag) | 2019/02/17 | 98 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324444 | Dissolved Strontium (Sr) | 2019/02/17 | NC | 80 - 120 | 103 | 80 - 120 | <0.000050 | mg/L | 0.80 | 20 |
| 9324444 | Dissolved Sulphur (S) | 2019/02/17 | 97 | 80 - 120 | 99 | 80 - 120 | <0.60 | mg/L | 0.47 | 20 |
| 9324444 | Dissolved Thallium (Tl) | 2019/02/17 | 99 | 80 - 120 | 104 | 80 - 120 | <0.0000020 | mg/L | 16 | 20 |
| 9324444 | Dissolved Tin (Sn) | 2019/02/17 | 99 | 80 - 120 | 101 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9324444 | Dissolved Titanium (Ti) | 2019/02/17 | 101 | 80 - 120 | 102 | 80 - 120 | <0.00050 | mg/L | 6.9 | 20 |
| 9324444 | Dissolved Uranium (U) | 2019/02/17 | 104 | 80 - 120 | 106 | 80 - 120 | <0.0000020 | mg/L | 8.5 | 20 |
| 9324444 | Dissolved Vanadium (V) | 2019/02/17 | 98 | 80 - 120 | 99 | 80 - 120 | <0.00020 | mg/L | 4.2 | 20 |
| 9324444 | Dissolved Zinc (Zn) | 2019/02/17 | 97 | 80 - 120 | 102 | 80 - 120 | <0.00010 | mg/L | 1.5 | 20 |



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Maxxam Job #: B911268
Report Date: 2019/02/19

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9324444 | Dissolved Zirconium (Zr) | 2019/02/17 | 105 | 80 - 120 | 107 | 80 - 120 | <0.00010 | mg/L | NC | 20 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Method Blank exceeds acceptance limits for As. Sample values for As are >10x the concentration of the method blank and the contamination is considered irrelevant.



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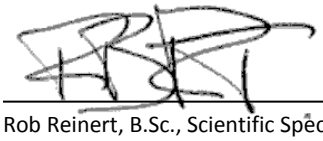
Maxxam Job #: B911268
Report Date: 2019/02/19

MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Rob Reinert, B.Sc., Scientific Specialist

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



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/22**
Report #: R5603118
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B937168**
**Received: 2019/02/11, 16:55**

Sample Matrix: Water
# Samples Received: 21

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Acidity (CaCO3) in water (1, 2) | 12 | N/A | 2019/02/19 | | SM 22 2310 |
| Alkalinity | 2 | N/A | 2019/02/13 | CAM SOP-00448 | SM 23 2320 B m |
| Alkalinity | 7 | N/A | 2019/02/14 | CAM SOP-00448 | SM 23 2320 B m |
| Dissolved Mercury (low level) | 21 | 2019/02/14 | 2019/02/14 | CAM SOP-00453 | EPA 7470 m |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Bedford
(2) Non-accredited test method

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/22**
Report #: R5603118
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B937168**
**Received: 2019/02/11, 16:55**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700

==========

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

Maxxam Job #: B937168
Report Date: 2019/02/22

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IYR380 | IYR381 | IYR382 | | | IYR383 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | | 2019/02/11 12:00 | | |
| COC Number | | n/a | n/a | n/a | | | n/a | | |
| | **UNITS** | **G-2018-C15 (15-20)** | **G-2018-C15 (20-30)** | **G-2018-C17 (0-5)** | **RDL** | **QC Batch** | **G-2018-C17 (10-20)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | 5.8 | <5.0 | <5.0 | 5.0 | 5979768 | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | | | | 27 | 1.0 | 5973610 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYR384 | | | IYR385 | IYR386 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | | | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | n/a | | | n/a | n/a | | |
| | **UNITS** | **G-2018-C17 (40-50)** | **RDL** | **QC Batch** | **G-2018-C6 (29NOV) (0-7.5)** | **G-2018-C6 (29NOV) (10-15)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Acidity | mg/L | | | | <5.0 | 5.6 | 5.0 | 5979893 |
| Alkalinity (Total as CaCO3) | mg/L | 33 | 1.0 | 5973610 | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYR387 | IYR388 | | | IYR389 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | | | 2019/02/11 12:00 | | |
| COC Number | | n/a | n/a | | | n/a | | |
| | **UNITS** | **G-2018-C6 (29NOV) (20-30)** | **G-2018-C6 (29NOV) (40-50)** | **RDL** | **QC Batch** | **G-2018-WR1** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Acidity | mg/L | <5.0 | <5.0 | 5.0 | 5979893 | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | | | 4.9 | 1.0 | 5972973 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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

Maxxam Job #: B937168
Report Date: 2019/02/22

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IYR390 | | | IYR391 | | IYR392 | | IYR393 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | | | 2019/02/11 12:00 | | 2019/02/11 12:00 | | 2019/02/11 12:00 | | |
| COC Number | | n/a | | | n/a | | n/a | | n/a | | |
| | **UNITS** | **G-2018-WR2** | **RDL** | **QC Batch** | **G-2018-WR3** | **QC Batch** | **G-2018-WR4** | **QC Batch** | **G-2018-WR5** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | | | |
| Acidity | mg/L | <5.0 | 5.0 | 5979893 | | | | | | | |
| Alkalinity (Total as CaCO3) | mg/L | | | | 3.9 | 5973610 | 13 | 5972973 | 16 | 1.0 | 5973610 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYR394 | | | IYR395 | IYR396 | IYR396 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | n/a | | | n/a | n/a | n/a | | |
| | **UNITS** | **G-2018-WR6** | **RDL** | **QC Batch** | **G-2018-SFC-1 (0-20)** | **G-2018-SFC-2** | **G-2018-SFC-2 Lab-Dup** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | | | | 32 | 18 | 18 | 5.0 | 5979893 |
| Alkalinity (Total as CaCO3) | mg/L | 2.9 | 1.0 | 5973610 | | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

| Maxxam ID | | IYR397 | IYR398 | | | IYR399 | IYR400 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | | | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | n/a | n/a | | | n/a | n/a | | |
| | **UNITS** | **G-2018-SFC-6** | **G-2018-SFC-7** | **RDL** | **QC Batch** | **G-2018-SFC-4** | **G-2018-SFC-5** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | | | | | <5.0 | <5.0 | 5.0 | 5979893 |
| Alkalinity (Total as CaCO3) | mg/L | 54 | 35 | 1.0 | 5973610 | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B937168
Report Date: 2019/02/22

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IYR380 | IYR381 | IYR382 | | IYR383 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | 2019/02/11 12:00 | | |
| COC Number | | n/a | n/a | n/a | | n/a | | |
| | **UNITS** | **G-2018-C15 (15-20)** | **G-2018-C15 (20-30)** | **G-2018-C17 (0-5)** | **QC Batch** | **G-2018-C17 (10-20)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | <0.01 | 0.02 | 0.02 | 5975283 | 0.06 | 0.01 | 5975291 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYR384 | | IYR385 | | IYR386 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | | 2019/02/11 12:00 | | 2019/02/11 12:00 | | |
| COC Number | | n/a | | n/a | | n/a | | |
| | **UNITS** | **G-2018-C17 (40-50)** | **QC Batch** | **G-2018-C6 (29NOV) (0-7.5)** | **QC Batch** | **G-2018-C6 (29NOV) (10-15)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.43 | 5974918 | 0.48 | 5975291 | 0.16 | 0.01 | 5975283 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYR387 | | | IYR388 | | | IYR389 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | | | 2019/02/11 12:00 | | | 2019/02/11 12:00 | | |
| COC Number | | n/a | | | n/a | | | n/a | | |
| | **UNITS** | **G-2018-C6 (29NOV) (20-30)** | **RDL** | **QC Batch** | **G-2018-C6 (29NOV) (40-50)** | **RDL** | **QC Batch** | **G-2018-WR1** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.70 | 0.02 | 5975283 | 0.23 | 0.01 | 5975291 | 1.73 | 0.05 | 5974918 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYR390 | | IYR391 | | IYR392 | | IYR393 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | | 2019/02/11 12:00 | | 2019/02/11 12:00 | | 2019/02/11 12:00 | | |
| COC Number | | n/a | | n/a | | n/a | | n/a | | |
| | **UNITS** | **G-2018-WR2** | **QC Batch** | **G-2018-WR3** | **QC Batch** | **G-2018-WR4** | **QC Batch** | **G-2018-WR5** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.26 | 5975291 | <0.01 | 5975283 | 0.07 | 5975291 | 0.07 | 0.01 | 5974918 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B937168
Report Date: 2019/02/22

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IYR394 | | IYR395 | IYR396 | | IYR397 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | | 2019/02/11 12:00 | 2019/02/11 12:00 | | 2019/02/11 12:00 | | |
| COC Number | | n/a | | n/a | n/a | | n/a | | |
| | **UNITS** | **G-2018-WR6** | **QC Batch** | **G-2018-SFC-1 (0-20)** | **G-2018-SFC-2** | **QC Batch** | **G-2018-SFC-6** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | <0.01 | 5975291 | <0.01 | 0.01 | 5975283 | 0.09 | 0.01 | 5975291 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYR398 | IYR398 | | IYR399 | IYR400 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | n/a | n/a | | n/a | n/a | | |
| | **UNITS** | **G-2018-SFC-7** | **G-2018-SFC-7 Lab-Dup** | **QC Batch** | **G-2018-SFC-4** | **G-2018-SFC-5** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.02 | 0.02 | 5975291 | <0.01 | 0.06 | 0.01 | 5975283 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B937168
Report Date: 2019/02/22

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 16.3°C |

**Results relate only to the items tested.**



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Maxxam Job #: B937168
Report Date: 2019/02/22

## QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5972973 | Alkalinity (Total as CaCO3) | 2019/02/13 | | | 95 | 85 - 115 | <1.0 | mg/L | 0.52 | 20 |
| 5973610 | Alkalinity (Total as CaCO3) | 2019/02/14 | | | 96 | 85 - 115 | <1.0 | mg/L | 0.048 | 20 |
| 5974918 | Dissolved Mercury (Hg) | 2019/02/14 | 81 | 75 - 125 | 97 | 80 - 120 | <0.01 | ug/L | 2.0 | 20 |
| 5975283 | Dissolved Mercury (Hg) | 2019/02/14 | 89 | 75 - 125 | 96 | 80 - 120 | <0.01 | ug/L | NC | 20 |
| 5975291 | Dissolved Mercury (Hg) | 2019/02/14 | 96 | 75 - 125 | 97 | 80 - 120 | <0.01 | ug/L | 3.4 | 20 |
| 5979768 | Acidity | 2019/02/19 | 102 | 80 - 120 | 104 | 80 - 120 | <5.0 | mg/L | NC | 25 |
| 5979893 | Acidity | 2019/02/19 | 104 | 80 - 120 | 105 | 80 - 120 | <5.0 | mg/L | 1.1 | 25 |

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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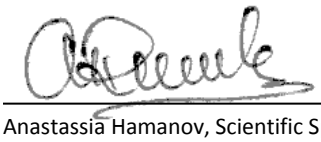
Maxxam Job #: B937168
Report Date: 2019/02/22

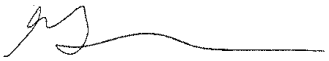
EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist



Gina Thompson, Inorganics General Chemistry Supervisor

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



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CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD

Page 1 of 3

| Invoice Information | Report Information (if differs from invoice) | Project Information (where applicable) | Turnaround Time (TAT) Required |
|---|---|---|---|
| Company Name: EcoMetrix Inc | Company Name: | Quotation #: | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: Daniel Skruch | Contact Name: | P.O. #/ AFE#: | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: 6800 Campobello Road | Address: | Project #: 18-2525 | Rush TAT (Surcharges will be applied) |
| Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: Fax: | Site Location: NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Email: dskruch@ecometrix.ca | Email: | Site #: | Date Required: |
| | | Sampled By: ALC+FL+CL | Rush Confirmation #: |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

| Regulation 153 | Other Regulations |
|---|---|
| [ ] Table 1 [ ] Res/Park [ ] Med/ Fine | [ ] CCME [ ] Sanitary Sewer Bylaw |
| [ ] Table 2 [ ] Ind/Comm [ ] Coarse | [ ] MISA [ ] Storm Sewer Bylaw |
| [ ] Table 3 [ ] Agri/ Other | [ ] PWQO Region |
| [ ] Table ____ | [ ] Other (Specify) |
| FOR RSC (PLEASE CIRCLE) Y / N | [ ] REG 558 (MIN. 3 DAY TAT REQUIRED) |

Include Criteria on Certificate of Analysis: Y / N

**SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM**

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED, to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G-2018-C15 (15-20) | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | G-2018-C15 (20-30) | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | G-2018-C17 (0-5) | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 4 | G-2018-C17 (10-20) | 11/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 5 | G-2018-C17 (40-50) | 11/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 6 | G-2018-C6 (29NOV) (0-7.5) | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 7 | G-2018-C6 (29NOV) (10-15) | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 8 | G-2018-C6 (29NOV) (20-30) | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 9 | G-2018-C6 (29NOV) (40-50) | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 10 | G-2018-WR1 | 11/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM |
|---|---|---|---|---|---|
| Fei Luo | 11/02/2019 | 16:55 | [signature] | 2019/02/11 | 16:55 |
| | | | | | |

LABORATORY USE ONLY

| CUSTODY SEAL Y / N | | COOLER TEMPERATURES |
|---|---|---|
| Present | Intact | |
| | | 17/16/16 |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / N

COMMENTS

*NOTE Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); **Mercury 0.00001 mg/L

*PLEASE CONTACT IF SAMPLE VOLUME CONCERNS*

11-Feb-19 16:55
Kyle Reinhart
B937168

ECN ENV-983

Maxxam
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6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD

Page 2 of 3

| Invoice Information | | Report Information (if differs from invoice) | | Project Information (where applicable) | | Turnaround Time (TAT) Required |
|---|---|---|---|---|---|---|
| Company Name: | EcoMetrix Inc | Company Name: | | Quotation #: | | X Regular TAT (5-7 days) Most analyses |
| Contact Name: | Daniel Skruch | Contact Name: | | P.O. #/ AFE#: | | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: | 6800 Campobello Road | Address: | | Project #: | 18-2525 | Rush TAT (Surcharges will be applied) |
| | | | | Site Location: | NS Lands | 1 Day 2 Days 3-4 Days |
| Phone: | 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: | Fax: | Site #: | | Date Required: |
| Email: | dskruch@ecometrix.ca | Email: | | Sampled By: | ALC+FL+CL | Rush Confirmation #: |

**MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY**

| Regulation 153 | Other Regulations |
|---|---|
| ☐ Table 1 ☐ Res/Park ☐ Med/ Fine | ☐ CCME ☐ Sanitary Sewer Bylaw |
| ☐ Table 2 ☐ Ind/Comm ☐ Coarse | ☐ MISA ☐ Storm Sewer Bylaw |
| ☐ Table 3 ☐ Agri/ Other | ☐ PWQO Region |
| ☐ Table ____ | ☐ Other (Specify) |
| FOR RSC (PLEASE CIRCLE) Y / N | ☐ REG 558 (MIN. 3 DAY TAT REQUIRED) |

Include Criteria on Certificate of Analysis: Y / N

**SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM**

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED; to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G-2018-WR2 | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | G-2018-WR3 | 11/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 3 | G-2018-WR4 | 11/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 4 | G-2018-WR5 | 11/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 5 | G-2018-WR6 | 11/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 6 | G-2018-SFC-1 (0-20) | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 7 | G-2018-SFC-2 | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 8 | G-2018-SFC-6 | 11/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 9 | G-2018-SFC-7 | 11/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 10 | G-2018-SFC-4 | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) |
|---|---|---|---|---|---|
| Fei Luo | 11/02/2019 | 16:55 | See page 1 | | |
| | | | | | |

LABORATORY USE ONLY

| CUSTODY SEAL Y / N | | COOLER TEMPERATURES |
|---|---|---|
| Present | Intact | |
| | | |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / N

COMMENTS

***NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); ****Mercury 0.00001 mg/L**

***PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

MAXXAM JOB #

Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM-FCD-01191/2

# CHAIN OF CUSTODY RECORD

Page 3 of 3

| Invoice Information | | Report Information (if differs from invoice) | | Project Information (where applicable) | | Turnaround Time (TAT) Required |
|---|---|---|---|---|---|---|
| Company Name: | EcoMetrix Inc | Company Name: | | Quotation #: | | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: | Daniel Skruch | Contact Name: | | P.O. #/ AFE#: | | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: | 6800 Campobello Road | Address: | | Project #: | 18-2525 | Rush TAT (Surcharges will be applied) |
| Phone: | 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: | Fax: | Site Location: | NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Email: | dskruch@ecometrix.ca | Email: | | Site #: | | Date Required: |
| | | | | Sampled By: | ALC+FL+CL | Rush Confirmation #: |

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

**Regulation 153**: [ ] Table 1 [ ] Res/Park [ ] Med/ Fine; [ ] Table 2 [ ] Ind/Comm [ ] Coarse; [ ] Table 3 [ ] Agri/ Other; [ ] Table ____
FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**: [ ] CCME [ ] Sanitary Sewer Bylaw; [ ] MISA [ ] Storm Sewer Bylaw; [ ] PWQO Region ____; [ ] Other (Specify); [ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

LABORATORY USE ONLY

CUSTODY SEAL Y / N (Present / Intact) — COOLER TEMPERATURES

COOLING MEDIA PRESENT: Y / N

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, Include Sulphur FILTERED; to Burnaby)* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G-2018-SFC-5 | 11/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |

COMMENTS

*NOTE Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); **Mercury 0.00001 mg/L

*PLEASE CONTACT IF SAMPLE VOLUME CONCERNS*

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) | MAXXAM JOB # |
|---|---|---|---|---|---|---|
| Fei Luo | 11/02/2019 | 16:55 | See page 1 | | | |
| | | | | | | |

Success Through Science®

Your Project #: MB937168
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b937168-m058-01-01, b973168-m058-02-01, b937168-m058-03-01

**Report Date: 2019/02/21**
Report #: R2687946
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B911260**
**Received: 2019/02/14, 08:50**

Sample Matrix: Water
# Samples Received: 21

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | 1 | N/A | 2019/02/20 | BBY WI-00033 | Auto Calc |
| Hardness (calculated as CaCO3) | 20 | N/A | 2019/02/21 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 1 | N/A | 2019/02/20 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 20 | N/A | 2019/02/21 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 21 | N/A | 2019/02/20 | BBY7SOP-00002 | EPA 6020b R2 m |
| Filter and HNO3 Preserve for Metals | 21 | N/A | 2019/02/15 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



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Your Project #: MB937168
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b937168-m058-01-01, b973168-m058-02-01, b937168-m058-03-01

**Report Date: 2019/02/21**
Report #: R2687946
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B911260**
**Received: 2019/02/14, 08:50**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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

Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | VF7342 | VF7343 | VF7344 | VF7345 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | |
| COC Number | | b937168-m058-01-01 | b937168-m058-01-01 | b937168-m058-01-01 | b937168-m058-01-01 | |
| | UNITS | G-2018-C15 (15-20) | G-2018-C15 (20-30) | G-2018-C17 (0-5) | G-2018-C17 (10-20) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF7346 | VF7347 | VF7348 | VF7349 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | |
| COC Number | | b937168-m058-01-01 | b937168-m058-01-01 | b937168-m058-01-01 | b937168-m058-01-01 | |
| | UNITS | G-2018-C17 (40-50) | G-2018-C6 (29NOV) (0-7.5) | G-2018-C6 (29NOV) (10-15) | G-2018-C6 (29NOV) (20-30) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF7350 | VF7351 | VF7355 | VF7356 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | |
| COC Number | | b937168-m058-01-01 | b937168-m058-01-01 | b973168-m058-02-01 | b973168-m058-02-01 | |
| | UNITS | G-2018-C6 (29NOV) (40-50) | G-2018-WR1 | G-2018-WR2 | G-2018-WR3 | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF7357 | VF7358 | VF7359 | VF7360 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | |
| COC Number | | b973168-m058-02-01 | b973168-m058-02-01 | b973168-m058-02-01 | b973168-m058-02-01 | |
| | UNITS | G-2018-WR4 | G-2018-WR5 | G-2018-WR6 | G-2018-SFC-1 (0-20) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | VF7361 | VF7362 | VF7363 | VF7364 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | |
| COC Number | | b973168-m058-02-01 | b973168-m058-02-01 | b973168-m058-02-01 | b973168-m058-02-01 | |
| | UNITS | G-2018-SFC-2 | G-2018-SFC-6 | G-2018-SFC-7 | G-2018-SFC-4 | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF7365 | |
|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | |
| COC Number | | b937168-m058-03-01 | |
| | UNITS | G-2018-SFC-5 | QC Batch |
| **Calculated Parameters** | | | |
| Filter and HNO3 Preservation | N/A | FIELD | ONSITE |



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7342 | VF7343 | VF7344 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | b937168-m058-01-01 | b937168-m058-01-01 | b937168-m058-01-01 | | |
| | UNITS | G-2018-C15 (15-20) | G-2018-C15 (20-30) | G-2018-C17 (0-5) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 306 | 41.7 | 218 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0587 | 0.109 | 0.0168 | 0.00050 | 9324441 |
| Dissolved Antimony (Sb) | mg/L | 0.00143 | 0.00407 | 0.00567 | 0.000020 | 9324441 |
| Dissolved Arsenic (As) | mg/L | 0.202 | 0.755 | 0.180 | 0.000020 | 9324441 |
| Dissolved Barium (Ba) | mg/L | 0.0467 | 0.00820 | 0.0260 | 0.000020 | 9324441 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | 0.000018 | 0.000010 | 9324441 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | <0.0000050 | <0.0000050 | 0.0000050 | 9324441 |
| Dissolved Boron (B) | mg/L | 0.047 | 0.019 | <0.010 | 0.010 | 9324441 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000631 | 0.0000208 | 0.000276 | 0.0000050 | 9324441 |
| Dissolved Chromium (Cr) | mg/L | 0.00032 | 0.00061 | <0.00010 | 0.00010 | 9324441 |
| Dissolved Cobalt (Co) | mg/L | 0.0147 | 0.00505 | 0.0281 | 0.0000050 | 9324441 |
| Dissolved Copper (Cu) | mg/L | 0.000167 | 0.000487 | 0.000467 | 0.000050 | 9324441 |
| Dissolved Iron (Fe) | mg/L | 0.0206 | 0.102 | 0.595 | 0.0010 | 9324441 |
| Dissolved Lead (Pb) | mg/L | 0.000148 | 0.000265 | 0.000695 | 0.0000050 | 9324441 |
| Dissolved Lithium (Li) | mg/L | 0.00411 | 0.00124 | 0.00203 | 0.00050 | 9324441 |
| Dissolved Manganese (Mn) | mg/L | 4.98 | 0.809 | 4.68 | 0.000050 | 9324441 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000243 | <0.000050 | 0.000050 | 9324441 |
| Dissolved Nickel (Ni) | mg/L | 0.00748 | 0.00540 | 0.0370 | 0.000020 | 9324441 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | <0.000040 | <0.000040 | 0.000040 | 9324441 |
| Dissolved Silicon (Si) | mg/L | 2.75 | 2.60 | 1.16 | 0.050 | 9324441 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000074 | <0.0000050 | 0.0000050 | 9324441 |
| Dissolved Strontium (Sr) | mg/L | 0.806 | 0.101 | 0.459 | 0.000050 | 9324441 |
| Dissolved Thallium (Tl) | mg/L | 0.0000642 | 0.0000226 | 0.0000519 | 0.0000020 | 9324441 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00390 | <0.00050 | 0.00050 | 9324441 |
| Dissolved Uranium (U) | mg/L | 0.0000026 | 0.0000162 | 0.0000034 | 0.0000020 | 9324441 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00043 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Zinc (Zn) | mg/L | 0.0367 | 0.0162 | 0.0307 | 0.00010 | 9324441 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00013 | <0.00010 | 0.00010 | 9324441 |

RDL = Reportable Detection Limit



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7342 | VF7343 | VF7344 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | b937168-m058-01-01 | b937168-m058-01-01 | b937168-m058-01-01 | | |
| | UNITS | G-2018-C15 (15-20) | G-2018-C15 (20-30) | G-2018-C17 (0-5) | RDL | QC Batch |
| Dissolved Calcium (Ca) | mg/L | 109 | 13.7 | 72.0 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 8.48 | 1.79 | 9.25 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 1.50 | 0.853 | 1.91 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 6.78 | 6.02 | 3.73 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 112 | 17.2 | 80.1 | 0.60 | 9324441 |
| RDL = Reportable Detection Limit | | | | | | |



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7344 | | | VF7345 | VF7346 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | | | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | b937168-m058-01-01 | | | b937168-m058-01-01 | b937168-m058-01-01 | | |
| | UNITS | G-2018-C17 (0-5) Lab-Dup | RDL | QC Batch | G-2018-C17 (10-20) | G-2018-C17 (40-50) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | | | | 248 | 221 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0170 | 0.00050 | 9324441 | 0.0115 | 0.0899 | 0.00050 | 9324441 |
| Dissolved Antimony (Sb) | mg/L | 0.00563 | 0.000020 | 9324441 | 0.00421 | 0.0115 | 0.000020 | 9324441 |
| Dissolved Arsenic (As) | mg/L | 0.181 | 0.000020 | 9324441 | 0.225 | 0.627 | 0.000020 | 9324441 |
| Dissolved Barium (Ba) | mg/L | 0.0257 | 0.000020 | 9324441 | 0.0267 | 0.0209 | 0.000020 | 9324441 |
| Dissolved Beryllium (Be) | mg/L | 0.000017 | 0.000010 | 9324441 | <0.000010 | 0.000010 | 0.000010 | 9324441 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000050 | 9324441 | <0.0000050 | 0.0000199 | 0.0000050 | 9324441 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 9324441 | <0.010 | <0.010 | 0.010 | 9324441 |
| Dissolved Cadmium (Cd) | mg/L | 0.000282 | 0.0000050 | 9324441 | <0.0000050 | 0.0000110 | 0.0000050 | 9324441 |
| Dissolved Chromium (Cr) | mg/L | <0.00010 | 0.00010 | 9324441 | <0.00010 | 0.00017 | 0.00010 | 9324441 |
| Dissolved Cobalt (Co) | mg/L | 0.0281 | 0.0000050 | 9324441 | 0.00301 | 0.00202 | 0.0000050 | 9324441 |
| Dissolved Copper (Cu) | mg/L | 0.000467 | 0.000050 | 9324441 | 0.000168 | 0.000476 | 0.000050 | 9324441 |
| Dissolved Iron (Fe) | mg/L | 0.596 | 0.0010 | 9324441 | 0.0806 | 0.139 | 0.0010 | 9324441 |
| Dissolved Lead (Pb) | mg/L | 0.000682 | 0.0000050 | 9324441 | 0.000338 | 0.00160 | 0.0000050 | 9324441 |
| Dissolved Lithium (Li) | mg/L | 0.00188 | 0.00050 | 9324441 | 0.00070 | 0.00052 | 0.00050 | 9324441 |
| Dissolved Manganese (Mn) | mg/L | 4.65 | 0.000050 | 9324441 | 2.07 | 0.901 | 0.000050 | 9324441 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.000050 | 9324441 | 0.000547 | 0.000941 | 0.000050 | 9324441 |
| Dissolved Nickel (Ni) | mg/L | 0.0373 | 0.000020 | 9324441 | 0.0149 | 0.00850 | 0.000020 | 9324441 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000040 | 9324441 | <0.000040 | <0.000040 | 0.000040 | 9324441 |
| Dissolved Silicon (Si) | mg/L | 1.14 | 0.050 | 9324441 | 0.545 | 1.11 | 0.050 | 9324441 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000050 | 9324441 | <0.0000050 | <0.0000050 | 0.0000050 | 9324441 |
| Dissolved Strontium (Sr) | mg/L | 0.460 | 0.000050 | 9324441 | 0.525 | 0.431 | 0.000050 | 9324441 |
| Dissolved Thallium (Tl) | mg/L | 0.0000574 | 0.0000020 | 9324441 | <0.0000020 | <0.0000020 | 0.0000020 | 9324441 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9324441 | <0.00020 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00050 | 9324441 | <0.00050 | 0.00187 | 0.00050 | 9324441 |
| Dissolved Uranium (U) | mg/L | 0.0000034 | 0.0000020 | 9324441 | 0.000266 | 0.000296 | 0.0000020 | 9324441 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00020 | 9324441 | <0.00020 | 0.00033 | 0.00020 | 9324441 |
| Dissolved Zinc (Zn) | mg/L | 0.0307 | 0.00010 | 9324441 | 0.00164 | 0.00356 | 0.00010 | 9324441 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00010 | 9324441 | <0.00010 | 0.00061 | 0.00010 | 9324441 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7344 | | | VF7345 | VF7346 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | | | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | b937168-m058-01-01 | | | b937168-m058-01-01 | b937168-m058-01-01 | | |
| | UNITS | G-2018-C17 (0-5) Lab-Dup | RDL | QC Batch | G-2018-C17 (10-20) | G-2018-C17 (40-50) | RDL | QC Batch |
| Dissolved Calcium (Ca) | mg/L | | | | 93.6 | 83.8 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | | | | 3.60 | 2.80 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | | | | 2.16 | 2.66 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | | | | 2.06 | 2.17 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 79.8 | 0.60 | 9324441 | 83.8 | 67.7 | 0.60 | 9324441 |

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7347 | VF7348 | VF7349 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | b937168-m058-01-01 | b937168-m058-01-01 | b937168-m058-01-01 | | |
| | UNITS | G-2018-C6 (29NOV) (0-7.5) | G-2018-C6 (29NOV) (10-15) | G-2018-C6 (29NOV) (20-30) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 8.26 | 47.3 | 57.9 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.148 | 0.0655 | 0.128 | 0.00050 | 9324441 |
| Dissolved Antimony (Sb) | mg/L | 0.00205 | 0.00366 | 0.00319 | 0.000020 | 9324441 |
| Dissolved Arsenic (As) | mg/L | 0.836 | 0.162 | 0.204 | 0.000020 | 9324441 |
| Dissolved Barium (Ba) | mg/L | 0.00673 | 0.0521 | 0.0163 | 0.000020 | 9324441 |
| Dissolved Beryllium (Be) | mg/L | 0.000028 | 0.000067 | <0.000010 | 0.000010 | 9324441 |
| Dissolved Bismuth (Bi) | mg/L | 0.000249 | 0.0000109 | 0.0000554 | 0.0000050 | 9324441 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324441 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000838 | 0.000628 | 0.0000435 | 0.0000050 | 9324441 |
| Dissolved Chromium (Cr) | mg/L | 0.00079 | 0.00038 | 0.00086 | 0.00010 | 9324441 |
| Dissolved Cobalt (Co) | mg/L | 0.00279 | 0.0155 | 0.00227 | 0.0000050 | 9324441 |
| Dissolved Copper (Cu) | mg/L | 0.00296 | 0.00281 | 0.000692 | 0.000050 | 9324441 |
| Dissolved Iron (Fe) | mg/L | 0.654 | 0.0684 | 0.125 | 0.0010 | 9324441 |
| Dissolved Lead (Pb) | mg/L | 0.0134 | 0.0523 | 0.00251 | 0.0000050 | 9324441 |
| Dissolved Lithium (Li) | mg/L | 0.00216 | 0.0120 | 0.00428 | 0.00050 | 9324441 |
| Dissolved Manganese (Mn) | mg/L | 0.266 | 1.21 | 0.589 | 0.000050 | 9324441 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000113 | <0.000050 | 0.000088 | 0.000050 | 9324441 |
| Dissolved Nickel (Ni) | mg/L | 0.00623 | 0.0168 | 0.00328 | 0.000020 | 9324441 |
| Dissolved Selenium (Se) | mg/L | 0.000062 | <0.000040 | <0.000040 | 0.000040 | 9324441 |
| Dissolved Silicon (Si) | mg/L | 1.91 | 2.02 | 3.96 | 0.050 | 9324441 |
| Dissolved Silver (Ag) | mg/L | 0.0000306 | <0.0000050 | 0.0000114 | 0.0000050 | 9324441 |
| Dissolved Strontium (Sr) | mg/L | 0.0203 | 0.114 | 0.124 | 0.000050 | 9324441 |
| Dissolved Thallium (Tl) | mg/L | 0.0000138 | 0.0000553 | 0.0000208 | 0.0000020 | 9324441 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Titanium (Ti) | mg/L | 0.00379 | <0.00050 | 0.00832 | 0.00050 | 9324441 |
| Dissolved Uranium (U) | mg/L | 0.0000336 | 0.0000069 | 0.0000165 | 0.0000020 | 9324441 |
| Dissolved Vanadium (V) | mg/L | 0.00040 | <0.00020 | 0.00038 | 0.00020 | 9324441 |
| Dissolved Zinc (Zn) | mg/L | 0.0126 | 0.0856 | 0.0116 | 0.00010 | 9324441 |
| Dissolved Zirconium (Zr) | mg/L | 0.00041 | <0.00010 | 0.00035 | 0.00010 | 9324441 |

RDL = Reportable Detection Limit



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7347 | VF7348 | VF7349 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| **COC Number** | | b937168-m058-01-01 | b937168-m058-01-01 | b937168-m058-01-01 | | |
| | **UNITS** | **G-2018-C6 (29NOV) (0-7.5)** | **G-2018-C6 (29NOV) (10-15)** | **G-2018-C6 (29NOV) (20-30)** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 2.31 | 11.8 | 15.4 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 0.604 | 4.34 | 4.72 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 1.97 | 1.86 | 0.894 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 4.85 | 2.96 | 4.36 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 1.17 | 18.3 | 21.7 | 0.60 | 9324441 |
| RDL = Reportable Detection Limit | | | | | | |



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Maxxam Job #: B911260
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MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7350 | VF7351 | VF7355 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | b937168-m058-01-01 | b937168-m058-01-01 | b973168-m058-02-01 | | |
| | UNITS | G-2018-C6 (29NOV) (40-50) | G-2018-WR1 | G-2018-WR2 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 19.2 | 12.0 | 7.98 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.190 | 0.379 | 0.139 | 0.00050 | 9324441 |
| Dissolved Antimony (Sb) | mg/L | 0.00128 | 0.000745 | 0.00565 | 0.000020 | 9324441 |
| Dissolved Arsenic (As) | mg/L | 0.219 | 0.626 | 0.725 | 0.000020 | 9324441 |
| Dissolved Barium (Ba) | mg/L | 0.00685 | 0.0112 | 0.00340 | 0.000020 | 9324441 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000022 | <0.000010 | 0.000010 | 9324441 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000136 | 0.0000666 | 0.0000476 | 0.0000050 | 9324441 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324441 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000116 | 0.0000272 | 0.0000185 | 0.0000050 | 9324441 |
| Dissolved Chromium (Cr) | mg/L | 0.00113 | 0.00055 | 0.00027 | 0.00010 | 9324441 |
| Dissolved Cobalt (Co) | mg/L | 0.000469 | 0.00204 | 0.00130 | 0.0000050 | 9324441 |
| Dissolved Copper (Cu) | mg/L | 0.000581 | 0.00662 | 0.00338 | 0.000050 | 9324441 |
| Dissolved Iron (Fe) | mg/L | 0.0908 | 1.31 | 0.644 | 0.0010 | 9324441 |
| Dissolved Lead (Pb) | mg/L | 0.000607 | 0.00714 | 0.0120 | 0.0000050 | 9324441 |
| Dissolved Lithium (Li) | mg/L | 0.00240 | 0.00113 | <0.00050 | 0.00050 | 9324441 |
| Dissolved Manganese (Mn) | mg/L | 0.123 | 0.0352 | 0.0783 | 0.000050 | 9324441 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000123 | 0.000077 | 0.000144 | 0.000050 | 9324441 |
| Dissolved Nickel (Ni) | mg/L | 0.00308 | 0.00652 | 0.00151 | 0.000020 | 9324441 |
| Dissolved Selenium (Se) | mg/L | 0.000042 | <0.000040 | 0.000070 | 0.000040 | 9324441 |
| Dissolved Silicon (Si) | mg/L | 4.14 | 0.656 | 0.616 | 0.050 | 9324441 |
| Dissolved Silver (Ag) | mg/L | 0.0000100 | 0.0000310 | 0.0000321 | 0.0000050 | 9324441 |
| Dissolved Strontium (Sr) | mg/L | 0.0374 | 0.0330 | 0.0195 | 0.000050 | 9324441 |
| Dissolved Thallium (Tl) | mg/L | 0.0000117 | 0.0000128 | 0.0000106 | 0.0000020 | 9324441 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Titanium (Ti) | mg/L | 0.00732 | 0.0127 | 0.00629 | 0.00050 | 9324441 |
| Dissolved Uranium (U) | mg/L | 0.0000318 | 0.0000319 | 0.0000204 | 0.0000020 | 9324441 |
| Dissolved Vanadium (V) | mg/L | 0.00061 | 0.00042 | 0.00027 | 0.00020 | 9324441 |
| Dissolved Zinc (Zn) | mg/L | 0.00788 | 0.0121 | 0.00422 | 0.00010 | 9324441 |
| Dissolved Zirconium (Zr) | mg/L | 0.00014 | 0.00012 | 0.00032 | 0.00010 | 9324441 |

RDL = Reportable Detection Limit



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7350 | VF7351 | VF7355 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| **COC Number** | | b937168-m058-01-01 | b937168-m058-01-01 | b973168-m058-02-01 | | |
| | **UNITS** | **G-2018-C6 (29NOV) (40-50)** | **G-2018-WR1** | **G-2018-WR2** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 4.97 | 4.04 | 2.77 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 1.64 | 0.469 | 0.261 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 0.624 | 1.35 | 0.703 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 4.69 | 1.13 | 0.728 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 8.17 | 2.77 | 2.28 | 0.60 | 9324441 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7356 | VF7357 | VF7358 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | b973168-m058-02-01 | b973168-m058-02-01 | b973168-m058-02-01 | | |
| | UNITS | G-2018-WR3 | G-2018-WR4 | G-2018-WR5 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 10.4 | 18.9 | 18.2 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.152 | 0.188 | 0.0875 | 0.00050 | 9324441 |
| Dissolved Antimony (Sb) | mg/L | 0.000425 | 0.000688 | 0.000771 | 0.000020 | 9324441 |
| Dissolved Arsenic (As) | mg/L | 0.401 | 0.248 | 0.149 | 0.000020 | 9324441 |
| Dissolved Barium (Ba) | mg/L | 0.00197 | 0.00171 | 0.000893 | 0.000020 | 9324441 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000015 | <0.000010 | 0.000010 | 9324441 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000197 | 0.0000190 | 0.0000115 | 0.0000050 | 9324441 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324441 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000078 | <0.0000050 | <0.0000050 | 0.0000050 | 9324441 |
| Dissolved Chromium (Cr) | mg/L | 0.00034 | 0.00042 | 0.00014 | 0.00010 | 9324441 |
| Dissolved Cobalt (Co) | mg/L | 0.000510 | 0.00155 | 0.000757 | 0.0000050 | 9324441 |
| Dissolved Copper (Cu) | mg/L | 0.00154 | 0.00278 | 0.00230 | 0.000050 | 9324441 |
| Dissolved Iron (Fe) | mg/L | 0.374 | 0.597 | 0.154 | 0.0010 | 9324441 |
| Dissolved Lead (Pb) | mg/L | 0.00180 | 0.00190 | 0.000836 | 0.0000050 | 9324441 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00177 | 0.00172 | 0.00050 | 9324441 |
| Dissolved Manganese (Mn) | mg/L | 0.0178 | 0.0223 | 0.00684 | 0.000050 | 9324441 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000055 | <0.000050 | 0.000267 | 0.000050 | 9324441 |
| Dissolved Nickel (Ni) | mg/L | 0.00182 | 0.00241 | 0.00172 | 0.000020 | 9324441 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | <0.000040 | <0.000040 | 0.000040 | 9324441 |
| Dissolved Silicon (Si) | mg/L | 0.204 | 0.345 | 0.285 | 0.050 | 9324441 |
| Dissolved Silver (Ag) | mg/L | 0.0000131 | 0.0000077 | 0.0000107 | 0.0000050 | 9324441 |
| Dissolved Strontium (Sr) | mg/L | 0.0201 | 0.0494 | 0.0411 | 0.000050 | 9324441 |
| Dissolved Thallium (Tl) | mg/L | 0.0000043 | 0.0000049 | 0.0000026 | 0.0000020 | 9324441 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Titanium (Ti) | mg/L | 0.00461 | 0.00871 | 0.00184 | 0.00050 | 9324441 |
| Dissolved Uranium (U) | mg/L | 0.0000149 | 0.0000124 | 0.0000094 | 0.0000020 | 9324441 |
| Dissolved Vanadium (V) | mg/L | 0.00026 | 0.00025 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Zinc (Zn) | mg/L | 0.00267 | 0.00375 | 0.00203 | 0.00010 | 9324441 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | <0.00010 | 0.00026 | 0.00010 | 9324441 |

RDL = Reportable Detection Limit



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7356 | VF7357 | VF7358 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | b973168-m058-02-01 | b973168-m058-02-01 | b973168-m058-02-01 | | |
| | UNITS | G-2018-WR3 | G-2018-WR4 | G-2018-WR5 | RDL | QC Batch |
| Dissolved Calcium (Ca) | mg/L | 3.61 | 5.07 | 4.94 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 0.344 | 1.51 | 1.42 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 0.720 | 1.46 | 2.32 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 1.38 | 0.664 | 0.795 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 2.02 | 2.21 | 1.53 | 0.60 | 9324441 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7359 | VF7360 | VF7361 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | b973168-m058-02-01 | b973168-m058-02-01 | b973168-m058-02-01 | | |
| | UNITS | G-2018-WR6 | G-2018-SFC-1 (0-20) | G-2018-SFC-2 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 6.17 | 1.93 | 4.09 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0326 | 0.549 | 0.441 | 0.00050 | 9324441 |
| Dissolved Antimony (Sb) | mg/L | 0.000145 | 0.000650 | 0.000781 | 0.000020 | 9324441 |
| Dissolved Arsenic (As) | mg/L | 0.0777 | 0.152 | 0.0523 | 0.000020 | 9324441 |
| Dissolved Barium (Ba) | mg/L | 0.000811 | 0.0136 | 0.0147 | 0.000020 | 9324441 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000029 | 0.000056 | 0.000010 | 9324441 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000059 | <0.0000050 | <0.0000050 | 0.0000050 | 9324441 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324441 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000055 | 0.0000615 | 0.0000801 | 0.0000050 | 9324441 |
| Dissolved Chromium (Cr) | mg/L | <0.00010 | <0.00010 | 0.00011 | 0.00010 | 9324441 |
| Dissolved Cobalt (Co) | mg/L | 0.000510 | 0.00182 | 0.00670 | 0.0000050 | 9324441 |
| Dissolved Copper (Cu) | mg/L | 0.00227 | 0.0179 | 0.0199 | 0.000050 | 9324441 |
| Dissolved Iron (Fe) | mg/L | 0.101 | 0.323 | 0.125 | 0.0010 | 9324441 |
| Dissolved Lead (Pb) | mg/L | 0.000961 | 0.00336 | 0.000613 | 0.0000050 | 9324441 |
| Dissolved Lithium (Li) | mg/L | <0.00050 | 0.00210 | 0.00297 | 0.00050 | 9324441 |
| Dissolved Manganese (Mn) | mg/L | 0.00930 | 0.0313 | 0.103 | 0.000050 | 9324441 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | <0.000050 | <0.000050 | 0.000050 | 9324441 |
| Dissolved Nickel (Ni) | mg/L | 0.00102 | 0.00611 | 0.0104 | 0.000020 | 9324441 |
| Dissolved Selenium (Se) | mg/L | 0.000051 | 0.000098 | <0.000040 | 0.000040 | 9324441 |
| Dissolved Silicon (Si) | mg/L | 0.220 | 2.01 | 2.16 | 0.050 | 9324441 |
| Dissolved Silver (Ag) | mg/L | 0.0000273 | 0.0000074 | <0.0000050 | 0.0000050 | 9324441 |
| Dissolved Strontium (Sr) | mg/L | 0.0137 | 0.00440 | 0.00998 | 0.000050 | 9324441 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | 0.0000359 | 0.0000285 | 0.0000020 | 9324441 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Titanium (Ti) | mg/L | 0.00069 | 0.00055 | <0.00050 | 0.00050 | 9324441 |
| Dissolved Uranium (U) | mg/L | 0.0000103 | 0.0000068 | 0.0000211 | 0.0000020 | 9324441 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Zinc (Zn) | mg/L | 0.00136 | 0.0267 | 0.0151 | 0.00010 | 9324441 |
| Dissolved Zirconium (Zr) | mg/L | 0.00016 | <0.00010 | <0.00010 | 0.00010 | 9324441 |
| RDL = Reportable Detection Limit | | | | | | |



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7359 | VF7360 | VF7361 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| **COC Number** | | b973168-m058-02-01 | b973168-m058-02-01 | b973168-m058-02-01 | | |
| | **UNITS** | **G-2018-WR6** | **G-2018-SFC-1 (0-20)** | **G-2018-SFC-2** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 1.77 | 0.286 | 0.606 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 0.421 | 0.296 | 0.626 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 0.597 | 0.952 | 1.85 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 0.745 | 0.601 | 1.20 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 0.92 | 9.94 | 6.84 | 0.60 | 9324441 |
| RDL = Reportable Detection Limit | | | | | | |



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7362 | VF7363 | VF7364 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| COC Number | | b973168-m058-02-01 | b973168-m058-02-01 | b973168-m058-02-01 | | |
| | UNITS | G-2018-SFC-6 | G-2018-SFC-7 | G-2018-SFC-4 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 119 | 45.0 | 4.46 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.113 | 0.0194 | 0.0375 | 0.00050 | 9324441 |
| Dissolved Antimony (Sb) | mg/L | 0.00253 | 0.0132 | 0.000131 | 0.000020 | 9324441 |
| Dissolved Arsenic (As) | mg/L | 1.86 | 1.12 | 0.0144 | 0.000020 | 9324441 |
| Dissolved Barium (Ba) | mg/L | 0.00782 | 0.000494 | 0.0260 | 0.000020 | 9324441 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | 0.000035 | 0.000010 | 9324441 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000069 | 0.0000102 | <0.0000050 | 0.0000050 | 9324441 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324441 |
| Dissolved Cadmium (Cd) | mg/L | <0.0000050 | 0.0000084 | 0.000479 | 0.0000050 | 9324441 |
| Dissolved Chromium (Cr) | mg/L | 0.00017 | <0.00010 | <0.00010 | 0.00010 | 9324441 |
| Dissolved Cobalt (Co) | mg/L | 0.00304 | 0.000176 | 0.00147 | 0.0000050 | 9324441 |
| Dissolved Copper (Cu) | mg/L | 0.000882 | 0.00182 | 0.0457 | 0.000050 | 9324441 |
| Dissolved Iron (Fe) | mg/L | 0.122 | 0.194 | 0.0028 | 0.0010 | 9324441 |
| Dissolved Lead (Pb) | mg/L | 0.000399 | 0.000641 | 0.000165 | 0.0000050 | 9324441 |
| Dissolved Lithium (Li) | mg/L | 0.00194 | 0.00183 | 0.00114 | 0.00050 | 9324441 |
| Dissolved Manganese (Mn) | mg/L | 0.835 | 0.00715 | 0.262 | 0.000050 | 9324441 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00739 | 0.00653 | <0.000050 | 0.000050 | 9324441 |
| Dissolved Nickel (Ni) | mg/L | 0.0102 | 0.00134 | 0.0435 | 0.000020 | 9324441 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000055 | <0.000040 | 0.000040 | 9324441 |
| Dissolved Silicon (Si) | mg/L | 1.63 | 0.394 | 0.376 | 0.050 | 9324441 |
| Dissolved Silver (Ag) | mg/L | 0.0000062 | 0.0000050 | <0.0000050 | 0.0000050 | 9324441 |
| Dissolved Strontium (Sr) | mg/L | 0.304 | 0.0907 | 0.0152 | 0.000050 | 9324441 |
| Dissolved Thallium (Tl) | mg/L | 0.0000024 | 0.0000024 | 0.0000296 | 0.0000020 | 9324441 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Titanium (Ti) | mg/L | 0.00183 | 0.00053 | <0.00050 | 0.00050 | 9324441 |
| Dissolved Uranium (U) | mg/L | 0.000322 | 0.0000187 | 0.0000032 | 0.0000020 | 9324441 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324441 |
| Dissolved Zinc (Zn) | mg/L | 0.00221 | 0.00146 | 0.119 | 0.00010 | 9324441 |
| Dissolved Zirconium (Zr) | mg/L | 0.00034 | <0.00010 | <0.00010 | 0.00010 | 9324441 |
| RDL = Reportable Detection Limit | | | | | | |



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7362 | VF7363 | VF7364 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/11 12:00 | 2019/02/11 12:00 | 2019/02/11 12:00 | | |
| **COC Number** | | b973168-m058-02-01 | b973168-m058-02-01 | b973168-m058-02-01 | | |
| | **UNITS** | **G-2018-SFC-6** | **G-2018-SFC-7** | **G-2018-SFC-4** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 42.6 | 16.9 | 1.27 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 3.17 | 0.658 | 0.313 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 7.92 | 2.63 | 1.02 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 1.68 | 1.27 | 0.613 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 26.8 | 4.77 | 2.63 | 0.60 | 9324441 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7365 | | |
|---|---|---|---|---|
| Sampling Date | | 2019/02/11 12:00 | | |
| COC Number | | b937168-m058-03-01 | | |
| | UNITS | G-2018-SFC-5 | RDL | QC Batch |
| **Calculated Parameters** | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 6.05 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0768 | 0.00050 | 9324434 |
| Dissolved Antimony (Sb) | mg/L | 0.00306 | 0.000020 | 9324434 |
| Dissolved Arsenic (As) | mg/L | 1.98 | 0.000020 | 9324434 |
| Dissolved Barium (Ba) | mg/L | 0.00328 | 0.000020 | 9324434 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000010 | 9324434 |
| Dissolved Bismuth (Bi) | mg/L | 0.000110 | 0.0000050 | 9324434 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | 9324434 |
| Dissolved Cadmium (Cd) | mg/L | 0.000118 | 0.0000050 | 9324434 |
| Dissolved Chromium (Cr) | mg/L | 0.00036 | 0.00010 | 9324434 |
| Dissolved Cobalt (Co) | mg/L | 0.00248 | 0.0000050 | 9324434 |
| Dissolved Copper (Cu) | mg/L | 0.0132 | 0.000050 | 9324434 |
| Dissolved Iron (Fe) | mg/L | 0.840 | 0.0010 | 9324434 |
| Dissolved Lead (Pb) | mg/L | 0.00667 | 0.0000050 | 9324434 |
| Dissolved Lithium (Li) | mg/L | 0.00074 | 0.00050 | 9324434 |
| Dissolved Manganese (Mn) | mg/L | 0.200 | 0.000050 | 9324434 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000503 | 0.000050 | 9324434 |
| Dissolved Nickel (Ni) | mg/L | 0.00822 | 0.000020 | 9324434 |
| Dissolved Selenium (Se) | mg/L | 0.000052 | 0.000040 | 9324434 |
| Dissolved Silicon (Si) | mg/L | 0.822 | 0.050 | 9324434 |
| Dissolved Silver (Ag) | mg/L | 0.0000220 | 0.0000050 | 9324434 |
| Dissolved Strontium (Sr) | mg/L | 0.0145 | 0.000050 | 9324434 |
| Dissolved Thallium (Tl) | mg/L | 0.0000235 | 0.0000020 | 9324434 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | 9324434 |
| Dissolved Titanium (Ti) | mg/L | 0.00193 | 0.00050 | 9324434 |
| Dissolved Uranium (U) | mg/L | 0.0000226 | 0.0000020 | 9324434 |
| Dissolved Vanadium (V) | mg/L | 0.00034 | 0.00020 | 9324434 |
| Dissolved Zinc (Zn) | mg/L | 0.00808 | 0.00010 | 9324434 |
| Dissolved Zirconium (Zr) | mg/L | 0.00032 | 0.00010 | 9324434 |
| RDL = Reportable Detection Limit | | | | |



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MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7365 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2019/02/11 12:00 | | |
| **COC Number** | | b937168-m058-03-01 | | |
| | **UNITS** | **G-2018-SFC-5** | **RDL** | **QC Batch** |
| Dissolved Calcium (Ca) | mg/L | 2.00 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 0.255 | 0.050 | 9323408 |
| Dissolved Potassium (K) | mg/L | 2.30 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 1.66 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 1.39 | 0.60 | 9324434 |
| RDL = Reportable Detection Limit | | | | |



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MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7342 **Collected:** 2019/02/11
**Sample ID:** G-2018-C15 (15-20) **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7343 **Collected:** 2019/02/11
**Sample ID:** G-2018-C15 (20-30) **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7344 **Collected:** 2019/02/11
**Sample ID:** G-2018-C17 (0-5) **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7344 Dup **Collected:** 2019/02/11
**Sample ID:** G-2018-C17 (0-5) **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |

**Maxxam ID:** VF7345 **Collected:** 2019/02/11
**Sample ID:** G-2018-C17 (10-20) **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7346 **Collected:** 2019/02/11
**Sample ID:** G-2018-C17 (40-50) **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7347 **Collected:** 2019/02/11
**Sample ID:** G-2018-C6 (29NOV) (0-7.5) **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7348 **Collected:** 2019/02/11
**Sample ID:** G-2018-C6 (29NOV) (10-15) **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7349 **Collected:** 2019/02/11
**Sample ID:** G-2018-C6 (29NOV) (20-30) **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7350 **Collected:** 2019/02/11
**Sample ID:** G-2018-C6 (29NOV) (40-50) **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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Client Project #: MB937168
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Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7351 **Collected:** 2019/02/11
**Sample ID:** G-2018-WR1 **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7355 **Collected:** 2019/02/11
**Sample ID:** G-2018-WR2 **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7356 **Collected:** 2019/02/11
**Sample ID:** G-2018-WR3 **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7357 **Collected:** 2019/02/11
**Sample ID:** G-2018-WR4 **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7358 **Collected:** 2019/02/11
**Sample ID:** G-2018-WR5 **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7359
**Sample ID:** G-2018-WR6
**Matrix:** Water

**Collected:** 2019/02/11
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7360
**Sample ID:** G-2018-SFC-1 (0-20)
**Matrix:** Water

**Collected:** 2019/02/11
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7361
**Sample ID:** G-2018-SFC-2
**Matrix:** Water

**Collected:** 2019/02/11
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7362
**Sample ID:** G-2018-SFC-6
**Matrix:** Water

**Collected:** 2019/02/11
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7363
**Sample ID:** G-2018-SFC-7
**Matrix:** Water

**Collected:** 2019/02/11
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7364
**Sample ID:** G-2018-SFC-4
**Matrix:** Water

**Collected:** 2019/02/11
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/21 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/21 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324441 | N/A | 2019/02/20 | Valentina Balada |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7365
**Sample ID:** G-2018-SFC-5
**Matrix:** Water

**Collected:** 2019/02/11
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/20 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 6.0°C |

**Results relate only to the items tested.**



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B911260
Report Date: 2019/02/21

## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9324434 | Dissolved Aluminum (Al) | 2019/02/19 | 98 | 80 - 120 | 99 | 80 - 120 | <0.00050 | mg/L | 1.9 | 20 |
| 9324434 | Dissolved Antimony (Sb) | 2019/02/19 | 103 | 80 - 120 | 103 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Arsenic (As) | 2019/02/19 | 103 | 80 - 120 | 102 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Barium (Ba) | 2019/02/19 | 102 | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Beryllium (Be) | 2019/02/19 | 87 | 80 - 120 | 88 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9324434 | Dissolved Bismuth (Bi) | 2019/02/19 | 102 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Boron (B) | 2019/02/19 | 89 | 80 - 120 | 88 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 9324434 | Dissolved Cadmium (Cd) | 2019/02/19 | 103 | 80 - 120 | 103 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Chromium (Cr) | 2019/02/19 | 103 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9324434 | Dissolved Cobalt (Co) | 2019/02/19 | 102 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Copper (Cu) | 2019/02/19 | 101 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | 16 | 20 |
| 9324434 | Dissolved Iron (Fe) | 2019/02/19 | 106 | 80 - 120 | 105 | 80 - 120 | <0.0010 | mg/L | 12 | 20 |
| 9324434 | Dissolved Lead (Pb) | 2019/02/19 | 100 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | 20 | 20 |
| 9324434 | Dissolved Lithium (Li) | 2019/02/19 | 86 | 80 - 120 | 86 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9324434 | Dissolved Manganese (Mn) | 2019/02/19 | 101 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Molybdenum (Mo) | 2019/02/19 | 103 | 80 - 120 | 102 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Nickel (Ni) | 2019/02/19 | 102 | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Selenium (Se) | 2019/02/19 | 102 | 80 - 120 | 101 | 80 - 120 | <0.000040 | mg/L | NC | 20 |
| 9324434 | Dissolved Silicon (Si) | 2019/02/19 | 94 | 80 - 120 | 91 | 80 - 120 | <0.050 | mg/L | NC | 20 |
| 9324434 | Dissolved Silver (Ag) | 2019/02/19 | 102 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Strontium (Sr) | 2019/02/19 | 99 | 80 - 120 | 97 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Sulphur (S) | 2019/02/19 | 101 | 80 - 120 | 99 | 80 - 120 | <0.60 | mg/L | | |
| 9324434 | Dissolved Thallium (Tl) | 2019/02/19 | 101 | 80 - 120 | 102 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Tin (Sn) | 2019/02/19 | 102 | 80 - 120 | 102 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9324434 | Dissolved Titanium (Ti) | 2019/02/19 | 100 | 80 - 120 | 97 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9324434 | Dissolved Uranium (U) | 2019/02/19 | 98 | 80 - 120 | 97 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Vanadium (V) | 2019/02/19 | 102 | 80 - 120 | 99 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9324434 | Dissolved Zinc (Zn) | 2019/02/19 | 105 | 80 - 120 | 102 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9324434 | Dissolved Zirconium (Zr) | 2019/02/19 | 101 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9324441 | Dissolved Aluminum (Al) | 2019/02/20 | 98 | 80 - 120 | 98 | 80 - 120 | <0.00050 | mg/L | 1.2 | 20 |
| 9324441 | Dissolved Antimony (Sb) | 2019/02/20 | NC | 80 - 120 | 100 | 80 - 120 | <0.000020 | mg/L | 0.84 | 20 |
| 9324441 | Dissolved Arsenic (As) | 2019/02/20 | NC | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | 0.61 | 20 |



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Maxxam Job #: B911260
Report Date: 2019/02/21

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9324441 | Dissolved Barium (Ba) | 2019/02/20 | 97 | 80 - 120 | 100 | 80 - 120 | <0.000020 | mg/L | 1.2 | 20 |
| 9324441 | Dissolved Beryllium (Be) | 2019/02/20 | 89 | 80 - 120 | 90 | 80 - 120 | <0.000010 | mg/L | 2.3 | 20 |
| 9324441 | Dissolved Bismuth (Bi) | 2019/02/20 | 99 | 80 - 120 | 100 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324441 | Dissolved Boron (B) | 2019/02/20 | 97 | 80 - 120 | 95 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 9324441 | Dissolved Cadmium (Cd) | 2019/02/20 | 98 | 80 - 120 | 98 | 80 - 120 | <0.0000050 | mg/L | 2.2 | 20 |
| 9324441 | Dissolved Chromium (Cr) | 2019/02/20 | 100 | 80 - 120 | 100 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9324441 | Dissolved Cobalt (Co) | 2019/02/20 | 99 | 80 - 120 | 100 | 80 - 120 | <0.0000050 | mg/L | 0.16 | 20 |
| 9324441 | Dissolved Copper (Cu) | 2019/02/20 | 97 | 80 - 120 | 100 | 80 - 120 | <0.000050 | mg/L | 0.11 | 20 |
| 9324441 | Dissolved Iron (Fe) | 2019/02/20 | NC | 80 - 120 | 102 | 80 - 120 | <0.0010 | mg/L | 0.10 | 20 |
| 9324441 | Dissolved Lead (Pb) | 2019/02/20 | 102 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | 1.9 | 20 |
| 9324441 | Dissolved Lithium (Li) | 2019/02/20 | 86 | 80 - 120 | 89 | 80 - 120 | <0.00050 | mg/L | 7.9 | 20 |
| 9324441 | Dissolved Manganese (Mn) | 2019/02/20 | NC | 80 - 120 | 100 | 80 - 120 | <0.000050 | mg/L | 0.64 | 20 |
| 9324441 | Dissolved Molybdenum (Mo) | 2019/02/20 | 105 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9324441 | Dissolved Nickel (Ni) | 2019/02/20 | 96 | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | 0.78 | 20 |
| 9324441 | Dissolved Selenium (Se) | 2019/02/20 | 101 | 80 - 120 | 99 | 80 - 120 | <0.000040 | mg/L | NC | 20 |
| 9324441 | Dissolved Silicon (Si) | 2019/02/20 | 88 | 80 - 120 | 90 | 80 - 120 | <0.050 | mg/L | 1.8 | 20 |
| 9324441 | Dissolved Silver (Ag) | 2019/02/20 | 100 | 80 - 120 | 99 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324441 | Dissolved Strontium (Sr) | 2019/02/20 | NC | 80 - 120 | 97 | 80 - 120 | <0.000050 | mg/L | 0.38 | 20 |
| 9324441 | Dissolved Sulphur (S) | 2019/02/20 | NC | 80 - 120 | 99 | 80 - 120 | <0.60 | mg/L | 0.42 | 20 |
| 9324441 | Dissolved Thallium (Tl) | 2019/02/20 | 98 | 80 - 120 | 101 | 80 - 120 | <0.0000020 | mg/L | 10 | 20 |
| 9324441 | Dissolved Tin (Sn) | 2019/02/20 | 102 | 80 - 120 | 101 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9324441 | Dissolved Titanium (Ti) | 2019/02/20 | 101 | 80 - 120 | 98 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9324441 | Dissolved Uranium (U) | 2019/02/20 | 104 | 80 - 120 | 100 | 80 - 120 | <0.0000020 | mg/L | 0 | 20 |
| 9324441 | Dissolved Vanadium (V) | 2019/02/20 | 101 | 80 - 120 | 99 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9324441 | Dissolved Zinc (Zn) | 2019/02/20 | 98 | 80 - 120 | 102 | 80 - 120 | <0.00010 | mg/L | 0.085 | 20 |



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Maxxam Job #: B911260
Report Date: 2019/02/21

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9324441 | Dissolved Zirconium (Zr) | 2019/02/20 | 105 | 80 - 120 | 99 | 80 - 120 | <0.00010 | mg/L | NC | 20 |

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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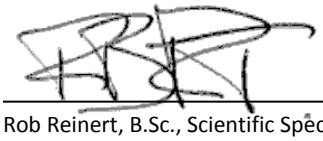
Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Rob Reinert, B.Sc., Scientific Specialist

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Maxxam
A Bureau Veritas Group Company

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: na

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/21**
Report #: R5601791
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B937829**
**Received: 2019/02/12, 13:20**

Sample Matrix: Water
# Samples Received: 12

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Acidity (CaCO3) in water (1, 2) | 8 | N/A | 2019/02/19 | | SM 22 2310 |
| Alkalinity | 4 | N/A | 2019/02/14 | CAM SOP-00448 | SM 23 2320 B m |
| Dissolved Mercury (low level) | 12 | 2019/02/14 | 2019/02/14 | CAM SOP-00453 | EPA 7470 m |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Bedford
(2) Non-accredited test method


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

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: na

**Attention: Daniel Skruch**

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

**Report Date: 2019/02/21**
Report #: R5601791
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B937829**
**Received: 2019/02/12, 13:20**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700

==========

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

Maxxam Job #: B937829
Report Date: 2019/02/21

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | IYU750 | IYU751 | IYU752 | IYU753 | IYU754 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | 2019/02/12 | 2019/02/12 | 2019/02/12 | 2019/02/12 | | |
| COC Number | | na | na | na | na | na | | |
| | **UNITS** | **G-2018-SFC-10** | **G-2018-SFC-12** | **G-2018-SFC-13** | **G-2018-SFC-14** | **G-2018-SFC-15** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | |
| Acidity | mg/L | <5.0 | 240 | 5.0 | <5.0 | 7.8 | 5.0 | 5979893 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYU755 | | | IYU756 | | | IYU757 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | | | 2019/02/12 | | | 2019/02/12 | | |
| COC Number | | na | | | na | | | na | | |
| | **UNITS** | **G-2018-SFC-16** | **RDL** | **QC Batch** | **G-2018-SFC-18** | **RDL** | **QC Batch** | **G-2018-C1 (0-10)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | | |
| Acidity | mg/L | | | | 24 | 5.0 | 5979893 | | | |
| Alkalinity (Total as CaCO3) | mg/L | 36 | 1.0 | 5973610 | | | | 43 | 1.0 | 5973610 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYU758 | IYU759 | | | IYU760 | IYU761 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | 2019/02/12 | | | 2019/02/12 | 2019/02/12 | | |
| COC Number | | na | na | | | na | na | | |
| | **UNITS** | **G-2018-C1 (20-40)** | **G-2018-C1 (60-80)** | **RDL** | **QC Batch** | **G-2018-C1 (140-160)** | **G-2018-C4 (10-20)** | **RDL** | **QC Batch** |
| **Inorganics** | | | | | | | | | |
| Acidity | mg/L | | | | | 15 | <5.0 | 5.0 | 5979893 |
| Alkalinity (Total as CaCO3) | mg/L | 28 | 14 | 1.0 | 5973610 | | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B937829
Report Date: 2019/02/21

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | IYU750 | | | IYU751 | | IYU752 | | IYU753 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | | | 2019/02/12 | | 2019/02/12 | | 2019/02/12 | | |
| COC Number | | na | | | na | | na | | na | | |
| | **UNITS** | **G-2018-SFC-10** | **RDL** | **QC Batch** | **G-2018-SFC-12** | **RDL** | **G-2018-SFC-13** | **RDL** | **G-2018-SFC-14** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.18 | 0.01 | 5975291 | 6.4 | 0.2 | 0.63 | 0.02 | 0.20 | 0.01 | 5975283 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYU754 | IYU754 | IYU755 | | IYU756 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | 2019/02/12 | 2019/02/12 | | 2019/02/12 | | |
| COC Number | | na | na | na | | na | | |
| | **UNITS** | **G-2018-SFC-15** | **G-2018-SFC-15 Lab-Dup** | **G-2018-SFC-16** | **QC Batch** | **G-2018-SFC-18** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | <0.01 | <0.01 | 0.18 | 5975283 | <0.01 | 0.01 | 5975291 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

| Maxxam ID | | IYU757 | IYU758 | IYU759 | IYU760 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | 2019/02/12 | 2019/02/12 | 2019/02/12 | | |
| COC Number | | na | na | na | na | | |
| | **UNITS** | **G-2018-C1 (0-10)** | **G-2018-C1 (20-40)** | **G-2018-C1 (60-80)** | **G-2018-C1 (140-160)** | **RDL** | **QC Batch** |
| **Metals** | | | | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.06 | 0.21 | 0.10 | 0.01 | 0.01 | 5975283 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

| Maxxam ID | | IYU761 | | |
|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | | |
| COC Number | | na | | |
| | **UNITS** | **G-2018-C4 (10-20)** | **RDL** | **QC Batch** |
| **Metals** | | | | |
| Dissolved Mercury (Hg) | ug/L | 0.15 | 0.01 | 5975283 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B937829
Report Date: 2019/02/21

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 15.0°C |

**Results relate only to the items tested.**



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

Maxxam Job #: B937829
Report Date: 2019/02/21

## QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 5973610 | Alkalinity (Total as CaCO3) | 2019/02/14 | | | 96 | 85 - 115 | <1.0 | mg/L | 0.048 | 20 |
| 5975283 | Dissolved Mercury (Hg) | 2019/02/14 | 89 | 75 - 125 | 96 | 80 - 120 | <0.01 | ug/L | NC | 20 |
| 5975291 | Dissolved Mercury (Hg) | 2019/02/14 | 96 | 75 - 125 | 97 | 80 - 120 | <0.01 | ug/L | 3.4 | 20 |
| 5979893 | Acidity | 2019/02/19 | 104 | 80 - 120 | 105 | 80 - 120 | <5.0 | mg/L | 1.1 | 25 |

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



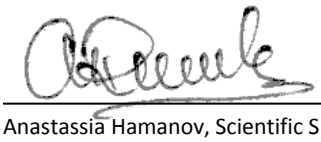
Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B937829
Report Date: 2019/02/21

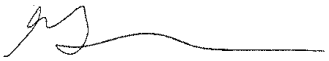
EcoMetrix Incorporated
Client Project #: 18-2525
Site Location: NS LANDS
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist



Gina Thompson, Inorganics General Chemistry Supervisor

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



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6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | | Report Information (if differs from invoice) | | Project Information (where applicable) | | Turnaround Time (TAT) Required |
|---|---|---|---|---|---|---|
| Company Name: | EcoMetrix Inc | Company Name: | | Quotation #: | | X Regular TAT (5-7 days) Most analyses |
| Contact Name: | Daniel Skruch | Contact Name: | | P.O. #/ AFE#: | | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: | 6800 Campobello Road | Address: | | Project #: | 18-2525 | Rush TAT (Surcharges will be applied) |
| | | | | Site Location: | NS Lands | 1 Day 2 Days 3-4 Days |
| Phone: | 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: | Fax: | Site #: | | |
| Email: | dskruch@ecometrix.ca | Email: | | Sampled By: | ALC+FL+CL | Date Required: |

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Rush Confirmation #:

**Regulation 153**

☐ Table 1 ☐ Res/Park ☐ Med/ Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/ Other
☐ Table ____
FOR RSC (PLEASE CIRCLE) Y / N

**Other Regulations**

☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☐ PWQO Region
☐ Other (Specify)
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED; to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G-2018-SFC-10 | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | G-2018-SFC-12 | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 3 | G-2018-SFC-13 | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 4 | G-2018-SFC-14 | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 5 | G-2018-SFC-15 | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 6 | G-2018-SFC-16 | 12/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 7 | | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 8 | | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 9 | | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 10 | | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) |
|---|---|---|---|---|---|
| C. Larsen Christian Larsen | 12/02/2019 | 13:17 | Dipk Singh DIPKA SINGH | 2019/02/12 | 13:20 |
| | | | | | |

**LABORATORY USE ONLY**

| CUSTODY SEAL Y / N | | COOLER TEMPERATURES |
|---|---|---|
| Present | Intact | |
| | | 15/15/15 |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / N

COMMENTS

***NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); ****Mercury 0.00001 mg/L**

***PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

12-Feb-19 13:20
Kyle Reinhart

B937829

MAF ENV-911

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Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

# CHAIN OF CUSTODY RECORD



| Invoice Information | Report Information (if differs from invoice) | Project Information (where applicable) | Turnaround Time (TAT) Required |
|---|---|---|---|
| Company Name: EcoMetrix Inc | Company Name: | Quotation #: | [X] Regular TAT (5-7 days) Most analyses |
| Contact Name: Daniel Skruch | Contact Name: | P.O. #/ AFE#: | PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS |
| Address: 6800 Campobello Road | Address: | Project #: 18-2525 | Rush TAT (Surcharges will be applied) |
| | | Site Location: NS Lands | [ ] 1 Day [ ] 2 Days [ ] 3-4 Days |
| Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338 | Phone: Fax: | Site #: | |
| Email: dskruch@ecometrix.ca | Email: | Sampled By: ALC+FL+CL | Date Required: |

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Rush Confirmation #:

| Regulation 153 | Other Regulations |
|---|---|
| [ ] Table 1 [ ] Res/Park [ ] Med/ Fine | [ ] CCME [ ] Sanitary Sewer Bylaw |
| [ ] Table 2 [ ] Ind/Comm [ ] Coarse | [ ] MISA [ ] Storm Sewer Bylaw |
| [ ] Table 3 [ ] Agri/ Other | [ ] PWQO Region |
| [ ] Table ____ | [ ] Other (Specify) |
| FOR RSC (PLEASE CIRCLE) Y / N | [ ] REG 558 (MIN. 3 DAY TAT REQUIRED) |

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL ( < 10 °C ) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

| | SAMPLE IDENTIFICATION | DATE SAMPLED (YYYY/MM/DD) | TIME SAMPLED (HH:MM) | MATRIX | # OF CONTAINERS SUBMITTED | FIELD FILTERED | Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED; to Burnaby* | Alkalinity FILTERED | Acidity FILTERED | Dissolved Cyanide (Free/Total/WAD) FILTERED | Dissolved Mercury** FILTERED | HOLD- DO NOT ANALYZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G-2018-SFC-18 | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 2 | G-2018-C1 (0-10) | 12/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 3 | G-2018-C1 (20-40) | 12/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 4 | G-2018-C1 (60-80) | 12/02/2019 | 12:00 | Water | 3 | X | X | X | | | X | |
| 5 | G-2018-C1 (140-160) | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 6 | G-2018-C4 (10-20) | 12/02/2019 | 12:00 | Water | 3 | X | X | | X | | X | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |

LABORATORY USE ONLY

| CUSTODY SEAL Y / N | | COOLER TEMPERATURES |
|---|---|---|
| Present | Intact | |
| | | |
| | | |
| | | |

COOLING MEDIA PRESENT: Y / N

COMMENTS

**NOTE** Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); **Mercury 0.00001 mg/L

**PLEASE CONTACT IF SAMPLE VOLUME CONCERNS***

| RELINQUISHED BY: (Signature/Print) | DATE: (YYYY/MM/DD) | TIME: (HH:MM) | RECEIVED BY: (Signature/Print) | | TIME: (HH:MM) |
|---|---|---|---|---|---|
| Christian Larsen | 12/02/2019 | 13:17 | See page 1 | | |
| | | | | | |

MAXXAM JOB #: B936096 MA

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Success Through Science®

Your Project #: MB937829
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b937829-m058-01-01, b937829-m058-02-01

**Report Date: 2019/02/20**
Report #: R2687382
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B911252**
**Received: 2019/02/14, 08:50**

Sample Matrix: Water
# Samples Received: 12

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | 12 | N/A | 2019/02/20 | BBY WI-00033 | Auto Calc |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 12 | N/A | 2019/02/20 | BBY WI-00033 | Auto Calc |
| Elements by ICPMS Low Level (dissolved) | 6 | N/A | 2019/02/19 | BBY7SOP-00002 | EPA 6020b R2 m |
| Elements by ICPMS Low Level (dissolved) | 6 | N/A | 2019/02/20 | BBY7SOP-00002 | EPA 6020b R2 m |
| Filter and HNO3 Preserve for Metals | 12 | N/A | 2019/02/15 | BBY7 WI-00004 | BCMOE Reqs 08/14 |

**Remarks:**

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



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Your Project #: MB937829
Site#: NS LANDS
Site Location: 18-2525

**Attention: KYLE REINHART**

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b937829-m058-01-01, b937829-m058-02-01

**Report Date: 2019/02/20**
Report #: R2687382
Version: 1 - Final

# CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B911252**
**Received: 2019/02/14, 08:50**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

==========

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

Maxxam Job #: B911252
Report Date: 2019/02/20

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## RESULTS OF CHEMICAL ANALYSES OF WATER

| Maxxam ID | | VF7311 | VF7312 | VF7313 | VF7314 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | 2019/02/12 | 2019/02/12 | 2019/02/12 | |
| COC Number | | b937829-m058-01-01 | b937829-m058-01-01 | b937829-m058-01-01 | b937829-m058-01-01 | |
| | UNITS | G-2018-SFC-10 | G-2018-SFC-12 | G-2018-SFC-13 | G-2018-SFC-14 | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF7315 | VF7316 | VF7317 | VF7318 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | 2019/02/12 | 2019/02/12 | 2019/02/12 | |
| COC Number | | b937829-m058-01-01 | b937829-m058-01-01 | b937829-m058-01-01 | b937829-m058-01-01 | |
| | UNITS | G-2018-SFC-15 | G-2018-SFC-16 | G-2018-SFC-18 | G-2018-C1 (0-10) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |

| Maxxam ID | | VF7319 | VF7320 | VF7321 | VF7322 | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | 2019/02/12 | 2019/02/12 | 2019/02/12 | |
| COC Number | | b937829-m058-01-01 | b937829-m058-01-01 | b937829-m058-02-01 | b937829-m058-02-01 | |
| | UNITS | G-2018-C1(20-40) | G-2018-C1(60-80) | G-2018-C1 (140-160) | G-2018-C1 (10-20) | QC Batch |
| **Calculated Parameters** | | | | | | |
| Filter and HNO3 Preservation | N/A | FIELD | FIELD | FIELD | FIELD | ONSITE |



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Maxxam Job #: B911252
Report Date: 2019/02/20

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7311 | | VF7312 | | VF7313 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | | 2019/02/12 | | 2019/02/12 | | |
| COC Number | | b937829-m058-01-01 | | b937829-m058-01-01 | | b937829-m058-01-01 | | |
| | UNITS | G-2018-SFC-10 | RDL | G-2018-SFC-12 | RDL | G-2018-SFC-13 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 5.78 | 0.50 | 13.2 | 0.50 | 19.6 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.118 | 0.00050 | 2.34 | 0.0025 | 0.280 | 0.0010 | 9324434 |
| Dissolved Antimony (Sb) | mg/L | 0.00215 | 0.000020 | 0.0156 | 0.00010 | 0.00603 | 0.000040 | 9324434 |
| Dissolved Arsenic (As) | mg/L | 0.662 | 0.000020 | 4.74 | 0.00010 | 2.39 | 0.000040 | 9324434 |
| Dissolved Barium (Ba) | mg/L | 0.00163 | 0.000020 | 0.0246 | 0.00010 | 0.00389 | 0.000040 | 9324434 |
| Dissolved Beryllium (Be) | mg/L | 0.000018 | 0.000010 | 0.000116 | 0.000050 | <0.000020 | 0.000020 | 9324434 |
| Dissolved Bismuth (Bi) | mg/L | 0.000163 | 0.0000050 | <0.000025 | 0.000025 | 0.000134 | 0.000010 | 9324434 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.010 | <0.050 | 0.050 | <0.020 | 0.020 | 9324434 |
| Dissolved Cadmium (Cd) | mg/L | 0.000245 | 0.0000050 | 0.000169 | 0.000025 | 0.000107 | 0.000010 | 9324434 |
| Dissolved Chromium (Cr) | mg/L | 0.00044 | 0.00010 | 0.00617 | 0.00050 | 0.00031 | 0.00020 | 9324434 |
| Dissolved Cobalt (Co) | mg/L | 0.00145 | 0.0000050 | 0.0228 | 0.000025 | 0.00520 | 0.000010 | 9324434 |
| Dissolved Copper (Cu) | mg/L | 0.00933 | 0.000050 | 0.0993 | 0.00025 | 0.0102 | 0.00010 | 9324434 |
| Dissolved Iron (Fe) | mg/L | 1.24 | 0.0010 | 4.79 | 0.0050 | 1.76 | 0.0020 | 9324434 |
| Dissolved Lead (Pb) | mg/L | 0.0119 | 0.0000050 | 1.38 | 0.000025 | 0.0138 | 0.000010 | 9324434 |
| Dissolved Lithium (Li) | mg/L | 0.00123 | 0.00050 | 0.0036 | 0.0025 | 0.0021 | 0.0010 | 9324434 |
| Dissolved Manganese (Mn) | mg/L | 0.0882 | 0.000050 | 0.235 | 0.00025 | 0.175 | 0.00010 | 9324434 |
| Dissolved Molybdenum (Mo) | mg/L | 0.000811 | 0.000050 | 0.00026 | 0.00025 | 0.00025 | 0.00010 | 9324434 |
| Dissolved Nickel (Ni) | mg/L | 0.0139 | 0.000020 | 0.0551 | 0.00010 | 0.0517 | 0.000040 | 9324434 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | 0.000040 | 0.00065 | 0.00020 | <0.000080 | 0.000080 | 9324434 |
| Dissolved Silicon (Si) | mg/L | 0.944 | 0.050 | 3.41 | 0.25 | 1.09 | 0.10 | 9324434 |
| Dissolved Silver (Ag) | mg/L | 0.0000335 | 0.0000050 | 0.00166 | 0.000025 | 0.000057 | 0.000010 | 9324434 |
| Dissolved Strontium (Sr) | mg/L | 0.0160 | 0.000050 | 0.0385 | 0.00025 | 0.0637 | 0.00010 | 9324434 |
| Dissolved Thallium (Tl) | mg/L | 0.0000169 | 0.0000020 | 0.000081 | 0.000010 | 0.0000157 | 0.0000040 | 9324434 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | 0.00020 | <0.0010 | 0.0010 | <0.00040 | 0.00040 | 9324434 |
| Dissolved Titanium (Ti) | mg/L | 0.00240 | 0.00050 | 0.0082 | 0.0025 | 0.0050 | 0.0010 | 9324434 |
| Dissolved Uranium (U) | mg/L | 0.0000239 | 0.0000020 | 0.000222 | 0.000010 | 0.0000286 | 0.0000040 | 9324434 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | 0.00020 | 0.0013 | 0.0010 | <0.00040 | 0.00040 | 9324434 |
| Dissolved Zinc (Zn) | mg/L | 0.0314 | 0.00010 | 0.115 | 0.00050 | 0.0430 | 0.00020 | 9324434 |
| Dissolved Zirconium (Zr) | mg/L | 0.00015 | 0.00010 | <0.00050 | 0.00050 | <0.00020 | 0.00020 | 9324434 |
| Dissolved Calcium (Ca) | mg/L | 1.84 | 0.050 | 3.26 | 0.25 | 6.04 | 0.10 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 0.288 | 0.050 | 1.22 | 0.25 | 1.10 | 0.10 | 9323408 |

RDL = Reportable Detection Limit



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Maxxam Job #: B911252
Report Date: 2019/02/20

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7311 | | VF7312 | | VF7313 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | | 2019/02/12 | | 2019/02/12 | | |
| COC Number | | b937829-m058-01-01 | | b937829-m058-01-01 | | b937829-m058-01-01 | | |
| | UNITS | G-2018-SFC-10 | RDL | G-2018-SFC-12 | RDL | G-2018-SFC-13 | RDL | QC Batch |
| Dissolved Potassium (K) | mg/L | 1.73 | 0.050 | 1.08 | 0.25 | 2.85 | 0.10 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 0.934 | 0.050 | 0.38 | 0.25 | 0.98 | 0.10 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 1.08 | 0.60 | 69.1 | 3.0 | 6.6 | 1.2 | 9324434 |
| RDL = Reportable Detection Limit | | | | | | | | |



Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B911252
Report Date: 2019/02/20

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7314 | VF7315 | VF7316 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | 2019/02/12 | 2019/02/12 | | |
| COC Number | | b937829-m058-01-01 | b937829-m058-01-01 | b937829-m058-01-01 | | |
| | UNITS | G-2018-SFC-14 | G-2018-SFC-15 | G-2018-SFC-16 | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 32.3 | 13.5 | 40.7 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.124 | 0.0558 | 0.0805 | 0.00050 | 9324434 |
| Dissolved Antimony (Sb) | mg/L | 0.0110 | 0.00221 | 0.00591 | 0.000020 | 9324434 |
| Dissolved Arsenic (As) | mg/L | 1.70 | 0.184 | 0.978 | 0.000020 | 9324434 |
| Dissolved Barium (Ba) | mg/L | 0.00145 | 0.00161 | 0.0119 | 0.000020 | 9324434 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | 0.000026 | <0.000010 | 0.000010 | 9324434 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000694 | <0.0000050 | 0.000133 | 0.0000050 | 9324434 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324434 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000283 | 0.0000292 | 0.0000370 | 0.0000050 | 9324434 |
| Dissolved Chromium (Cr) | mg/L | 0.00033 | <0.00010 | 0.00030 | 0.00010 | 9324434 |
| Dissolved Cobalt (Co) | mg/L | 0.000624 | 0.00600 | 0.00115 | 0.0000050 | 9324434 |
| Dissolved Copper (Cu) | mg/L | 0.00201 | 0.0184 | 0.00340 | 0.000050 | 9324434 |
| Dissolved Iron (Fe) | mg/L | 1.19 | 0.0081 | 0.655 | 0.0010 | 9324434 |
| Dissolved Lead (Pb) | mg/L | 0.00444 | 0.0000862 | 0.0115 | 0.0000050 | 9324434 |
| Dissolved Lithium (Li) | mg/L | 0.00117 | 0.00276 | 0.00054 | 0.00050 | 9324434 |
| Dissolved Manganese (Mn) | mg/L | 0.0221 | 0.211 | 0.366 | 0.000050 | 9324434 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00116 | <0.000050 | 0.00129 | 0.000050 | 9324434 |
| Dissolved Nickel (Ni) | mg/L | 0.00390 | 0.0432 | 0.00369 | 0.000020 | 9324434 |
| Dissolved Selenium (Se) | mg/L | 0.000069 | 0.000040 | <0.000040 | 0.000040 | 9324434 |
| Dissolved Silicon (Si) | mg/L | 2.09 | 0.866 | 0.989 | 0.050 | 9324434 |
| Dissolved Silver (Ag) | mg/L | 0.0000398 | <0.0000050 | 0.0000253 | 0.0000050 | 9324434 |
| Dissolved Strontium (Sr) | mg/L | 0.0487 | 0.0369 | 0.110 | 0.000050 | 9324434 |
| Dissolved Thallium (Tl) | mg/L | 0.0000073 | 0.0000059 | 0.0000075 | 0.0000020 | 9324434 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324434 |
| Dissolved Titanium (Ti) | mg/L | 0.00347 | <0.00050 | 0.00262 | 0.00050 | 9324434 |
| Dissolved Uranium (U) | mg/L | 0.0000110 | 0.0000020 | 0.0000193 | 0.0000020 | 9324434 |
| Dissolved Vanadium (V) | mg/L | 0.00031 | <0.00020 | 0.00039 | 0.00020 | 9324434 |
| Dissolved Zinc (Zn) | mg/L | 0.00433 | 0.0507 | 0.00337 | 0.00010 | 9324434 |
| Dissolved Zirconium (Zr) | mg/L | 0.00019 | <0.00010 | 0.00032 | 0.00010 | 9324434 |
| Dissolved Calcium (Ca) | mg/L | 10.5 | 3.91 | 14.6 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 1.49 | 0.919 | 1.00 | 0.050 | 9323408 |

RDL = Reportable Detection Limit



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Maxxam Job #: B911252
Report Date: 2019/02/20

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7314 | VF7315 | VF7316 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/12 | 2019/02/12 | 2019/02/12 | | |
| **COC Number** | | b937829-m058-01-01 | b937829-m058-01-01 | b937829-m058-01-01 | | |
| | **UNITS** | **G-2018-SFC-14** | **G-2018-SFC-15** | **G-2018-SFC-16** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 3.34 | 1.91 | 6.77 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 1.50 | 1.31 | 2.70 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 10.6 | 6.61 | 6.19 | 0.60 | 9324434 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7317 | VF7318 | VF7319 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | 2019/02/12 | 2019/02/12 | | |
| COC Number | | b937829-m058-01-01 | b937829-m058-01-01 | b937829-m058-01-01 | | |
| | UNITS | G-2018-SFC-18 | G-2018-C1 (0-10) | G-2018-C1(20-40) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 5.88 | 67.4 | 128 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 1.21 | 0.0300 | 0.0814 | 0.00050 | 9324434 |
| Dissolved Antimony (Sb) | mg/L | 0.00116 | 0.00208 | 0.00238 | 0.000020 | 9324434 |
| Dissolved Arsenic (As) | mg/L | 0.151 | 0.853 | 0.143 | 0.000020 | 9324434 |
| Dissolved Barium (Ba) | mg/L | 0.00848 | 0.00306 | 0.0130 | 0.000020 | 9324434 |
| Dissolved Beryllium (Be) | mg/L | 0.000067 | <0.000010 | <0.000010 | 0.000010 | 9324434 |
| Dissolved Bismuth (Bi) | mg/L | <0.0000050 | 0.0000121 | 0.0000122 | 0.0000050 | 9324434 |
| Dissolved Boron (B) | mg/L | <0.010 | <0.010 | <0.010 | 0.010 | 9324434 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000922 | 0.0000060 | 0.0000094 | 0.0000050 | 9324434 |
| Dissolved Chromium (Cr) | mg/L | <0.00010 | <0.00010 | <0.00010 | 0.00010 | 9324434 |
| Dissolved Cobalt (Co) | mg/L | 0.0805 | 0.000786 | 0.00121 | 0.0000050 | 9324434 |
| Dissolved Copper (Cu) | mg/L | 0.0411 | 0.00126 | 0.000366 | 0.000050 | 9324434 |
| Dissolved Iron (Fe) | mg/L | 0.0650 | 0.0938 | 0.0750 | 0.0010 | 9324434 |
| Dissolved Lead (Pb) | mg/L | 0.0000727 | 0.000767 | 0.000866 | 0.0000050 | 9324434 |
| Dissolved Lithium (Li) | mg/L | 0.00295 | 0.00120 | 0.00158 | 0.00050 | 9324434 |
| Dissolved Manganese (Mn) | mg/L | 1.28 | 0.137 | 0.194 | 0.000050 | 9324434 |
| Dissolved Molybdenum (Mo) | mg/L | <0.000050 | 0.00305 | 0.00264 | 0.000050 | 9324434 |
| Dissolved Nickel (Ni) | mg/L | 0.0438 | 0.00297 | 0.0497 | 0.000020 | 9324434 |
| Dissolved Selenium (Se) | mg/L | 0.000051 | 0.000048 | <0.000040 | 0.000040 | 9324434 |
| Dissolved Silicon (Si) | mg/L | 2.55 | 1.48 | 0.852 | 0.050 | 9324434 |
| Dissolved Silver (Ag) | mg/L | <0.0000050 | 0.0000094 | <0.0000050 | 0.0000050 | 9324434 |
| Dissolved Strontium (Sr) | mg/L | 0.0147 | 0.162 | 0.344 | 0.000050 | 9324434 |
| Dissolved Thallium (Tl) | mg/L | 0.0000177 | 0.0000049 | <0.0000020 | 0.0000020 | 9324434 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324434 |
| Dissolved Titanium (Ti) | mg/L | <0.00050 | 0.00054 | 0.00099 | 0.00050 | 9324434 |
| Dissolved Uranium (U) | mg/L | 0.0000312 | 0.0000291 | 0.000276 | 0.0000020 | 9324434 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324434 |
| Dissolved Zinc (Zn) | mg/L | 0.0852 | 0.00278 | 0.00430 | 0.00010 | 9324434 |
| Dissolved Zirconium (Zr) | mg/L | <0.00010 | 0.00013 | <0.00010 | 0.00010 | 9324434 |
| Dissolved Calcium (Ca) | mg/L | 1.06 | 25.1 | 48.2 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 0.783 | 1.13 | 1.82 | 0.050 | 9323408 |
| RDL = Reportable Detection Limit | | | | | | |



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Maxxam Job #: B911252
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MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7317 | VF7318 | VF7319 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/12 | 2019/02/12 | 2019/02/12 | | |
| **COC Number** | | b937829-m058-01-01 | b937829-m058-01-01 | b937829-m058-01-01 | | |
| | **UNITS** | **G-2018-SFC-18** | **G-2018-C1 (0-10)** | **G-2018-C1(20-40)** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 1.70 | 3.76 | 6.01 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 1.02 | 1.52 | 1.08 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 8.90 | 11.9 | 37.6 | 0.60 | 9324434 |
| RDL = Reportable Detection Limit | | | | | | |



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MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| Maxxam ID | | VF7320 | VF7321 | VF7322 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2019/02/12 | 2019/02/12 | 2019/02/12 | | |
| COC Number | | b937829-m058-01-01 | b937829-m058-02-01 | b937829-m058-02-01 | | |
| | UNITS | G-2018-C1(60-80) | G-2018-C1 (140-160) | G-2018-C1 (10-20) | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | 147 | 101 | 9.26 | 0.50 | 9323406 |
| **Dissolved Metals by ICPMS** | | | | | | |
| Dissolved Aluminum (Al) | mg/L | 0.0702 | 0.0724 | 0.0864 | 0.00050 | 9324434 |
| Dissolved Antimony (Sb) | mg/L | 0.0206 | 0.00114 | 0.00250 | 0.000020 | 9324434 |
| Dissolved Arsenic (As) | mg/L | 0.199 | 0.304 | 0.0881 | 0.000020 | 9324434 |
| Dissolved Barium (Ba) | mg/L | 0.0151 | 0.0438 | 0.00631 | 0.000020 | 9324434 |
| Dissolved Beryllium (Be) | mg/L | <0.000010 | <0.000010 | 0.000012 | 0.000010 | 9324434 |
| Dissolved Bismuth (Bi) | mg/L | 0.0000221 | <0.0000050 | 0.0000640 | 0.0000050 | 9324434 |
| Dissolved Boron (B) | mg/L | <0.010 | 0.011 | <0.010 | 0.010 | 9324434 |
| Dissolved Cadmium (Cd) | mg/L | 0.0000053 | <0.0000050 | 0.0000537 | 0.0000050 | 9324434 |
| Dissolved Chromium (Cr) | mg/L | <0.00010 | 0.00034 | 0.00072 | 0.00010 | 9324434 |
| Dissolved Cobalt (Co) | mg/L | 0.00825 | 0.0329 | 0.000725 | 0.0000050 | 9324434 |
| Dissolved Copper (Cu) | mg/L | 0.000593 | 0.000195 | 0.00102 | 0.000050 | 9324434 |
| Dissolved Iron (Fe) | mg/L | 0.318 | 5.40 | 0.107 | 0.0010 | 9324434 |
| Dissolved Lead (Pb) | mg/L | 0.00202 | 0.000197 | 0.00200 | 0.0000050 | 9324434 |
| Dissolved Lithium (Li) | mg/L | 0.00399 | 0.00120 | <0.00050 | 0.00050 | 9324434 |
| Dissolved Manganese (Mn) | mg/L | 0.687 | 1.56 | 0.408 | 0.000050 | 9324434 |
| Dissolved Molybdenum (Mo) | mg/L | 0.00145 | 0.000079 | <0.000050 | 0.000050 | 9324434 |
| Dissolved Nickel (Ni) | mg/L | 0.0275 | 0.0312 | 0.00178 | 0.000020 | 9324434 |
| Dissolved Selenium (Se) | mg/L | <0.000040 | <0.000040 | 0.000049 | 0.000040 | 9324434 |
| Dissolved Silicon (Si) | mg/L | 0.866 | 1.37 | 0.643 | 0.050 | 9324434 |
| Dissolved Silver (Ag) | mg/L | 0.0000068 | <0.0000050 | 0.0000122 | 0.0000050 | 9324434 |
| Dissolved Strontium (Sr) | mg/L | 0.382 | 0.263 | 0.0198 | 0.000050 | 9324434 |
| Dissolved Thallium (Tl) | mg/L | <0.0000020 | <0.0000020 | 0.0000062 | 0.0000020 | 9324434 |
| Dissolved Tin (Sn) | mg/L | <0.00020 | <0.00020 | <0.00020 | 0.00020 | 9324434 |
| Dissolved Titanium (Ti) | mg/L | 0.00101 | 0.00050 | 0.00593 | 0.00050 | 9324434 |
| Dissolved Uranium (U) | mg/L | 0.0000160 | <0.0000020 | 0.0000149 | 0.0000020 | 9324434 |
| Dissolved Vanadium (V) | mg/L | <0.00020 | <0.00020 | 0.00037 | 0.00020 | 9324434 |
| Dissolved Zinc (Zn) | mg/L | 0.00363 | 0.0235 | 0.00290 | 0.00010 | 9324434 |
| Dissolved Zirconium (Zr) | mg/L | 0.00017 | <0.00010 | 0.00012 | 0.00010 | 9324434 |
| Dissolved Calcium (Ca) | mg/L | 55.7 | 33.6 | 2.80 | 0.050 | 9323408 |
| Dissolved Magnesium (Mg) | mg/L | 1.88 | 4.21 | 0.552 | 0.050 | 9323408 |
| RDL = Reportable Detection Limit | | | | | | |



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Maxxam Job #: B911252
Report Date: 2019/02/20

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## LOW LEVEL DISSOLVED METALS IN WATER (WATER)

| **Maxxam ID** | | VF7320 | VF7321 | VF7322 | | |
|---|---|---|---|---|---|---|
| **Sampling Date** | | 2019/02/12 | 2019/02/12 | 2019/02/12 | | |
| **COC Number** | | b937829-m058-01-01 | b937829-m058-02-01 | b937829-m058-02-01 | | |
| | **UNITS** | **G-2018-C1(60-80)** | **G-2018-C1 (140-160)** | **G-2018-C1 (10-20)** | **RDL** | **QC Batch** |
| Dissolved Potassium (K) | mg/L | 4.41 | 1.81 | 0.324 | 0.050 | 9323408 |
| Dissolved Sodium (Na) | mg/L | 0.691 | 2.99 | 2.98 | 0.050 | 9323408 |
| Dissolved Sulphur (S) | mg/L | 45.9 | 39.3 | 4.27 | 0.60 | 9324434 |
| RDL = Reportable Detection Limit | | | | | | |



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Report Date: 2019/02/20

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7311 **Collected:** 2019/02/12
**Sample ID:** G-2018-SFC-10 **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/19 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7312 **Collected:** 2019/02/12
**Sample ID:** G-2018-SFC-12 **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/20 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7313 **Collected:** 2019/02/12
**Sample ID:** G-2018-SFC-13 **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/20 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7314 **Collected:** 2019/02/12
**Sample ID:** G-2018-SFC-14 **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/19 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7315 **Collected:** 2019/02/12
**Sample ID:** G-2018-SFC-15 **Shipped:**
**Matrix:** Water **Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/19 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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Maxxam Job #: B911252
Report Date: 2019/02/20

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7316
**Sample ID:** G-2018-SFC-16
**Matrix:** Water

**Collected:** 2019/02/12
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/19 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7317
**Sample ID:** G-2018-SFC-18
**Matrix:** Water

**Collected:** 2019/02/12
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Automated Statchk |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Automated Statchk |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/19 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7318
**Sample ID:** G-2018-C1 (0-10)
**Matrix:** Water

**Collected:** 2019/02/12
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/19 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7319
**Sample ID:** G-2018-C1(20-40)
**Matrix:** Water

**Collected:** 2019/02/12
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/20 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7320
**Sample ID:** G-2018-C1(60-80)
**Matrix:** Water

**Collected:** 2019/02/12
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/20 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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Maxxam Job #: B911252
Report Date: 2019/02/20

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## TEST SUMMARY

**Maxxam ID:** VF7321
**Sample ID:** G-2018-C1 (140-160)
**Matrix:** Water

**Collected:** 2019/02/12
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/20 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |

**Maxxam ID:** VF7322
**Sample ID:** G-2018-C1 (10-20)
**Matrix:** Water

**Collected:** 2019/02/12
**Shipped:**
**Received:** 2019/02/14

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Hardness (calculated as CaCO3) | CALC | 9323406 | N/A | 2019/02/20 | Report Automation Engine |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | CALC | 9323408 | N/A | 2019/02/20 | Report Automation Engine |
| Elements by ICPMS Low Level (dissolved) | ICP/CRCM | 9324434 | N/A | 2019/02/20 | Jeffrey Laporte |
| Filter and HNO3 Preserve for Metals | ICP | ONSITE | N/A | 2019/02/15 | Aldean Alicando |



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Maxxam Job #: B911252
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MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## GENERAL COMMENTS

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

| | |
|---|---|
| Package 1 | 6.0°C |

**LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments**

Sample VF7312 [G-2018-SFC-12] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.
Sample VF7313 [G-2018-SFC-13] Elements by ICPMS Low Level (dissolved): RDL raised due to concentration over linear range, sample dilution required.

**Results relate only to the items tested.**



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Maxxam Job #: B911252
Report Date: 2019/02/20

## QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9324434 | Dissolved Aluminum (Al) | 2019/02/19 | 98 | 80 - 120 | 99 | 80 - 120 | <0.00050 | mg/L | 1.9 | 20 |
| 9324434 | Dissolved Antimony (Sb) | 2019/02/19 | 103 | 80 - 120 | 103 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Arsenic (As) | 2019/02/19 | 103 | 80 - 120 | 102 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Barium (Ba) | 2019/02/19 | 102 | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Beryllium (Be) | 2019/02/19 | 87 | 80 - 120 | 88 | 80 - 120 | <0.000010 | mg/L | NC | 20 |
| 9324434 | Dissolved Bismuth (Bi) | 2019/02/19 | 102 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Boron (B) | 2019/02/19 | 89 | 80 - 120 | 88 | 80 - 120 | <0.010 | mg/L | NC | 20 |
| 9324434 | Dissolved Cadmium (Cd) | 2019/02/19 | 103 | 80 - 120 | 103 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Chromium (Cr) | 2019/02/19 | 103 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | NC | 20 |
| 9324434 | Dissolved Cobalt (Co) | 2019/02/19 | 102 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Copper (Cu) | 2019/02/19 | 101 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | 16 | 20 |
| 9324434 | Dissolved Iron (Fe) | 2019/02/19 | 106 | 80 - 120 | 105 | 80 - 120 | <0.0010 | mg/L | 12 | 20 |
| 9324434 | Dissolved Lead (Pb) | 2019/02/19 | 100 | 80 - 120 | 101 | 80 - 120 | <0.0000050 | mg/L | 20 | 20 |
| 9324434 | Dissolved Lithium (Li) | 2019/02/19 | 86 | 80 - 120 | 86 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9324434 | Dissolved Manganese (Mn) | 2019/02/19 | 101 | 80 - 120 | 99 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Molybdenum (Mo) | 2019/02/19 | 103 | 80 - 120 | 102 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Nickel (Ni) | 2019/02/19 | 102 | 80 - 120 | 101 | 80 - 120 | <0.000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Selenium (Se) | 2019/02/19 | 102 | 80 - 120 | 101 | 80 - 120 | <0.000040 | mg/L | NC | 20 |
| 9324434 | Dissolved Silicon (Si) | 2019/02/19 | 94 | 80 - 120 | 91 | 80 - 120 | <0.050 | mg/L | NC | 20 |
| 9324434 | Dissolved Silver (Ag) | 2019/02/19 | 102 | 80 - 120 | 102 | 80 - 120 | <0.0000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Strontium (Sr) | 2019/02/19 | 99 | 80 - 120 | 97 | 80 - 120 | <0.000050 | mg/L | NC | 20 |
| 9324434 | Dissolved Sulphur (S) | 2019/02/19 | 101 | 80 - 120 | 99 | 80 - 120 | <0.60 | mg/L | | |
| 9324434 | Dissolved Thallium (Tl) | 2019/02/19 | 101 | 80 - 120 | 102 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Tin (Sn) | 2019/02/19 | 102 | 80 - 120 | 102 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9324434 | Dissolved Titanium (Ti) | 2019/02/19 | 100 | 80 - 120 | 97 | 80 - 120 | <0.00050 | mg/L | NC | 20 |
| 9324434 | Dissolved Uranium (U) | 2019/02/19 | 98 | 80 - 120 | 97 | 80 - 120 | <0.0000020 | mg/L | NC | 20 |
| 9324434 | Dissolved Vanadium (V) | 2019/02/19 | 102 | 80 - 120 | 99 | 80 - 120 | <0.00020 | mg/L | NC | 20 |
| 9324434 | Dissolved Zinc (Zn) | 2019/02/19 | 105 | 80 - 120 | 102 | 80 - 120 | <0.00010 | mg/L | NC | 20 |



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Maxxam Job #: B911252
Report Date: 2019/02/20

## QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

| | | | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 9324434 | Dissolved Zirconium (Zr) | 2019/02/19 | 101 | 80 - 120 | 101 | 80 - 120 | <0.00010 | mg/L | NC | 20 |

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



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Maxxam Job #: B911252
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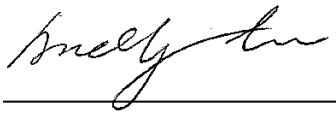
MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

## VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist

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



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BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

February 20, 2019

EcoMetrix Incorporated
Amanda L. Ciosek
6800 Campobello Road
Mississauga, Ontario L5N 2L8
aciosek@ecometrix.ca

RE: Project ECM-MS1801 Client Project: 18-2525

Dear Ms. Ciosek,

On February 6, 2019, Brooks Applied Labs (BAL) received fifteen (15) groundwater samples in a sealed cooler at a temperature of 4.8°C. The samples were logged in for arsenic speciation analyses, including arsenite [As(III)], arsenate [As(V)], monomethylarsonic acid [MMAs], and dimethylarsinic acid [DMAs].

The samples submitted for arsenic speciation analyses were filtered in the field by the client.

All samples were received, prepared, analyzed, and stored according to BAL SOPs and EPA methodology. Reagent water for dilutions and sample preservatives was monitored for contamination to account for any biases associated with the sample results.

*Arsenic Speciation Analysis by IC-ICP-CRC-MS*

Arsenic speciation analysis was performed by ion chromatography coupled to an inductively coupled plasma collision reaction cell mass spectrometer (IC-ICP-CRC-MS). Prior to analysis, an aliquot of each sample was filtered with a syringe filter and injected directly into a sealed autosampler vial. No further sample preparation was performed as any chemical alteration of a sample may shift the equilibrium of the system, resulting in changes in speciation ratios.

The arsenic speciation results were *not* method blank corrected as described in the calculations section of the relevant BAL SOP(s) and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

If the native sample result and/or the DUP result is not detected (ND), then the associated relative percent difference (RPD) is not calculated (N/C).

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the RPD are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the RPD of the MS/MSD set was not calculated (N/C).

All data was reported without qualification (aside from concentration qualifiers) and all associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information please see the *Report Information* page in your report.

It should be noted that all Brooks Applied Labs, LLC methods, standard operating procedures, inventions, ideas, processes, improvements, designs and techniques included or referred to therein, must be considered and treated as Proprietary Information, protected by the Washington State Trade Secret Act, RCW 19.108 et seq., and other laws. All Proprietary Information, written or implied, will not be distributed, copied, or altered in any fashion without prior written consent from Brooks Applied Labs, LLC. All Proprietary Information (including originals, copies, summaries or other reproductions thereof) shall remain the property of Brooks Applied Labs, LLC at all times and must be returned upon demand. Furthermore, products presented in this document may be protected by Federal Patent laws and infringement will be subject to prosecution in accordance with Title 35 US Code 271.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Collette Machado
Project Manager
Collette@brooksapplied.com

# Report Information

## Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations /certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/>. Results reported relate only to the samples listed in the report.

## Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

## Common Abbreviations

| | | | |
|---|---|---|---|
| **AR** | as received | **MS** | matrix spike |
| **BAL** | Brooks Applied Labs | **MSD** | matrix spike duplicate |
| **BLK** | method blank | **ND** | non-detect |
| **BS** | blank spike | **NR** | non-reportable |
| **CAL** | calibration standard | **N/C** | not calculated |
| **CCB** | continuing calibration blank | **PS** | post preparation spike |
| **CCV** | continuing calibration verification | **REC** | percent recovery |
| **COC** | chain of custody record | **RPD** | relative percent difference |
| **D** | dissolved fraction | **SCV** | secondary calibration verification |
| **DUP** | duplicate | **SOP** | standard operating procedure |
| **IBL** | instrument blank | **SRM** | standard reference material |
| **ICV** | initial calibration verification | **T** | total fraction |
| **MDL** | method detection limit | **TR** | total recoverable fraction |
| **MRL** | method reporting limit | | |

## Definition of Data Qualifiers

(Effective 9/23/09)

| | |
|---|---|
| **E** | An estimated value due to the presence of interferences. A full explanation is presented in the narrative. |
| **H** | Holding time and/or preservation requirements not met. Please see narrative for explanation. |
| **J** | Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate. |
| **J-1** | Estimated value. A full explanation is presented in the narrative. |
| **M** | Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation. |
| **N** | Spike recovery was not within acceptance criteria. Please see narrative for explanation. |
| **R** | Rejected, unusable value. A full explanation is presented in the narrative. |
| **U** | Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL. |
| **X** | Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. |
| | Result is estimated. |

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

**Project ID:** ECM-MS1801
**PM:** Collette Machado

**Client PM:** Amanda L Ciosek
**Client Project:** 18-2525

# Sample Information

| Sample | Lab ID | Report Matrix | Type | Sampled | Received |
|---|---|---|---|---|---|
| *M-2018-C1 (0-5)* | 1906007-01 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *M-2018-SFC-T9* | 1906007-02 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *M-2018-C13 (2.5-10)* | 1906007-03 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *M-2018-C5 (2.5-10)* | 1906007-04 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *M-2018-SFC-T23* | 1906007-05 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *M-2018-SFC-T35* | 1906007-06 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *M-2018-C4 (0-10)* | 1906007-07 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *M-2018-C18 (0-2.5)* | 1906007-08 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *G-2018-C3 (0-5)* | 1906007-09 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *G-2018-C6 (28NOV) (2.5-10)* | 1906007-10 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *G-2018-C9 (0-7.5)* | 1906007-11 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *G-2018-SFC-3* | 1906007-12 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *G-2018-SFC-8* | 1906007-13 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *G-2018-SFC-11* | 1906007-14 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |
| *G-2018-C4 (0-5)* | 1906007-15 | Groundwater | Sample | 02/05/2019 | 02/06/2019 |

# Batch Summary

| Analyte | Lab Matrix | Method | Prepared | Analyzed | Batch | Sequence |
|---|---|---|---|---|---|---|
| As(III) | Water | SOP BAL-4100 | 02/15/2019 | 02/18/2019 | B190328 | 1900190 |
| As(V) | Water | SOP BAL-4100 | 02/15/2019 | 02/18/2019 | B190328 | 1900190 |
| DMAs | Water | SOP BAL-4100 | 02/15/2019 | 02/18/2019 | B190328 | 1900190 |
| MMAs | Water | SOP BAL-4100 | 02/15/2019 | 02/18/2019 | B190328 | 1900190 |

# Sample Results

| Sample | Analyte | Report Matrix | Basis | Result | Qualifier | MDL | MRL | Unit | Batch | Sequence |
|---|---|---|---|---|---|---|---|---|---|---|
| ***M-2018-C1 (0-5)*** | | | | | | | | | | |
| 1906007-01 | As(III) | Groundwater | D | 5200 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-01 | As(V) | Groundwater | D | 326 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-01 | DMAs | Groundwater | D | ≤ 5.00 | U | 5.00 | 21.0 | µg/L | B190328 | 1900190 |
| 1906007-01 | MMAs | Groundwater | D | ≤ 9.00 | U | 9.00 | 23.0 | µg/L | B190328 | 1900190 |
| ***M-2018-SFC-T9*** | | | | | | | | | | |
| 1906007-02 | As(III) | Groundwater | D | 85.3 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-02 | As(V) | Groundwater | D | 299 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-02 | DMAs | Groundwater | D | ≤ 0.125 | U | 0.125 | 0.525 | µg/L | B190328 | 1900190 |
| 1906007-02 | MMAs | Groundwater | D | ≤ 0.225 | U | 0.225 | 0.575 | µg/L | B190328 | 1900190 |
| ***M-2018-C13 (2.5-10)*** | | | | | | | | | | |
| 1906007-03 | As(III) | Groundwater | D | 6.39 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-03 | As(V) | Groundwater | D | 36.2 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-03 | DMAs | Groundwater | D | ≤ 0.125 | U | 0.125 | 0.525 | µg/L | B190328 | 1900190 |
| 1906007-03 | MMAs | Groundwater | D | ≤ 0.225 | U | 0.225 | 0.575 | µg/L | B190328 | 1900190 |
| ***M-2018-C5 (2.5-10)*** | | | | | | | | | | |
| 1906007-04 | As(III) | Groundwater | D | 44.7 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-04 | As(V) | Groundwater | D | 1170 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-04 | DMAs | Groundwater | D | ≤ 5.00 | U | 5.00 | 21.0 | µg/L | B190328 | 1900190 |
| 1906007-04 | MMAs | Groundwater | D | ≤ 9.00 | U | 9.00 | 23.0 | µg/L | B190328 | 1900190 |
| ***M-2018-SFC-T23*** | | | | | | | | | | |
| 1906007-05 | As(III) | Groundwater | D | ≤ 4.00 | U | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-05 | As(V) | Groundwater | D | 3470 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-05 | DMAs | Groundwater | D | ≤ 5.00 | U | 5.00 | 21.0 | µg/L | B190328 | 1900190 |
| 1906007-05 | MMAs | Groundwater | D | ≤ 9.00 | U | 9.00 | 23.0 | µg/L | B190328 | 1900190 |
| ***M-2018-SFC-T35*** | | | | | | | | | | |
| 1906007-06 | As(III) | Groundwater | D | 1.47 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-06 | As(V) | Groundwater | D | 489 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-06 | DMAs | Groundwater | D | ≤ 0.125 | U | 0.125 | 0.525 | µg/L | B190328 | 1900190 |
| 1906007-06 | MMAs | Groundwater | D | ≤ 0.225 | U | 0.225 | 0.575 | µg/L | B190328 | 1900190 |

# Sample Results

| Sample | Analyte | Report Matrix | Basis | Result | Qualifier | MDL | MRL | Unit | Batch | Sequence |
|---|---|---|---|---|---|---|---|---|---|---|
| ***M-2018-C4 (0-10)*** | | | | | | | | | | |
| 1906007-07 | As(III) | Groundwater | D | 2.47 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-07 | As(V) | Groundwater | D | 279 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-07 | DMAs | Groundwater | D | ≤ 0.125 | U | 0.125 | 0.525 | µg/L | B190328 | 1900190 |
| 1906007-07 | MMAs | Groundwater | D | ≤ 0.225 | U | 0.225 | 0.575 | µg/L | B190328 | 1900190 |
| ***M-2018-C18 (0-2.5)*** | | | | | | | | | | |
| 1906007-08 | As(III) | Groundwater | D | 17.9 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-08 | As(V) | Groundwater | D | 5.97 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-08 | DMAs | Groundwater | D | ≤ 0.125 | U | 0.125 | 0.525 | µg/L | B190328 | 1900190 |
| 1906007-08 | MMAs | Groundwater | D | ≤ 0.225 | U | 0.225 | 0.575 | µg/L | B190328 | 1900190 |
| ***G-2018-C3 (0-5)*** | | | | | | | | | | |
| 1906007-09 | As(III) | Groundwater | D | 11600 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-09 | As(V) | Groundwater | D | 525 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-09 | DMAs | Groundwater | D | ≤ 5.00 | U | 5.00 | 21.0 | µg/L | B190328 | 1900190 |
| 1906007-09 | MMAs | Groundwater | D | ≤ 9.00 | U | 9.00 | 23.0 | µg/L | B190328 | 1900190 |
| ***G-2018-C6 (28NOV) (2.5-10)*** | | | | | | | | | | |
| 1906007-10 | As(III) | Groundwater | D | 1080 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-10 | As(V) | Groundwater | D | 110 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-10 | DMAs | Groundwater | D | ≤ 5.00 | U | 5.00 | 21.0 | µg/L | B190328 | 1900190 |
| 1906007-10 | MMAs | Groundwater | D | ≤ 9.00 | U | 9.00 | 23.0 | µg/L | B190328 | 1900190 |
| ***G-2018-C9 (0-7.5)*** | | | | | | | | | | |
| 1906007-11 | As(III) | Groundwater | D | 61.4 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-11 | As(V) | Groundwater | D | 41.8 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-11 | DMAs | Groundwater | D | ≤ 0.125 | U | 0.125 | 0.525 | µg/L | B190328 | 1900190 |
| 1906007-11 | MMAs | Groundwater | D | ≤ 0.225 | U | 0.225 | 0.575 | µg/L | B190328 | 1900190 |
| ***G-2018-SFC-3*** | | | | | | | | | | |
| 1906007-12 | As(III) | Groundwater | D | 88.6 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-12 | As(V) | Groundwater | D | 2320 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-12 | DMAs | Groundwater | D | ≤ 5.00 | U | 5.00 | 21.0 | µg/L | B190328 | 1900190 |
| 1906007-12 | MMAs | Groundwater | D | ≤ 9.00 | U | 9.00 | 23.0 | µg/L | B190328 | 1900190 |

# Sample Results

| Sample | Analyte | Report Matrix | Basis | Result | Qualifier | MDL | MRL | Unit | Batch | Sequence |
|---|---|---|---|---|---|---|---|---|---|---|
| ***G-2018-SFC-8*** | | | | | | | | | | |
| 1906007-13 | As(III) | Groundwater | D | 8.56 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-13 | As(V) | Groundwater | D | 132 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-13 | DMAs | Groundwater | D | ≤ 0.125 | U | 0.125 | 0.525 | µg/L | B190328 | 1900190 |
| 1906007-13 | MMAs | Groundwater | D | ≤ 0.225 | U | 0.225 | 0.575 | µg/L | B190328 | 1900190 |
| ***G-2018-SFC-11*** | | | | | | | | | | |
| 1906007-14 | As(III) | Groundwater | D | 1.57 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-14 | As(V) | Groundwater | D | 59.1 | | 0.100 | 0.500 | µg/L | B190328 | 1900190 |
| 1906007-14 | DMAs | Groundwater | D | ≤ 0.125 | U | 0.125 | 0.525 | µg/L | B190328 | 1900190 |
| 1906007-14 | MMAs | Groundwater | D | ≤ 0.225 | U | 0.225 | 0.575 | µg/L | B190328 | 1900190 |
| ***G-2018-C4 (0-5)*** | | | | | | | | | | |
| 1906007-15 | As(III) | Groundwater | D | 4960 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-15 | As(V) | Groundwater | D | 113 | | 4.00 | 20.0 | µg/L | B190328 | 1900190 |
| 1906007-15 | DMAs | Groundwater | D | ≤ 5.00 | U | 5.00 | 21.0 | µg/L | B190328 | 1900190 |
| 1906007-15 | MMAs | Groundwater | D | ≤ 9.00 | U | 9.00 | 23.0 | µg/L | B190328 | 1900190 |

**Project ID:** ECM-MS1801
**PM:** Collette Machado

**Client PM:** Amanda L Ciosek
**Client Project:** 18-2525

# Accuracy & Precision Summary

**Batch:** B190328
**Lab Matrix:** Water
**Method:** SOP BAL-4100

| Sample | Analyte | Native | Spike | Result | Units | REC & Limits | RPD & Limits |
|---|---|---|---|---|---|---|---|
| **B190328-BS1** | **Blank Spike, (1902089)** | | | | | | |
| | As(III) | | 5.010 | 5.435 | µg/L | 108% 75-125 | |
| | As(V) | | 5.000 | 5.380 | µg/L | 108% 75-125 | |
| | DMAs | | 5.210 | 5.409 | µg/L | 104% 75-125 | |
| **B190328-BS2** | **Blank Spike, (1833021)** | | | | | | |
| | MMAs | | 4.700 | 4.930 | µg/L | 105% 75-125 | |
| **B190328-DUP1** | **Duplicate, (1906007-08)** | | | | | | |
| | As(III) | 17.88 | | 17.89 | µg/L | | 0.009% 25 |
| | As(V) | 5.970 | | 6.014 | µg/L | | 0.7% 25 |
| | DMAs | ND | | ND | µg/L | | N/C 25 |
| | MMAs | ND | | ND | µg/L | | N/C 25 |
| **B190328-MS1** | **Matrix Spike, (1906007-08)** | | | | | | |
| | As(III) | 17.88 | 25.75 | 43.70 | µg/L | 100% 75-125 | |
| | As(V) | 5.970 | 26.00 | 32.67 | µg/L | 103% 75-125 | |
| | DMAs | ND | 25.50 | 25.94 | µg/L | 102% 75-125 | |
| | MMAs | ND | 25.00 | 25.54 | µg/L | 102% 75-125 | |
| **B190328-MSD1** | **Matrix Spike Duplicate, (1906007-08)** | | | | | | |
| | As(III) | 17.88 | 25.75 | 44.24 | µg/L | 102% 75-125 | 1% 25 |
| | As(V) | 5.970 | 26.00 | 32.49 | µg/L | 102% 75-125 | 0.6% 25 |
| | DMAs | ND | 25.50 | 26.16 | µg/L | 103% 75-125 | 0.8% 25 |
| | MMAs | ND | 25.00 | 25.57 | µg/L | 102% 75-125 | 0.1% 25 |
| **B190328-DUP2** | **Duplicate, (1906007-15)** | | | | | | |
| | As(III) | 4959 | | 4897 | µg/L | | 1% 25 |
| | As(V) | 113.3 | | 116.9 | µg/L | | 3% 25 |
| | DMAs | ND | | ND | µg/L | | N/C 25 |
| | MMAs | ND | | ND | µg/L | | N/C 25 |
| **B190328-MS2** | **Matrix Spike, (1906007-15)** | | | | | | |
| | As(III) | 4959 | 515.0 | 5430 | µg/L | NR 75-125 | |
| | As(V) | 113.3 | 520.0 | 650.7 | µg/L | 103% 75-125 | |
| | DMAs | ND | 510.0 | 514.4 | µg/L | 101% 75-125 | |
| | MMAs | ND | 500.0 | 507.6 | µg/L | 102% 75-125 | |

**Project ID:** ECM-MS1801
**PM:** Collette Machado

**Client PM:** Amanda L Ciosek
**Client Project:** 18-2525

# Accuracy & Precision Summary

**Batch:** B190328
**Lab Matrix:** Water
**Method:** SOP BAL-4100

| Sample | Analyte | Native | Spike | Result | Units | REC & Limits | RPD & Limits |
|---|---|---|---|---|---|---|---|
| **B190328-MSD2** | **Matrix Spike Duplicate, (1906007-15)** | | | | | | |
| | As(III) | 4959 | 515.0 | 5429 | µg/L | NR 75-125 | N/C 25 |
| | As(V) | 113.3 | 520.0 | 656.7 | µg/L | 105% 75-125 | 0.9% 25 |
| | DMAs | ND | 510.0 | 516.5 | µg/L | 101% 75-125 | 0.4% 25 |
| | MMAs | ND | 500.0 | 505.4 | µg/L | 101% 75-125 | 0.4% 25 |

# Method Blanks & Reporting Limits

**Batch:** B190328
**Matrix:** Water
**Method:** SOP BAL-4100
**Analyte:** As(III)

| Sample | Result | Units |
|---|---|---|
| B190328-BLK1 | 0.000003 | µg/L |
| B190328-BLK2 | 0.0001 | µg/L |
| B190328-BLK3 | 0.0002 | µg/L |
| B190328-BLK4 | 0.00006 | µg/L |

**Average:** 0.000
**Limit:** 0.020

**MDL:** 0.004
**MRL:** 0.020

**Analyte:** As(V)

| Sample | Result | Units |
|---|---|---|
| B190328-BLK1 | -0.0008 | µg/L |
| B190328-BLK2 | -0.001 | µg/L |
| B190328-BLK3 | -0.001 | µg/L |
| B190328-BLK4 | -0.001 | µg/L |

**Average:** -0.001
**Limit:** 0.020

**MDL:** 0.004
**MRL:** 0.020

**Analyte:** DMAs

| Sample | Result | Units |
|---|---|---|
| B190328-BLK1 | 0.00 | µg/L |
| B190328-BLK2 | 0.00 | µg/L |
| B190328-BLK3 | 0.00 | µg/L |
| B190328-BLK4 | 0.00 | µg/L |

**Average:** 0.000
**Limit:** 0.021

**MDL:** 0.005
**MRL:** 0.021

**Project ID:** ECM-MS1801
**PM:** Collette Machado

**Client PM:** Amanda L Ciosek
**Client Project:** 18-2525

# Method Blanks & Reporting Limits

**Analyte:** MMAs

| Sample | Result | Units |
|---|---|---|
| B190328-BLK1 | 0.00 | µg/L |
| B190328-BLK2 | 0.00 | µg/L |
| B190328-BLK3 | 0.00 | µg/L |
| B190328-BLK4 | 0.00 | µg/L |

**Average:** 0.000
**Limit:** 0.023

**MDL:** 0.009
**MRL:** 0.023

# Sample Containers

**Lab ID:** 1906007-01
**Sample:** M-2018-C1 (0-5)
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-02
**Sample:** M-2018-SFC-T9
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-03
**Sample:** M-2018-C13 (2.5-10)
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-04
**Sample:** M-2018-C5 (2.5-10)
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-05
**Sample:** M-2018-SFC-T23
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-06
**Sample:** M-2018-SFC-T35
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Project ID:** ECM-MS1801
**PM:** Collette Machado

**Client PM:** Amanda L Ciosek
**Client Project:** 18-2525

# Sample Containers

**Lab ID:** 1906007-07
**Sample:** M-2018-C4 (0-10)
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-08
**Sample:** M-2018-C18 (0-2.5)
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-09
**Sample:** G-2018-C3 (0-5)
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-10
**Sample:** G-2018-C6 (28NOV) (2.5-10)
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-11
**Sample:** G-2018-C9 (0-7.5)
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-12
**Sample:** G-2018-SFC-3
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Project ID:** ECM-MS1801
**PM:** Collette Machado

**Client PM:** Amanda L Ciosek
**Client Project:** 18-2525

# Sample Containers

**Lab ID:** 1906007-13
**Sample:** G-2018-SFC-8
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-14
**Sample:** G-2018-SFC-11
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

**Lab ID:** 1906007-15
**Sample:** G-2018-C4 (0-5)
**Report Matrix:** Groundwater
**Sample Type:** Sample
**Collected:** 02/05/2019
**Received:** 02/06/2019

| Des | Container | Size | Lot | Preservation | P-Lot | pH | Ship. Cont. |
|---|---|---|---|---|---|---|---|
| A | Vacutainer | 10mL | 18-0169 | EDTA (PP) | na | na | Cooler - 1906007 |

# Shipping Containers

### Cooler - 1906007

**Received:** February 6, 2019 10:30
**Tracking No:** 1Z A42 06Y 66 6227 3638 via UPS
**Coolant Type:** Ice
**Temperature:** 4.8 °C

**Description:** Cooler
**Damaged in transit?** No
**Returned to client?** No
**Comments:** IR#18

**Custody seals present?** Yes
**Custody seals intact?** Yes
**COC present?** Yes

BROOKS APPLIED LABS

# Chain-of-Custody Form

*Ship samples to:*
18804 North Creek Parkway, Suite 100
Bothell, WA 98011

For BAL use only
*Received by:* _____ *Date:* 2/6/19
*Work Order ID:* _____ *Time:* 1036
*Project ID:* _____

Client: EcoMetrix Incorporated
Contact: Daniel Skruch
Client Project ID: 18-2525
Samples Collected By: Amanda Ciosek & Fei Luo

PO Number: 05FEB2019-ALC
Phone: 1-905-794-2325 ext. 229
Email: dskruch@ecometrix.ca

Mailing Address: 6800 Campobello Road; Mississauga, ONT L5N 2L8; CANADA
Email Receipt Confirmation? Yes
BAL PM: Collette Machado

Requested TAT (business days)
☐ 20 (standard)
☐ 15*
☐ 10*
☐ 5*
☐ Other ____
*Surcharges may apply to expedited TATs

| | Sample ID | Collection: Date | Collection: Time | Client Sample Info: Matrix Type | Client Sample Info: Number of Containers | Client Sample Info: Field Filtered? | Client Sample Info: Preservation Type | BRL Analyses Required: Total Hg, EPA 1631 | Methyl Hg, EPA 1630 | ICP-MS Metals (specify) | As Species (specify) | Se Species (specify) | Filtration | Other (specify here) | Other (specify here) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M-2018-C1 (0-5) | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | Specify Here |
| 2 | M-2018-SFC-T9 | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | *APPLY TO ALL* |
| 3 | M-2018-C13 (2.5-10) | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | SWAOOO |
| 4 | M-2018-C5 (2.5-10) | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | IC-ICP-CRC-MS |
| 5 | M-2018-SFC-T23 | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | Dissolved |
| 6 | M-2018-SFC-T35 | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | As(III)As(V) MMA DMA |
| 7 | M-2018-C4 (0-10) | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | |
| 8 | M-2018-C18 (0-2.5) | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | |
| 9 | G-2018-C3 (0-5) | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | |
| 10 | G-2018-C6 (28NOV) (2.5-10 | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | |
| | Trip Blank (specify) | | | Groundwater | | Yes | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Relinquished By: AClosek | Date: 05/02/19 | Time: 16:00 | Relinquished By: | Date: | Time: |
| Received By: | Date: | Time: | Total Number of Packages: | | |

Page 1 of 2

List Hazardous Contaminants: _____





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BROOKS APPLIED LABS

# Chain-of-Custody Form

*Ship samples to:*
18804 North Creek Parkway, Suite 100
Bothell, WA 98011

For BAL use only
Received by: _____ Date: 2/6/19
Work Order ID: _____ Time: 1030
Project ID: _____

Client: EcoMetrix Incorporated
Contact: Daniel Skruch
Client Project ID: 18-2525
Samples Collected By: Amanda Ciosek & Fei Luo

PO Number: 05FEB2019-ALC
Phone: 1-905-794-2325 ext. 229
Email: dskruch@ecometrix.ca

Mailing Address: 6800 Campobello Road; Mississauga, ONT L5N 2L8; CANADA
Email Receipt Confirmation? Yes
BAL PM: Collette Machado

Requested TAT (business days)
☐ 20 (standard)
☐ 15*
☐ 10*
☐ 5*
☐ Other ____
*Surcharges may apply to expedited TATs

| | Sample ID | Collection: Date | Collection: Time | Client Sample Info: Matrix Type | Client Sample Info: Number of Containers | Client Sample Info: Field Filtered? | Client Sample Info: Preservation Type | BRL Analyses Required: Total Hg, EPA 1631 | Methyl Hg, EPA 1630 | ICP-MS Metals (specify) | As Species (specify) | Se Species (specify) | Filtration | Other (specify here) | Other (specify here) | Comments: Specify Here |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G-2018-C9 (0-7.5) | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | *APPLY TO ALL* |
| 2 | G-2018-SFC-3 | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | SWAOOO |
| 3 | G-2018-SFC-8 | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | IC-ICP-CRC-MS |
| 4 | G-2018-SFC-11 | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | Dissolved |
| 5 | G-2018-C4 (0-5) | 05-02-19 | 15:00 | Groundwater | 1 | Yes | Other | | | | ✓ | | | | | As(III)As(V) MMA DMA |
| 6 | | | | Groundwater | | Yes | | | | | | | | | | |
| 7 | | | | Groundwater | | Yes | | | | | | | | | | |
| 8 | | | | Groundwater | | Yes | | | | | | | | | | |
| 9 | | | | Groundwater | | Yes | | | | | | | | | | |
| 10 | | | | Groundwater | | Yes | | | | | | | | | | |
| | Trip Blank (specify) | | | Groundwater | | Yes | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Relinquished By: A. Ciosek | Date: 05/02/19 | Time: 16:00 | Relinquished By: | Date: | Time: |
| Received By: | Date: | Time: | Total Number of Packages: | | |



List Hazardous Contaminants: _____

samples@brooksapplied.com | brooksapplied.com

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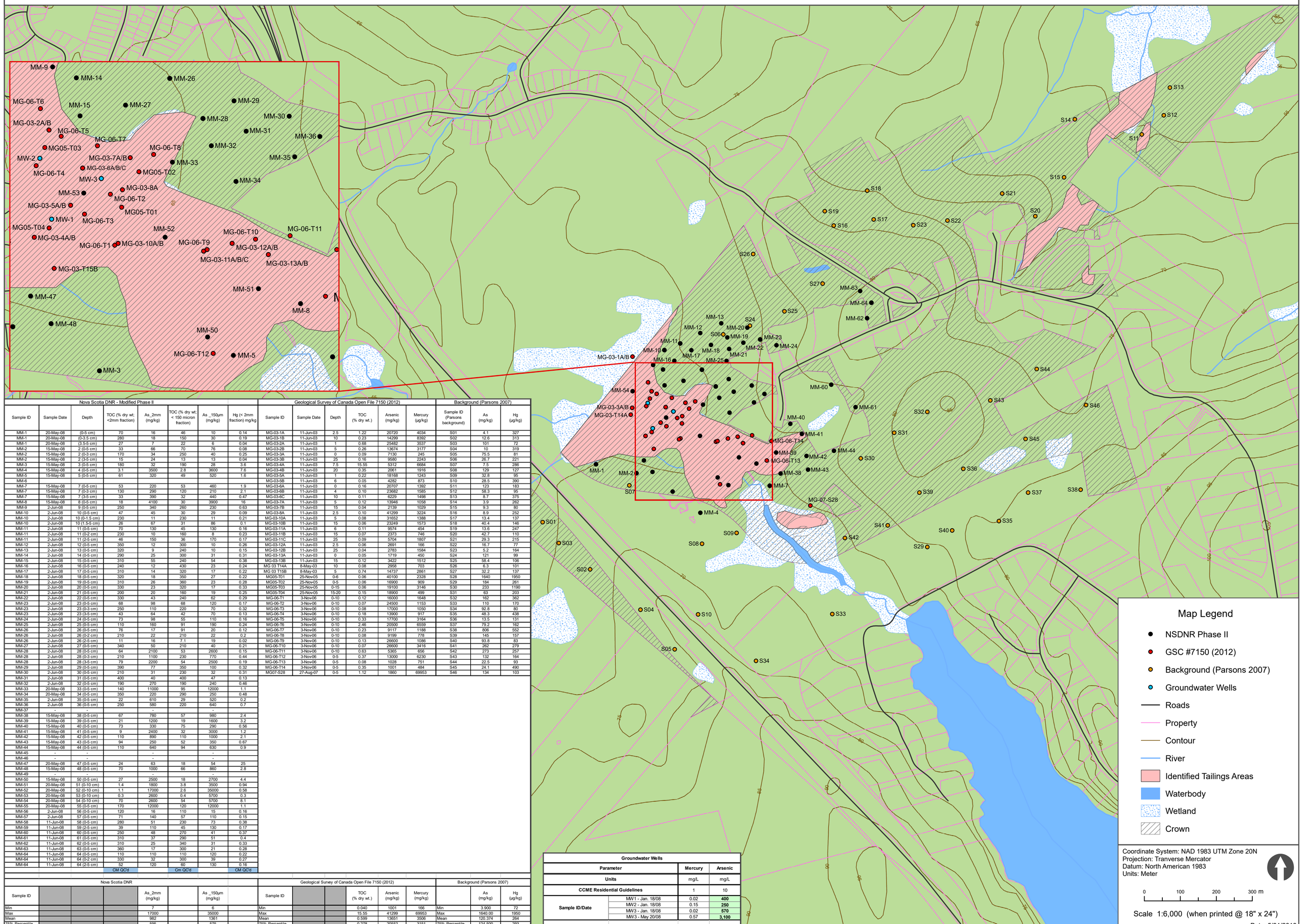
# APPENDIX D

## Historic Tailings Maps

# Montague Site Samples - Arsenic, Total Organic Carbon & Mercury




| Nova Scotia DNR - Modified Phase II | | | | | | | | Geological Survey of Canada Open File 7150 (2012) | | | | | | | Background (Parsons 2007) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Sample Date | Depth | TOC (% dry wt; <2mm fraction) | As_2mm (mg/kg) | TOC (% dry wt; < 150 micron fraction) | As _150µm (mg/kg) | Hg (< 2mm fraction) mg/kg | Sample ID | Sample Date | Depth | TOC (% dry wt.) | Arsenic (mg/kg) | Mercury (µg/kg) | | Sample ID (Parsons background) | As (mg/kg) | Hg (µg/kg) |
| MM-1 | 20-May-08 | (0-5 cm) | 70 | 16 | 46 | 10 | 0.14 | MG-03-1A | 11-Jun-03 | 2.5 | 1.22 | 20720 | 4034 | | S01 | 4.1 | 327 |
| MM-1 | 20-May-08 | (0-3.5 cm) | 280 | 18 | 150 | 30 | 0.19 | MG-03-1B | 11-Jun-03 | 10 | 0.23 | 14299 | 8392 | | S02 | 12.6 | 313 |
| MM-1 | 20-May-08 | (3.5-5 cm) | 27 | 7 | 22 | 6 | 0.04 | MG-03-2A | 11-Jun-03 | 1 | 0.68 | 25482 | 3537 | | S03 | 101 | 72 |
| MM-2 | 15-May-08 | 2 (0-5 cm) | 33 | 66 | 70 | 76 | 0.08 | MG-03-2B | 11-Jun-03 | 5 | 0.26 | 13674 | 3177 | | S04 | 10 | 319 |
| MM-2 | 15-May-08 | 2 (0-3 cm) | 170 | 34 | 250 | 40 | 0.25 | MG-03-3A | 11-Jun-03 | 0 | 0.09 | 7130 | 245 | | S05 | 75.5 | 81 |
| MM-2 | 15-May-08 | 2 (3-5 cm) | 15 | 24 | 13 | 13 | 0.04 | MG-03-3B | 11-Jun-03 | 25 | 0.16 | 9580 | 2243 | | S06 | 26.7 | 221 |
| MM-3 | 15-May-08 | 3 (0-5 cm) | 180 | 32 | 190 | 28 | 3.6 | MG-03-4A | 11-Jun-03 | 7.5 | 15.55 | 5312 | 6684 | | S07 | 7.5 | 286 |
| MM-4 | 15-May-08 | 4 (0-5 cm) | 3.1 | 3500 | 2.8 | 3600 | 7.6 | MG-03-4B | 11-Jun-03 | 20 | 0.35 | 2061 | 1916 | | S08 | 129 | 127 |
| MM-5 | 15-May-08 | 5 (0-5 cm) | 61 | 320 | 49 | 520 | 1.6 | MG-03-5A | 11-Jun-03 | 1 | 0.22 | 18168 | 1243 | | S09 | 32.8 | 95 |
| MM-6 | | | | | | | | MG-03-5B | 11-Jun-03 | 6 | 0.05 | 4282 | 873 | | S10 | 28.5 | 390 |
| MM-7 | 15-May-08 | 7 (0-5 cm) | 53 | 220 | 53 | 460 | 1.9 | MG-03-6A | 11-Jun-03 | 0 | 0.16 | 20707 | 1392 | | S11 | 123 | 183 |
| MM-7 | 15-May-08 | 7 (0-3 cm) | 130 | 290 | 120 | 210 | 2.1 | MG-03-6B | 11-Jun-03 | 4 | 0.10 | 23682 | 1585 | | S12 | 58.3 | 95 |
| MM-7 | 15-May-08 | 7 (3-5 cm) | 33 | 390 | 32 | 440 | 0.47 | MG-03-6C | 11-Jun-03 | 10 | 0.11 | 6229 | 1498 | | S13 | 8.7 | 375 |
| MM-8 | 15-May-08 | 8 (0-5 cm) | 18 | 4100 | 30 | 3900 | 16 | MG-03-7A | 11-Jun-03 | 5 | 0.12 | 13946 | 1058 | | S14 | 3.9 | 262 |
| MM-9 | 2-Jun-08 | 9 (0-5 cm) | 250 | 340 | 260 | 230 | 0.63 | MG-03-7B | 11-Jun-03 | 15 | 0.04 | 2139 | 1029 | | S15 | 9.3 | 80 |
| MM-10 | 2-Jun-08 | 10 (0-5 cm) | 47 | 45 | 30 | 29 | 0.09 | MG-03-8A | 11-Jun-03 | 2.5 | 0.10 | 41299 | 3224 | | S16 | 8.9 | 252 |
| MM-10 | 2-Jun-08 | 10 (0-1.5 cm) | 230 | 11 | 230 | 11 | 0.21 | MG-03-10A | 11-Jun-03 | 5 | 0.08 | 31652 | 1388 | | S17 | 13.4 | 137 |
| MM-10 | 2-Jun-08 | 10 (1.5-5 cm) | 26 | 67 | 31 | 86 | 0.1 | MG-03-10B | 11-Jun-03 | 15 | 0.06 | 23249 | 1573 | | S18 | 40.4 | 146 |
| MM-11 | 2-Jun-08 | 11 (0-5 cm) | 70 | 130 | 45 | 130 | 0.16 | MG-03-11A | 11-Jun-03 | 6 | 0.11 | 9574 | 454 | | S19 | 13.6 | 247 |
| MM-11 | 2-Jun-08 | 11 (0-2 cm) | 230 | 10 | 160 | 8 | 0.23 | MG-03-11B | 11-Jun-03 | 15 | 0.07 | 2373 | 746 | | S20 | 42.7 | 110 |
| MM-11 | 2-Jun-08 | 11 (2-5 cm) | 46 | 150 | 36 | 170 | 0.17 | MG-03-11C | 11-Jun-03 | 25 | 0.09 | 5704 | 1807 | | S21 | 29.3 | 215 |
| MM-12 | 2-Jun-08 | 12 (0-5 cm) | 350 | 12 | 300 | 10 | 0.26 | MG-03-12A | 11-Jun-03 | 2.5 | 0.06 | 2691 | 166 | | S22 | 16.7 | 77 |
| MM-13 | 2-Jun-08 | 13 (0-5 cm) | 320 | 9 | 240 | 10 | 0.15 | MG-03-12B | 11-Jun-03 | 25 | 0.04 | 2783 | 1584 | | S23 | 5.2 | 164 |
| MM-14 | 2-Jun-08 | 14 (0-5 cm) | 290 | 25 | 300 | 31 | 0.31 | MG-03-13A | 11-Jun-03 | 0 | 0.05 | 1719 | 450 | | S24 | 121 | 99 |
| MM-15 | 2-Jun-08 | 15 (0-5 cm) | 310 | 55 | 240 | 54 | 0.38 | MG-03-13B | 11-Jun-03 | 15 | 0.12 | 3422 | 1512 | | S25 | 58.4 | 106 |
| MM-16 | 2-Jun-08 | 16 (0-5 cm) | 240 | 12 | 430 | 23 | 0.24 | MG 03 T14A | 8-May-03 | 10 | 0.08 | 2958 | 703 | | S26 | 6.3 | 101 |
| MM-17 | 2-Jun-08 | 17 (0-5 cm) | 310 | 14 | 320 | 17 | 0.22 | MG 03 T15B | 8-May-03 | 5 | 0.74 | 14737 | 2861 | | S27 | 32.2 | 137 |
| MM-18 | 2-Jun-08 | 18 (0-5 cm) | 320 | 18 | 350 | 27 | 0.22 | MG05-T01 | 25-Nov-05 | 0-6 | 0.06 | 40100 | 2328 | | S28 | 1640 | 1950 |
| MM-19 | 2-Jun-08 | 19 (0-5 cm) | 310 | 26 | 360 | 23 | 0.28 | MG05-T02 | 25-Nov-05 | 0-5 | 0.06 | 16900 | 909 | | S29 | 184 | 261 |
| MM-20 | 2-Jun-08 | 20 (0-5 cm) | 330 | 23 | 320 | 17 | 0.33 | MG05-T03 | 25-Nov-05 | 0-15 | 0.06 | 19100 | 3146 | | S30 | 233 | 1190 |
| MM-21 | 2-Jun-08 | 21 (0-5 cm) | 200 | 20 | 160 | 19 | 0.25 | MG05-T04 | 25-Nov-05 | 15-20 | 0.15 | 18900 | 499 | | S31 | 63 | 203 |
| MM-22 | 2-Jun-08 | 22 (0-5 cm) | 330 | 43 | 240 | 62 | 0.29 | MG-06-T1 | 3-Nov-06 | 0-10 | 0.12 | 16000 | 1648 | | S32 | 162 | 362 |
| MM-23 | 2-Jun-08 | 23 (0-5 cm) | 68 | 98 | 68 | 120 | 0.17 | MG-06-T2 | 3-Nov-06 | 0-10 | 0.07 | 24500 | 1153 | | S33 | 110 | 170 |
| MM-23 | 2-Jun-08 | 23 (0-3 cm) | 250 | 110 | 220 | 70 | 0.32 | MG-06-T3 | 3-Nov-06 | 0-10 | 0.08 | 17000 | 1050 | | S34 | 92.8 | 80 |
| MM-23 | 2-Jun-08 | 23 (3-5 cm) | 43 | 64 | 42 | 70 | 0.13 | MG-06-T4 | 3-Nov-06 | 0-10 | 0.18 | 13900 | 917 | | S35 | 48.3 | 438 |
| MM-24 | 2-Jun-08 | 24 (0-5 cm) | 73 | 98 | 55 | 110 | 0.16 | MG-06-T5 | 3-Nov-06 | 0-10 | 0.33 | 17700 | 3164 | | S36 | 13.5 | 131 |
| MM-25 | 2-Jun-08 | 25 (0-5 cm) | 110 | 160 | 91 | 190 | 0.24 | MG-06-T6 | 3-Nov-06 | 0-10 | 2.46 | 20500 | 6559 | | S37 | 79.2 | 162 |
| MM-26 | 2-Jun-08 | 26 (0-5 cm) | 76 | 17 | 91 | 20 | 0.12 | MG-06-T7 | 3-Nov-06 | 0-10 | 0.23 | 9117 | 1188 | | S38 | 806 | 552 |
| MM-26 | 2-Jun-08 | 26 (0-2 cm) | 210 | 22 | 210 | 22 | 0.2 | MG-06-T8 | 3-Nov-06 | 0-10 | 0.08 | 9199 | 778 | | S39 | 145 | 157 |
| MM-26 | 2-Jun-08 | 26 (2-5 cm) | 11 | 16 | 7.1 | 19 | 0.02 | MG-06-T9 | 3-Nov-06 | 0-10 | 0.13 | 26600 | 1086 | | S40 | 93.8 | 83 |
| MM-27 | 2-Jun-08 | 27 (0-5 cm) | 340 | 50 | 210 | 40 | 0.21 | MG-06-T10 | 3-Nov-06 | 0-10 | 0.07 | 26600 | 3416 | | S41 | 262 | 279 |
| MM-28 | 2-Jun-08 | 28 (0-5 cm) | 64 | 2100 | 53 | 2600 | 0.15 | MG-06-T11 | 3-Nov-06 | 0-10 | 0.63 | 5365 | 656 | | S42 | 273 | 257 |
| MM-28 | 2-Jun-08 | 28 (0-3 cm) | 210 | 1100 | 230 | 770 | 0.44 | MG-06-T12 | 3-Nov-06 | 0-5 | 0.37 | 13000 | 6230 | | S43 | 132 | 164 |
| MM-28 | 2-Jun-08 | 28 (3-5 cm) | 79 | 2200 | 54 | 2500 | 0.19 | MG-06-T13 | 3-Nov-06 | 0-5 | 0.08 | 1028 | 751 | | S44 | 22.5 | 93 |
| MM-29 | 2-Jun-08 | 29 (0-5 cm) | 390 | 77 | 350 | 100 | 0.32 | MG-06-T14 | 3-Nov-06 | 0-5 | 0.35 | 1001 | 484 | | S45 | 24.1 | 490 |
| MM-30 | 2-Jun-08 | 30 (0-5 cm) | 210 | 31 | 230 | 32 | 0.31 | MG07-S28 | 27-Aug-07 | 0-5 | 1.12 | 1860 | 69953 | | S46 | 134 | 103 |
| MM-31 | 2-Jun-08 | 31 (0-5 cm) | 400 | 40 | 400 | 47 | 0.13 | | | | | | | | | | |
| MM-32 | 2-Jun-08 | 32 (0-5 cm) | 190 | 270 | 190 | 240 | 0.46 | | | | | | | | | | |
| MM-33 | 20-May-08 | 33 (0-5 cm) | 140 | 11000 | 95 | 12000 | 1.1 | | | | | | | | | | |
| MM-34 | 20-May-08 | 34 (0-5 cm) | 350 | 220 | 290 | 250 | 0.48 | | | | | | | | | | |
| MM-35 | 2-Jun-08 | 35 (0-5 cm) | 22 | 610 | 29 | 520 | 0.2 | | | | | | | | | | |
| MM-36 | 2-Jun-08 | 36 (0-5 cm) | 250 | 580 | 220 | 640 | 0.7 | | | | | | | | | | |
| MM-37 | - | - | | - | | - | | | | | | | | | | | |
| MM-38 | 15-May-08 | 38 (0-5 cm) | 67 | 780 | 57 | 980 | 2.4 | | | | | | | | | | |
| MM-39 | 15-May-08 | 39 (0-5 cm) | 21 | 1200 | 19 | 1600 | 3.2 | | | | | | | | | | |
| MM-40 | 15-May-08 | 40 (0-5 cm) | 73 | 330 | 75 | 290 | 0.56 | | | | | | | | | | |
| MM-41 | 15-May-08 | 41 (0-5 cm) | 9 | 2400 | 32 | 3000 | 1.2 | | | | | | | | | | |
| MM-42 | 15-May-08 | 42 (0-5 cm) | 110 | 890 | 110 | 1000 | 2.1 | | | | | | | | | | |
| MM-43 | 15-May-08 | 43 (0-5 cm) | 94 | 250 | 52 | 350 | 0.67 | | | | | | | | | | |
| MM-44 | 15-May-08 | 44 (0-5 cm) | 110 | 640 | 94 | 630 | 0.9 | | | | | | | | | | |
| MM-45 | - | - | | - | | - | | | | | | | | | | | |
| MM-46 | | | | | | | | | | | | | | | | | |
| MM-47 | 20-May-08 | 47 (0-5 cm) | 24 | 63 | 18 | 54 | 25 | | | | | | | | | | |
| MM-48 | 15-May-08 | 48 (0-5 cm) | 70 | 1000 | 66 | 860 | 2.8 | | | | | | | | | | |
| MM-49 | - | - | | - | | - | | | | | | | | | | | |
| MM-50 | 15-May-08 | 50 (0-5 cm) | 27 | 2500 | 18 | 2700 | 4.4 | | | | | | | | | | |
| MM-51 | 20-May-08 | 51 (0-10 cm) | 1.4 | 1800 | 3.8 | 3500 | 0.94 | | | | | | | | | | |
| MM-52 | 20-May-08 | 52 (0-10 cm) | 1.1 | 17000 | 2.6 | 35000 | 0.58 | | | | | | | | | | |
| MM-53 | 20-May-08 | 53 (0-10 cm) | 0.3 | 2600 | 0.4 | 5700 | 0.3 | | | | | | | | | | |
| MM-54 | 20-May-08 | 54 (0-10 cm) | 70 | 2600 | 54 | 5700 | 8.1 | | | | | | | | | | |
| MM-55 | 20-May-08 | 55 (0-5 cm) | 170 | 12000 | 120 | 12000 | 1.1 | | | | | | | | | | |
| MM-56 | 2-Jun-08 | 56 (0-5 cm) | 120 | 16 | 110 | 15 | 0.16 | | | | | | | | | | |
| MM-57 | 2-Jun-08 | 57 (0-5 cm) | 71 | 140 | 57 | 110 | 0.15 | | | | | | | | | | |
| MM-58 | 11-Jun-08 | 58 (0-5 cm) | 280 | 51 | 230 | 73 | 0.38 | | | | | | | | | | |
| MM-59 | 11-Jun-08 | 59 (2-5 cm) | 39 | 110 | 45 | 130 | 0.17 | | | | | | | | | | |
| MM-60 | 11-Jun-08 | 60 (0-5 cm) | 250 | 48 | 270 | 41 | 0.37 | | | | | | | | | | |
| MM-61 | 11-Jun-08 | 61 (0-5 cm) | 310 | 37 | 290 | 51 | 0.4 | | | | | | | | | | |
| MM-62 | 11-Jun-08 | 62 (0-5 cm) | 310 | 25 | 340 | 31 | 0.33 | | | | | | | | | | |
| MM-63 | 11-Jun-08 | 63 (0-5 cm) | 360 | 17 | 300 | 21 | 0.28 | | | | | | | | | | |
| MM-64 | 11-Jun-08 | 64 (0-5 cm) | 110 | 110 | 110 | 120 | 0.22 | | | | | | | | | | |
| MM-64 | 11-Jun-08 | 64 (0-2 cm) | 330 | 32 | 300 | 39 | 0.27 | | | | | | | | | | |
| MM-64 | 11-Jun-08 | 64 (2-5 cm) | 52 | 120 | 60 | 130 | 0.16 | | | | | | | | | | |
| | | | CM QC'd | | Cm QC'd | | CM QC'd | | | | | | | | | | |

| Nova Scotia DNR | | | | | | | Geological Survey of Canada Open File 7150 (2012) | | | | | | Background (Parsons 2007) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | | | As_2mm (mg/kg) | | As _150µm (mg/kg) | Sample ID | | | TOC (% dry wt.) | Arsenic (mg/kg) | Mercury (mg/kg) | | As (mg/kg) | Hg (µg/kg) |
| Min | | | | 7 | | 6 | Min | | | 0.040 | 1001 | 166 | Min | 3.900 | 72 |
| Max | | | | 17000 | | 35000 | Max | | | 15.55 | 41299 | 69953 | Max | 1640.00 | 1950 |
| Mean | | | | 982 | | 1361 | Mean | | | 0.599 | 13651 | 3506 | Mean | 120.374 | 264 |
| 75% Percentile | | | | 595 | | 575 | 75% Percentile | | | 0.278 | 20552 | 3151 | 75% Percentile | 124.500 | 293 |
| 90% Percentile | | | | 2520 | | 3520 | 90% Percentile | | | 0.854 | 26600 | 6329 | 90% Percentile | 241.700 | 454 |

| Groundwater Wells | | | |
|---|---|---|---|
| Parameter | | Mercury | Arsenic |
| Units | | mg/L | mg/L |
| CCME Residential Guidelines | | 1 | 10 |
| Sample ID/Date | MW1 - Jan. 18/08 | 0.02 | **400** |
| | MW2 - Jan. 18/08 | 0.15 | **250** |
| | MW3 - Jan. 18/08 | 0.02 | **570** |
| | MW3 - May 20/08 | 0.57 | **3,100** |
| Notes: | [value] | - Exceeds applicable guideline | |

## Map Legend

- NSDNR Phase II
- GSC #7150 (2012)
- Background (Parsons 2007)
- Groundwater Wells
- Roads
- Property
- Contour
- River
- Identified Tailings Areas
- Waterbody
- Wetland
- Crown

Coordinate System: NAD 1983 UTM Zone 20N
Projection: Tranverse Mercator
Datum: North American 1983
Units: Meter

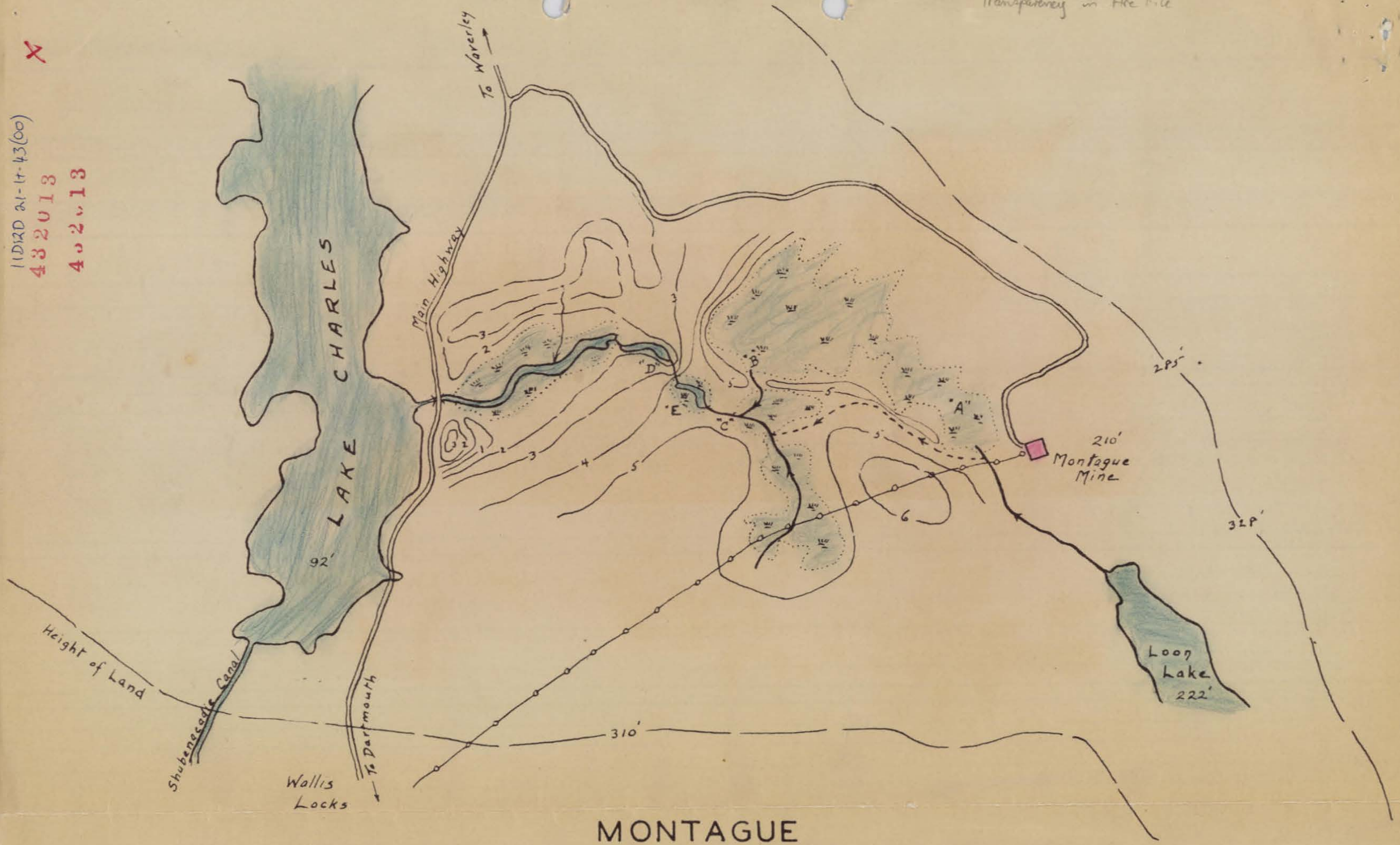
0 100 200 300 m

Scale 1:6,000 (when printed @ 18" x 24")

Date: 5/01/2018

Transparency in Arc File

11D12D 21-17-43(00)
4320113
4u2v13




# MONTAGUE
# TAILINGS DISPOSAL

# APPENDIX E

## Site Water Management Strategy and Treatment

## Site Water Management Strategy and Treatment

High level hydrological assessment was completed at the Montague Site. Detailed water management for the final design and phased construction water management should be completed in future stages of work. The area within and around the site boundaries is relatively flat and is dominated by wetland, making it challenging to determine flow direction and flow connections. High resolution LiDAR survey and aerial photography was used to make assumptions on flow direction and location of hydraulic connections. Verification of flow direction and / or water monitoring would be valuable to support future work.

The overall objectives of the water management strategy during construction are to:

- capture and treat runoff from disturbed areas; and,
- divert, where possible, clean water away from the disturbed areas.

An area of excavation and disturbance was defined, and surrounding watersheds were delineated as provided Section 4.1 of the main report. Clean water diversions were identified for watersheds upstream of the disturbed areas. Due to the wetlands that border the downstream boundary of the disturbed areas, a sheet pile wall or equivalent, will need to be installed, prior to relocating any historical tailings. The conceptual water management strategy and watershed boundaries are shown on Figure 1.

**Figure 1. Montague Conceptual Water Management Strategy during Construction**

Water from the disturbed area will be captured in a treatment pond to be treated with a portable modular water treatment system prior to release into the environment. The pond is planned to be temporary and will exist during the construction period only. This informed the following conceptual design criteria for the pond:

The pond should be able to store:

- All of the runoff from a 1:10-year, 24 hour rainfall; and,
- Seven days of average construction period (June to December) precipitation.

Any outflow from the pond due to the water treatment system was neglected for determining the capacity of the pond. This is conservative but realistic, considering the equipment may malfunction during a storm, when no one is on site to maintain it. Rainfall volumes were downloaded from the Environment Canada Shearwater Stations and a site-wide runoff coefficient of 0.9 was used to calculate the proportion of runoff. The total volume of the conceptual pond is 9510 $m^3$, consisting of 2010 $m^3$ of runoff during the 7 average days of rain and 7500 $m^3$ of runoff during the 1:10-year, 24-hour rainfall. Table 1 summarizes the volume calculations for the pond.

**Table 1: Summary of Water Treatment Volumes**

| Parameter | Value | Units |
|---|---|---|
| Total Precipitation June-Dec | 0.827 | m |
| 1:10-year, 24-hour Precipitation | 0.118 | m |
| Catchment Area | 7.033 | ha |
| Runoff Coefficient | 0.9 | |
| Volume of Storage for 7 days | 2,010 | $m^3$ |
| 1:10 Year Storm Volume | 7,500 | $m^3$ |
| Total Volume Storage | 9,510 | $m^3$ |

# APPENDIX F

## Detailed Cost Table

**TABLE A1: DETAILED COST FOR CONSTRUCTION STAGE 1 - MONTAGUE GOLD MINE**

| ITEM | DESCRIPTION | UNIT | BREAKDOWN OF LINE ITEM TOTALS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | No. Units | | | | | | Line Item Cost | | | | | |
| | | | Area 1A - Excavation | Area 1B - Cover | Area 1C - Cover | Area 3A - Cover | Area 3B - Cover | ESTIMATE OF UNIT PRICE ($/UNIT) | Area 1A - Excavation | Area 1B - Cover | Area 1C - Cover | Area 3A - Cover | Area 3B - Cover | Total |
| **DIRECTS** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **1.0** | **Water Diversion** | | | | | | | | | | | | | |
| **1.1** | Ditch 1 (Water Diversion) | | | | | | | | | | | | | |
| | Clearing, Stripping, Grubbing | m2 | 5,270 | | | | | $15 | 79,050 | | | | | $79,050 |
| | Excavation and Stockpiling | m3 | 1,240 | | | | | $33 | 40,920 | | | | | $40,920 |
| | Geotextile Placement | m2 | 3,201 | | | | | $3 | 9,602 | | | | | $9,602 |
| | 200 mm Riprap Liner, 0.3 m Thick | m3 | 960 | | | | | $15 | 14,403 | | | | | $14,403 |
| | | | | | | | | | | | | | | |
| **1.2** | Ditch 2 (Water Diversion) | | | | | | | | | | | | | |
| | Clearing, Stripping, Grubbing | m2 | 1,870 | | | | | $15 | 28,050 | | | | | $28,050 |
| | Excavation and Stockpiling | m3 | 440 | | | | | $33 | 14,520 | | | | | $14,520 |
| | Geotextile Placement | m2 | 1,136 | | | | | $3 | 3,407 | | | | | $3,407 |
| | 200 mm Riprap Liner, 0.3 m Thick | m3 | 341 | | | | | $15 | 5,111 | | | | | $5,111 |
| | | | | | | | | | | | | | | |
| **1.3** | Swale 1 (for Containment Cell 1) | | | | | | | | | | | | | |
| | Clearing, Stripping, Grubbing | m2 | | | | | | $15 | 0 | | | | | |
| | Excavation and Stockpiling | m3 | | | | | | $33 | 0 | | | | | |
| | Geotextile Placement | m2 | 1,445 | | | | | $3 | 4,336 | | | | | $4,336 |
| | 200 mm Riprap Liner, 0.3 m Thick | m3 | 434 | | | | | $15 | 6,504 | | | | | $6,504 |
| | | | | | | | | | | | | | | |
| **1.3** | Swale 2 (for Containment Cell 2) | | | | | | | | | | | | | |
| | Clearing, Stripping, Grubbing | m2 | | | | | | $15 | 0 | | | | | |
| | Excavation and Stockpiling | m3 | | | | | | $33 | 0 | | | | | |
| | Geotextile Placement | m2 | 3,097 | | | | | $3 | 9,292 | | | | | $9,292 |
| | 200 mm Riprap Liner, 0.3 m Thick | m3 | 929 | | | | | $15 | 13,938 | | | | | $13,938 |
| | | | | | | | | | | | | | | |
| **1.4** | Ditch 3 (for Low Permeability Cover) | | | | | | | | | | | | | |
| | Clearing, Stripping, Grubbing | m2 | | | | | | $15 | | | | | | |
| | Excavation and Stockpiling | m3 | | 2,243 | 4,251 | 2,477 | | $33 | | 74,003 | 140,283 | 81,725 | | $296,010 |
| | Geotextile Placement | m2 | | 3,332 | 6,316 | 3,680 | | $3 | | 9,996 | 18,949 | 11,039 | | $39,984 |
| | 200 mm Riprap Liner, 0.3 m Thick | m3 | | 1,000 | 1,895 | 1,104 | | $15 | | 14,994 | 28,423 | 16,558 | | $59,975 |
| | | | | | | | | | | | | | | |
| **2.0** | **Access Roads/Laydown** | | | | | | | | | | | | | |
| **2.1** | Access Road 1 | | | | | | | | | | | | | |
| | Clearing, Stripping, Grubbing | m2 | 5,732 | 2,574 | 4,000 | 3,614 | 941 | $15 | $85,982 | $38,610 | $59,994 | $54,203 | $14,108 | $252,896 |
| | Geogrid | m2 | 5,732 | 2,574 | 4,000 | 3,614 | 941 | $5 | $28,661 | $12,870 | $19,998 | $18,068 | $4,703 | $84,299 |
| | <150 mm Rockfill, 1 m Thick | m3 | 4,343 | 1,950 | 3,030 | 2,738 | 713 | $20 | $86,850 | $39,000 | $60,600 | $54,750 | $14,250 | $255,450 |
| | <75 mm Road Topping, 0.3 m Thick | m3 | 1,120 | 503 | 782 | 706 | 184 | $20 | $22,407 | $10,062 | $15,635 | $14,126 | $3,677 | $65,906 |
| | | | | | | | | | | | | | | |
| **2.2** | Access Road 2 | | | | | | | | | | | | | |
| | Clearing, Stripping, Grubbing | m2 | 4,455 | | | | | $15 | $66,825 | | | | | $66,825 |
| | Geogrid | m2 | 4,455 | | | | | $5 | $22,275 | | | | | $22,275 |
| | <150 mm Rockfill, 1 m Thick | m3 | 3,375 | | | | | $20 | $67,500 | | | | | $67,500 |
| | <75 mm Road Topping, 0.3 m Thick | m3 | 871 | | | | | $20 | $17,415 | | | | | $17,415 |
| | | | | | | | | | | | | | | |
| **2.3** | Construction Laydown Area 1 | | | | | | | | | | | | | |
| | Clearing, Stripping, Grubbing | m2 | 1,756 | | | | | $15 | $26,340 | | | | | $26,340 |
| | Geogrid | m2 | 1,756 | | | | | $5 | $8,780 | | | | | $8,780 |
| | <150 mm Rockfill, 1 m Thick | m3 | 1,660 | | | | | $20 | $33,200 | | | | | $33,200 |
| | <75 mm Road Topping, 0.3 m Thick | m3 | 485 | | | | | $20 | $9,708 | | | | | $9,708 |
| | | | | | | | | | | | | | | |
| **2.4** | Construction Laydown Area 2 | | | | | | | | | | | | | |
| | Clearing, Stripping, Grubbing | m3 | 1,756 | 1,756 | 1,756 | 1,756 | | $15 | $26,340 | $26,340 | $26,340 | $26,340 | | $105,360 |
| | Geogrid | m3 | 1,756 | 1,756 | 1,756 | 1,756 | | $5 | $8,780 | $8,780 | $8,780 | $8,780 | | $35,120 |
| | <150 mm Rockfill, 1 m Thick | m3 | 1,660 | 1,660 | 1,660 | 1,660 | | $20 | $33,200 | $33,200 | $33,200 | $33,200 | | $132,800 |
| | <75 mm Road Topping, 0.3 m Thick | m3 | 485 | 485 | 485 | 485 | | $20 | $9,708 | $9,708 | $9,708 | $9,708 | | $38,832 |
| | | | | | | | | | | | | | | |
| **3.0** | **Cut-off Wall** | | | | | | | | | | | | | |
| **3.1** | Cutoff Wall 1 | | | | | | | | | | | | | |
| | Excavation of Tailings, Mixing, Placement of Soil/Bentonite Cutoff | m | 5,211 | | | | | $30 | $156,330 | | | | | $156,330 |
| | | | | | | | | | | | | | | |
| **4.0** | **Containment Cell** | | | | | | | | | | | | | |
| **4.1** | Containment Cell 1 | | | | | | | | | | | | | |
| | Berm Excavated Tailings/Till (Workable) | m3 | 22,750 | | | | | $33 | $750,750 | | | | | $750,750 |
| | Liner/Cover Bituminous Geomembrane | m2 | 20,205 | | | | | $20 | $404,091 | | | | | $404,091 |
| | Drainage <75 mm Clear Stone Drainage Blanket, 0.3 m Thick | m3 | 643 | | | | | $20 | $12,863 | | | | | $12,863 |
| | Drainage Geotextile | m2 | 5,982 | | | | | $3 | $17,947 | | | | | $17,947 |
| | Cover Till Cover | m2 | 3,083 | | | | | $15 | $46,247 | | | | | $46,247 |
| | Cover Vegetative Medium | m3 | 3,083 | | | | | $15 | $46,247 | | | | | $46,247 |
| | Cover Revegetation | m2 | 10,277 | | | | | $2 | $15,416 | | | | | $15,416 |
| | | | | | | | | | | | | | | |
| **4.2** | Containment Cell 2 | | | | | | | | | | | | | |
| | Berm Excavated Tailings/Till (Workable) | m3 | 22,750 | | | | | $33 | $750,750 | | | | | $750,750 |
| | Liner/Cover Bituminous Geomembrane | m2 | 20,205 | | | | | $20 | $404,091 | | | | | $404,091 |
| | Drainage <75 mm Clear Stone Drainage Blanket, 0.3 m Thick | m3 | 643 | | | | | $20 | $12,863 | | | | | $12,863 |
| | Drainage Geotextile | m2 | 5,982 | | | | | $3 | $17,947 | | | | | $17,947 |
| | Cover Till Cover | m2 | 3,083 | | | | | $15 | $46,247 | | | | | $46,247 |
| | Cover Vegetative Medium | m3 | 3,083 | | | | | $15 | $46,247 | | | | | $46,247 |
| | Cover Revegetation | m2 | 10,277 | | | | | $2 | $15,416 | | | | | $15,416 |
| | | | | | | | | | | | | | | |
| **5.0** | **Excavation** | | | | | | | | | | | | | |
| **5.1** | Area Tailings | | | | | | | | | | | | | |
| | Excavate Area Tailings and Place in Containment Cell | m3 | 65,718 | | | | | $33 | $2,168,694 | | | | | $2,168,694 |
| | | | | | | | | | | | | | | |
| **6.0** | **Backfilling** | | | | | | | | | | | | | |
| **6.1** | Area Tailings | | | | | | | | | | | | | |
| | Backfill Area Tailings Excavation with "Clean" Fill | m3 | 65,718 | | | | | $15 | $985,770 | | | | | $985,770 |
| | | | | | | | | | | | | | | |
| **7.0** | **Cover** | | | | | | | | | | | | | |
| **7.1** | Area Tailings | | | | | | | | | | | | | |
| | GCL | m2 | | 9,654 | 14,860 | 17,141 | 1,337 | $17 | | $164,111 | $252,618 | $291,402 | $22,721 | $730,852 |
| | Till Cover, 0.3 m Thick | m3 | | 2,896 | 4,458 | 5,142 | 401 | $15 | | $43,441 | $66,870 | $77,136 | $6,014 | $193,461 |
| | Vegetative Medium, 0.3 m Thick | m3 | | 2,896 | 4,458 | 5,142 | 401 | $15 | | $43,441 | $66,870 | $77,136 | $6,014 | $193,461 |
| | Hydroseed | m2 | | 9,654 | 14,860 | 17,141 | 1,337 | $2 | | $14,480 | $22,290 | $25,712 | $2,005 | $64,487 |
| | | | | | | | | | | | | | | |
| | **Subtotal Direct Costs** | | | | | | | | **$6,681,016** | **$543,036** | **$830,557** | **$799,881** | **$73,490** | **$8,927,981** |
| | | | | | | | | | | | | | | |
| **9.0** | **Mob/Demob** | % | 3% | 3% | 3% | 3% | 3% | | $200,430 | $16,291 | $24,917 | $23,996 | $2,205 | $267,839 |
| | | | | | | | | | | | | | | |
| | **TOTAL DIRECT COSTS** | | | | | | | | **$6,881,446** | **$559,327** | **$855,474** | **$823,878** | **$75,695** | **$9,195,820** |
| | **TOTAL DIRECT COSTS (Rounded)** | | | | | | | | **$6,890,000** | **$560,000** | **$860,000** | **$830,000** | **$80,000** | **$9,220,000** |
| **INDIRECTS (% OF TOTAL DIRECT COSTS)** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | **Engineering and Construction Supervision** | % | 13% | 13% | 13% | 13% | 13% | | $894,588 | $72,713 | $111,212 | $107,104 | $9,840 | $1,195,457 |
| | **Monitoring During Construction (Instrumentation and Surface water)** | | | | | | | | | | | | | $0 |
| | **Agency Oversight Costs** | | | | | | | | | | | | | |
| | **Legal Costs** | | | | | | | | | | | | | |
| | **Owners Costs** | | | | | | | | | | | | | |
| | Procurement | % | 3% | 3% | 3% | 3% | 3% | | $206,443 | $16,780 | $25,664 | $24,716 | $2,271 | $275,875 |
| | Project Management | % | 9% | 9% | 9% | 9% | 9% | | $619,330 | $50,339 | $76,993 | $74,149 | $6,813 | $827,624 |
| | Administrative Expenses | % | 8% | 8% | 8% | 8% | 8% | | $550,516 | $44,746 | $68,438 | $65,910 | $6,056 | $735,666 |
| | | | | | | | | | | | | | | |
| | **TOTAL INDIRECT COSTS** | | | | | | | | **$2,270,877** | **$184,578** | **$282,306** | **$271,880** | **$24,979** | **$3,034,621** |
| | **TOTAL INDIRECT COSTS (Rounded)** | | | | | | | | **$2,280,000** | **$190,000** | **$290,000** | **$280,000** | **$30,000** | **$3,070,000** |
| **CONTINGENCY (% OF TOTAL DIRECT + TOTAL INDIRECT COSTS)** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | **General Contingency** | % | 20% | 20% | 20% | 20% | 20% | | $1,830,465 | $148,752 | $227,511 | $219,105 | $20,131 | **$2,445,963** |
| | | | | | | | | | | | | | | |
| | **TOTAL CONTINGENCY** | | | | | | | | **$1,830,465** | **$148,752** | **$227,511** | **$219,105** | **$20,131** | **$2,445,963** |
| | **TOTAL CONTINGENCY (Rounded)** | | | | | | | | **$1,840,000** | **$150,000** | **$230,000** | **$220,000** | **$30,000** | **$2,470,000** |
| **SUBTOTAL CONSTRUCTION COST** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | **SUBTOTAL CONSTRUCTION** | | | | | | | | **$10,982,788** | **$892,657** | **$1,365,291** | **$1,314,862** | **$120,805** | **$14,676,404** |
| | **SUBTOTAL CONSTRUCTION (Rounded)** | | | | | | | | **$11,010,000** | **$900,000** | **$1,380,000** | **$1,330,000** | **$140,000** | **$14,760,000** |
| | | | | | | | | | | | | | | |
| **ADDITIONAL ALLOWANCES - WATER TREATMENT (% OF TOTAL DIRECT COSTS)** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **10** | **Water Treatment** | % | 7% | 2% | 2% | 2% | 2% | | $481,701 | $11,187 | $17,109 | $16,478 | $1,514 | **$527,989** |
| | **TOTAL WATER TREATMENT (Rounded)** | | | | | | | | **$490,000** | **$20,000** | **$20,000** | **$20,000** | **$10,000** | **$560,000** |
| **ADDITIONAL ALLOWANCES - SITE CONTROL MEASURES (% OF TOTAL DIRECT COSTS)** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **11** | **Site Control Measures** | % | 3% | 3% | 3% | 3% | 3% | | $206,443 | $16,780 | $25,664 | $24,716 | $2,271 | **$275,875** |
| | **TOTAL SITE CONTROL MEASURES (Rounded)** | | | | | | | | **$210,000** | **$20,000** | **$30,000** | **$30,000** | **$10,000** | **$300,000** |
| **TOTAL CONSTRUCTION COST** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | **TOTAL CONSTRUCTION** | | | | | | | | $11,670,933 | $920,624 | $1,408,065 | $1,356,056 | $124,590 | **$15,480,267** |
| | **TOTAL CONSTRUCTION (Rounded)** | | | | | | | | **$11,710,000** | **$940,000** | **$1,430,000** | **$1,380,000** | **$160,000** | **$15,620,000** |

# APPENDIX G

# Decision Analysis

## 1.0 INTRODUCTION

This appendix describes the details of the decision analysis process recommended for the Nova Scotia Lands Conceptual Closure Plan for Montague Mines Tailings. This process was planned to be used to support of the closure options for the Montague mine site; although, as the Project progressed it became evident the formal decision analysis process was not required at this time. It may become relevant to revisit in the future and therefore how the process works is described below.

Section 2.0 describes the general Kepner-Tregoe (K-T) decision analysis process and Section 3.0 describes the decision analysis process that was completed for the conceptual closure options for the Montague Mine.

## 2.0 OPTIONS ASSESSMENT PROCESS

The decision analysis is based on the Kepner-Tregoe (K-T) decision making model. This approach is designed to build consensus among the stakeholders, consider a wide range of options, identify risks, and develop a plan with specific actions.

Generally, there two groups of people are involved in the process. The first group is called the task group, in which these participants are generally those whom are directly involved in the Project and assist in the development of the initial decision analysis structure. A second group is called the stakeholders, consist mainly of upper level managers, other groups (internal and external to the main government department) but are affected by or involved with the overall Project decisions.

The prescribed K-T decision analysis process was initiated and consists of the following steps:

1. The stakeholders that could be affected by the decision or have input to the decision were identified and a Task Group was formed to drive the decision analysis.
2. A decision statement is developed to define the overall goal of the project.
3. Site criteria (musts) and objectives (wants) were outlined.
4. The objectives are grouped as follows: technical, environmental, and socio-economic/reputational.
5. Weighting factors (0 – 10) are assigned to each want objective based on their relative importance compared to the other objectives. For example, *simplicity of closure option* is highly desirable and therefore given a 10-weighting factor. Whereas *maximize the opportunity for terrestrial wildlife habitat develop* was weighted low.
6. To support the scoring of each option, the objectives are assigned rating factors (0 – 10). For example, for the objective *maximize simplicity of the closure option construction methodology,* complex solution scored 0 and very simple technology scored 10).
7. Options are identified and developed as the process advances.
8. In some cases, the various options are fully assessed, a total score was calculated, referred to as the technical merit score.
9. High-level cost estimates are developed for each of the options, and Class D cost estimates are developed for the top scoring option(s).
10. An action plan is developed to identify activities that should be undertaken to fill information gaps and to confirm a preferred option.

The following sections describe the decision statement, objectives and process to identify and select a conceptual closure option for the former Montague Mines.

### 2.1.1 Decision Statement

The decision statement to focus the overall project objective was discussed and established as:

*Determine the best way to manage the Site.*

"Best" was defined as the optimization of technical and non-technical merit, risk and costs.

"Manage" refers to the NS Lands managed site protocols.

### 2.1.2 Objectives

Objectives have been identified based on the understanding of the issues and overall project objective. They have been subdivided into "musts" and "wants". "Must" objectives are criteria that must be met for an option to be considered (e.g. regulatory criteria). "Want" objectives provide the means of differentiating between options (e.g. timeline for implementation of the remedial measures); they do not need to be met for an option to be considered.

#### *2.1.2.1 Objectives - Musts*

The absolute requirements (i.e., musts) are:

- Meet the Tier II criteria, described in main report.
- Meet the NS Lands managed site requirements.
- Reduce exposure to humans through surface contact, ingestion and dust.
- Safety during construction and operation must not be compromised by the design or implementation of an option.

Options undergo a pre-screening process and are evaluated against these objectives. An option must meet all of the musts in order to be considered for further evaluation.

#### *2.1.2.2 Objectives - Wants*

The objectives (wants) are divided into three categories, technical/operational, environmental and socio-economic/reputational.
The "want" objectives were grouped according to technical/operational, environmental and socio-economic elements. Examples of want objectives include: *minimize timeline for achieve significant improvement to the site conditions* and *minimize adverse public perception of the site closure.*

The following objectives were identified:

<u>Technical/operational</u>

- Maximize the simplicity of the closure option construction methodology.
- Minimize the timeline to achieve significant improvement to the site conditions.
- Minimize the timeline to complete the implementation of the overall site closure activities.
- Minimize the maintenance (e.g. dams, fencing, erodible structures, etc.)
- Maximize the opportunity for progressive reclamation (proceed in stages).
- After implementation, maximize the ability to be able to respond to changing conditions and not restrict optionality.

Environmental

- Maximize fish passage opportunity (e.g. Mitchell Brook).
- Maximize the opportunity for wetland creation.
- Maximize access for terrestrial wildlife (habitat).
- Maximize sustainability of the site.

Socio-economic/reputational

- Minimize adverse public perception of the site closure.
- Maximize the development of terrestrial green space.

### 2.1.3 Objective Rating Factors

The individual objectives are assigned rating factors used to score the options. Each objective is broken down into ratings from 0 to 10, such that a rating of 10 would be assigned to those options that met or exceeded the objective. A rating of 0 would be assigned for those options that did not meet the objective. Definitions for the ratings between 0 and 10 were not developed during the Design Stage 1 project.

## 2.2 Option Scoring

Each option is provided a score based on the rating factor table as it related to the option's ability to achieve the objective. The assigned score is multiplied by the objective's weighting factor to calculate a weighted score for each objective. The weighted scores are summed by technical, environmental and socio-economic elements, and then totalled for an overall technical merit score.

## 2.3 Costs and Final Scores

Preliminary cost estimate ranges are developed to provide a comparison of the options. An overall final ranking of the options is developed based on the combination of the technical merit score and cost estimate.

# 3.0 OPTIONS ANALYSIS – MONTAGUE MINES CONCEPTUAL CLOSURE

A series of conference calls were held between December 2018 and March 2019. These calls involved a discussion of the decision statement, objectives, criteria and options for addressing the potential remedial measures to achieve the desired closure status.

Often during the K-T process, the preferred option will be identified early, and the completion of the scoring is not required. This was the case with the Montague Mines closure options analysis.

Once the objectives and the potential remedial measures were identified, based on site conditions, objectives and guidance from the Nova Scotia government it became evident there were two different closure strategies required to address specific areas based on the level of contamination. Therefore, detailed options scoring was not undertaken at this time. The conceptual closure option for areas of exposed tailings or soil/tailings arsenic concentrations that exceed the Tier II criteria by more than10 times requires an impermeable barrier to reduce and eventually stop the on-going impacts to the surrounding and downstream environments. For areas with arsenic concentrations that exceed the Tier II criteria but are less than 10 times the Tier II concentration limit a low permeable till cover was chosen as the preferred closure option. These closure options are conceptual based on the available information and required refinement and further development as additional information is available to advance the designs.