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

FINAL REPORT

Submitted to:
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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,

Christine Moore

Christine Moore, M.Sc.
Senior Scientist
Project Manager, Intrinsik Team

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

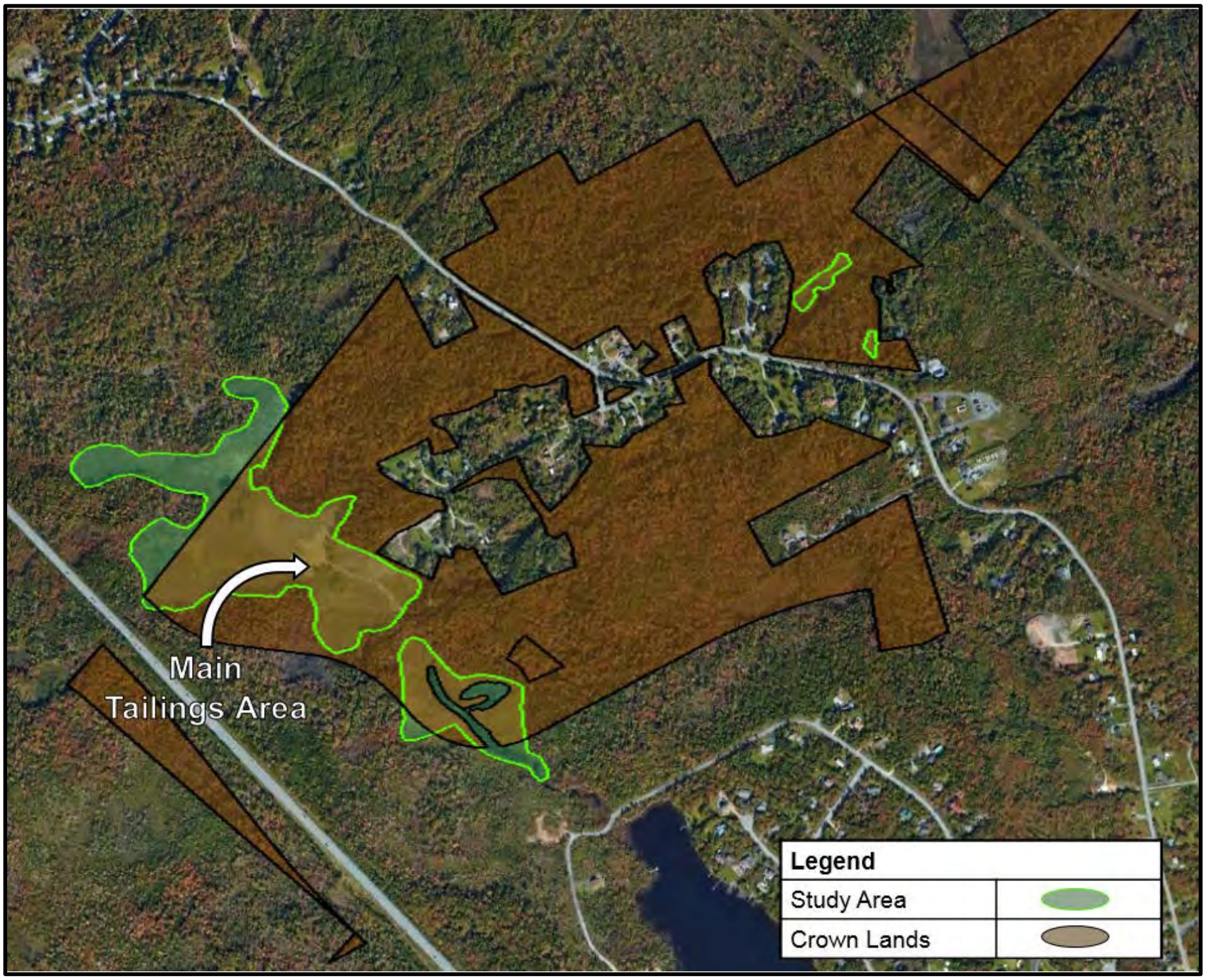

Figure 2-2: Montague Gold Mines – Study Area

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.

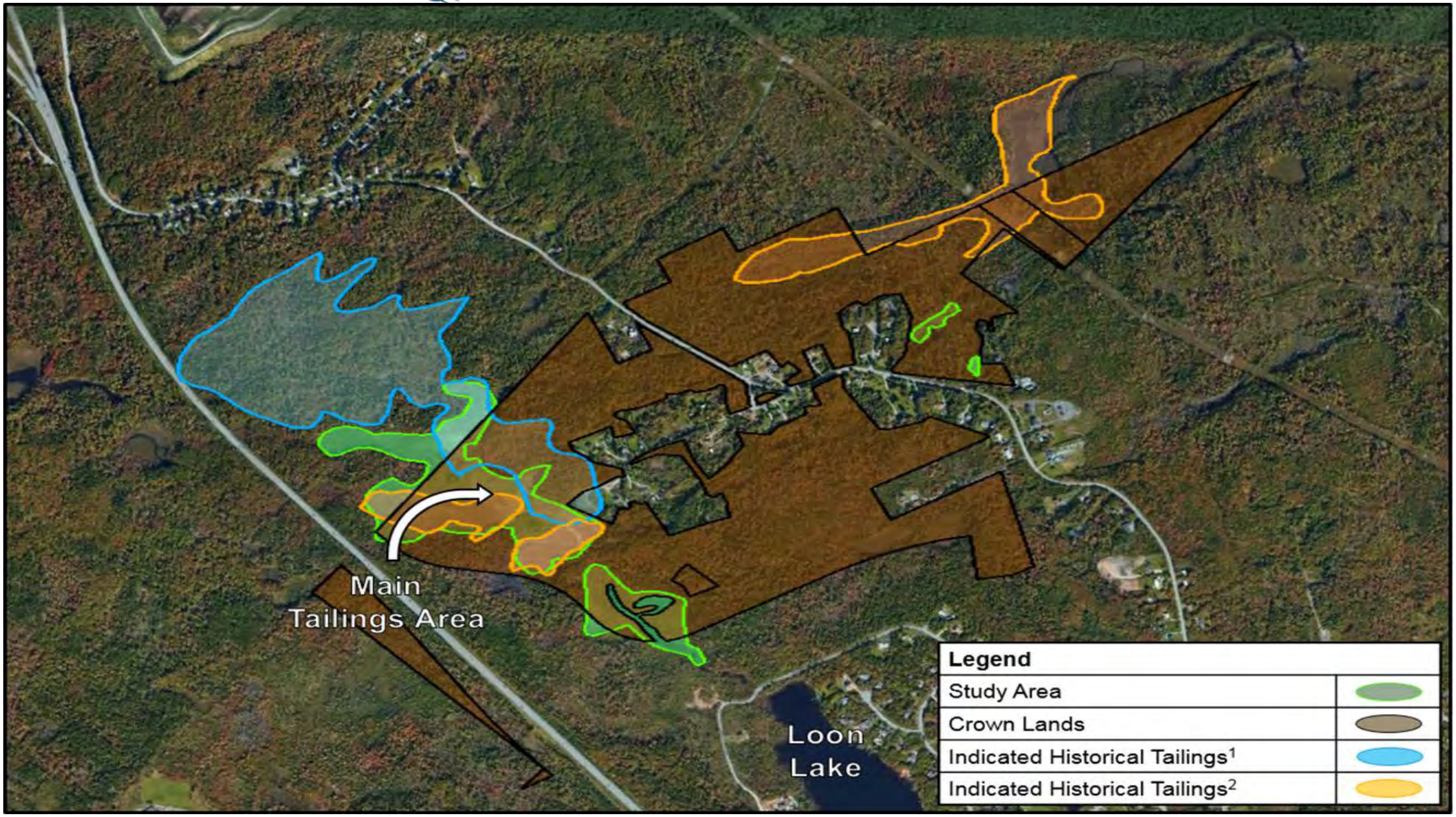

Figure 3-1: Montague Gold Mines – Study Area

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; 98th 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; 98th 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 95th 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.

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.

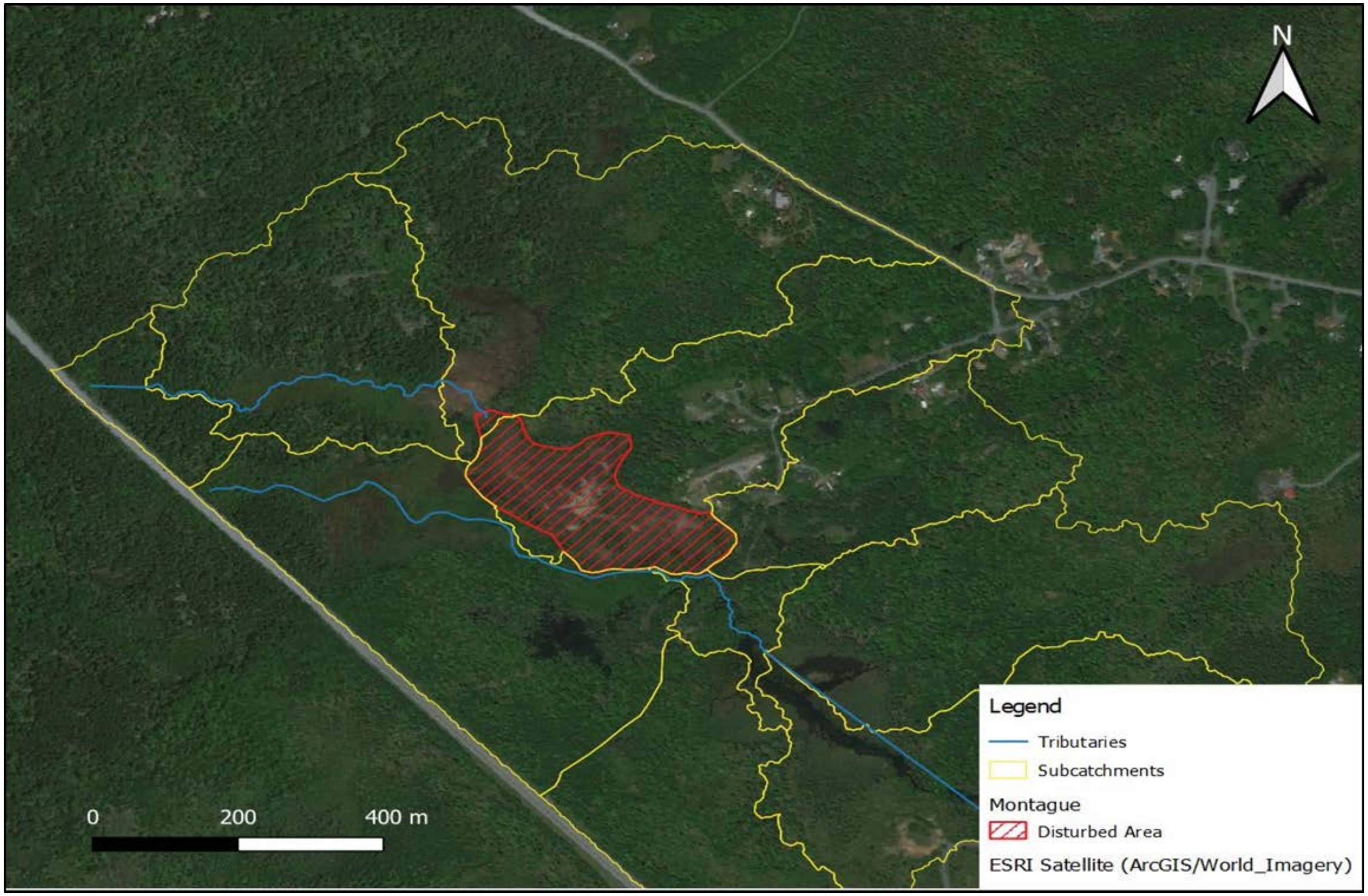

Figure 6-1: Montague Mines Surface Water Catchment Areas

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.

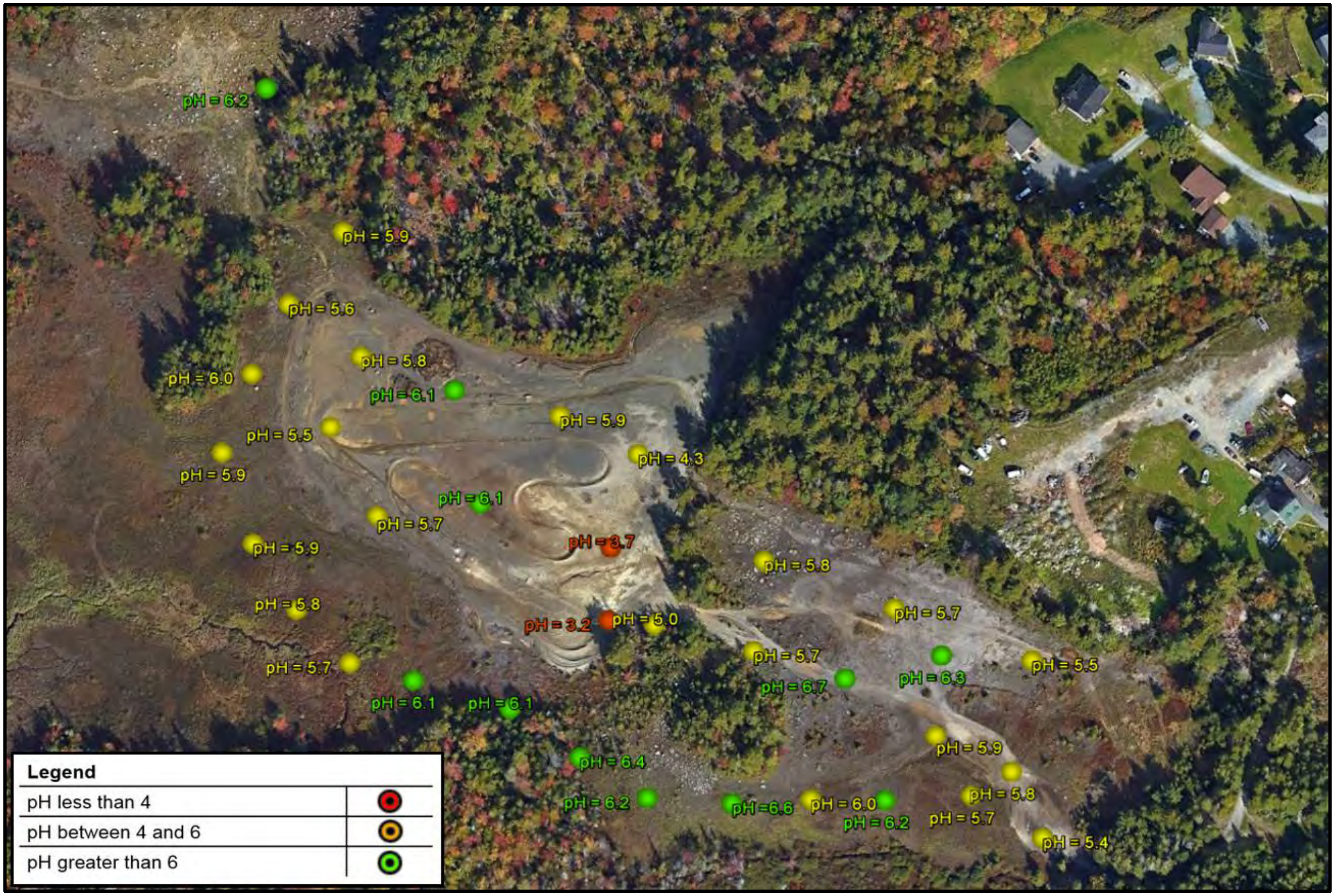

Figure 6-2: Montague Mines - Surficial Solids Rinse pH

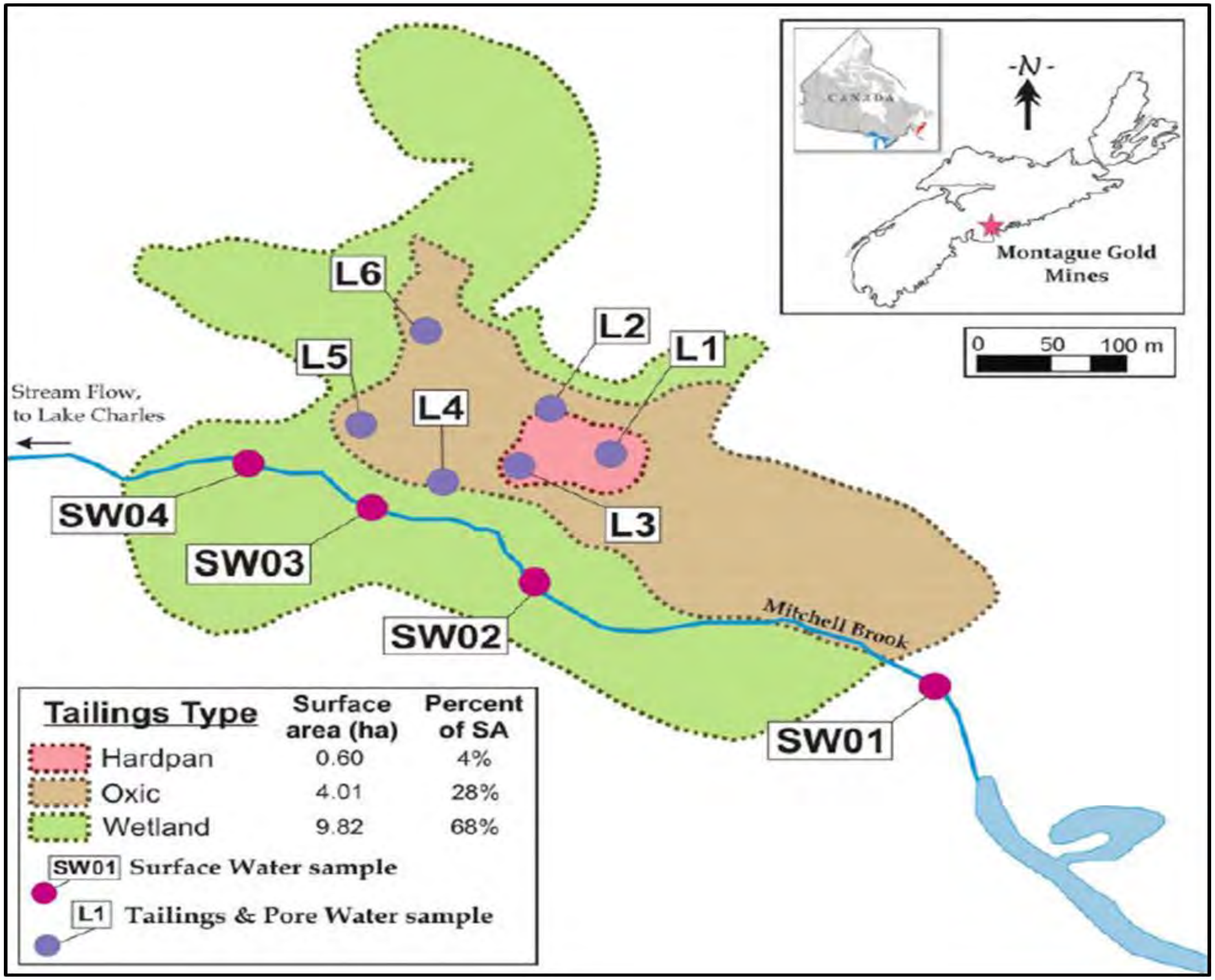

Figure 6-3: Montague Mines – Distribution of Near-Surface Tailings Types at Montague (DeSisto 2014)

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.

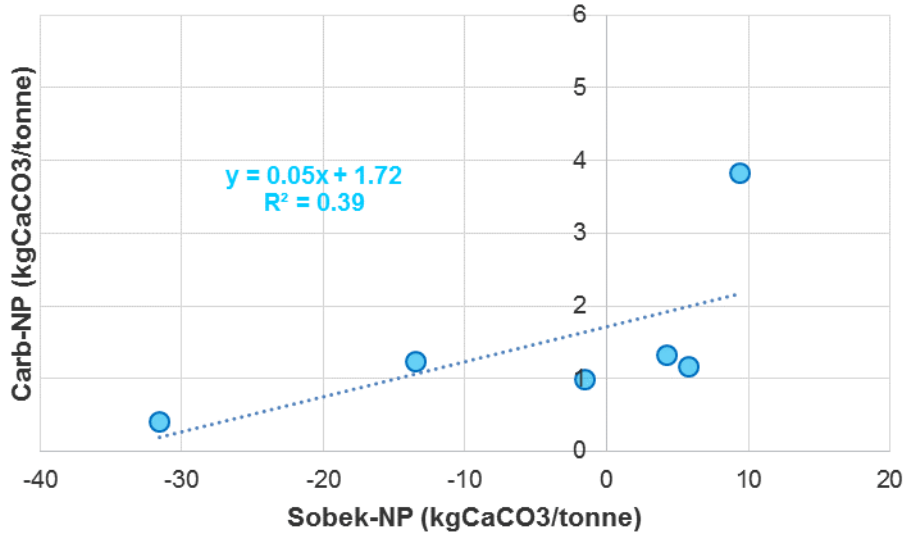

Figure 6-4: Montague Mines - Carb-NP vs. Modified Sobek-NP

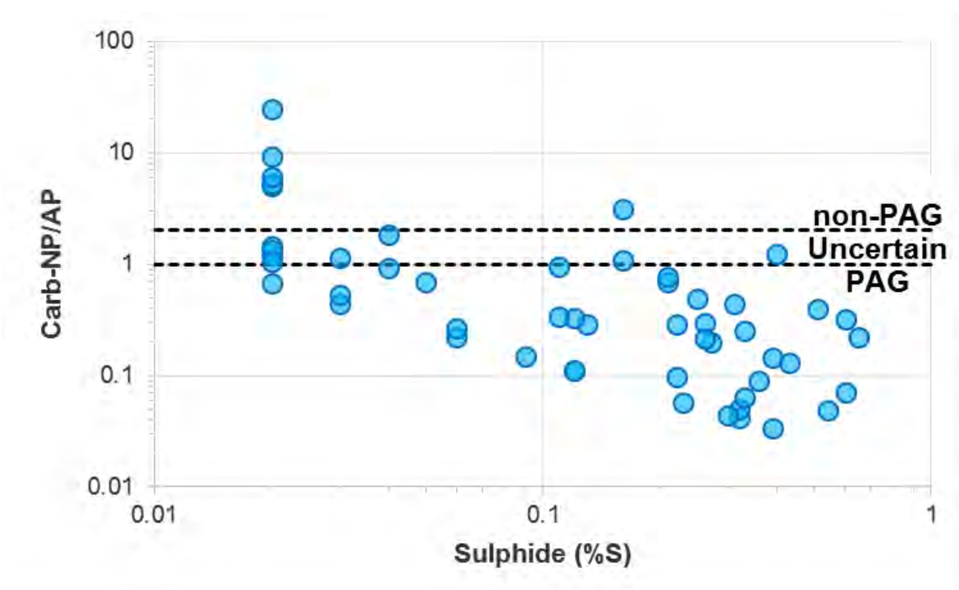

Figure 6-5: Montague Mines - Carb-NP/AP vs. Sulphide

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

Location	Carb-NPR			
	Count	PAG Carb-NPR < 1	Uncertain 1 ≤ Carb-NPR < 2	Non-PAG 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.

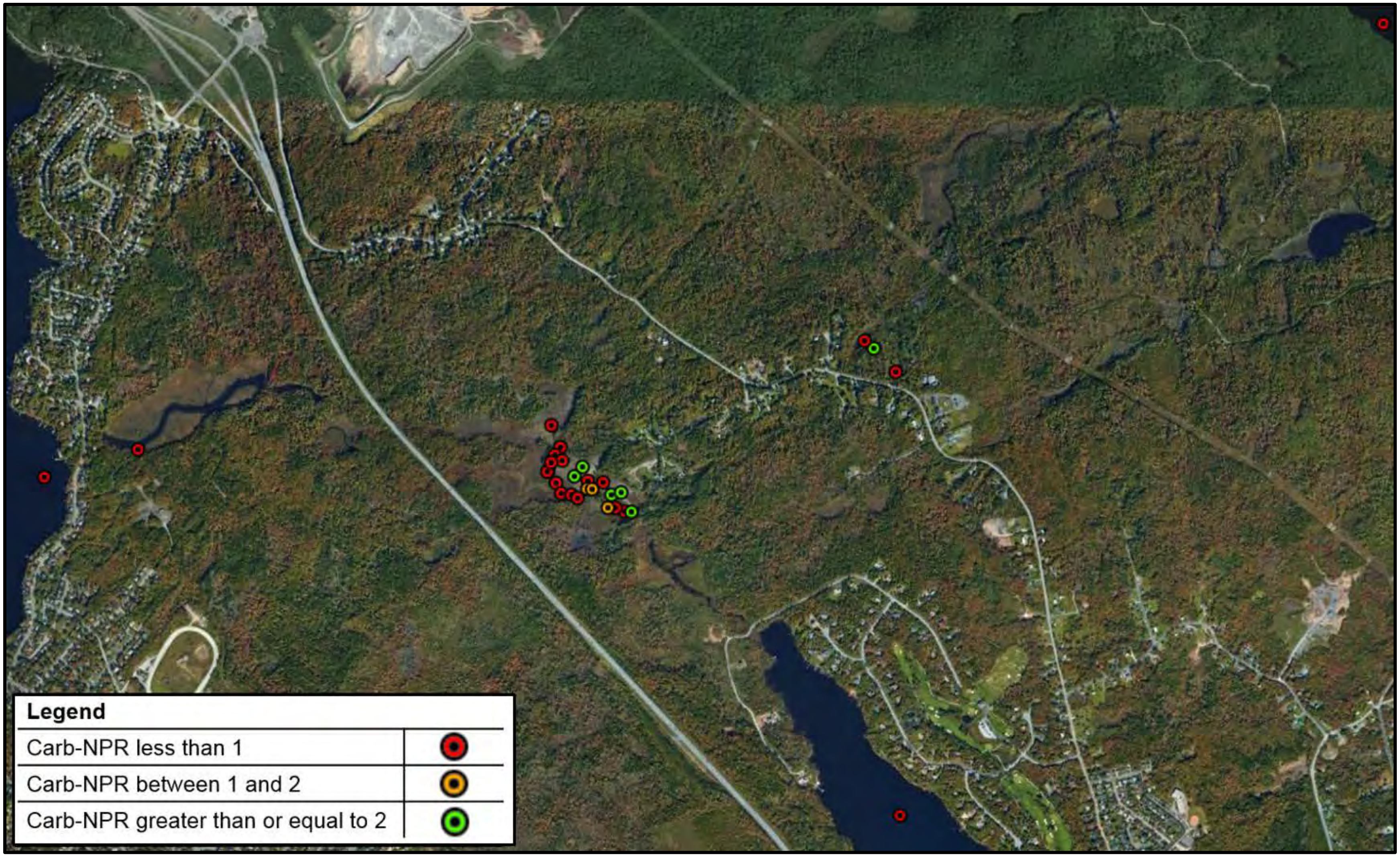

Figure 6-6: Montague Mines – Carb-NPR

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.

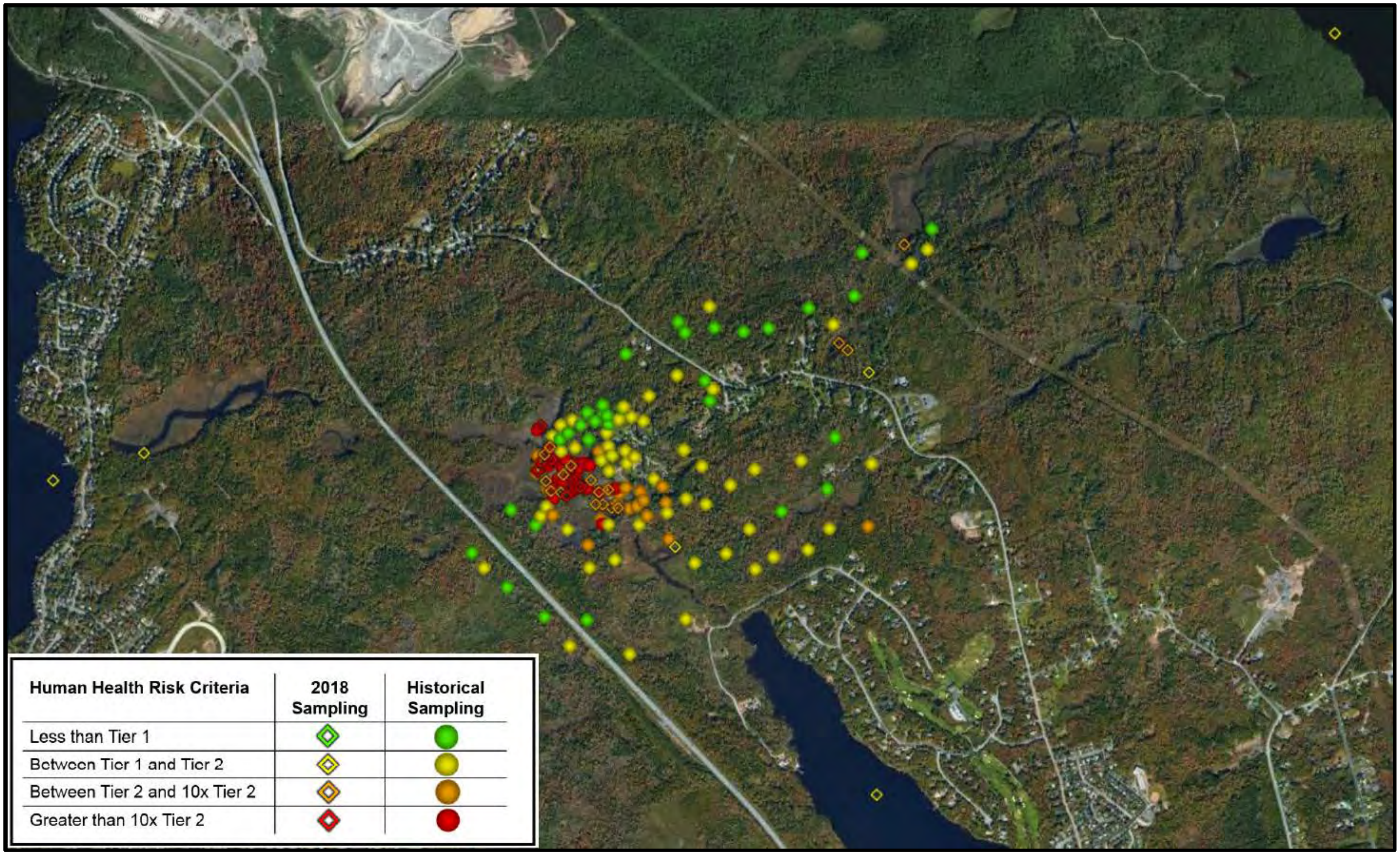

Figure 6-7: Montague Mines – Near-Surface Arsenic Contents – All Locations

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

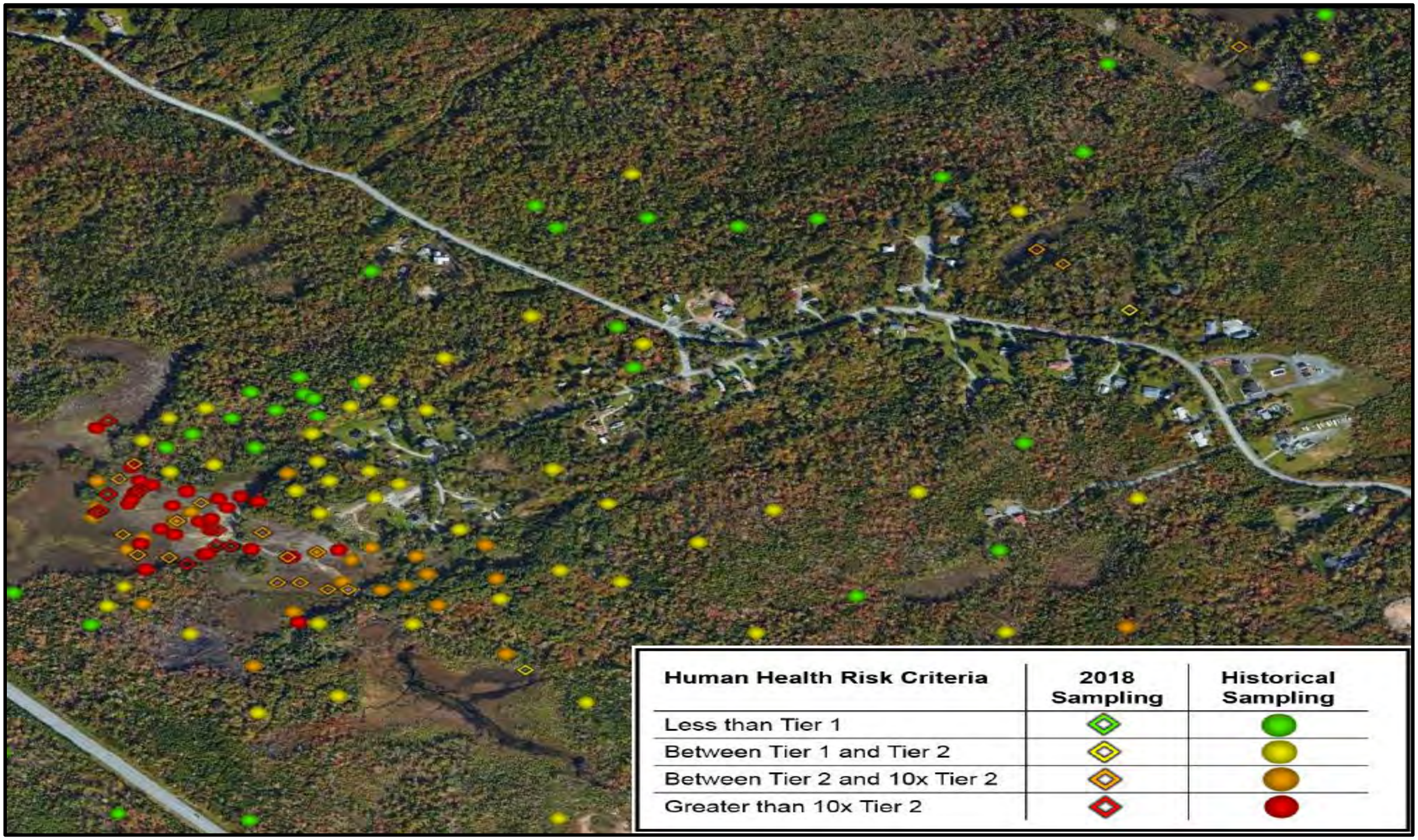

Figure 6-8: Montague Mines – Near-Surface Arsenic Contents – Central Region

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.

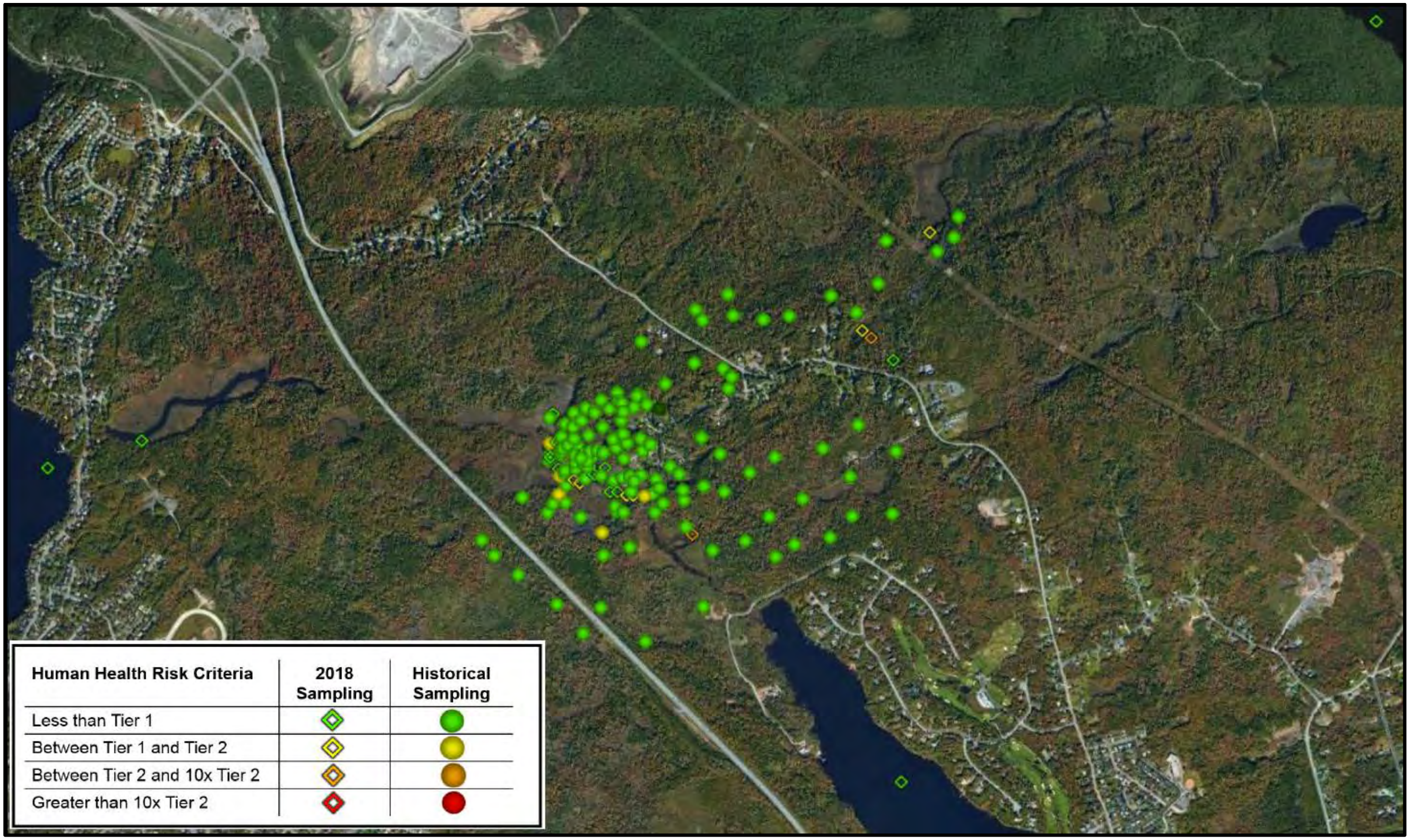

Figure 6-9: Montague Mines – Near-Surface Mercury Contents – All Locations

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

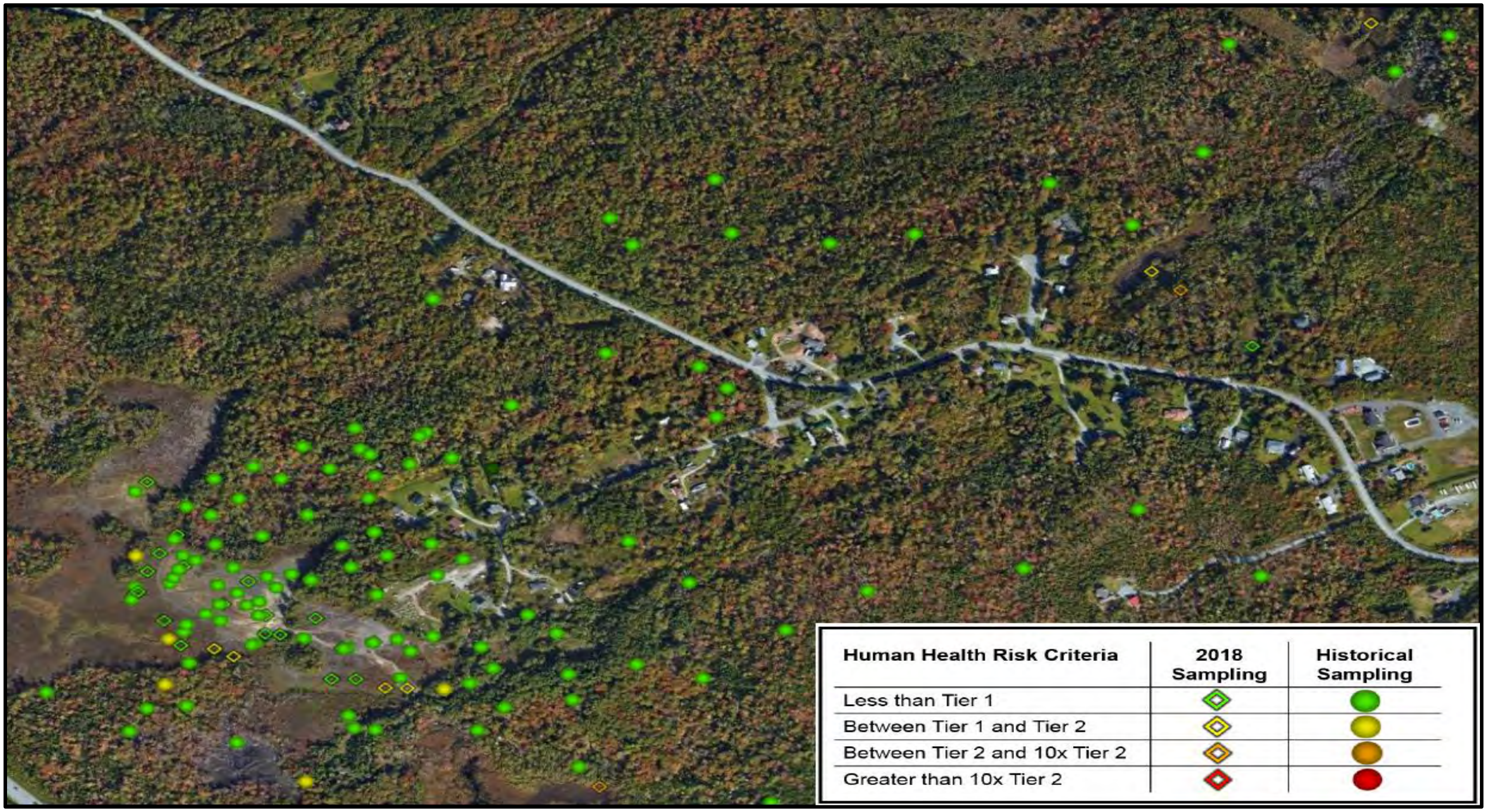

Figure 6-10: Montague Mines – Near-Surface Mercury Contents – Central Region

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

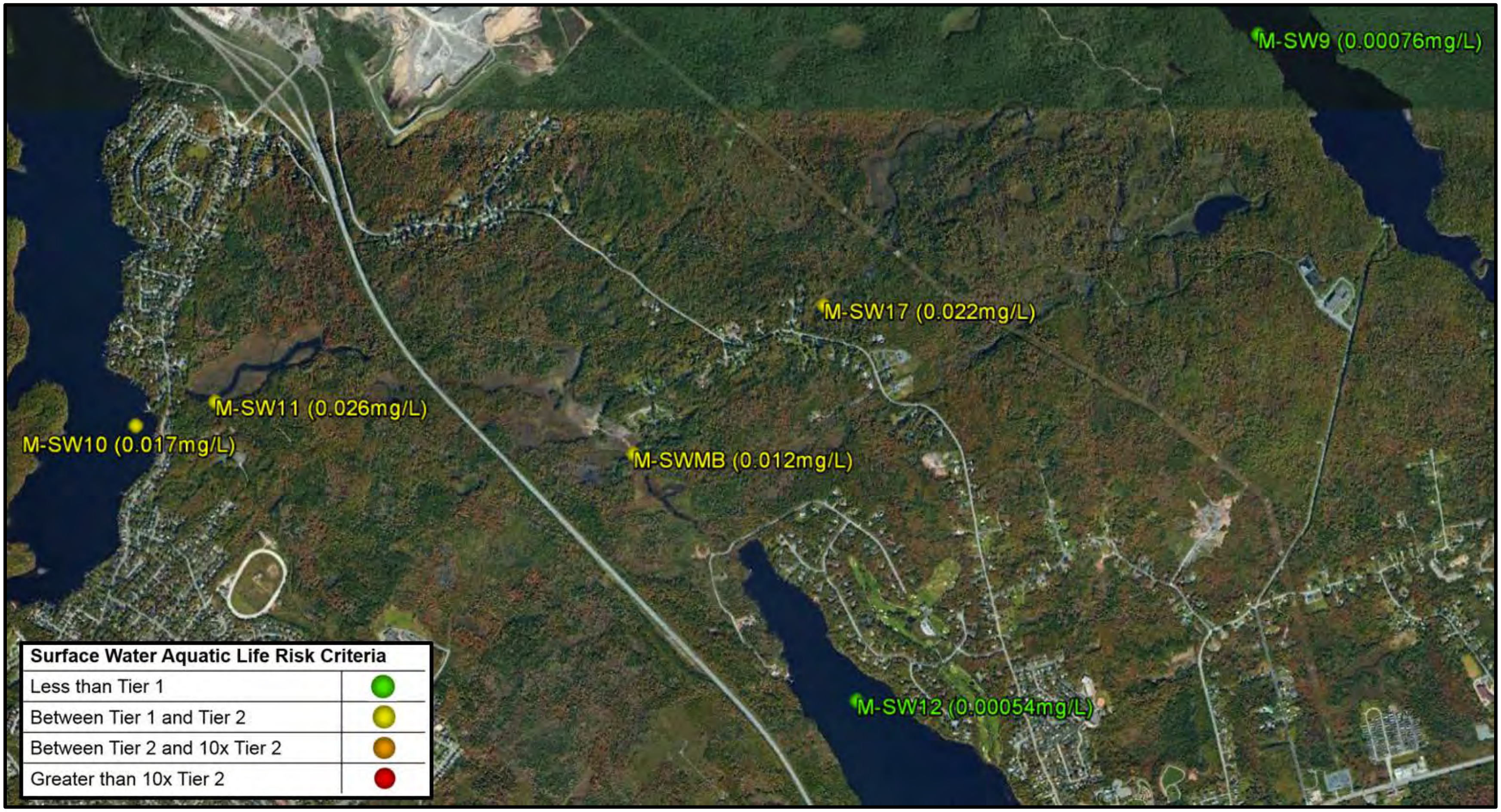

Figure 6-11: Montague Mines – Surface Water Total Arsenic Concentrations

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

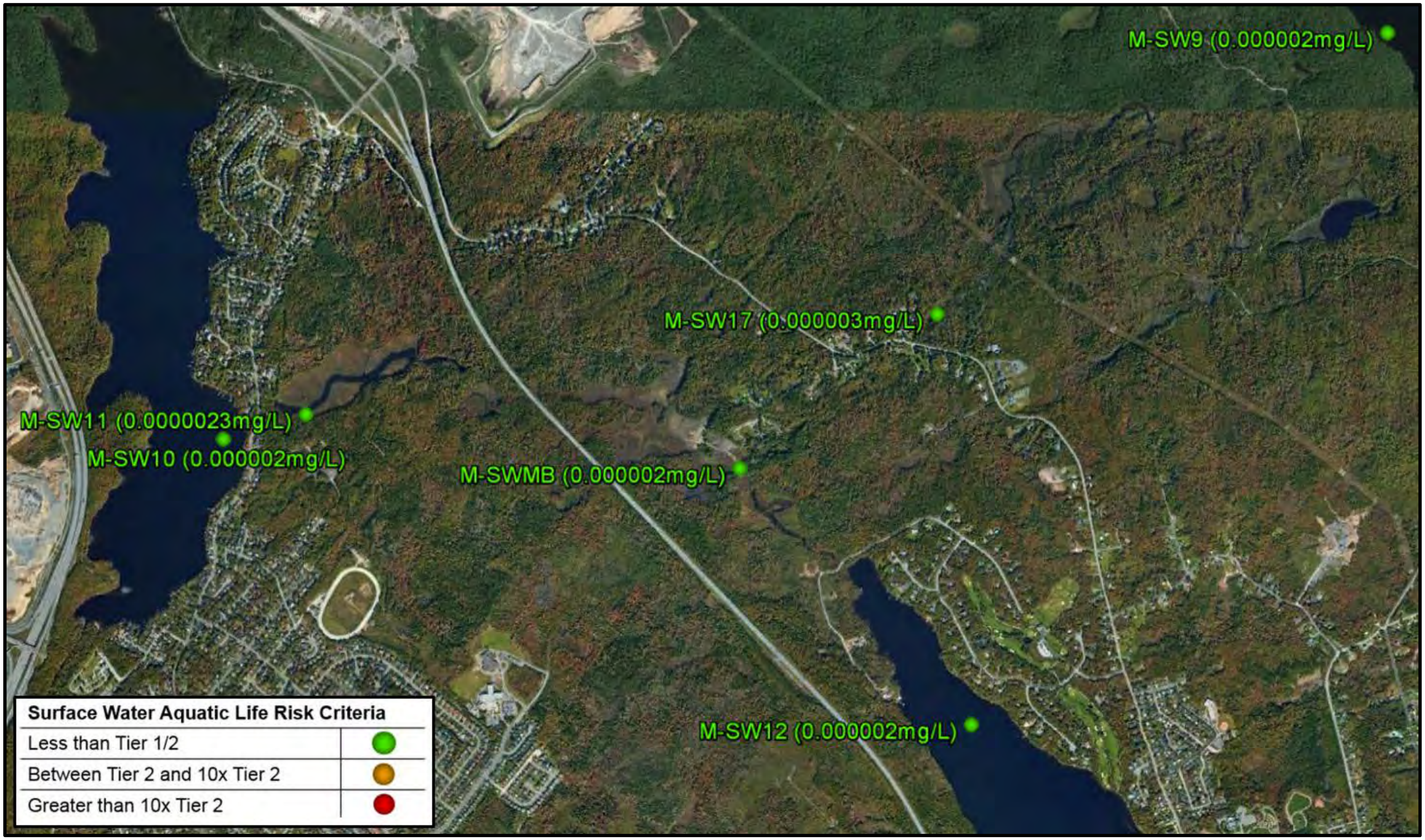

Figure 6-12: Montague Mines – Surface Water Total Mercury Concentrations

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.

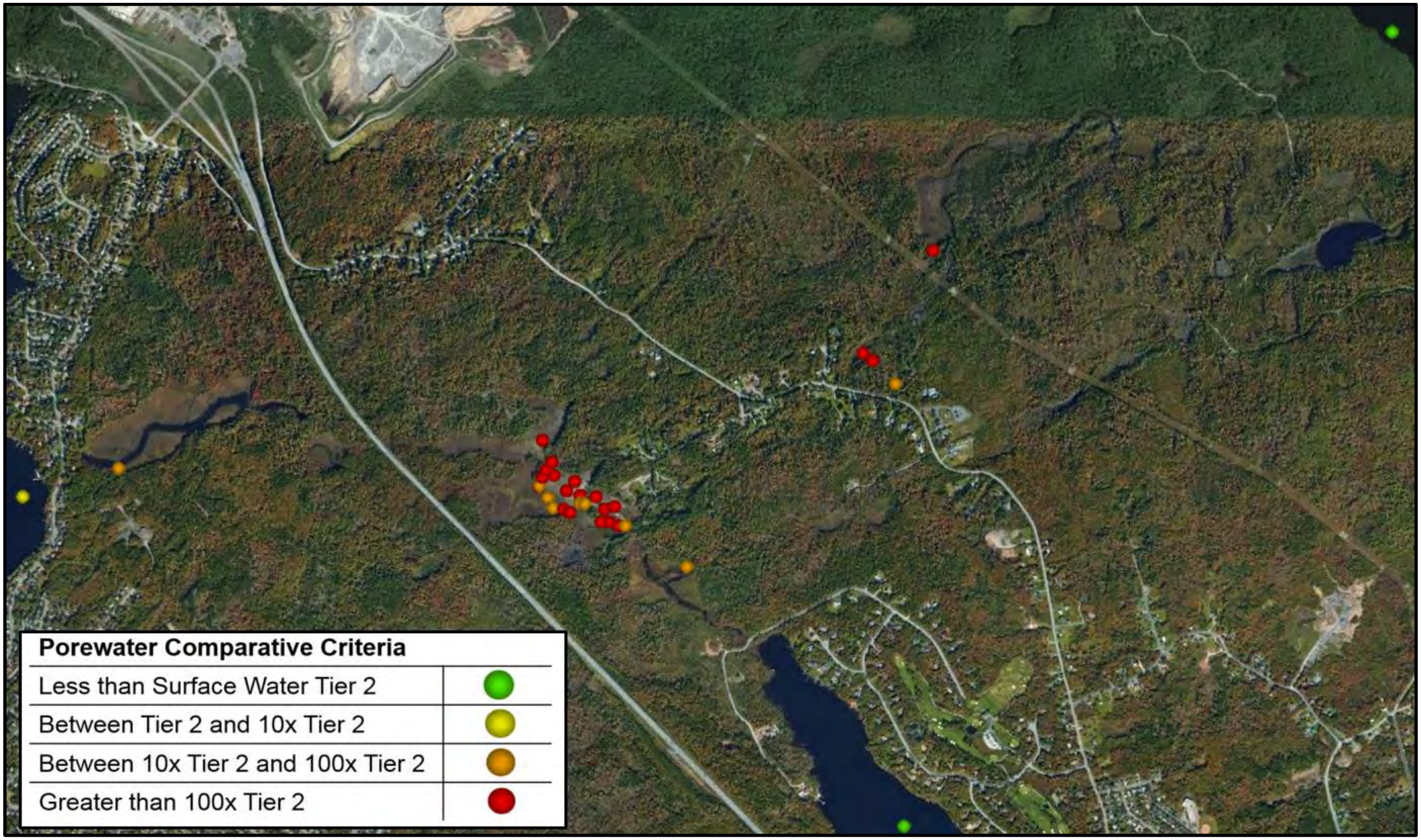

Figure 6-13: Montague Mines – Maximum Porewater Arsenic Concentrations – All Locations

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).

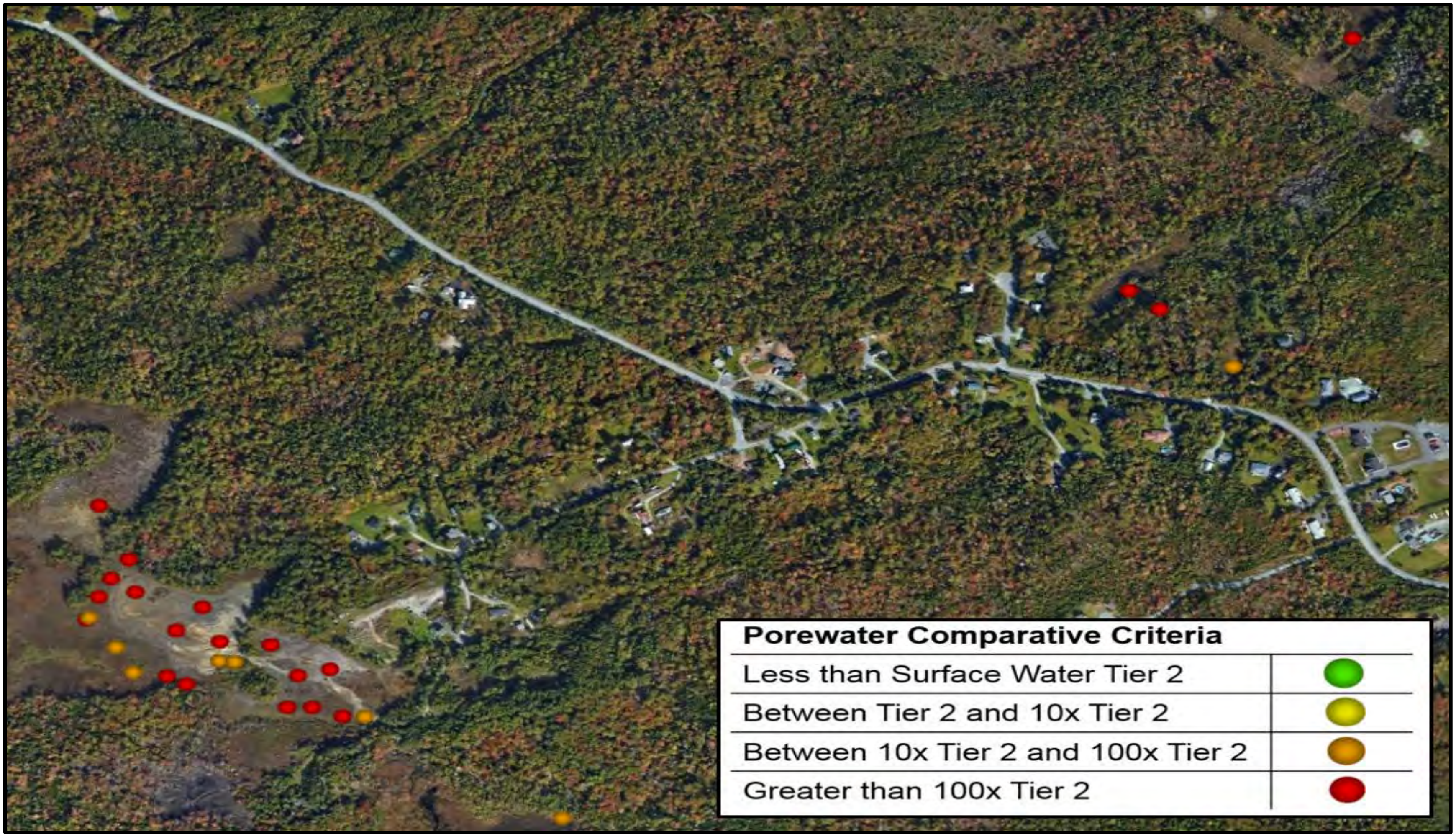

Figure 6-14: Montague Mines – Maximum Porewater Arsenic Concentrations – Central Region

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.

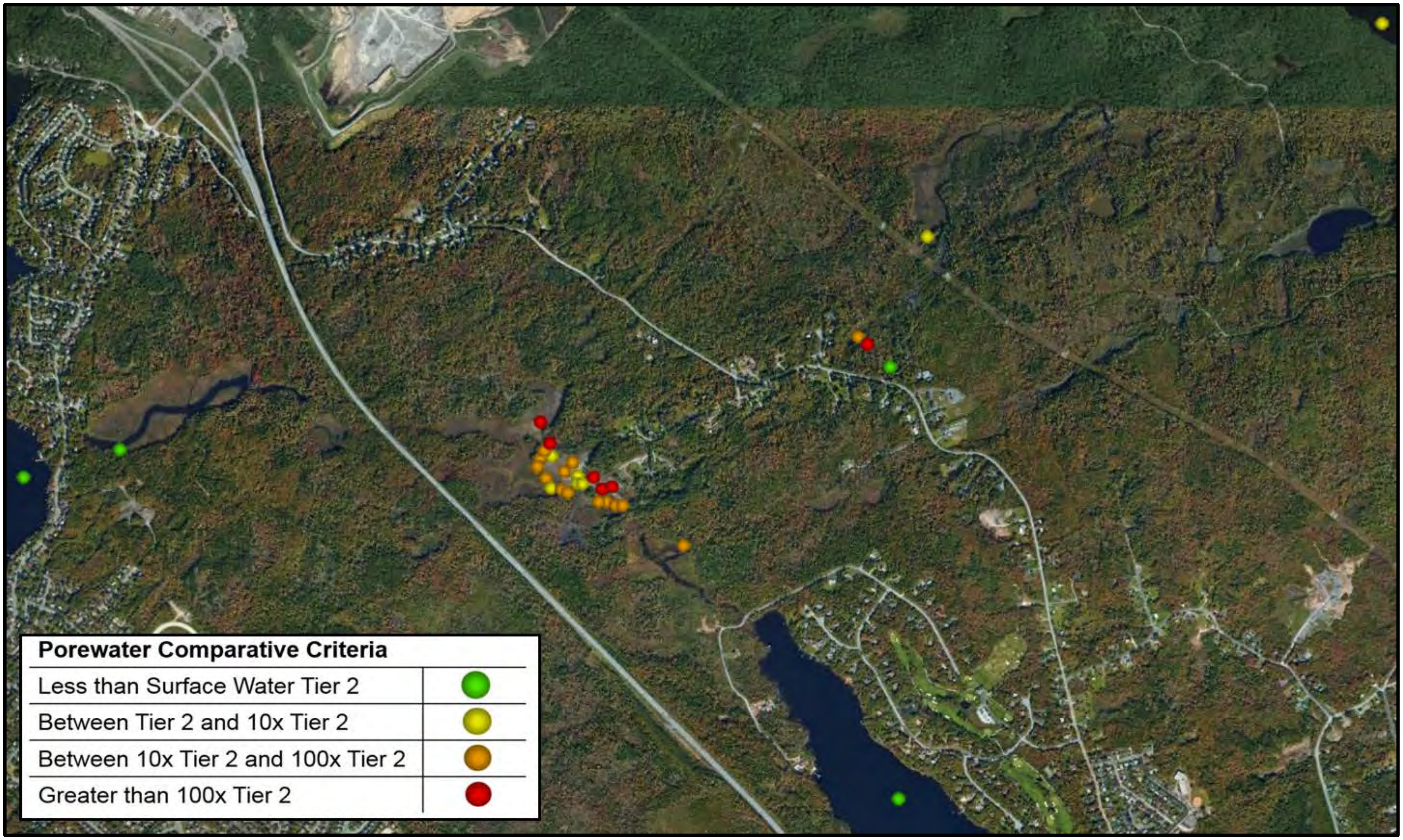

Figure 6-15: Montague Mines – Maximum Porewater Mercury Concentrations – All Locations

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).

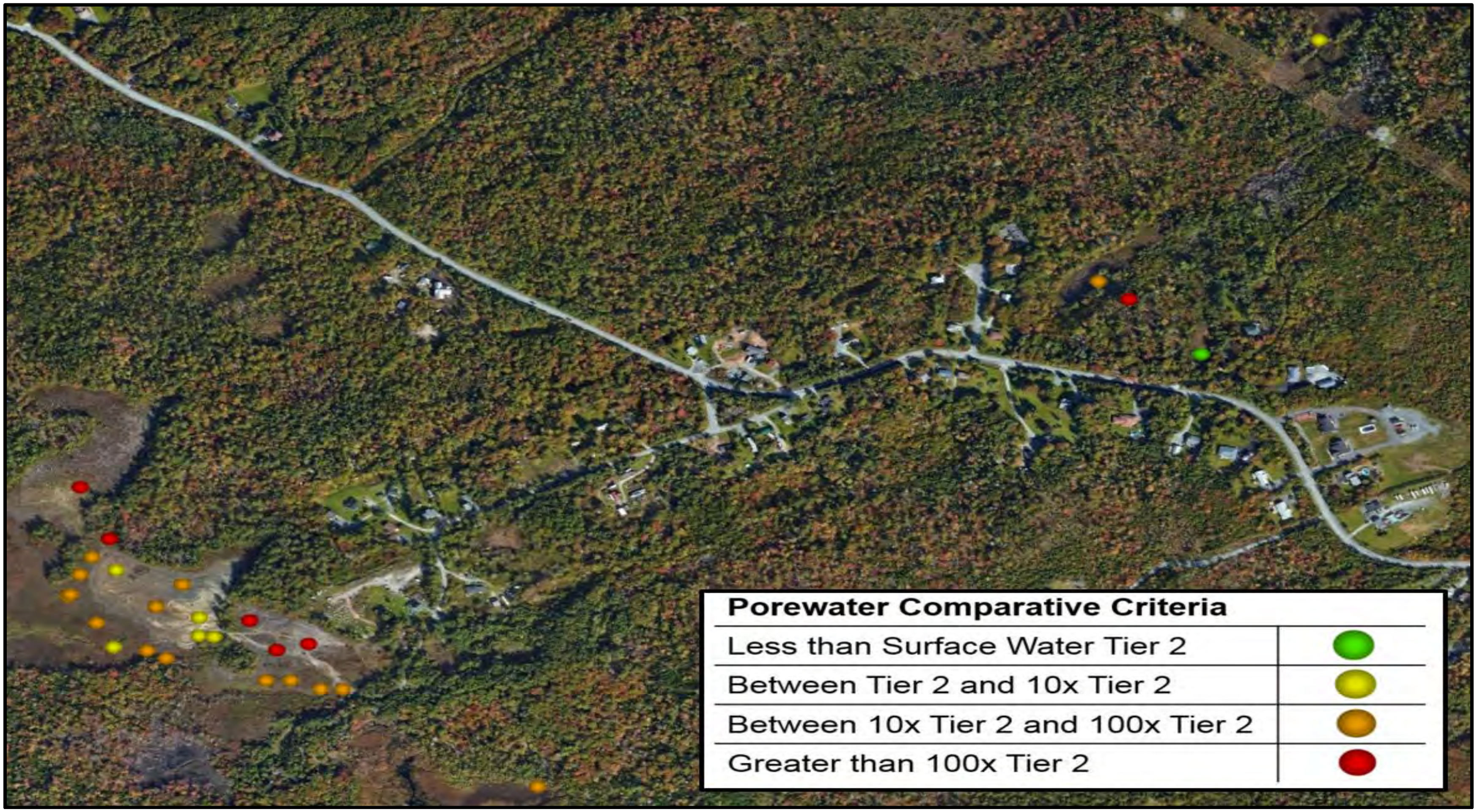

Figure 6-16: Montague Mines – Maximum Porewater Mercury Concentrations - Central Region

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.

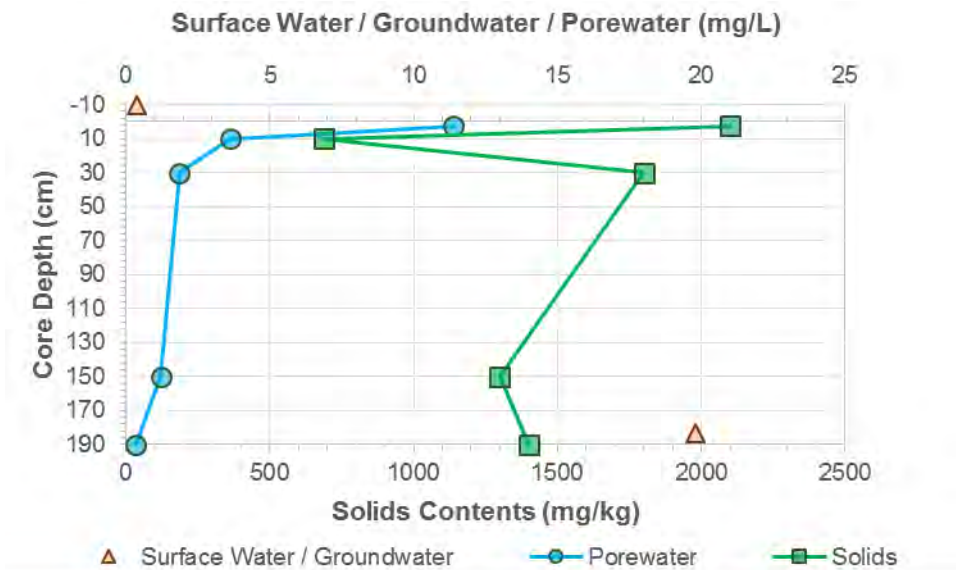

Figure 6-18: Montague Mines – M-Pz1 Arsenic Chemistry

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.

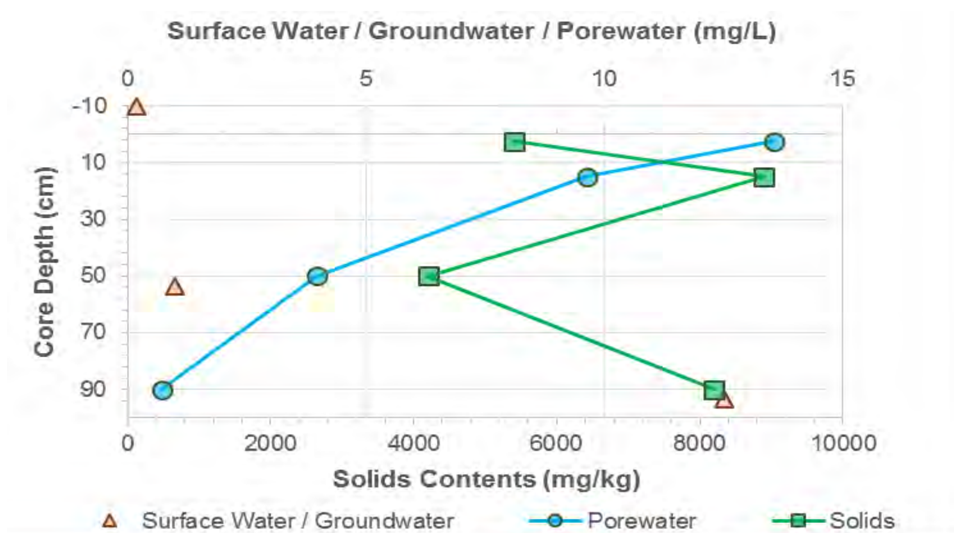

Figure 6-19: Montague Mines – M-Pz2 Arsenic Chemistry

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.

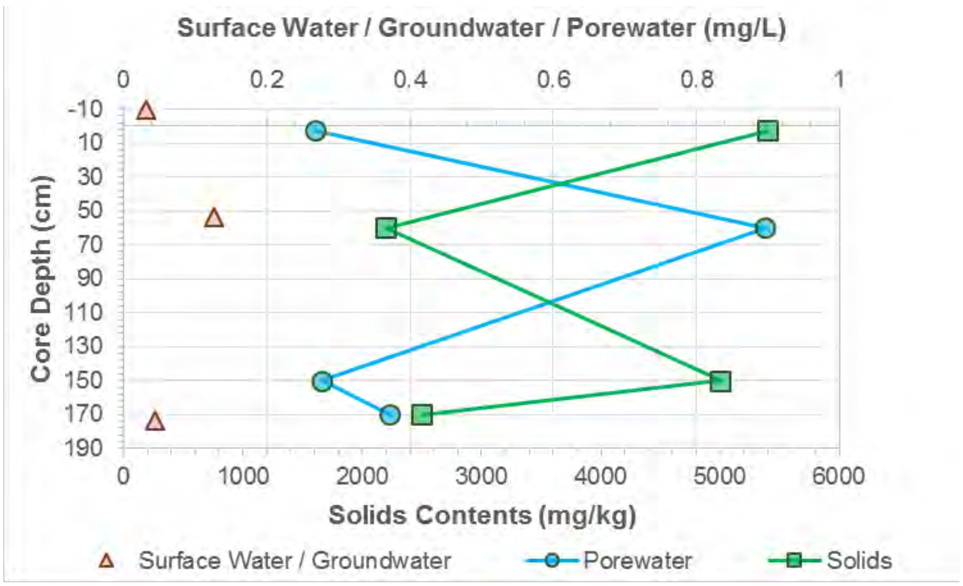

Figure 6-20: Montague Mines – M-Pz3 Arsenic Chemistry

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.

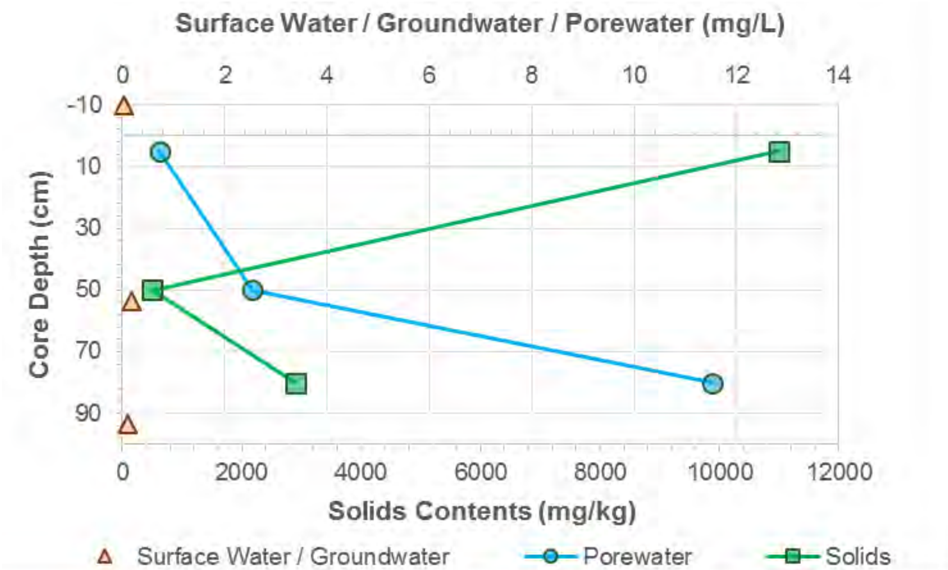

Figure 6-21: Montague Mines – M-Pz4 Arsenic Chemistry

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.

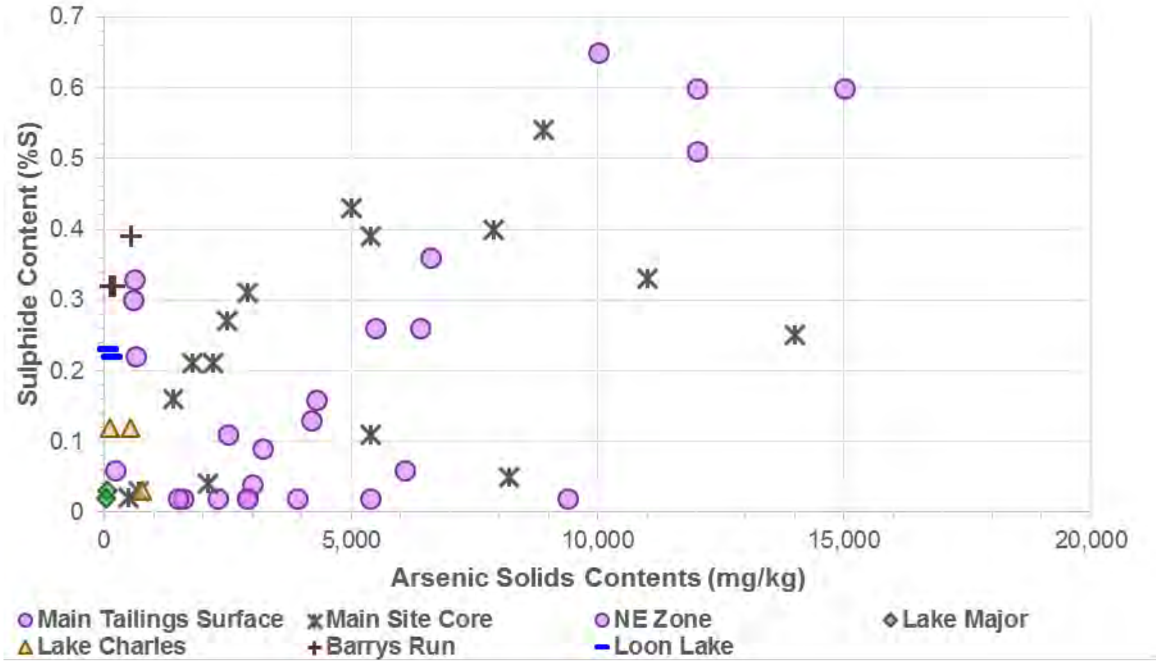

Figure 6-22: Montague Mines – Sulphide vs. Arsenic Contents in Tailings and Sediments

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.

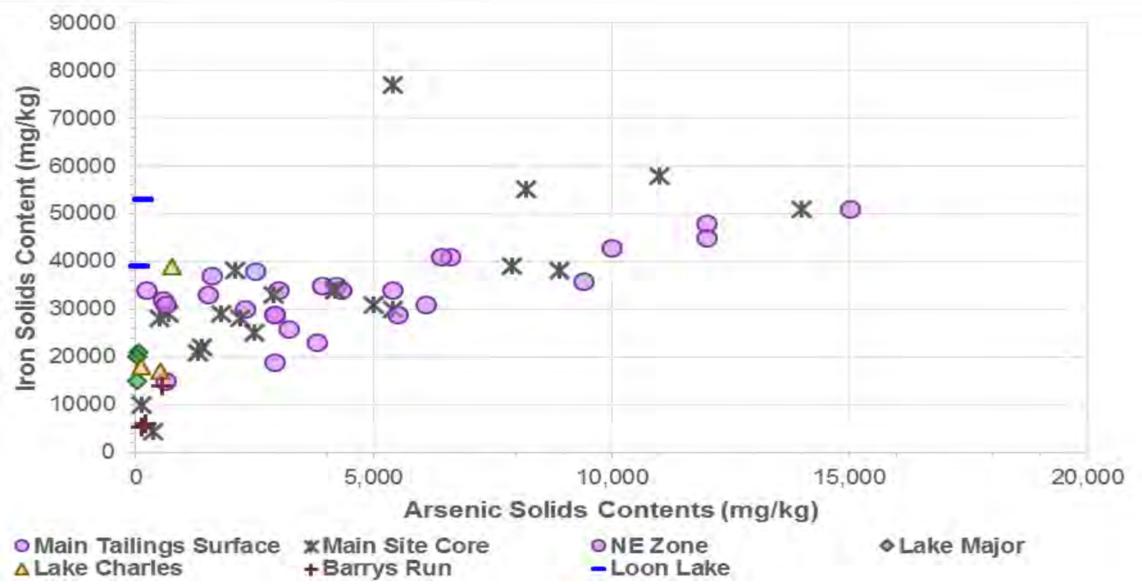

Figure 6-23: Montague Mines – Iron vs. Arsenic Contents in Tailings and Sediments

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.

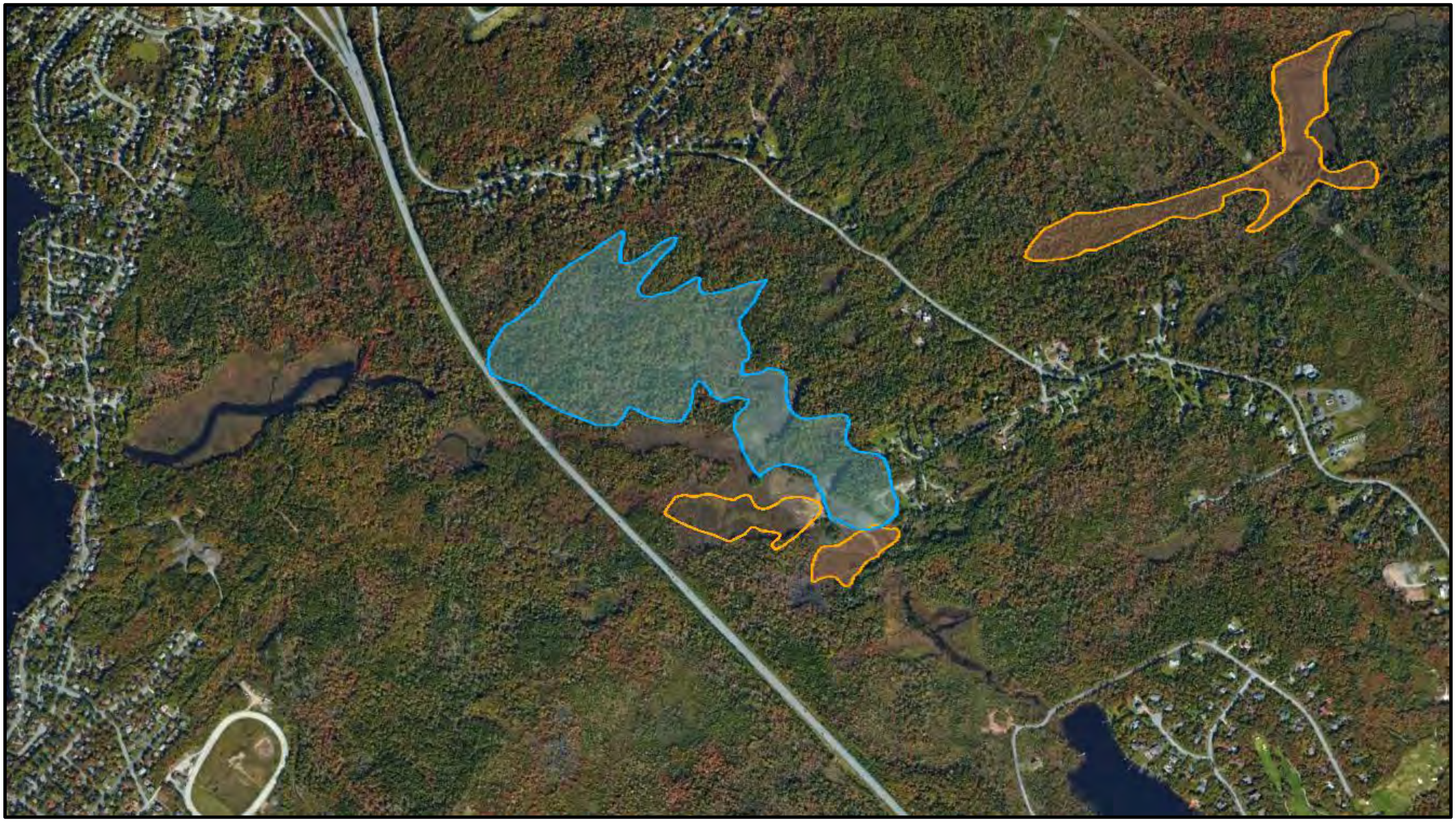

Figure 6-24: Indicated Historical Tailings Deposition Areas

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.

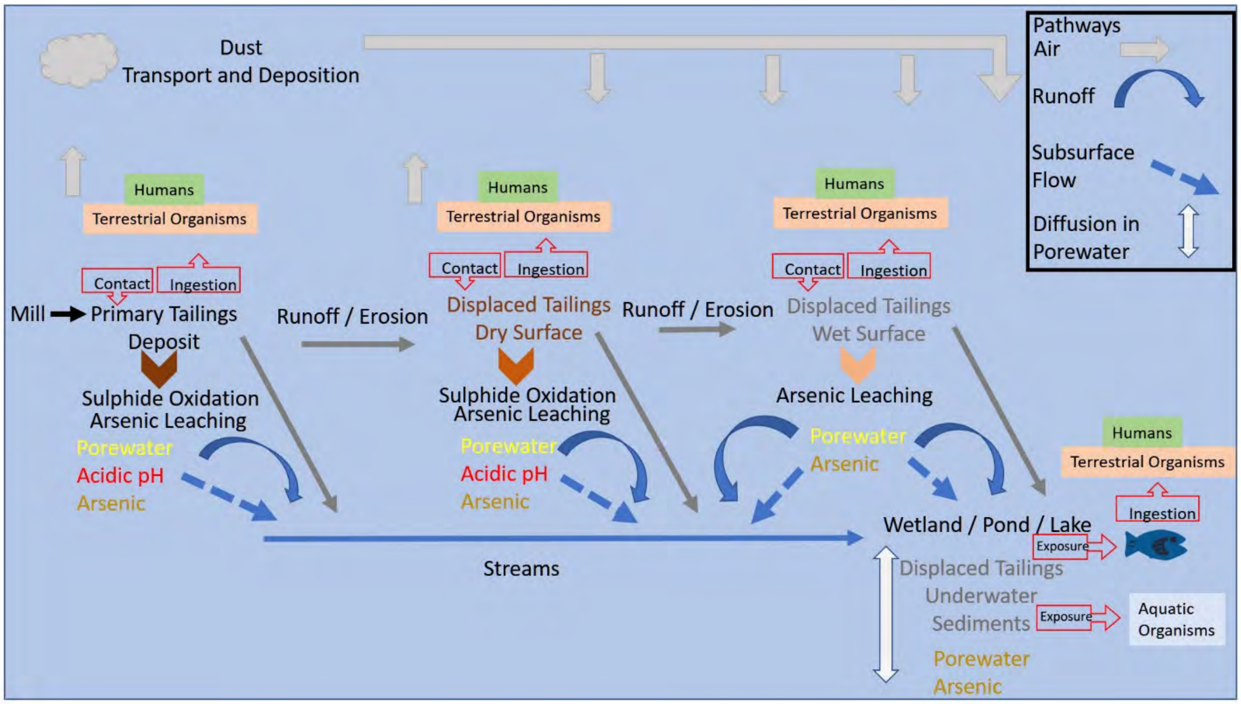

Figure 6-25: Conceptual Site Model for the Montague Site.

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).

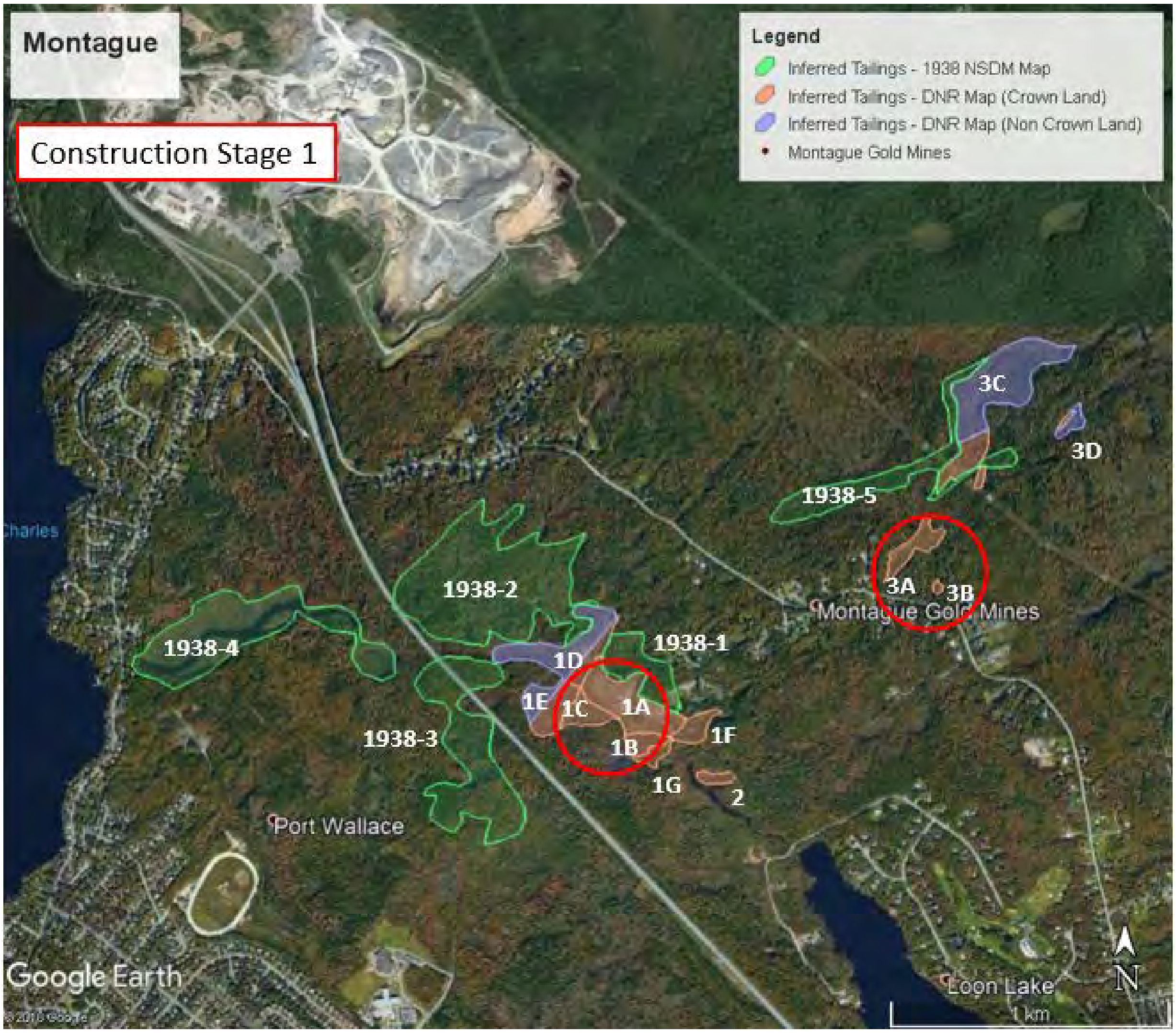

Figure 6-26: Areas of Known and Potentially Impacted by Historical Mining

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.

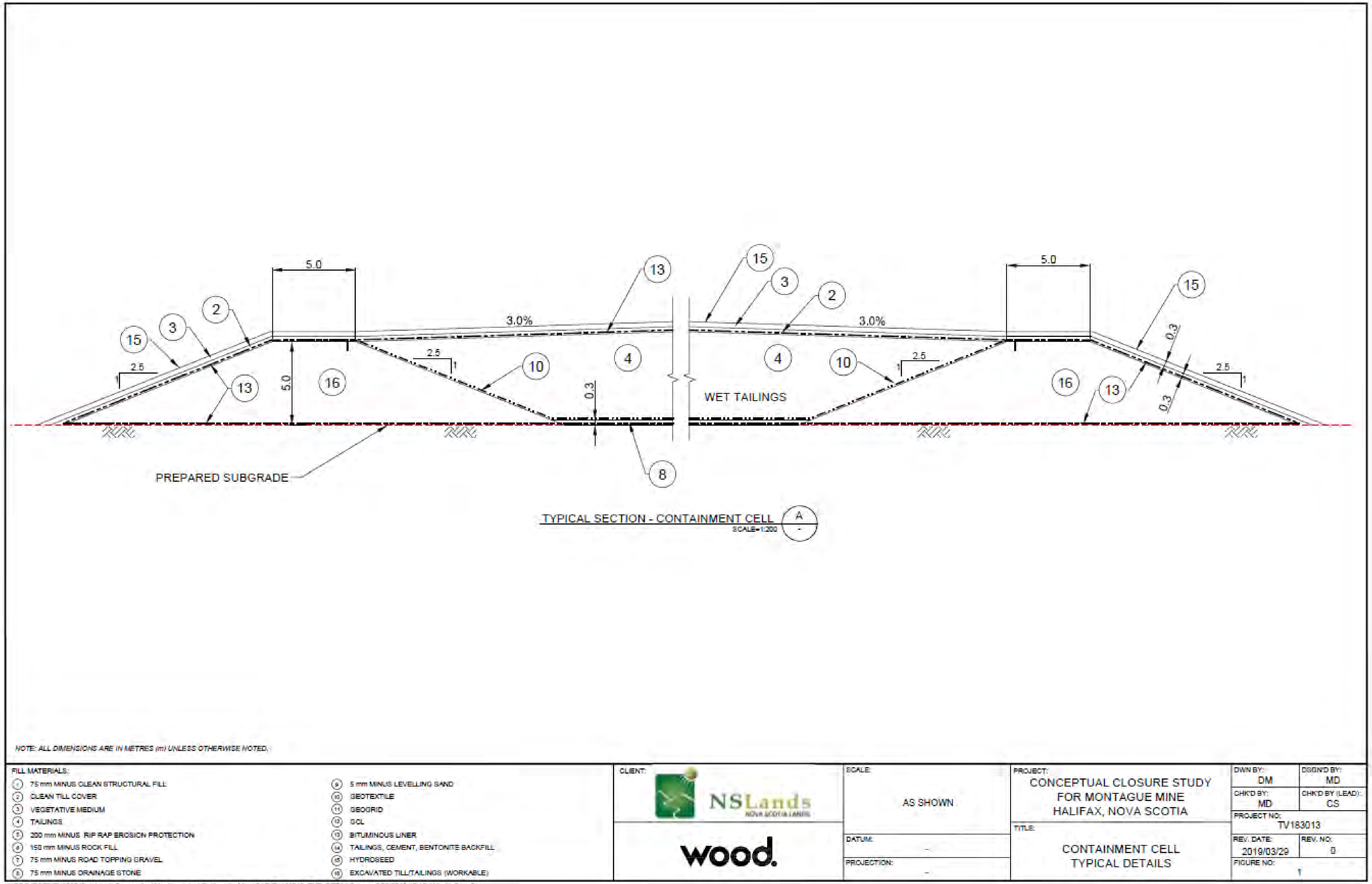

Figure 7-1: Containment Cell Typical Details

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.

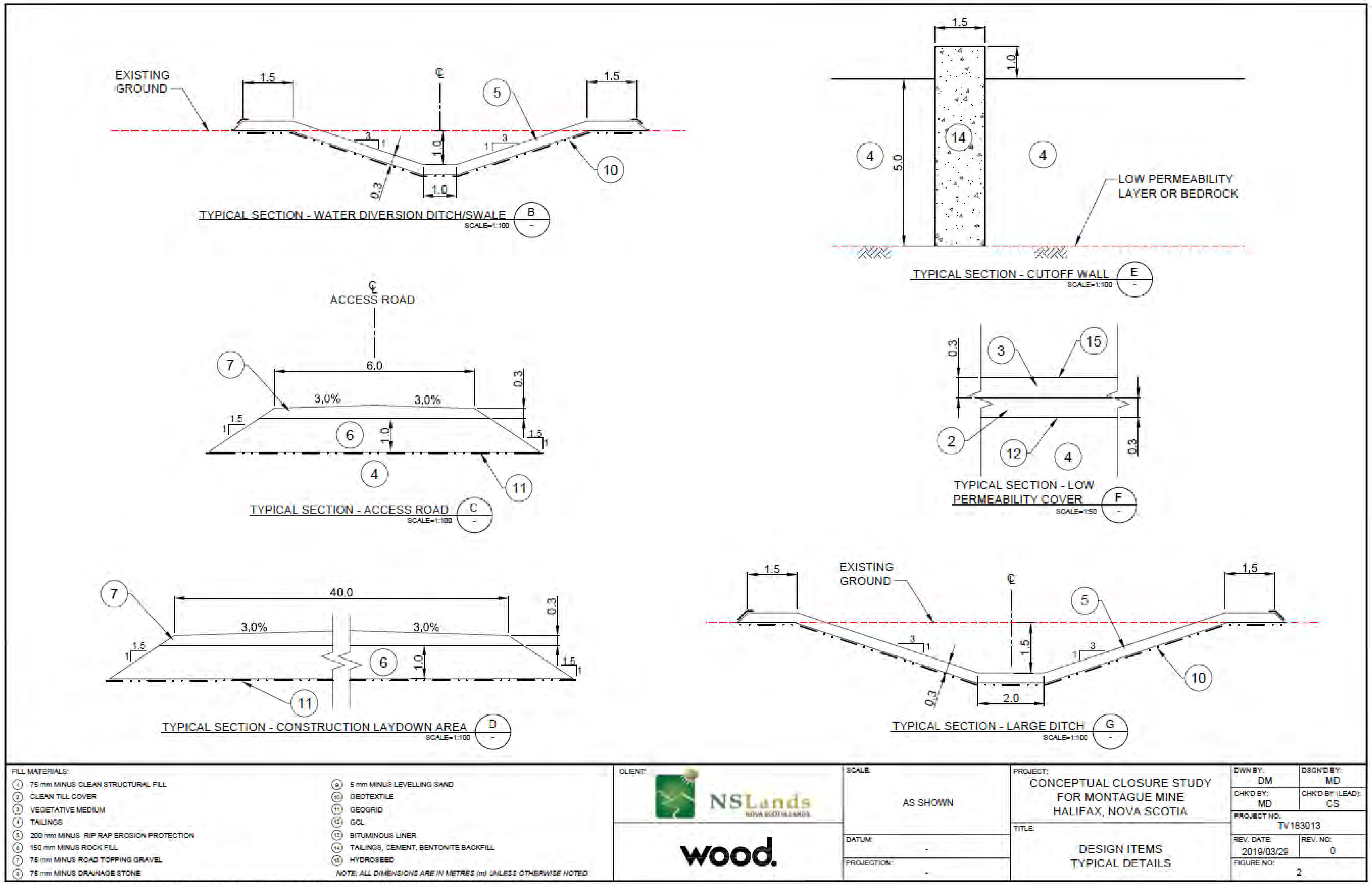

Figure 7-2: Design Items Typical Details

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.

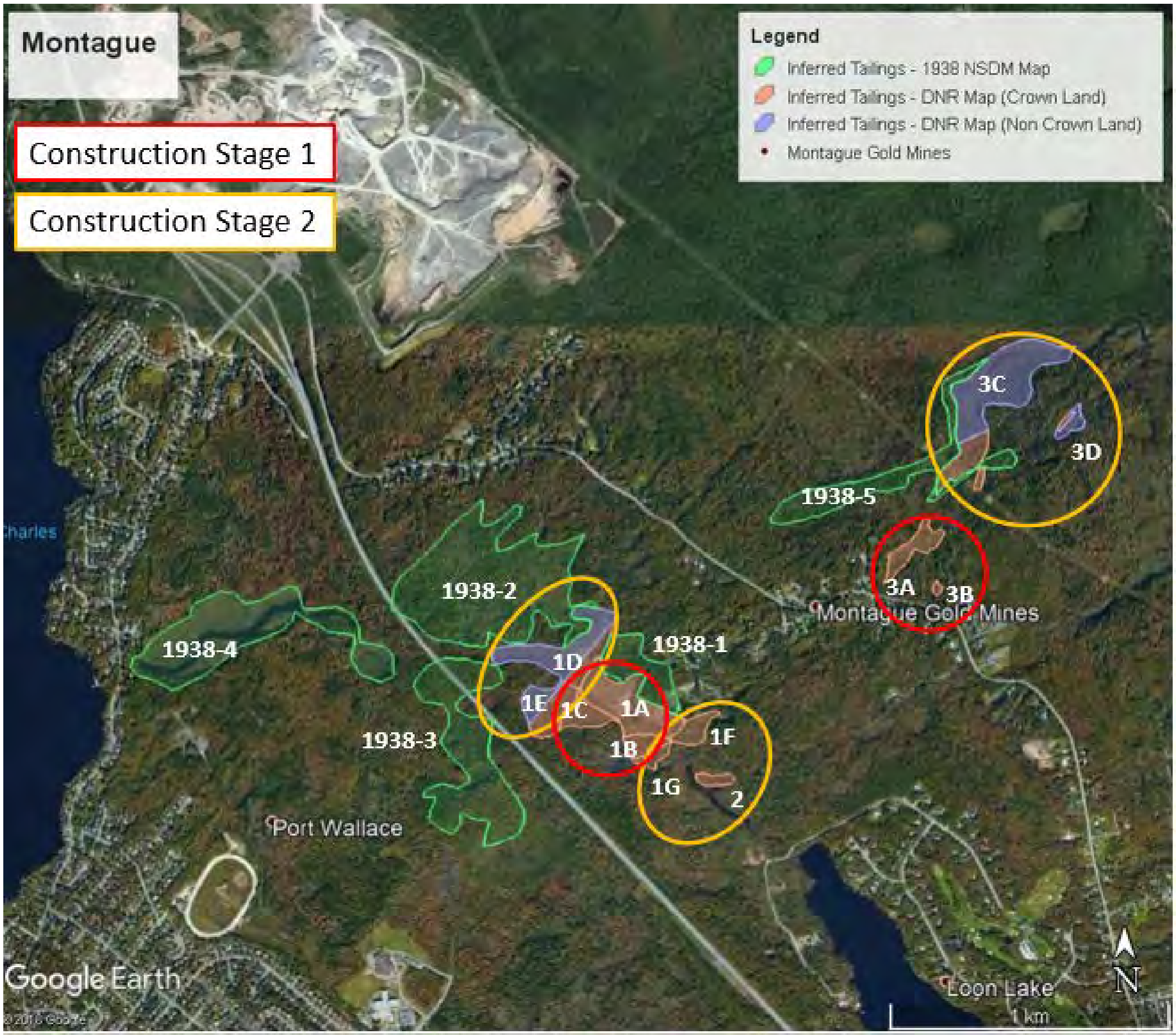

Figure 8-1: Construction Stage 2 – Crown Land Areas

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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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

<u>Task 2: Montague Mines Background Data Review</u>

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.

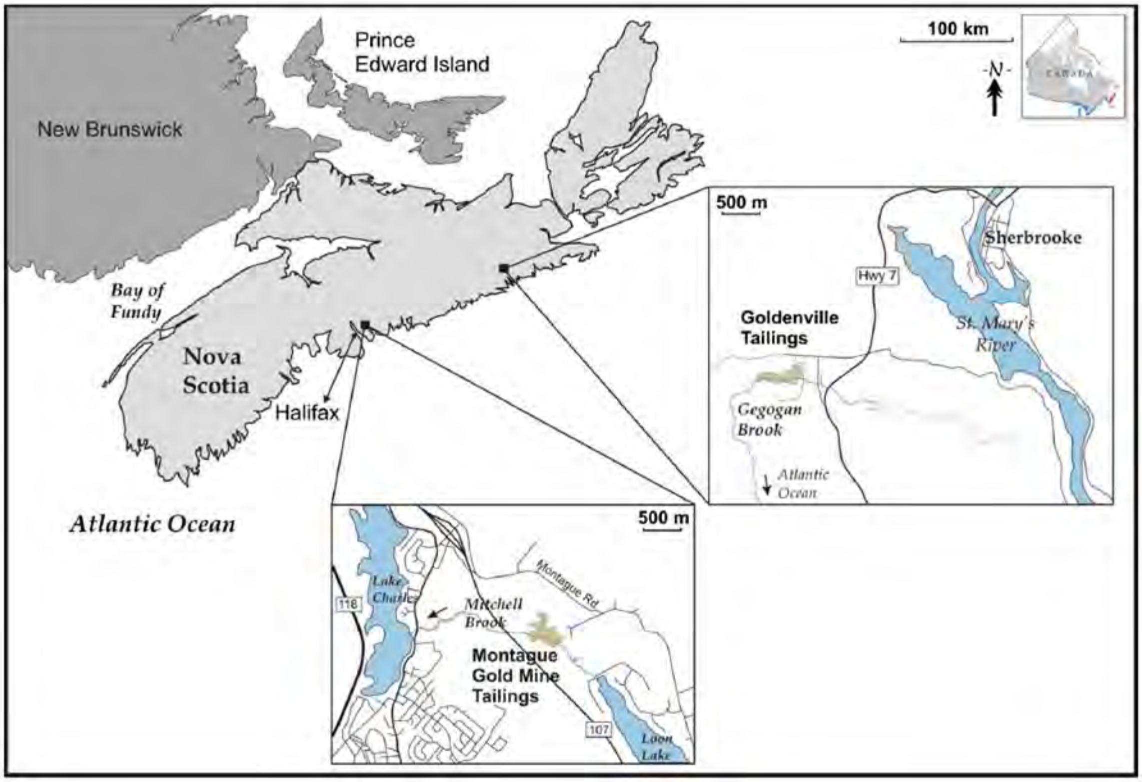


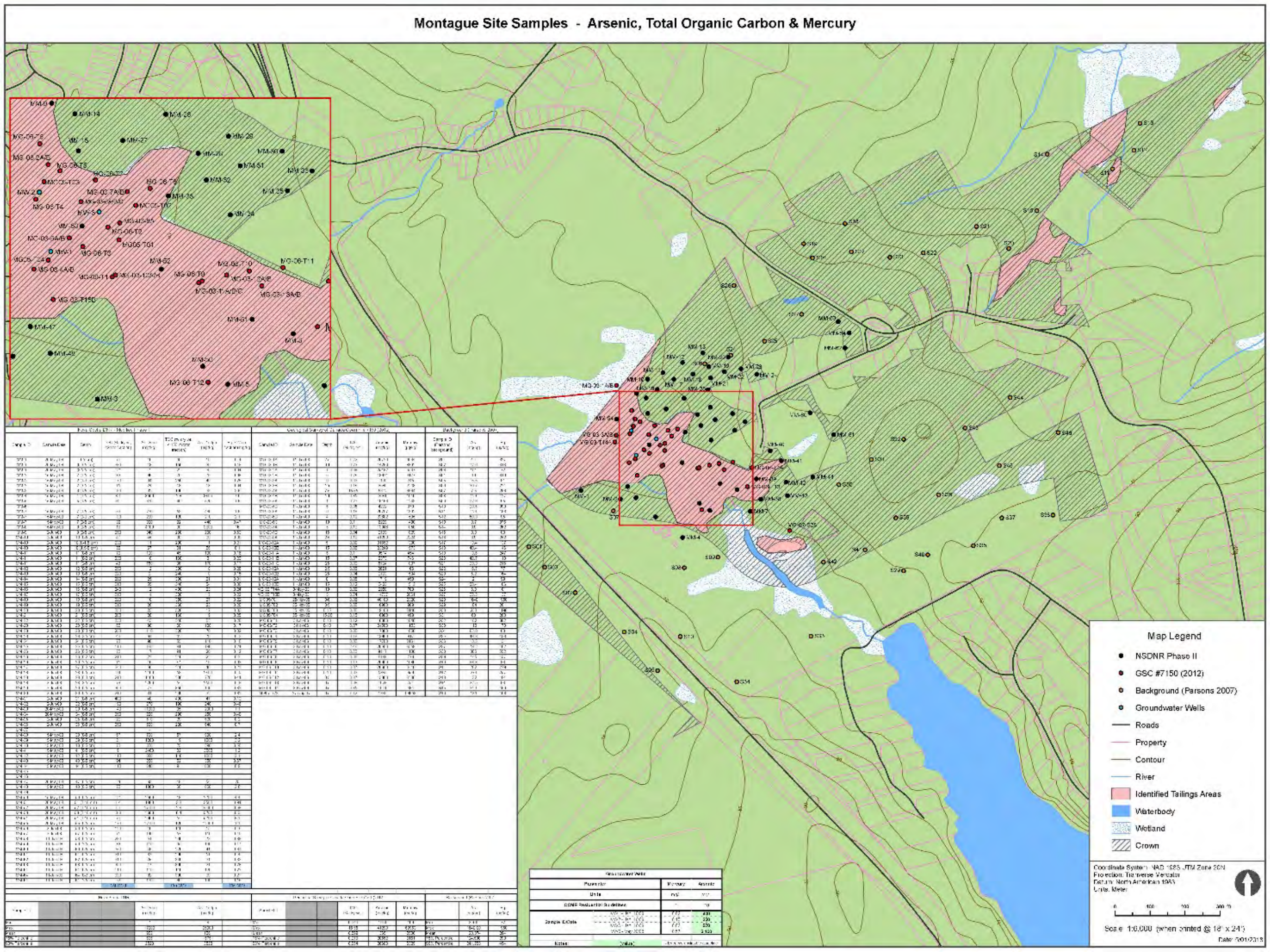
Figure 1-1: Location of Montague Mines Figure From: DeSisto, S.L. H. Jamieson, and M.Parsons. 2017. Arsenic mobility in weathered gold mine tailings under low-organic soil cover. Environmental Earth Sciences (2017) 76:773.

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).

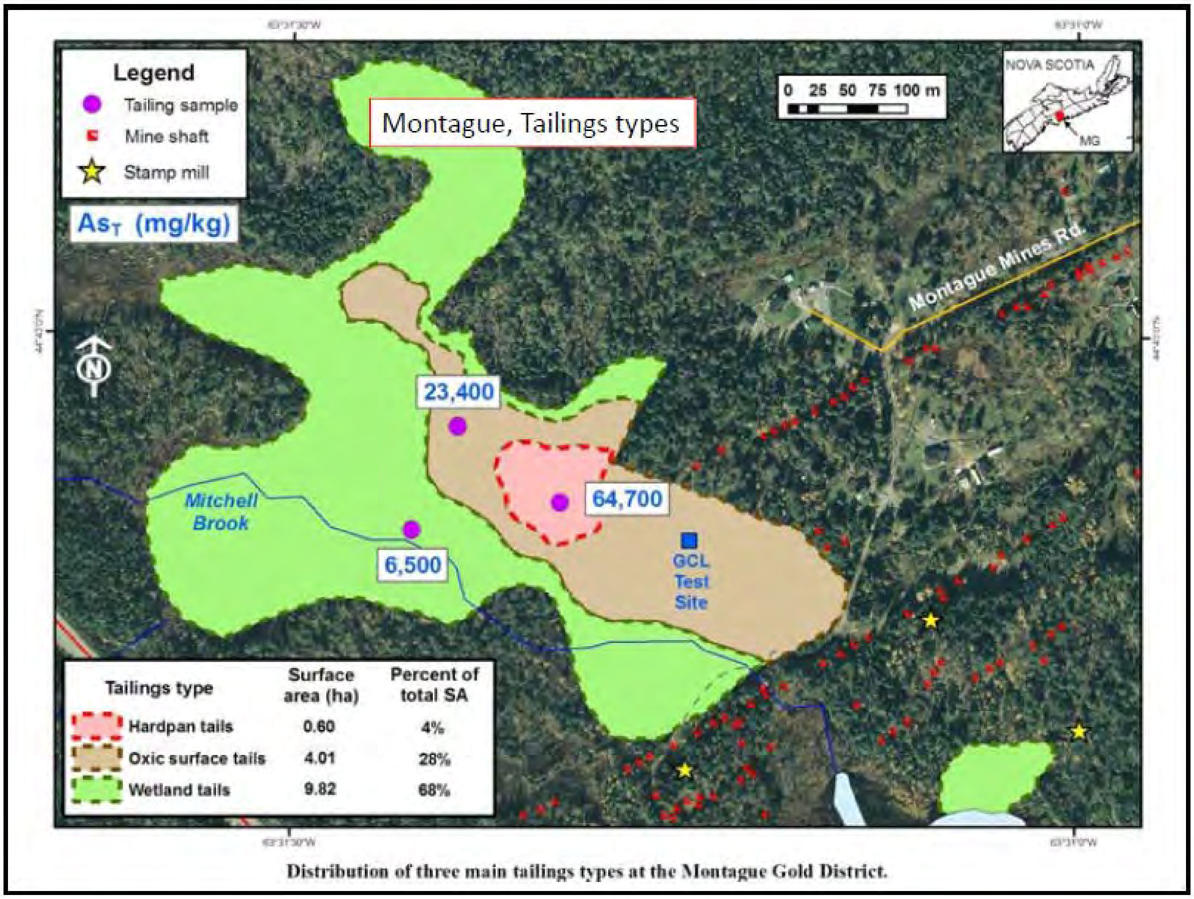


Figure 1-3: Distribution of Tailings Types at Montague Mines (from Jamieson, 2012)

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).

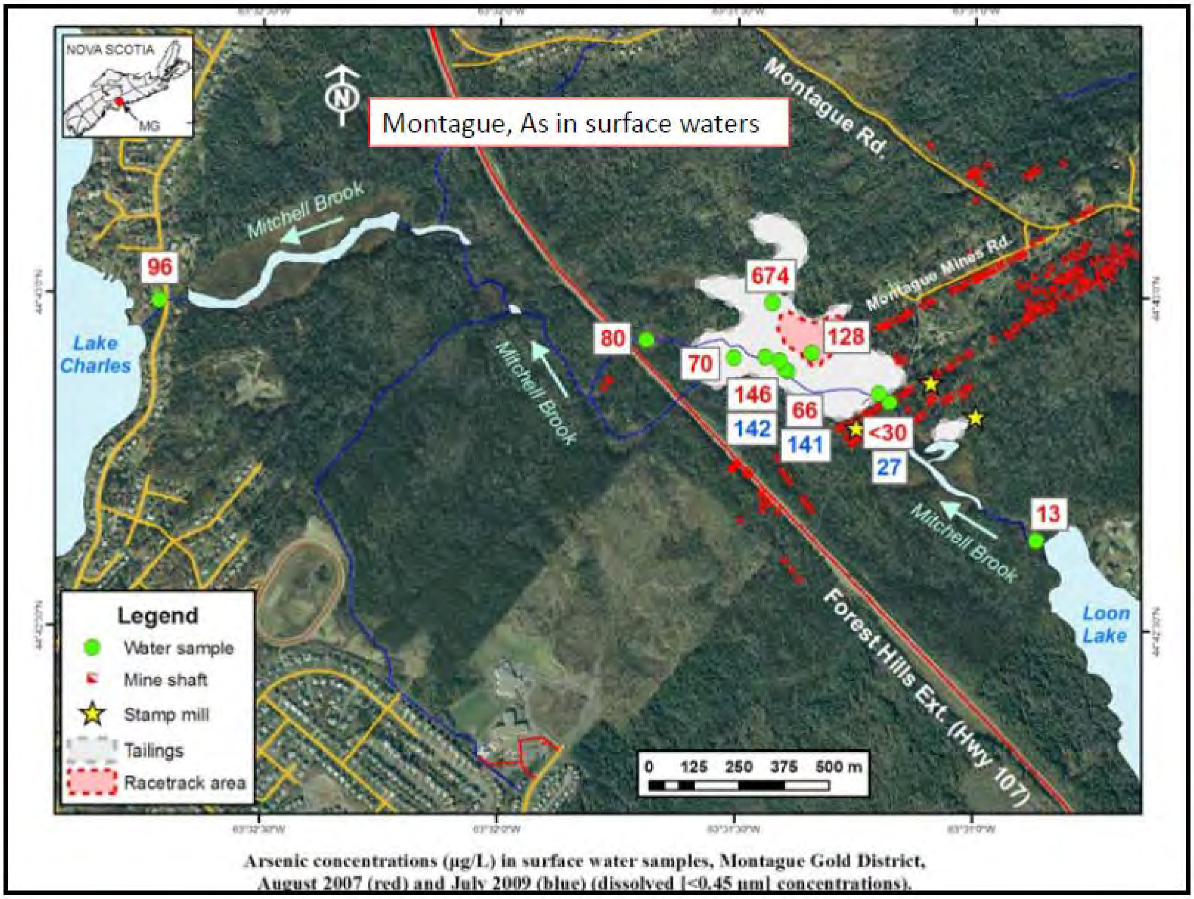


Figure 1-4 Arsenic Concentrations in surface water (Montague Mines Gold District) µg/L; August 2007 (red) and July 2009 (Blue) (dissolved < 0.45 µm) (from Jamieson, 2012)

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.

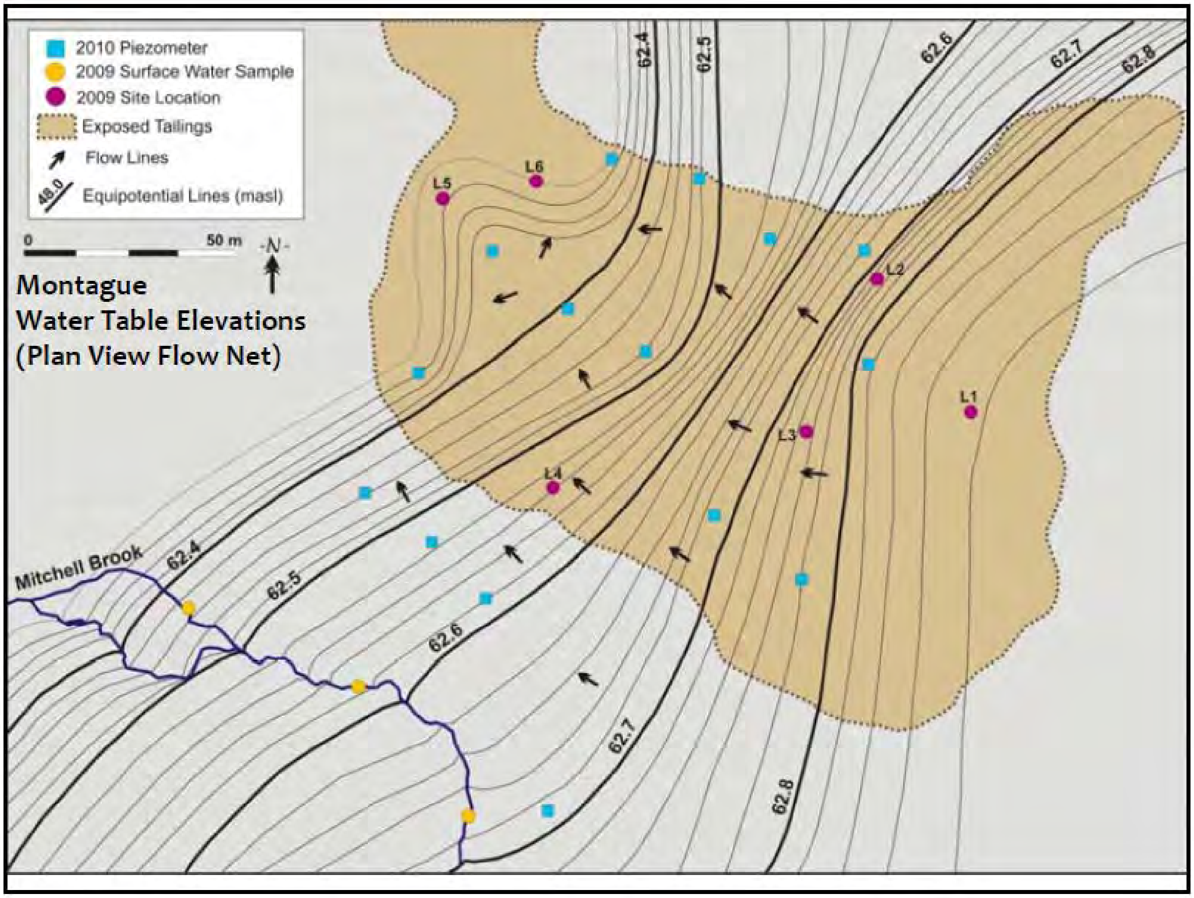


Figure 1-5 Montague Water Table Elevations (from Jamieson, 2012)

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

Table of Contents

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 14 day LC15	960 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 181-d growth NOEC 181-d threshold of chronic toxicity	9640 2480 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: pH	T (°C)	Alkalinity / Hardness (mg/L; $CaCO_3$)	Test Duration / Life Stage	Chronic Value (µg/L)	Geometric Mean Value (µg/L)	End Point	Reference	Rating
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										
Ankistrodesmus 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).

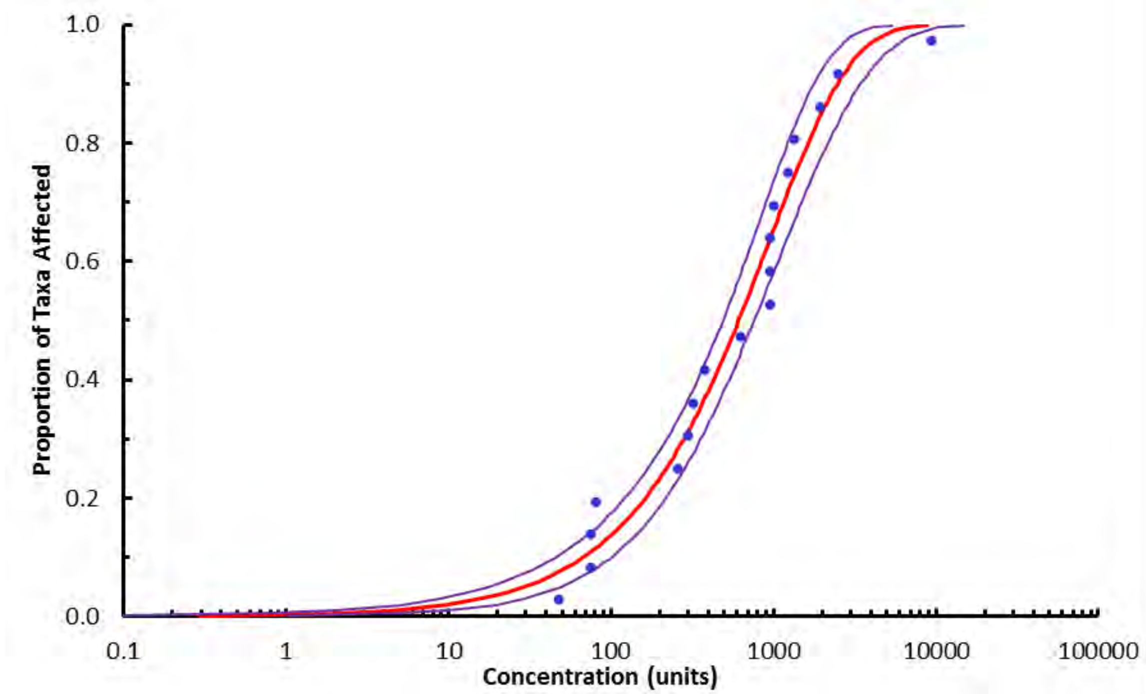

Figure B-1 SSD Based on the Sensitivity of the Freshwater Aquatic Community to Arsenic using the Extreme Value Model

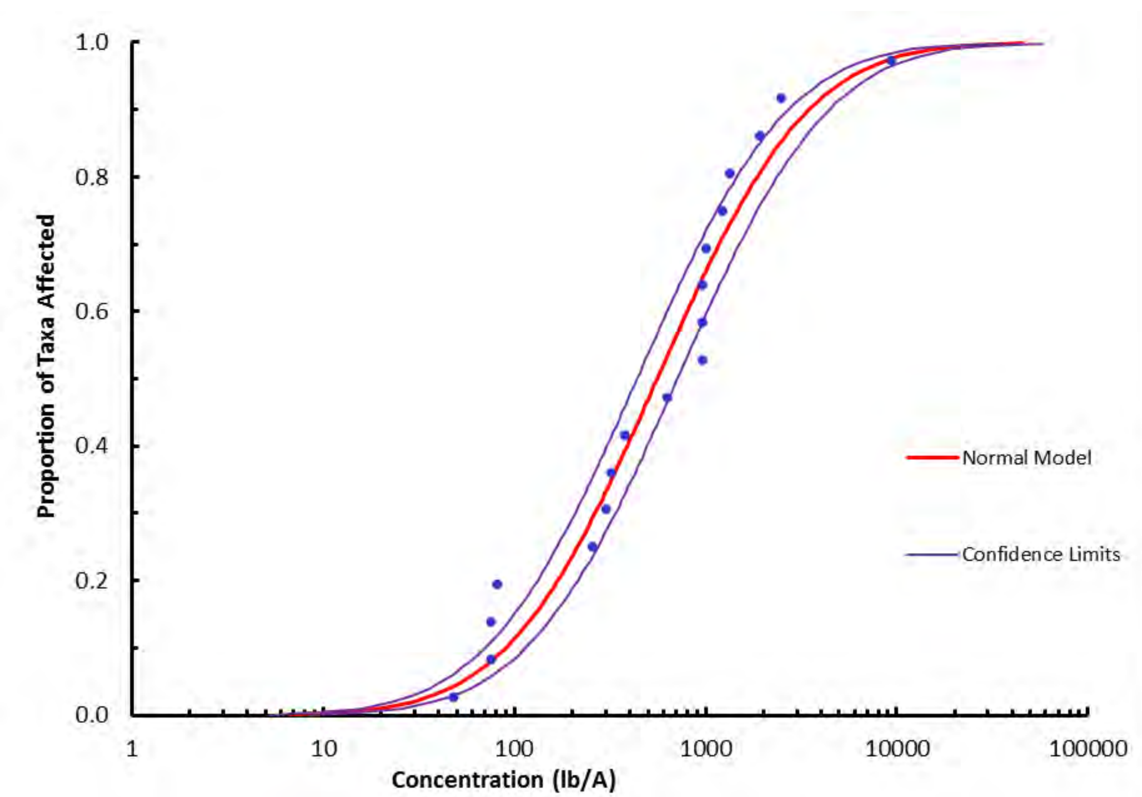

Figure B-2 SSD Based on the Sensitivity of the Freshwater Aquatic Community to Arsenic using the Normal Model

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;

μ = location parameter; and

s = scale parameter (always positive).

The fitted model parameters were: μ = 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 95th 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)

Metal	Tier 1 Criteria	Sampling Location																						
		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)

Metal	Tier 1 Criteria		Sampling Location																						
	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)

Metal	Tier 1 Criteria		Sampling Location																						
	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)

Metal	Tier 2 Criteria	Sampling Location																						
		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

Metal	Tier 2 Criteria	Sampling Location																						
		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

Metal	Tier 1 Criteria		Sampling Location														
	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

Metal	Tier 1 Criteria		Sampling Location														
	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

Metal	Tier 2 Criteria	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-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

Metal	Tier 2 Criteria	Sampling Location														
		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 are	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 hydro 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
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EcoMetrix
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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

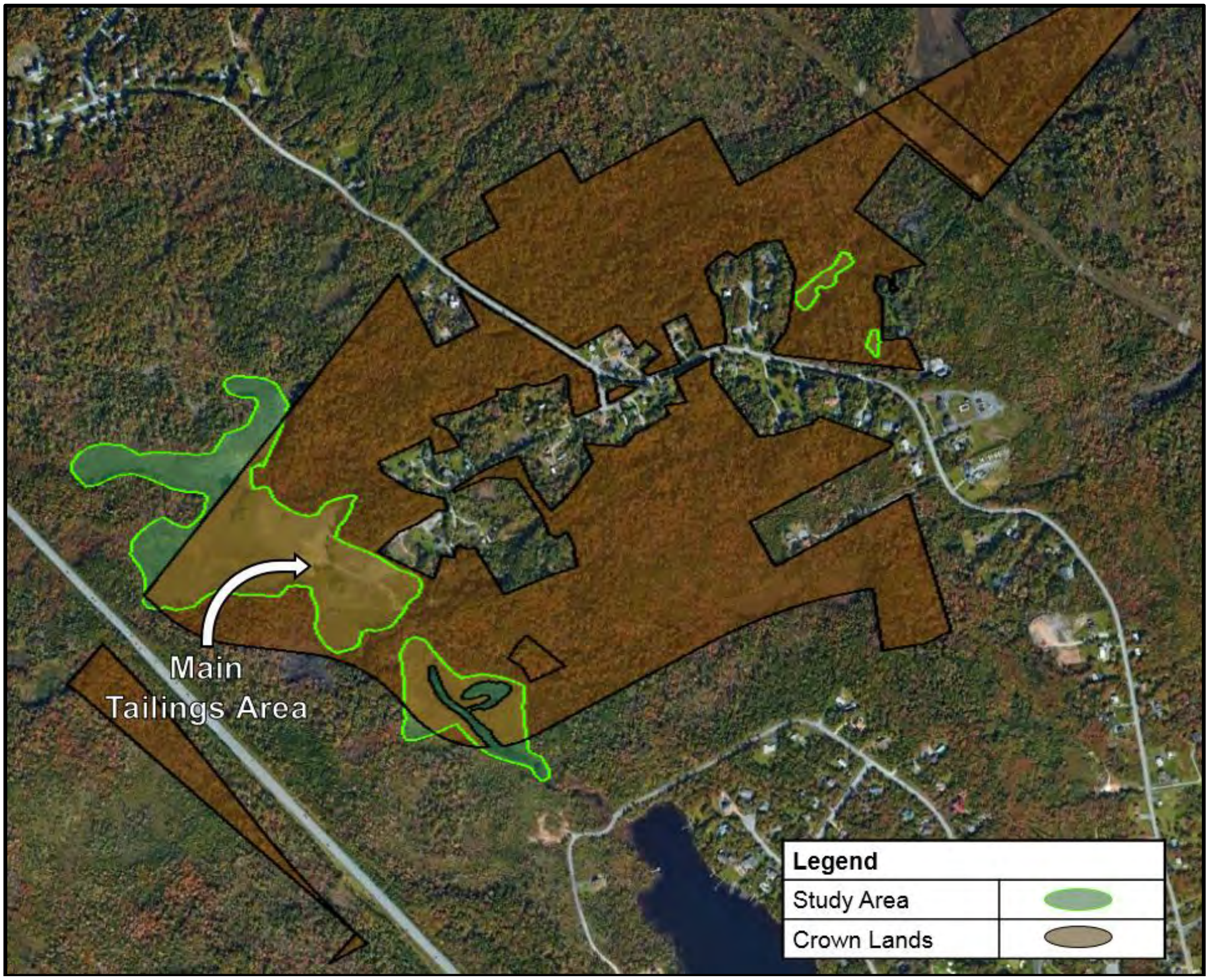

Figure 1-2: Montague Gold Mines – Study Area

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.

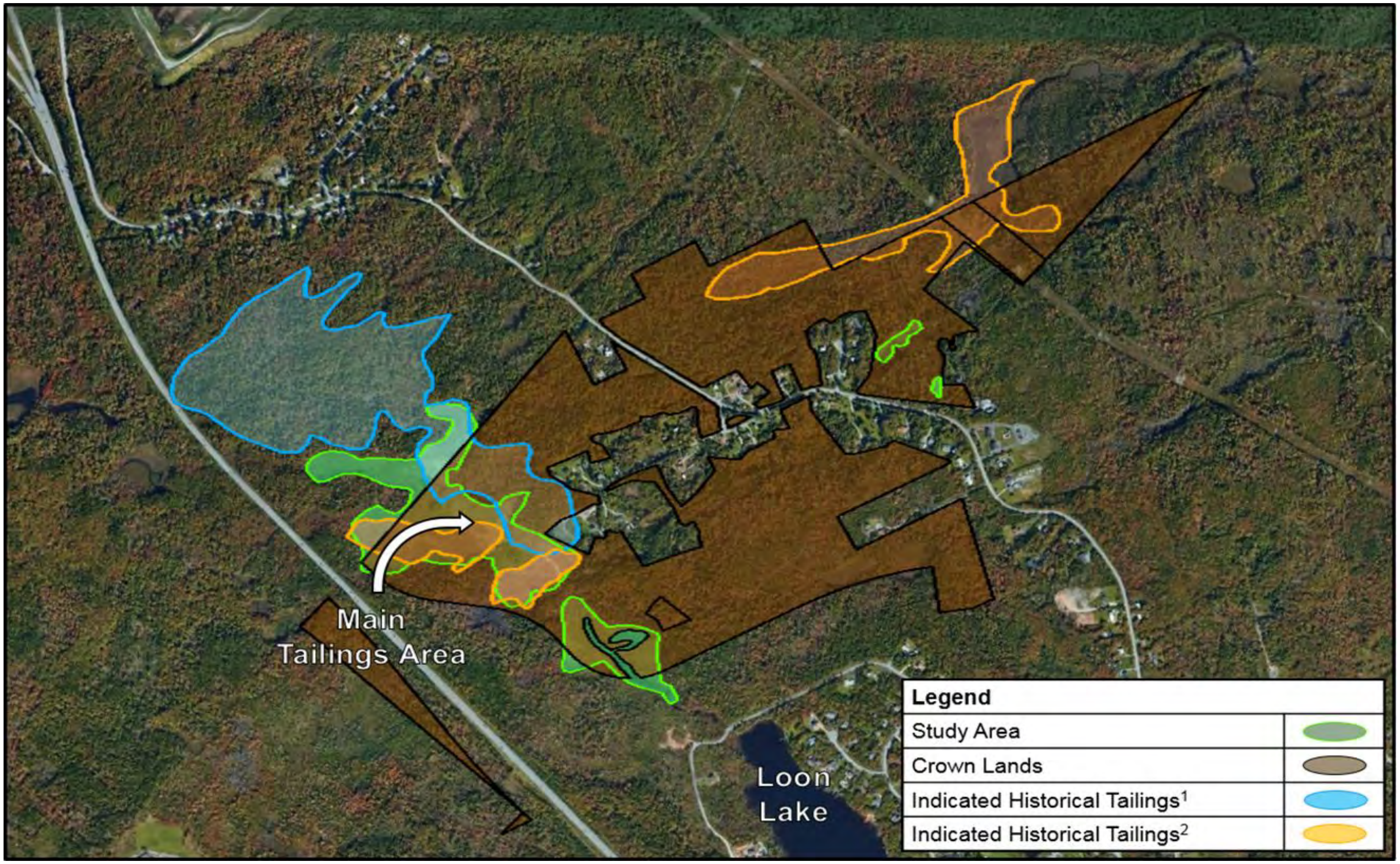

Figure 1-3: Montague Gold Mines – Study Area and Historical Tailings

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 *in 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.

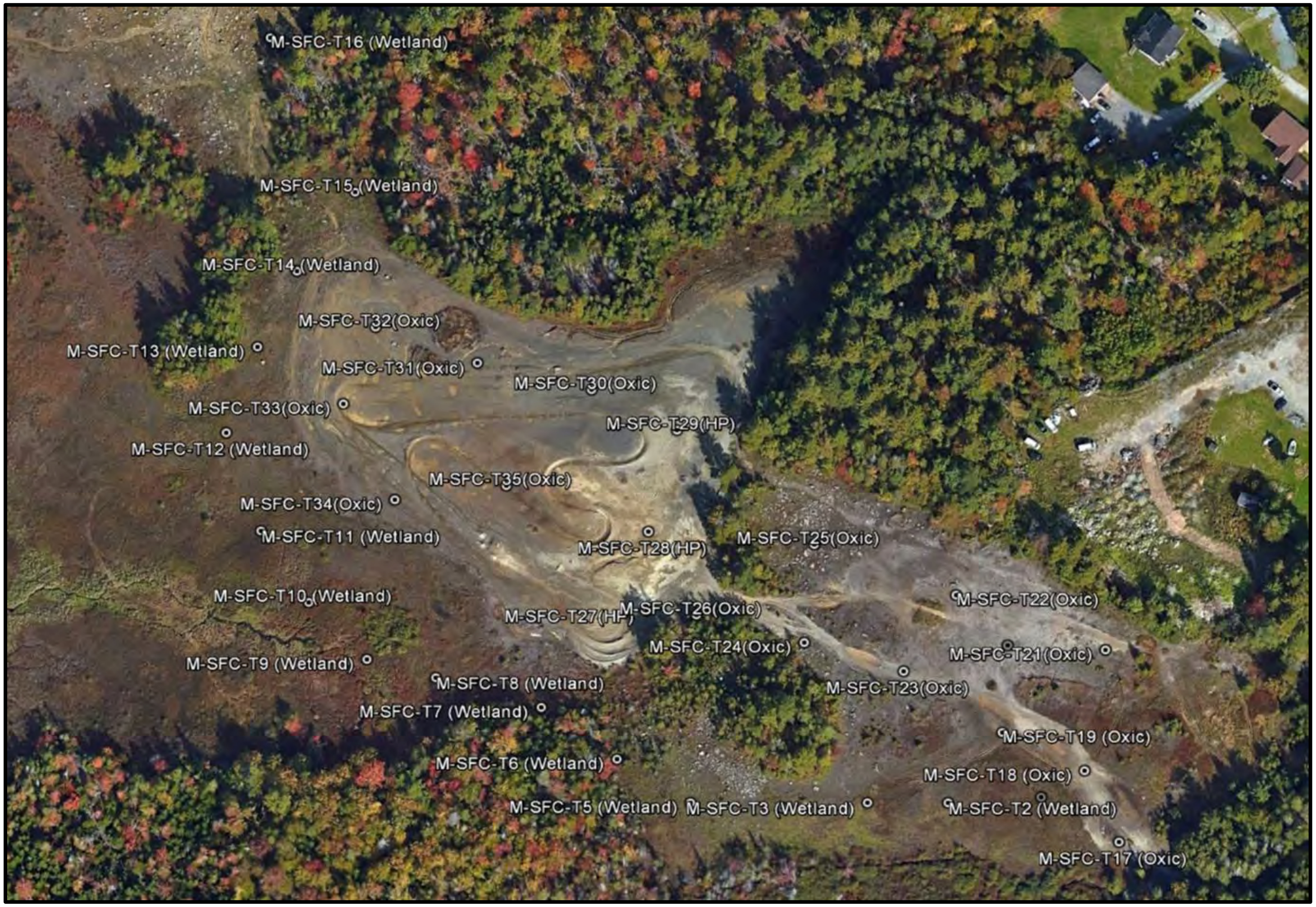

Figure 2-3: Montague Gold Mines – Surficial Solids Sampling Locations

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

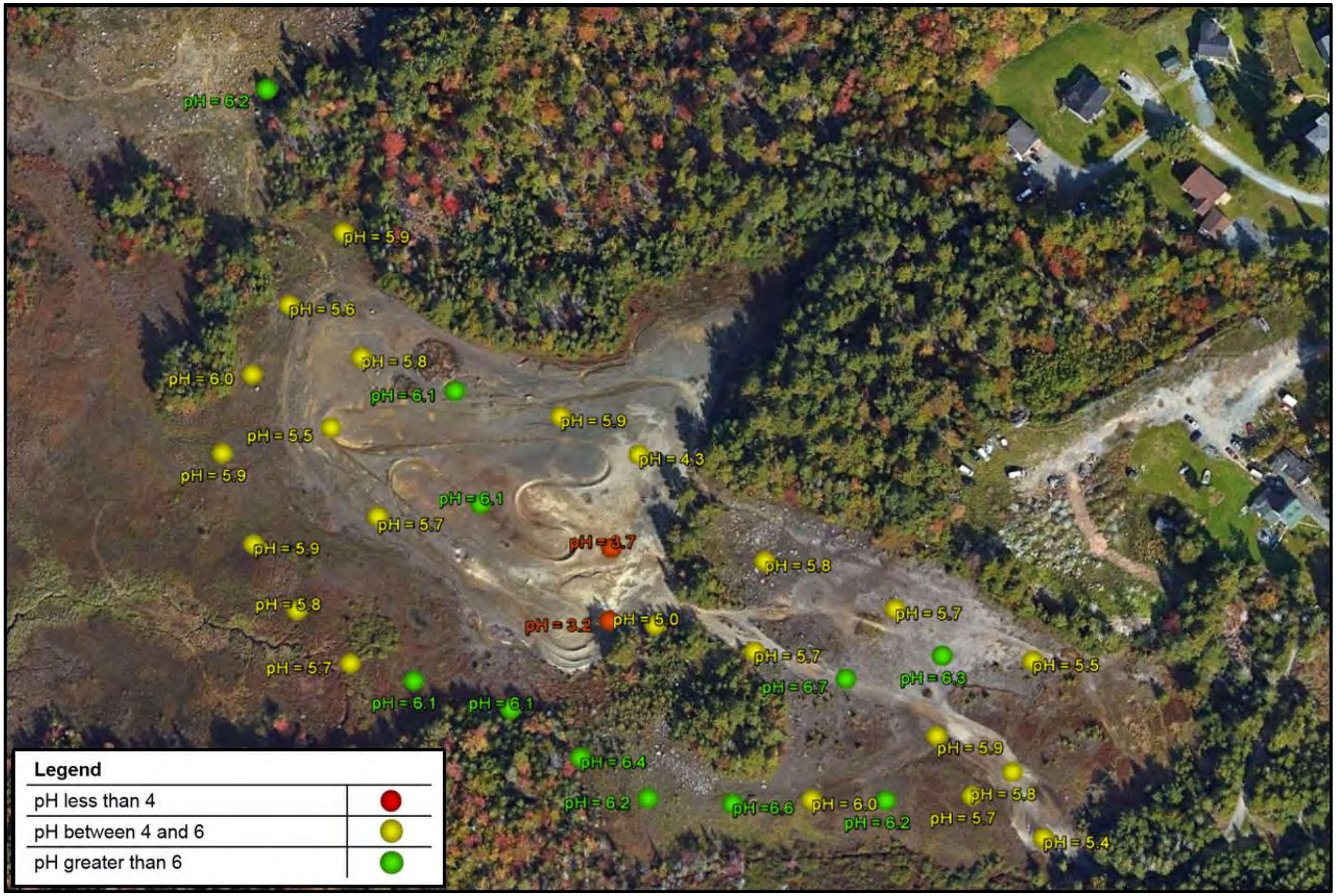

Figure 2-4: Montague Gold Mines – Surficial Solids Rinse pH

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.

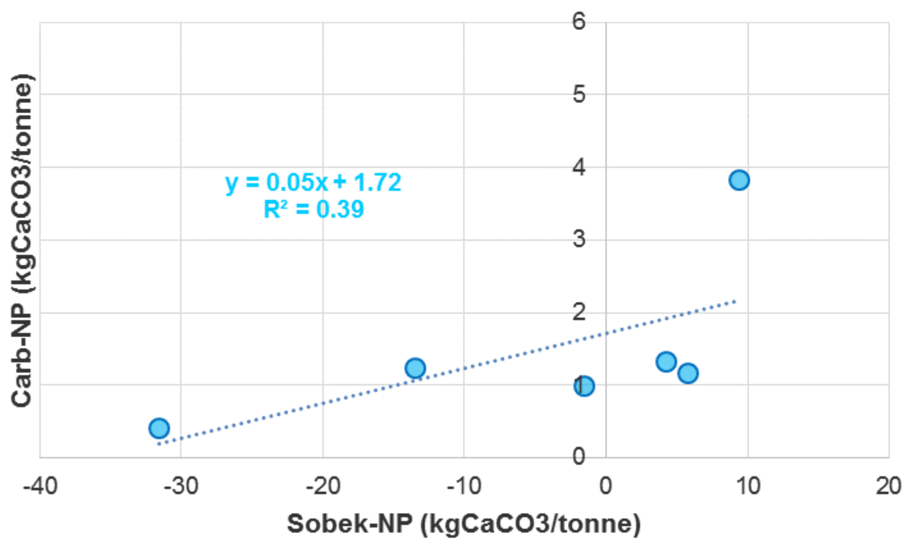

Figure 3-1: Montague Gold Mines – Carb-NP vs. Modified Sobek-NP

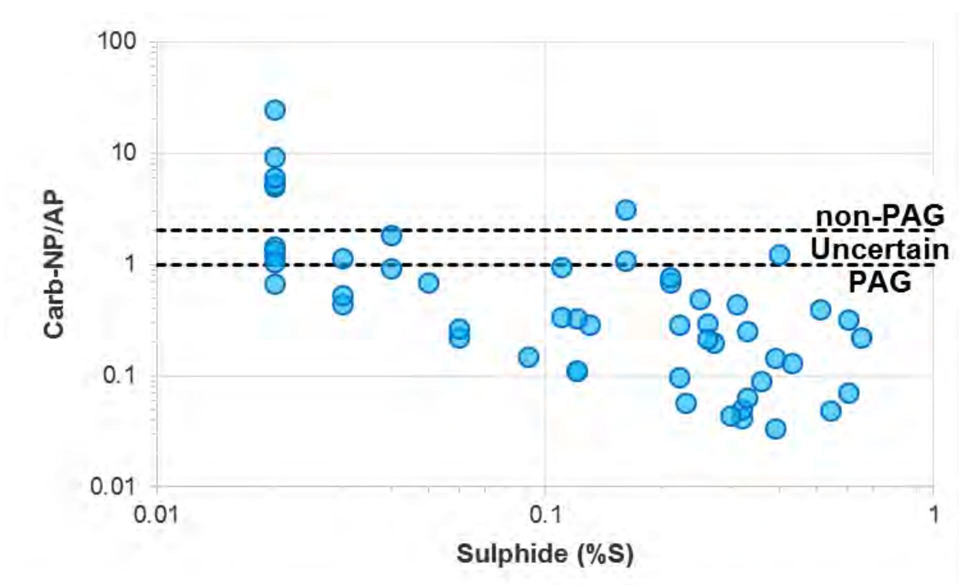

Figure 3-2: Montague Gold Mines – Carb-NP/AP vs. Sulphide

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

Location	Carb-NPR			
	Count	PAG Carb-NPR < 1	Uncertain 1 ≤ Carb-NPR < 2	Non-PAG 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.

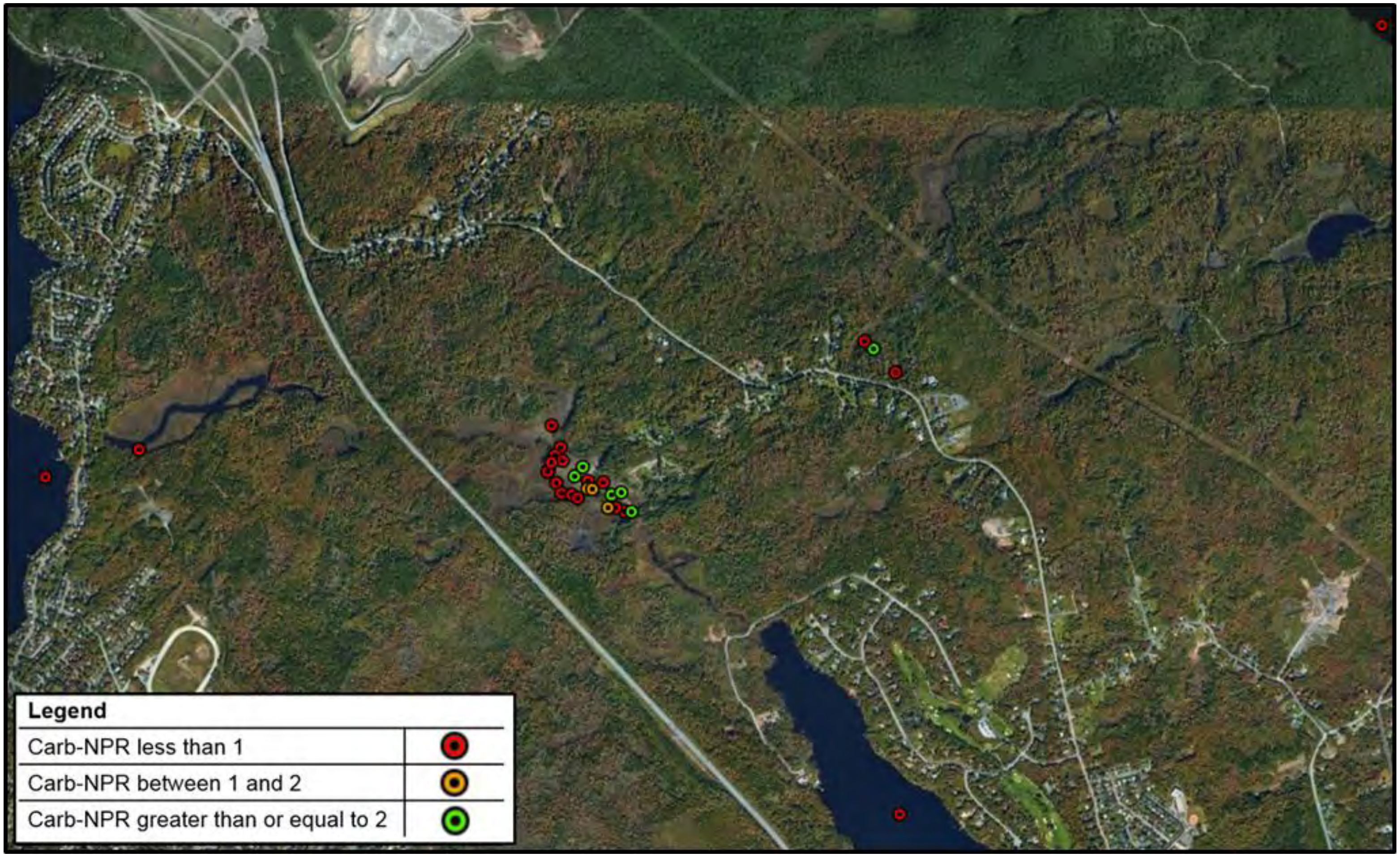

Figure 3-3: Montague Gold Mines – Carb-NP/AP Overview

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.

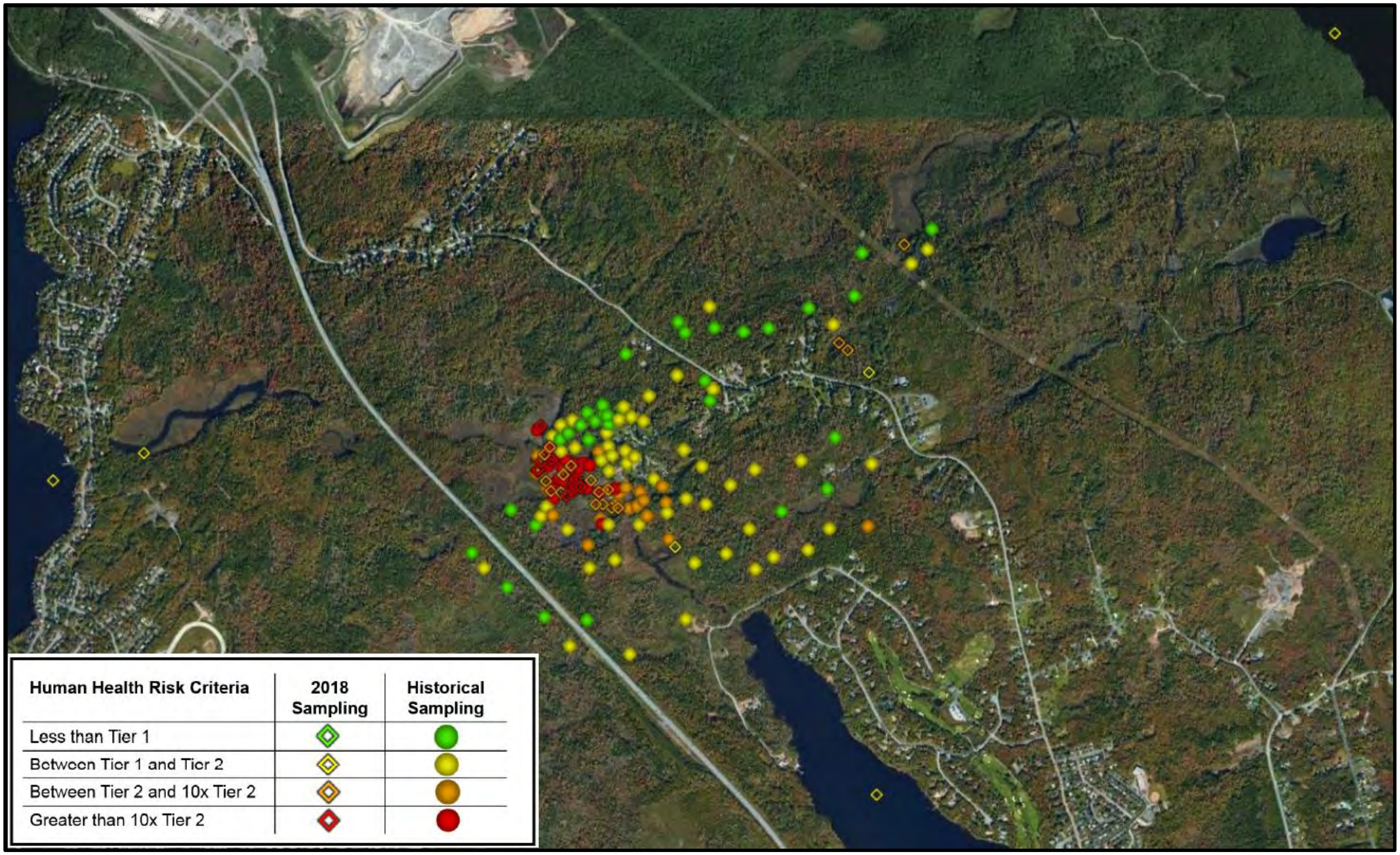

Figure 3-4: Montague Gold Mines – Near-Surface Arsenic Contents – All Locations

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

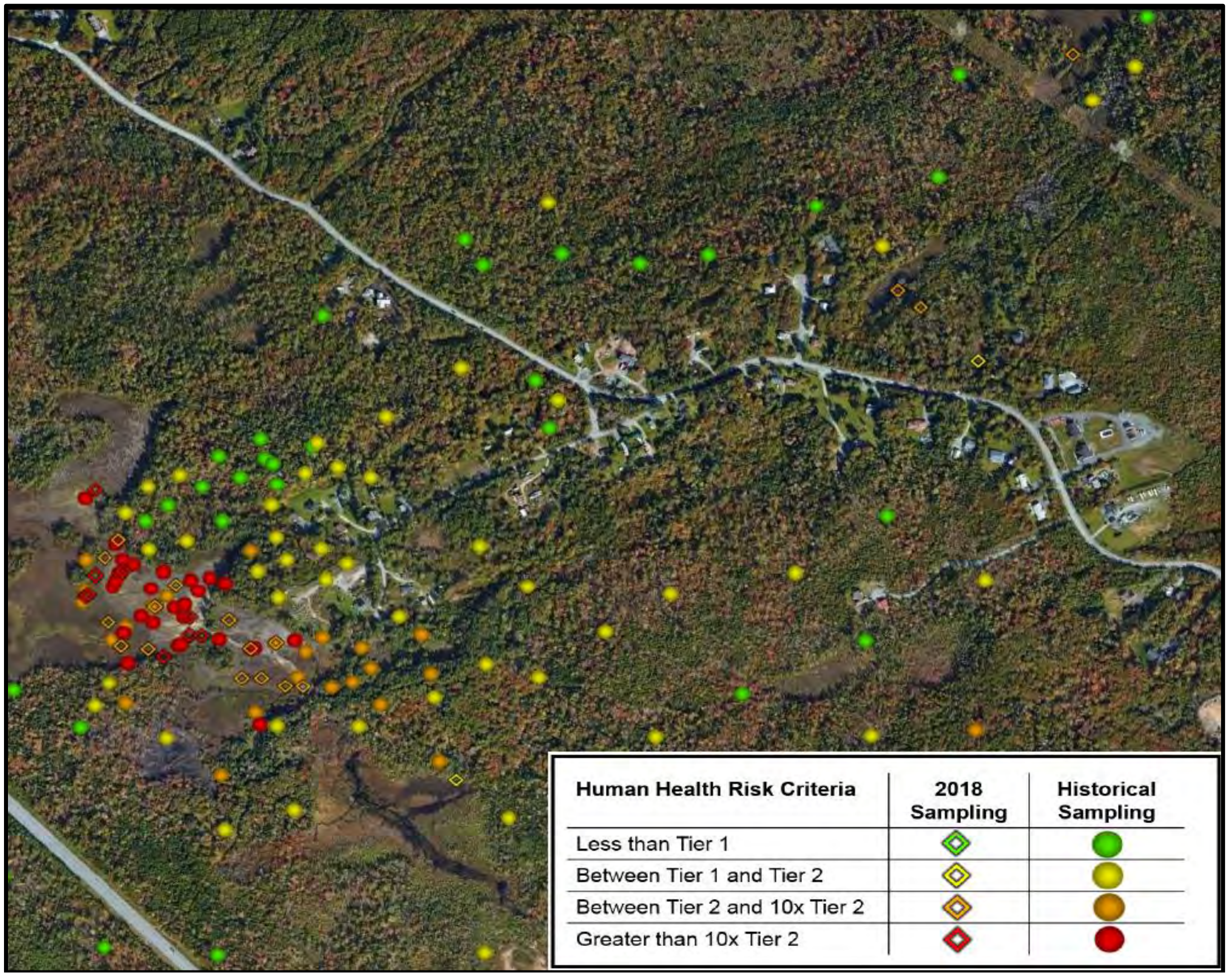

Figure 3-5: Montague Gold Mines – Near-Surface Arsenic Contents – Central Region

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.

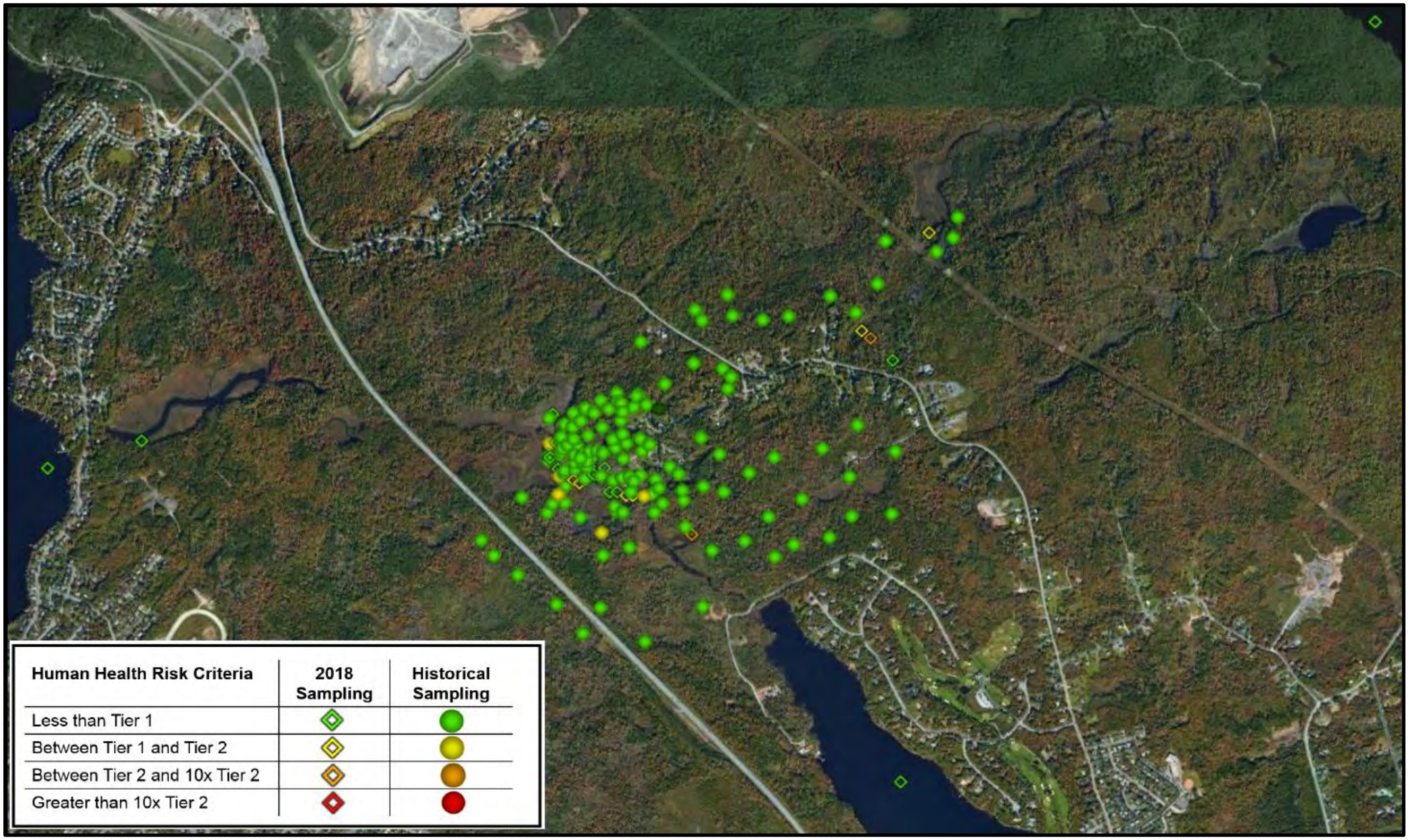

Figure 3-6: Montague Gold Mines – Near-Surface Mercury Contents – All Locations

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

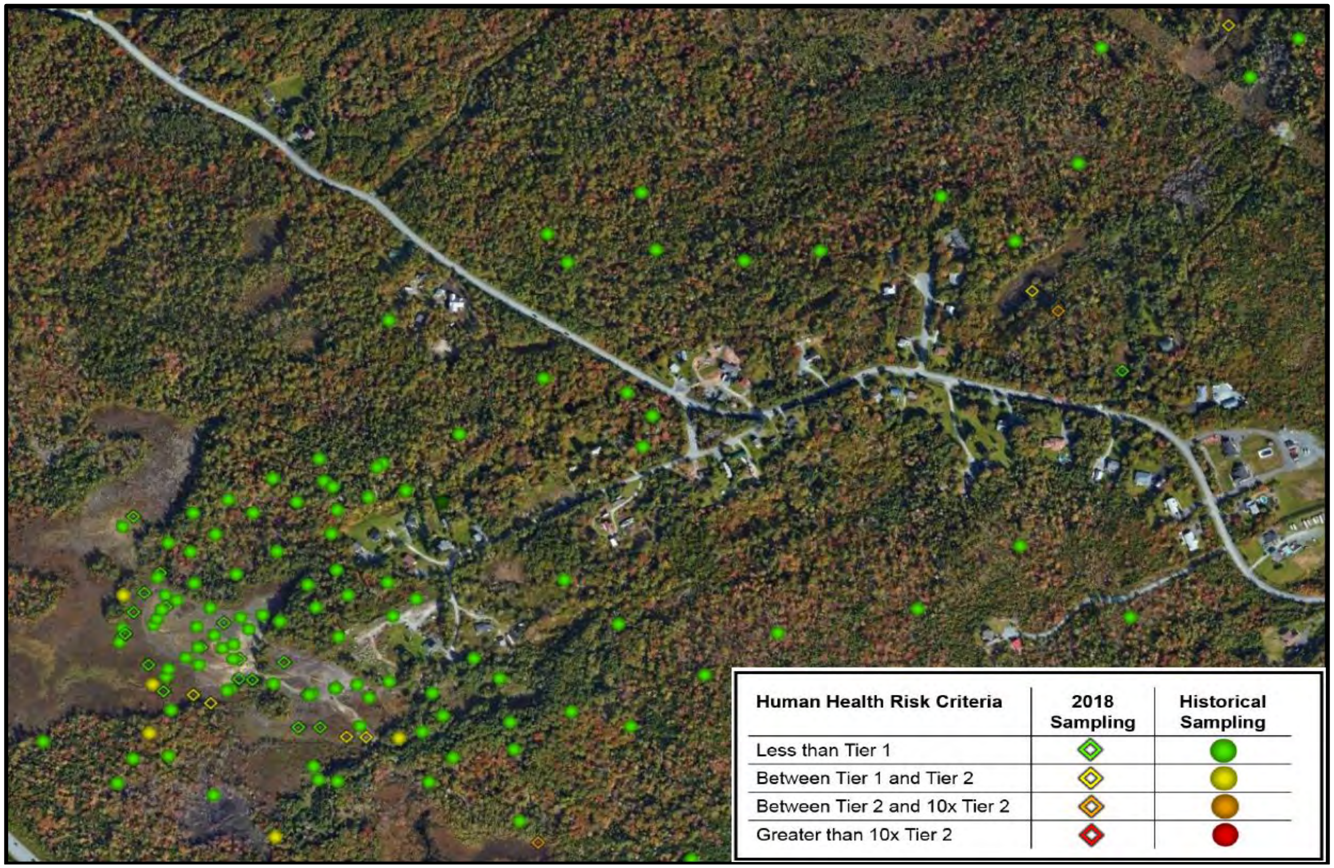

Figure 3-7: Montague Gold Mines – Near-Surface Mercury Contents – Central Region

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

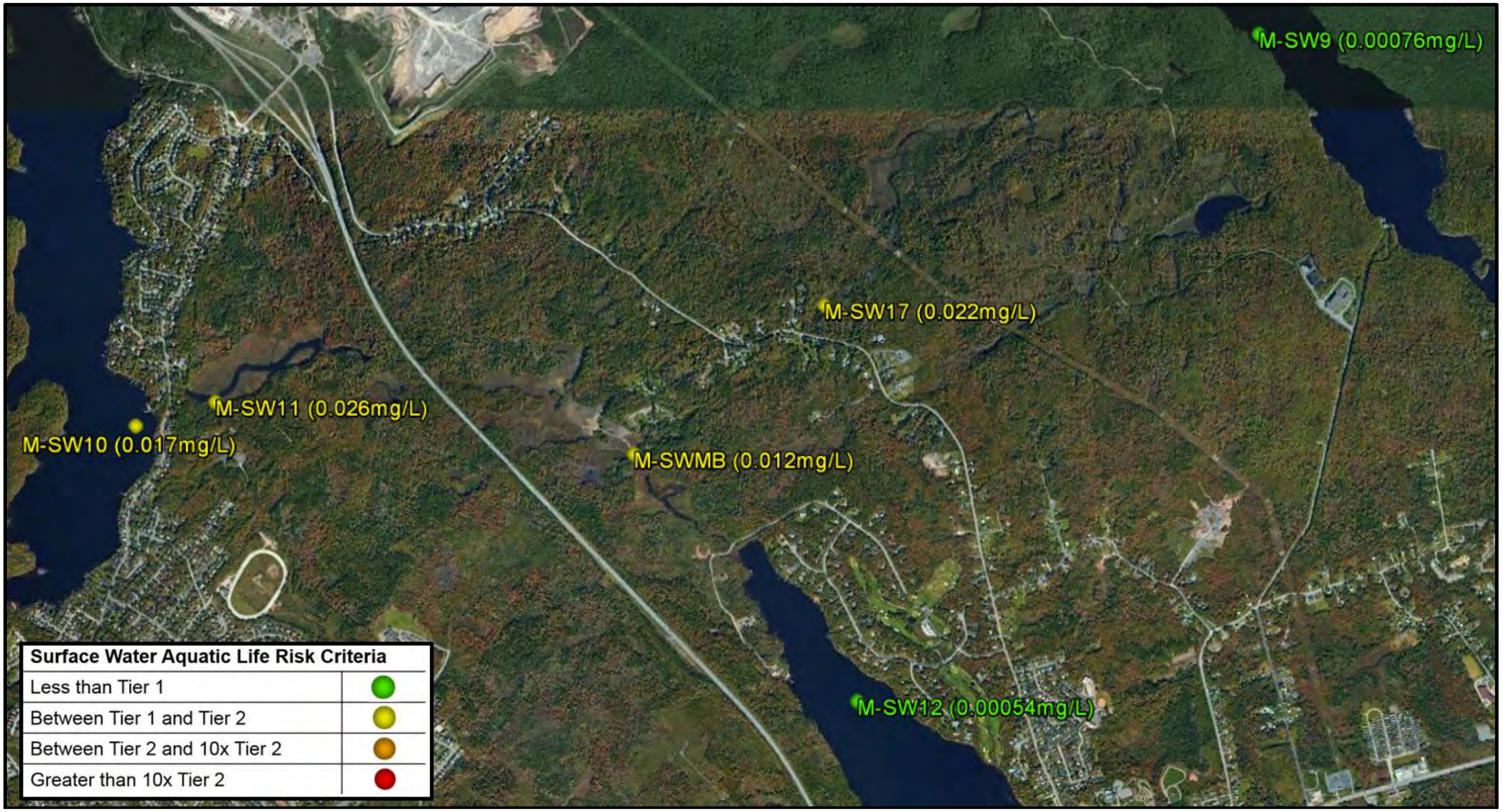

Figure 3-8: Montague Gold Mines – Surface Water Total Arsenic Concentrations

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

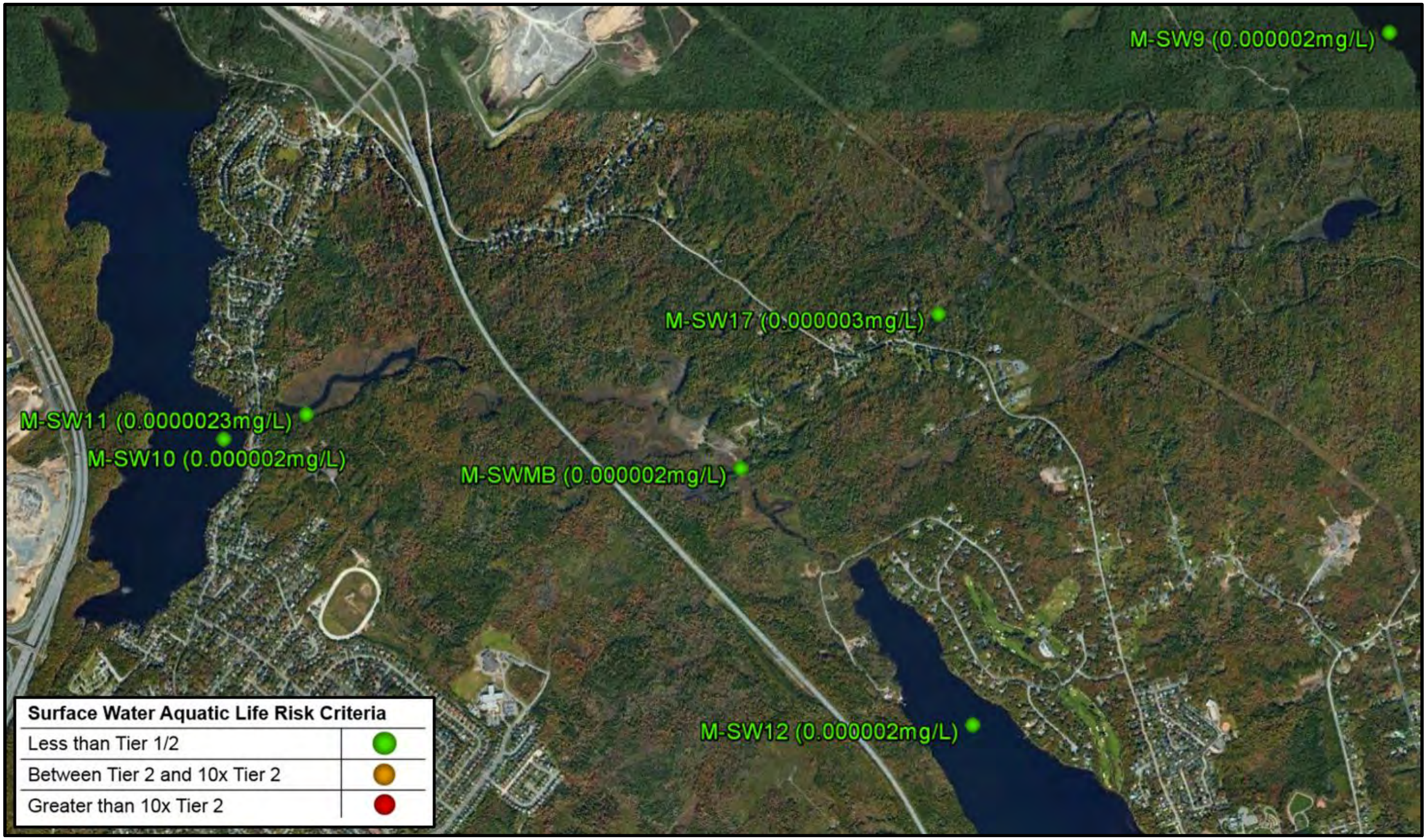

Figure 3-9: Montague Gold Mines – Surface Water Total Mercury Concentrations

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

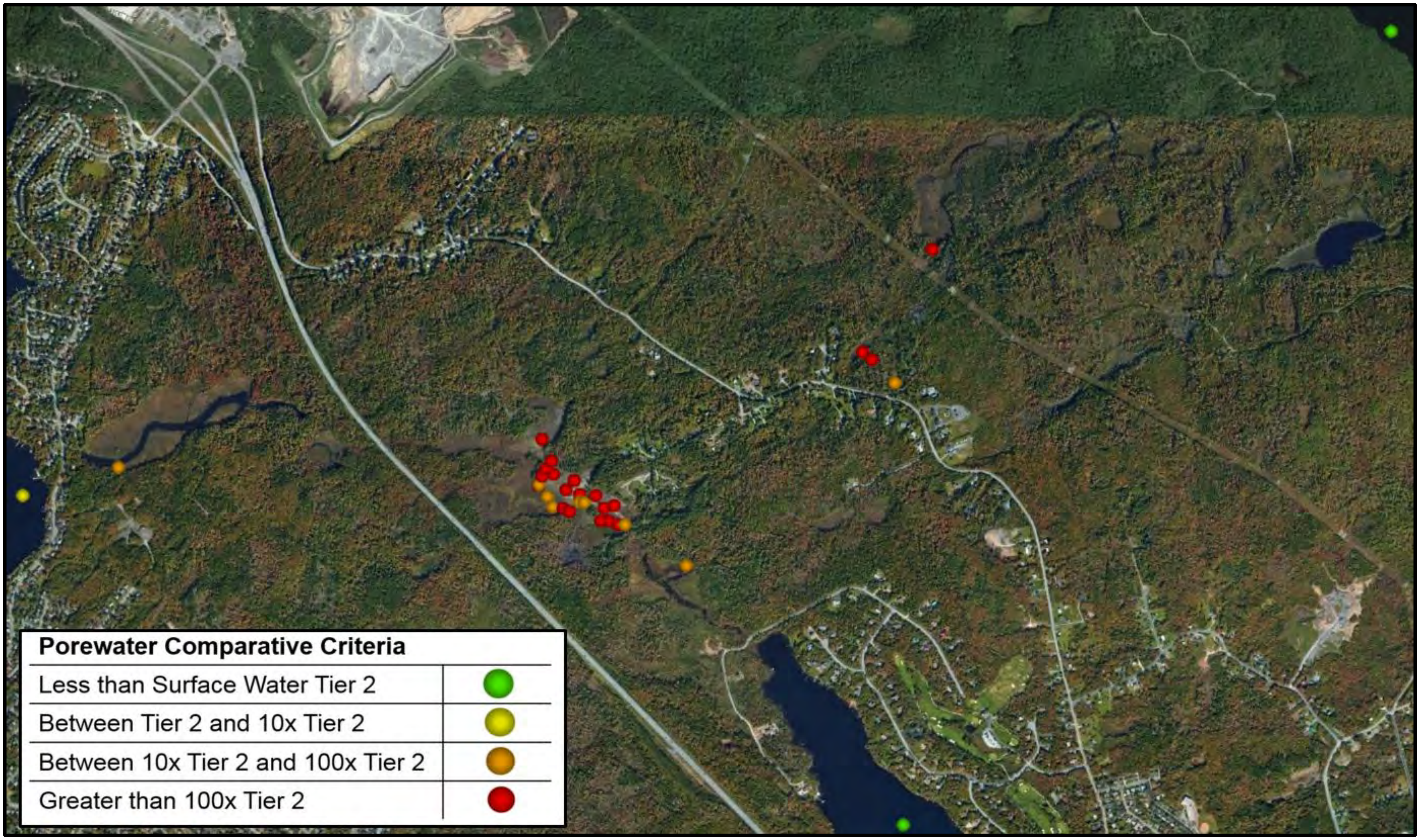

Figure 3-10: Montague Gold Mines – Maximum Porewater Arsenic Concentrations – All Locations

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).

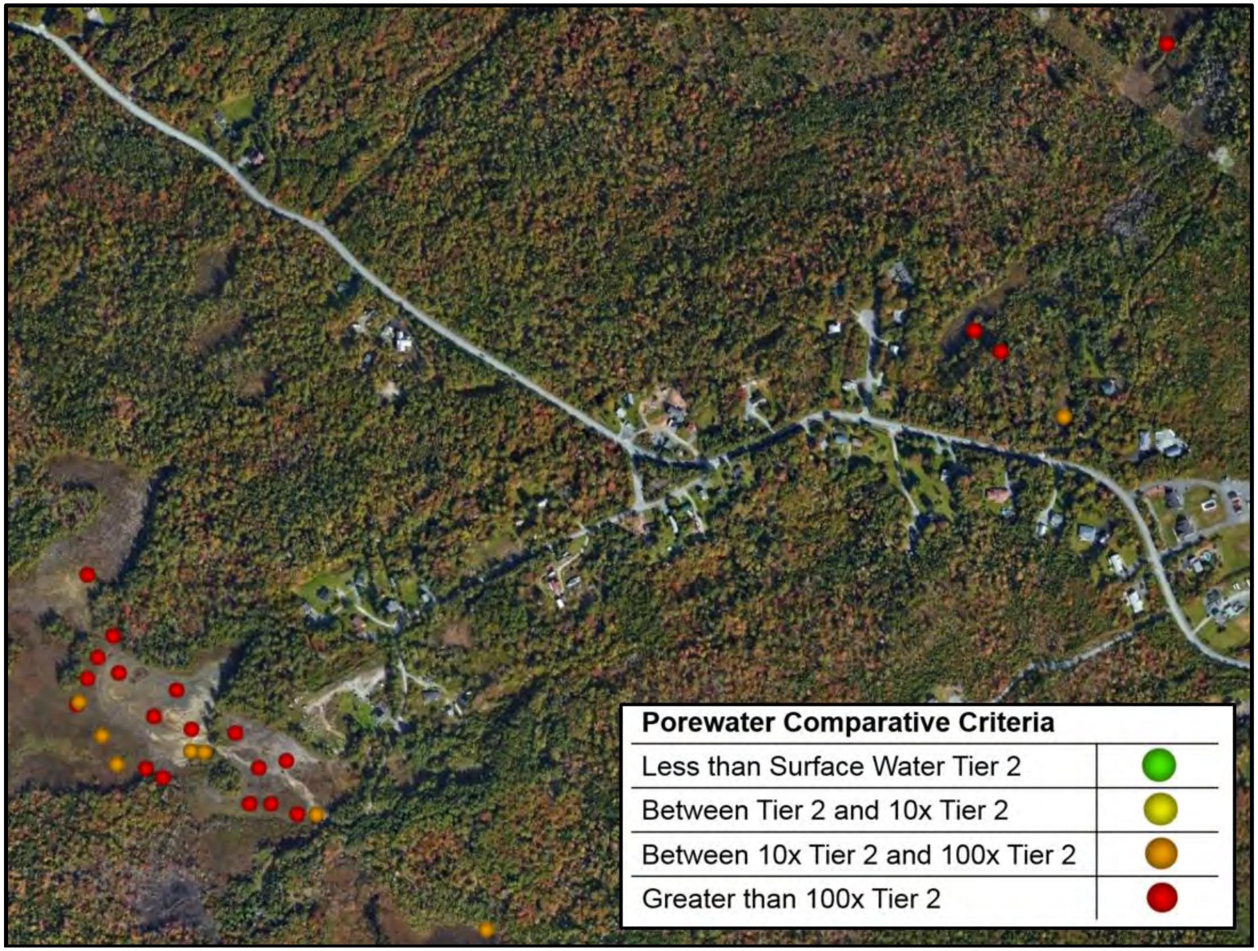

Figure 3-11: Montague Gold Mines – Maximum Porewater Arsenic Concentrations – Central Region

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).

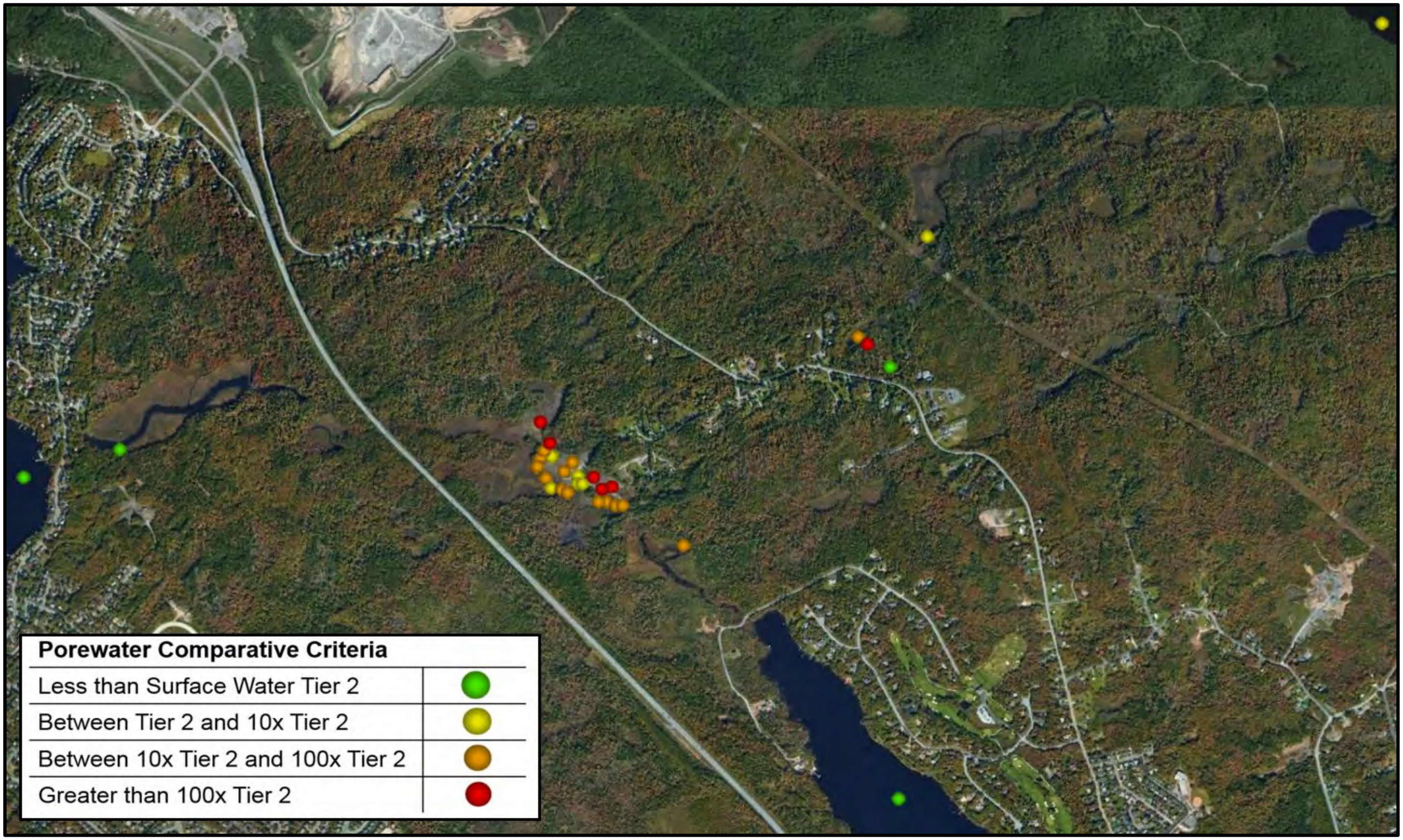

Figure 3-12: Montague Gold Mines – Maximum Porewater Mercury Concentrations – All Locations

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).

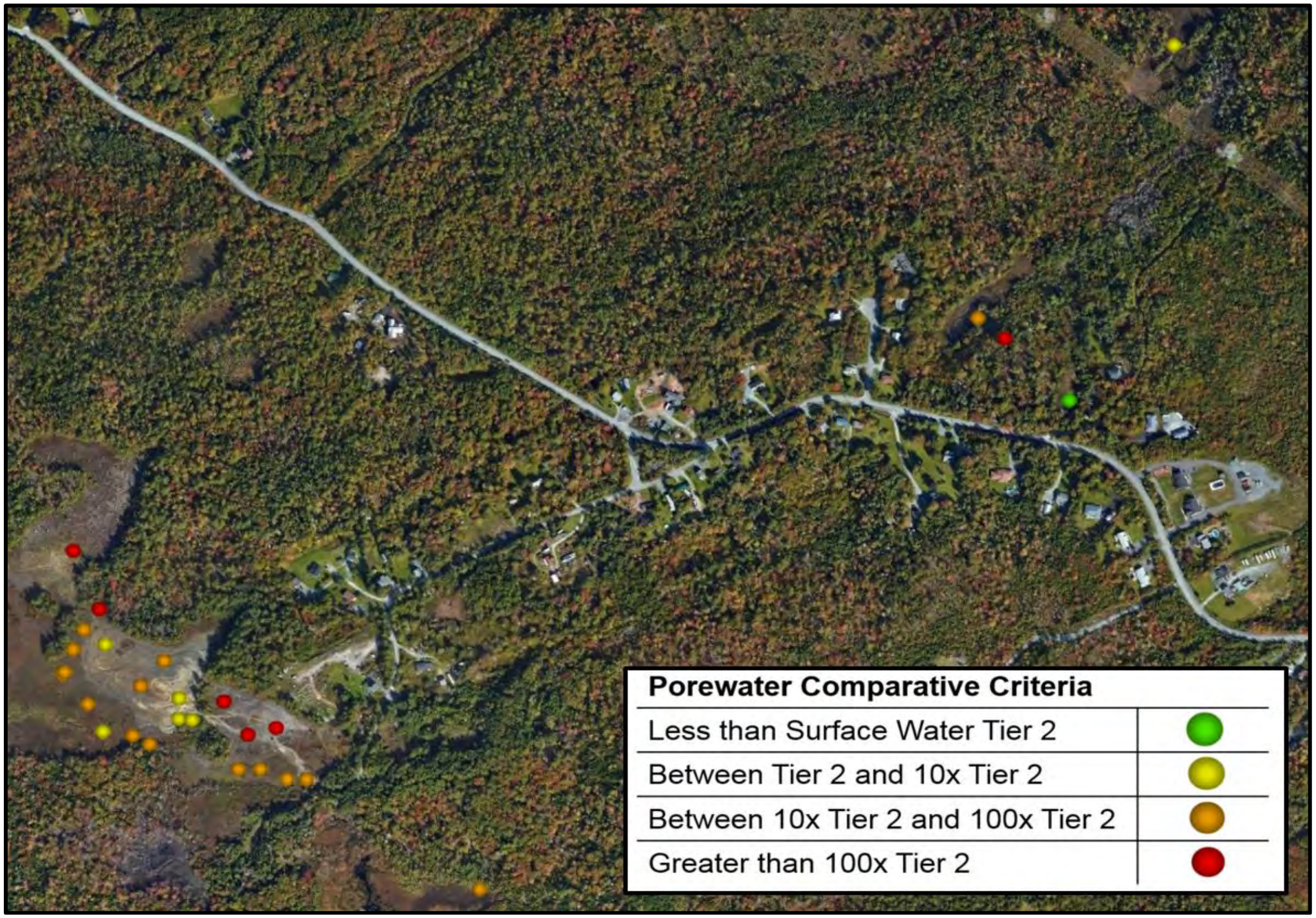

Figure 3-13: Montague Gold Mines – Maximum Porewater Mercury Concentrations – Central Region

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.

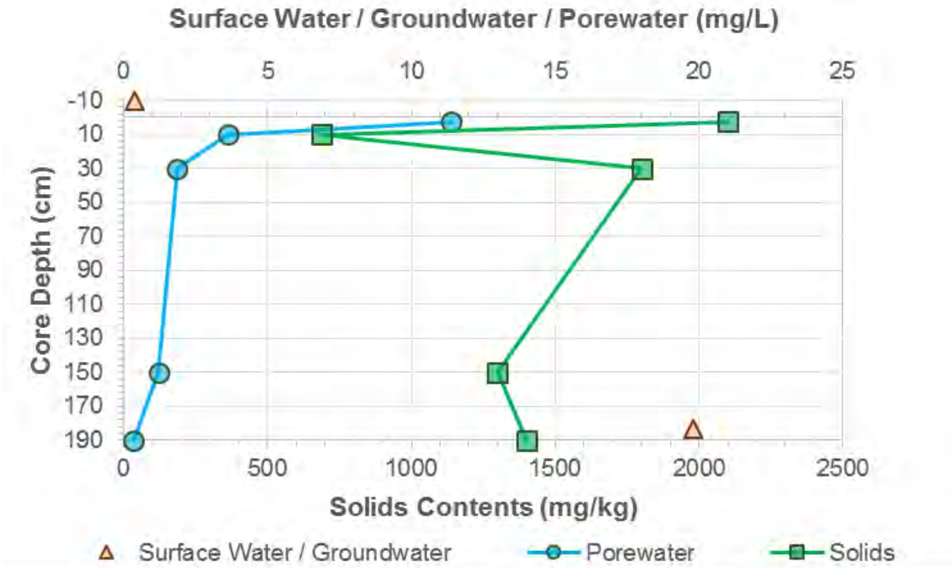

Figure 3-15: Montague Gold Mines – M-Pz1 Arsenic Chemistry

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.

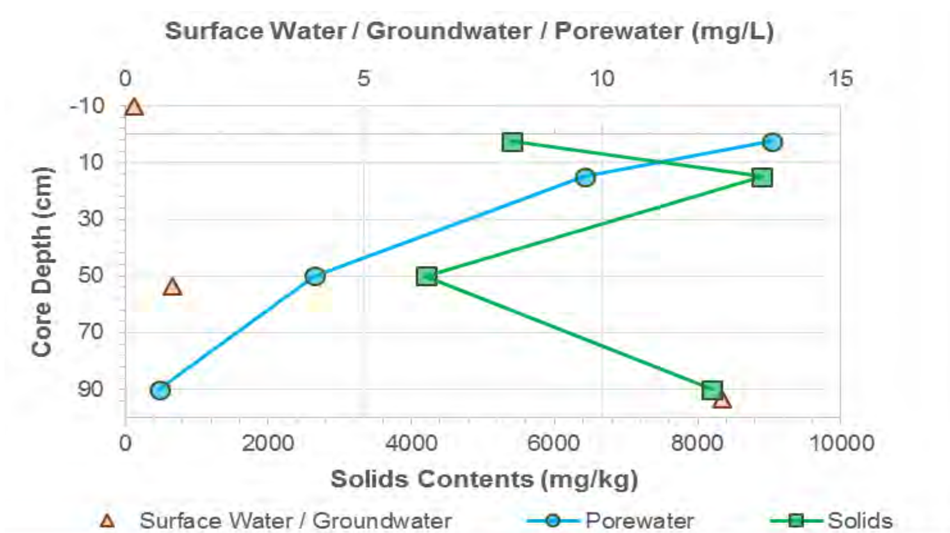

Figure 3-16: Montague Gold Mines – M-Pz2 Arsenic Chemistry

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.

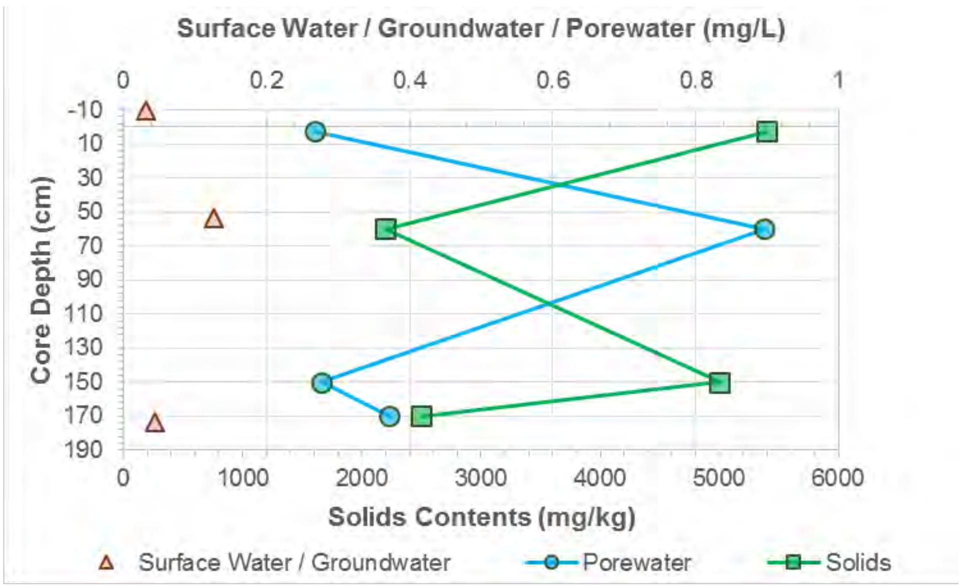

Figure 3-17: Montague Gold Mines – M-Pz3 Arsenic Chemistry

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.

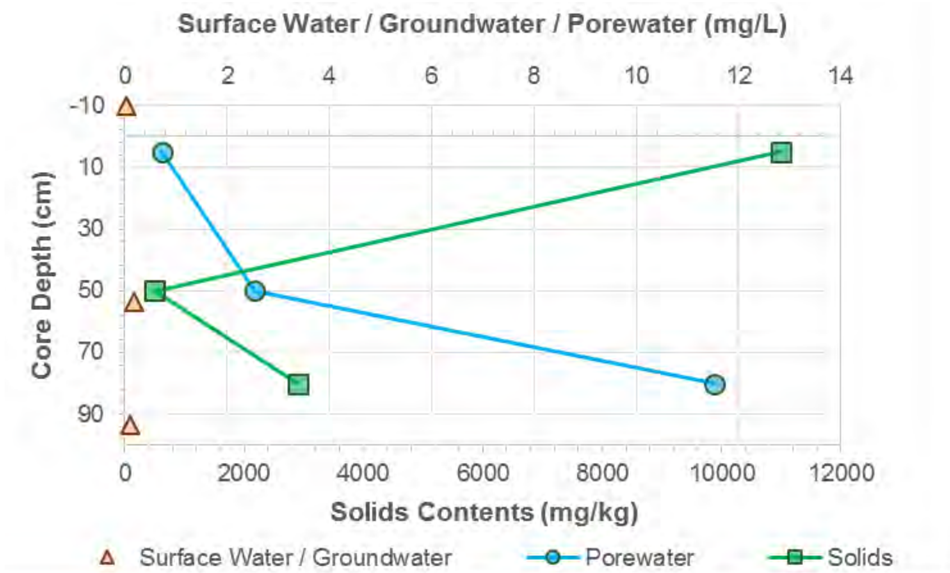

Figure 3-18: Montague Gold Mines – M-Pz4 Arsenic Chemistry

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.

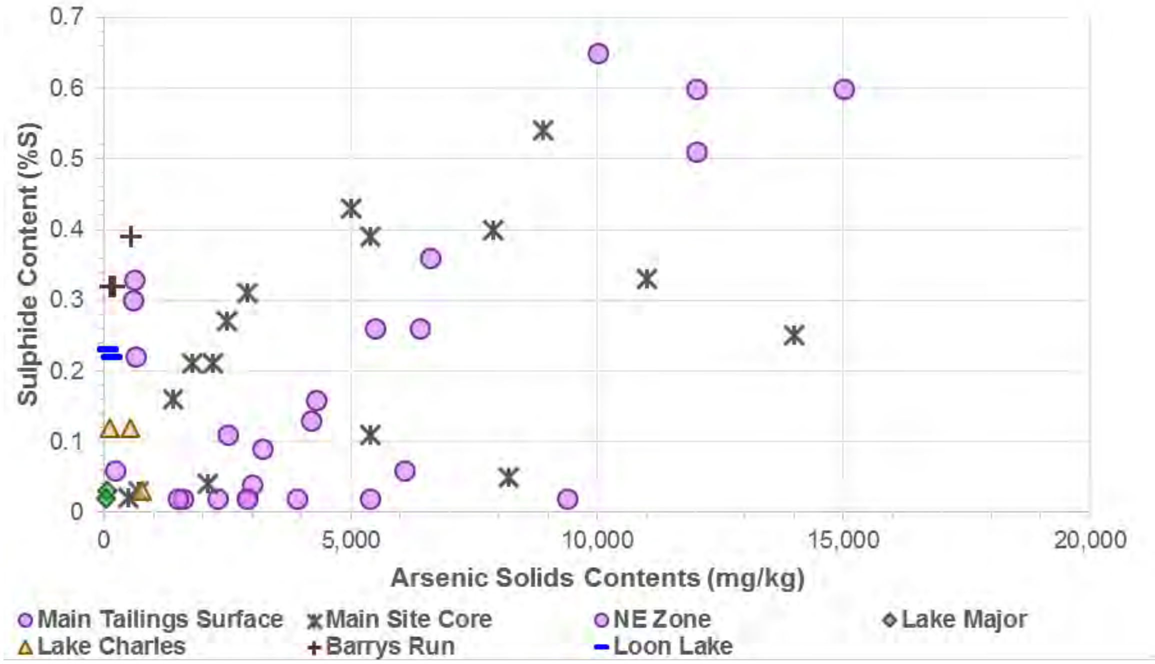

Figure 4-1: Montague Gold Mines – Sulphide vs. Arsenic Contents in Tailings and Sediments

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.

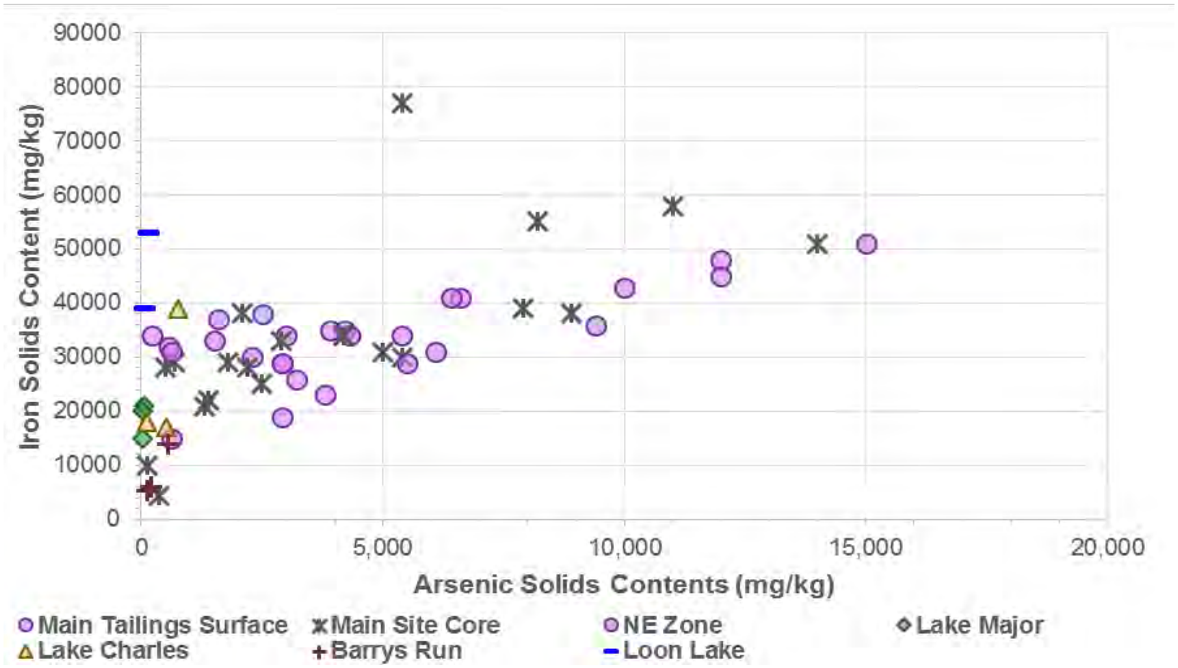

Figure 4-2: Montague Gold Mines – Iron vs. Arsenic Contents in Tailings and Sediments

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.
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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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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-T2 5	23: M-2018-SFC-T2 6	24: M-2018-SFC-T2 7	25: M-2018-SFC-T3 2	26: M-2018-SFC-T1 7	27: M-2018-SFC-T2 0	28: M-2018-SFC-T2 3	29: M-2018-SFC-T3 0
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-T3 5	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)
 = 50 x (N of HCL x Total HCL added - N NaOH x NaOH added)
   -------------------------------------------------------
                     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

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
Christopher Sullivan
CHEMIST

Chris Sullivan, B.Sc., C.Chem
Project Specialist,
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OnLine LIMS

0001657562

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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

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 (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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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)
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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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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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-CORE (0-7.5)	56: M-2018-SW9-CORE (15-20)	57: M-2018-SW9-CORE (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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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-CORE (0-7.5)	56: M-2018-SW9-CORE (15-20)	57: M-2018-SW9-CORE (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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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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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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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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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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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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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

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

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

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
Christopher Sullivan
CHEMIST

Chris Sullivan, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0001656057

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
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

OnLine LIMS

0001656057

Maxxam
A Bureau Veritas Group Company

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:

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).

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
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

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 A Bureau Veritas Group Company

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 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						

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

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						

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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		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).

Maxxam Job #: B8B0540
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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.

Maxxam Job #: B8B0540
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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 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		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 Job #: B8B0540
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4697
Site Location: 18-2525 MONTAGUE

TEST SUMMARY

Maxxam ID: UZ2879
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 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
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 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
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 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
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 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
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 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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TEST SUMMARY

Maxxam ID: UZ2884 **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 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 **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 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 **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 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 **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 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 **Collected:** 2018/11/29
Sample ID: G-2018-SW14 **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	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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TEST SUMMARY

Maxxam ID: UZ2890
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 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
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 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
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 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
Sample ID: G-2018-P1 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

Maxxam ID: UZ2894
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 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 Job #: B8B0540
Report Date: 2018/12/28

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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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.

QUALITY ASSURANCE REPORT

			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

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
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

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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Your Project #: MB8X4700
Site Location: 18-2525 MONTAGUE

Attention: KYLE REINHART

MAXXAM ANALYTICS
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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

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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
==
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 #: B8B0550
Report Date: 2018/12/28

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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
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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 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.								

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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 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
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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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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
Client Project #: MB8X4700
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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 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
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		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 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		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							

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		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							

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		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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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		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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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		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

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		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

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
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						

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**
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						

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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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 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		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						

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		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					

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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 Job #: B8B0550
Report Date: 2018/12/28

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 Job #: B8B0550
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X4700
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

TEST SUMMARY

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
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
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 (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
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 (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
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 (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
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 (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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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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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: 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
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
Sample ID: G-2018-P18
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	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
Sample ID: G-2018-P19
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	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
Sample ID: G-2018-P1 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	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
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
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 Job #: B8B0550
Report Date: 2018/12/28

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 Job #: B8B0550
Report Date: 2018/12/28

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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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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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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Maxxam Job #: B8B0550
Report Date: 2018/12/28

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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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**
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.

Maxxam Job #: B8B0550
Report Date: 2018/12/28

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

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Success Through Science®

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.
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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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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 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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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 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**
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						

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		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

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		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 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		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							

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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		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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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						

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		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						

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 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**
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						

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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		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 Job #: B8B0538
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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						

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						

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		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 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		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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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 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		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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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		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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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

TEST SUMMARY

Maxxam ID: UZ2857
Sample ID: M-2018-P2B
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	2018/12/22	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
Sample ID: M-2018-SW2
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	2018/12/22	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
Sample ID: M-2018-P3A
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	2018/12/22	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
Sample ID: M-2018-P3B
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	2018/12/22	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
Sample ID: M-2018-SW3
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	2018/12/22	Edwin Lamigo

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
Sample ID: M-2018-SW3
Matrix: Water

Collected: 2018/11/25
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	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
Sample ID: M-2018-P4A
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

Maxxam ID: UZ2863
Sample ID: M-2018-P4B
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	2018/12/22	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
Sample ID: M-2018-SW4
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	2018/12/22	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
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
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

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
Report Date: 2018/12/28

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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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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Maxxam Job #: B8B0538
Report Date: 2018/12/28

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
Report Date: 2018/12/28

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)

			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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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.

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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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 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 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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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 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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Client Project #: MB8X4745
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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.

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		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 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		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 Job #: B8B0754
Report Date: 2019/01/09

MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

TEST SUMMARY

Maxxam ID: UZ3739
Sample ID: M-2018-P1SW
Matrix: Water

Collected: 2018/11/24
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	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
Sample ID: M-2018-SW2
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	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
Sample ID: M-2018-SW3
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

Maxxam ID: UZ3742
Sample ID: M-2018-SW4
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	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
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
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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TEST SUMMARY

Maxxam ID: UZ3744
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 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
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 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
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 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
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 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
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 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: UZ3771
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 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
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 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
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 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
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 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
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 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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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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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.

Maxxam Job #: B8B0754
Report Date: 2019/01/09

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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Maxxam Job #: B8B0754
Report Date: 2019/01/09

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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Maxxam Job #: B8B0754
Report Date: 2019/01/09

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

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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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

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				

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				

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				

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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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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QUALITY ASSURANCE REPORT

			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

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 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

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

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.

Your Project #: MB929300
Site#: NS LANDS
Site Location: 18-2525

Attention: KYLE REINHART

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
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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

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**
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

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		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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Maxxam Job #: B909556
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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**
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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Client Project #: MB929300
Site Location: 18-2525
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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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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		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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MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
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**
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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MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
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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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**
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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Client Project #: MB929300
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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**
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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Client Project #: MB929300
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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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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						

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		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
Sample ID: M-2018-SFC-T32
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: VE9314
Sample ID: M-2018-SFC-T17
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: VE9315
Sample ID: M-2018-SFC-T20
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: VE9316
Sample ID: M-2018-SFC-T30
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: VE9317
Sample ID: M-2018-C19 (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

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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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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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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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Success Through Science®

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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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

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Maxxam
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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
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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

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						

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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

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

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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

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.

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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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

31-Jan-19 17:47
Kyle Reinhart
B927885

Maxxam
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Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

FCN ENV-685

ORD

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)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Amanda Ciosek	31/01/2019	17:46	[signature]	2019/01/31	17:47	

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			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	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); 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	17:40	See page 1			

Maxxam
A Bureau Veritas Group Company

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

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

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

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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
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 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**
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							

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		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

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		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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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**
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 Job #: B908276
Report Date: 2019/02/06

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 Job #: B908276
Report Date: 2019/02/06

MAXXAM ANALYTICS
Client Project #: MB927885
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VE3863
Sample ID: M-2018-SFC-T7
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: VE3864
Sample ID: M-2018-SFC-T2
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: VE3865
Sample ID: M-2018-SFC-T14
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: VE3866
Sample ID: M-2018-SFC-T28AHP
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: VE3867
Sample ID: M-2018-SFC-12
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 Job #: B908276
Report Date: 2019/02/06

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
Report Date: 2019/02/06

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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Maxxam Job #: B908276
Report Date: 2019/02/06

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)

			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).

Maxxam Job #: B908276
Report Date: 2019/02/06

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

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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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

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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		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

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

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

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

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

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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Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

CHAIN OF CUSTODY RECORD

Page 1 of 1

Invoice Information

Company Name: EcoMetrix Inc
Contact Name: Daniel Skruch
Address: 6800 Campobello Road
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338
Email: dskruch@ecometrix.ca

Report Information (if differs from invoice)

Company Name:
Contact Name:
Address:
Phone: Fax:
Email:

Project Information (where applicable)

Quotation #:
P.O. #/ AFE#:
Project #: 18-2525
Site Location: NS Lands
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	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)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Fei Luo	01/02/2019	19:40	Pareep / Pareep Khurewal	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

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CAM FCD-01191/2

CHAIN OF CUSTODY RECORD

Page 2 of 2

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
				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

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)
Fei Luo	01/02/2019	19:40	See P91		

MAXXAM JOB #

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

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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
==
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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		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

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 #: 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.

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

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A Bureau Veritas Group Company

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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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)	
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

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-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	

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); 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)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Amanda Cicsek	04/02/2019	2:15PM		19/02/04	14:15

04-Feb-19 14:15
Kyle Reinhart
B930148
GID ENV-983

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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

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-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); 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)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Amanda Closek	04/02/2019	14:15		2019/02/04	14:15	

Maxxam A Bureau Veritas Group Company

Success Through Science®

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.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

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

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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**
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								

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 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		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 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**
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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Client Project #: MB930148
Site Location: 18-2525
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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							

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**
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				

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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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.

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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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
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).

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

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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

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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: 2019/02/15
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
==
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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

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

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

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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		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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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.

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 _1_ of _2_

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
				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	
		16 / 16 / 16

COOLING MEDIA PRESENT: Y / (N)

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-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	

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)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Amanda Ciosek	05/02/2019	17:45	FRANCINE CHONG	2019/02/05	17:46

05-Feb-19 17:46
Kyle Reinhart
B932246

MAF ENV-879

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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 — Present | Intact — COOLER TEMPERATURES
COOLING MEDIA PRESENT: Y / N

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-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

Job Barcode Label

B932246

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

ANALYSIS REQUESTED

#	SAMPLE ID	MATRIX	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	SAMPLER INITIALS	# CONT.	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																	

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	Temp: (°C)	1	2	3
Custody Seal Present	✓			5	7	5
Custody Seal Intact	✓					
Cooling Media Present	✓					

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present						
Custody Seal Intact						
Cooling Media Present						

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present						
Custody Seal Intact						
Cooling Media Present						

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. [signature]	2019/02/08	13:38		
2.			2.				

Maxxam
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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.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

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.

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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		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

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**
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
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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**
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 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		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

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
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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		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								

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
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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		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						

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		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 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		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							

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		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

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**
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 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		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						

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		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						

TEST SUMMARY

Maxxam ID: VF1253
Sample ID: M-2018-C1 (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: VF1254
Sample ID: M-2018-SFC-T9
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: VF1255
Sample ID: M-2018-C13 (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: VF1255 Dup
Sample ID: M-2018-C13 (2.5-10)
Matrix: Water

Collected: 2019/02/05
Shipped:
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
Sample ID: M-2018-C5 (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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Maxxam Job #: B909907
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
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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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 Job #: B909907
Report Date: 2019/02/14

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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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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Maxxam Job #: B909907
Report Date: 2019/02/14

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)

			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).

Maxxam Job #: B909907
Report Date: 2019/02/14

MAXXAM ANALYTICS
Client Project #: MB932246
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. #: 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

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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.

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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

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

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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

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				

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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

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

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

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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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)
				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, Table 2, Table 3, Table ___; Res/Park, Ind/Comm, Agri/ Other; Med/ Fine, Coarse
FOR RSC (PLEASE CIRCLE) Y / N

Other Regulations: CCME, MISA, PWQO, Other (Specify); Sanitary Sewer Bylaw, Storm Sewer Bylaw, Region; 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-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	

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE	TIME: (HH:MM)
Fei Luo	07/02/2019	15:20	RAJ KUMAR	2019/02/07	15:18

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
		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); Zinc (0.0001 mg/L); **Mercury 0.00001 mg/L

PLEASE CONTACT IF SAMPLE VOLUME CONCERNS

07-Feb-19 15:18
Kyle Reinhart
B934454
CA2 ENV-1370

Maxxam
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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

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)
		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 — 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-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												

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	07/02/2019	15:20	See page 1			

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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.

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
==
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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

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

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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Client Project #: MB934454
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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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Client Project #: MB934454
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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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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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Client Project #: MB934454
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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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Client Project #: MB934454
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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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MAXXAM ANALYTICS
Client Project #: MB934454
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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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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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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 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		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				

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		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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TEST SUMMARY

Maxxam ID: VF1560 **Collected:** 2019/02/07
Sample ID: G-2018-C2 (0-5) **Shipped:**
Matrix: Water **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 **Collected:** 2019/02/07
Sample ID: G-2018-C2 (20-40) **Shipped:**
Matrix: Water **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 **Collected:** 2019/02/07
Sample ID: G-2018-C2 (60-80) **Shipped:**
Matrix: Water **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 **Collected:** 2019/02/07
Sample ID: G-2018-C3 (20-40) **Shipped:**
Matrix: Water **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 **Collected:** 2019/02/07
Sample ID: G-2018-C3 (60-80) **Shipped:**
Matrix: Water **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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Report Date: 2019/02/14

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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 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
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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 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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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
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).

Maxxam Job #: B909974
Report Date: 2019/02/14

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.

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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

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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

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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

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 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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A Bureau Veritas Group Company

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

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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

IMMEDIATE

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)	
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
- [ ] Table 2
- [ ] Table 3
- [ ] Table ____
- [ ] Res/Park
- [ ] Ind/Comm
- [ ] Agri/ Other
- [ ] Med/ Fine
- [ ] Coarse

FOR RSC (PLEASE CIRCLE) Y / N

Other Regulations

- [ ] CCME
- [ ] MISA
- [ ] PWQO
- [ ] Other (Specify)
- [ ] REG 558 (MIN. 3 DAY TAT REQUIRED)
- [ ] Sanitary Sewer Bylaw
- [ ] Storm Sewer Bylaw

Region ____

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)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Amanda Ciosek	08/02/2019	17:52	Cynthia Ozi; Cynthia Aziz	19/02/08	17:54

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
		7/6/6

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

Company Name: EcoMetrix Inc
Contact Name: Daniel Skruch
Address: 6800 Campobello Road
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338
Email: dskruch@ecometrix.ca

Report Information (if differs from invoice)

Company Name:
Contact Name:
Address:
Phone: Fax:
Email:

Project Information (where applicable)

Quotation #:
P.O. #/ AFE#:
Project #: 18-2525
Site Location: NS Lands
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

LABORATORY USE ONLY

CUSTODY SEAL Y / N — Present / Intact
COOLER TEMPERATURES: 17/16/16
COOLING MEDIA PRESENT: Y / N

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												

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)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Amanda Closek	08/02/2019	17:53	Cynthia Aeiz	19/02/08	17:54	

Maxxam
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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.
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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.

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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 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		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 Job #: B911268
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		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 Job #: B911268
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		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 Job #: B911268
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		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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Maxxam Job #: B911268
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		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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Maxxam Job #: B911268
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		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						

Maxxam Job #: B911268
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		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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Maxxam Job #: B911268
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		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 Job #: B911268
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		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						

Maxxam Job #: B911268
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**
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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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						

Maxxam Job #: B911268
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		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 Job #: B911268
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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				

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 Job #: B911268
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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

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**
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.

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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

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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

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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

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
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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										

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

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

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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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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EcoMetrix Incorporated
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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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Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/2

CHAIN OF CUSTODY RECORD

Page 1 of 3

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
				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

Present	Intact	COOLER TEMPERATURES
		17/16/16

COOLING MEDIA PRESENT: Y / N

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-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	

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	11/02/2019	16:55	[illegible signature]	2019/02/11	16:55

11-Feb-19 16:55
Kyle Reinhart
B937168
FCN ENV-983

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6740 Campobello Road, Mississauga, Ontario L5N 2L8
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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)
		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

	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	

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	11/02/2019	16:55	See page 1			

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CAM FCD-01191/2

CHAIN OF CUSTODY RECORD

Page 3 of 3

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)	
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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

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-SFC-5	11/02/2019	12:00	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	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.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

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

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.

Success Through Science®

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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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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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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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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Client Project #: MB937168
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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 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

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		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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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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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 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**
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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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

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		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				

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		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				

Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VF7342
Sample ID: G-2018-C15 (15-20)
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	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
Sample ID: G-2018-C15 (20-30)
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: VF7344
Sample ID: G-2018-C17 (0-5)
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	2019/02/21	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
Sample ID: G-2018-C17 (0-5)
Matrix: Water

Collected: 2019/02/11
Shipped:
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
Sample ID: G-2018-C17 (10-20)
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	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 Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VF7346
Sample ID: G-2018-C17 (40-50)
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: VF7347
Sample ID: G-2018-C6 (29NOV) (0-7.5)
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	2019/02/21	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
Sample ID: G-2018-C6 (29NOV) (10-15)
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: VF7349
Sample ID: G-2018-C6 (29NOV) (20-30)
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: VF7350
Sample ID: G-2018-C6 (29NOV) (40-50)
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

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Maxxam Job #: B911260
Report Date: 2019/02/21

MAXXAM ANALYTICS
Client Project #: MB937168
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VF7351
Sample ID: G-2018-WR1
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: VF7355
Sample ID: G-2018-WR2
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: VF7356
Sample ID: G-2018-WR3
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: VF7357
Sample ID: G-2018-WR4
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: VF7358
Sample ID: G-2018-WR5
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 Job #: B911260
Report Date: 2019/02/21

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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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

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.

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QUALITY ASSURANCE REPORT

			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

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
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

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
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).

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

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: 2019/02/21
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
A Bureau Veritas Group Company

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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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
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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).

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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

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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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

Company Name: EcoMetrix Inc
Contact Name: Daniel Skruch
Address: 6800 Campobello Road
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338
Email: dskruch@ecometrix.ca

Report Information (if differs from invoice)

Company Name:
Contact Name:
Address:
Phone: Fax:
Email:

Project Information (where applicable)

Quotation #:
P.O. #/ AFE#:
Project #: 18-2525
Site Location: NS Lands
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

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
		15/15/15

COOLING MEDIA PRESENT: Y / N

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-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	

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)	DATE	TIME: (HH:MM)
C. L. Christian Larsen	12/02/2019	13:17	Dilip Singh DILIP SINGH	2019/02/12	13:20

12-Feb-19 13:20
Kyle Reinhart
B937829
MAF ENV-911

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)	
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

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-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)	MAXXAM JOB #
Christian Larsen C. Larsen	12/02/2019	13:17	See page 1			B93fa96 MA/

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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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

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
A Bureau Veritas Group Company

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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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

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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		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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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 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**
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
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		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 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**
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 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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Maxxam Job #: B911252
Report Date: 2019/02/20

MAXXAM ANALYTICS
Client Project #: MB937829
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VF7311
Sample ID: G-2018-SFC-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	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
Sample ID: G-2018-SFC-12
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	2019/02/20	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/15	Aldean Alicando

Maxxam ID: VF7313
Sample ID: G-2018-SFC-13
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: VF7314
Sample ID: G-2018-SFC-14
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: VF7315
Sample ID: G-2018-SFC-15
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

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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

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

Maxxam Job #: B911252
Report Date: 2019/02/20

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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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
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
Report Date: 2019/02/20

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
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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

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

Project ID: ECM-MS1801
PM: Collette Machado

Client PM: Amanda L Ciosek
Client Project: 18-2525

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

Project ID: ECM-MS1801
PM: Collette Machado

Client PM: Amanda L Ciosek
Client Project: 18-2525

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 **MDL:** 0.004
Limit: 0.020 **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 **MDL:** 0.004
Limit: 0.020 **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 **MDL:** 0.005
Limit: 0.021 **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

Project ID: ECM-MS1801
PM: Collette Machado

Client PM: Amanda L Ciosek
Client Project: 18-2525

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

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: [signature] *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	Number of Containers	Field Filtered?	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	M-2018-C1 (0-5)	05-02-19	15:00	Groundwater	1	Yes	Other				✓					*APPLY TO ALL*
2	M-2018-SFC-T9	05-02-19	15:00	Groundwater	1	Yes	Other				✓					SWAOOO
3	M-2018-C13 (2.5-10)	05-02-19	15:00	Groundwater	1	Yes	Other				✓					IC-ICP-CRC-MS
4	M-2018-C5 (2.5-10)	05-02-19	15:00	Groundwater	1	Yes	Other				✓					Dissolved
5	M-2018-SFC-T23	05-02-19	15:00	Groundwater	1	Yes	Other				✓					As(III)As(V) MMA DMA
6	M-2018-SFC-T35	05-02-19	15:00	Groundwater	1	Yes	Other				✓					
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: A Ciosek	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: ______

samples@brooksapplied.com | brooksapplied.com

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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: [signature] *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	Number of Containers	Field Filtered?	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:		

Page 2 of 2 List Hazardous Contaminants: ____

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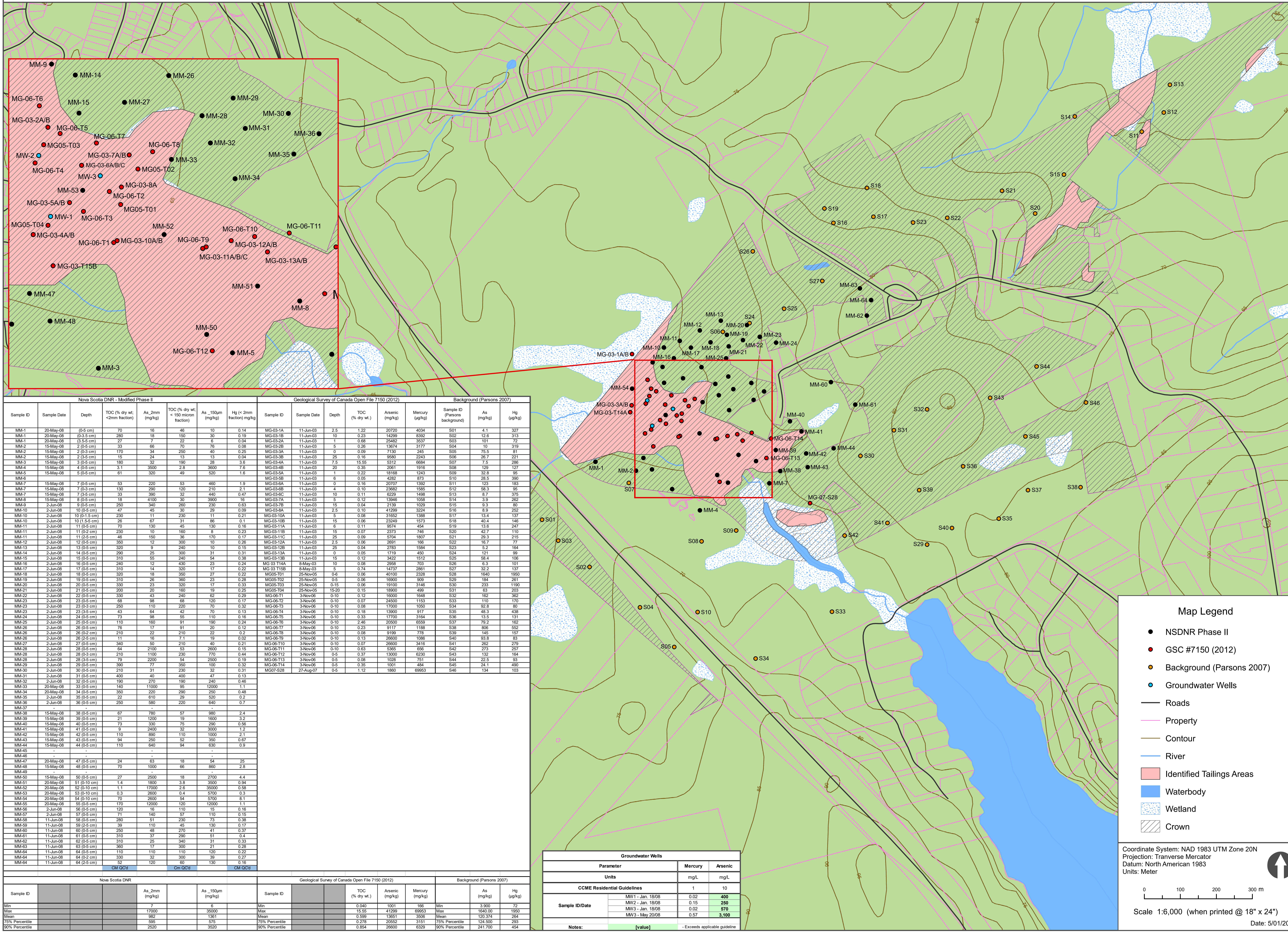
APPENDIX D

Historic Tailings Maps

Montague Site Samples - Arsenic, Total Organic Carbon & Mercury



Nova Scotia DNR - Modified Phase II

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
MM-1	20-May-08	(0-5 cm)	70	16	46	10	0.14
MM-1	20-May-08	(0-3.5 cm)	280	18	150	30	0.19
MM-1	20-May-08	(3.5-5 cm)	27	7	22	6	0.04
MM-2	15-May-08	2 (0-5 cm)	33	66	70	76	0.08
MM-2	15-May-08	2 (0-3 cm)	170	34	250	40	0.25
MM-2	15-May-08	2 (3-5 cm)	15	24	13	13	0.04
MM-3	15-May-08	3 (0-5 cm)	180	32	190	28	3.6
MM-4	15-May-08	4 (0-5 cm)	3.1	3500	2.8	3600	7.6
MM-5	15-May-08	5 (0-5 cm)	61	320	49	520	1.6
MM-6							
MM-7	15-May-08	7 (0-5 cm)	53	220	53	460	1.9
MM-7	15-May-08	7 (0-3 cm)	130	290	120	210	2.1
MM-7	15-May-08	7 (3-5 cm)	33	390	32	440	0.47
MM-8	15-May-08	8 (0-5 cm)	18	4100	30	3900	16
MM-9	2-Jun-08	9 (0-5 cm)	250	340	260	230	0.63
MM-10	2-Jun-08	10 (0-5 cm)	47	45	30	29	0.09
MM-10	2-Jun-08	10 (0-1.5 cm)	230	11	230	11	0.21
MM-10	2-Jun-08	10 (1.5-5 cm)	26	67	31	86	0.1
MM-11	2-Jun-08	11 (0-5 cm)	70	130	45	130	0.16
MM-11	2-Jun-08	11 (0-2 cm)	230	10	160	8	0.23
MM-11	2-Jun-08	11 (2-5 cm)	46	150	36	170	0.17
MM-12	2-Jun-08	12 (0-5 cm)	350	12	300	10	0.26
MM-13	2-Jun-08	13 (0-5 cm)	320	9	240	10	0.15
MM-14	2-Jun-08	14 (0-5 cm)	290	25	300	31	0.31
MM-15	2-Jun-08	15 (0-5 cm)	310	55	240	54	0.38
MM-16	2-Jun-08	16 (0-5 cm)	240	12	430	23	0.24
MM-17	2-Jun-08	17 (0-5 cm)	310	14	320	17	0.22
MM-18	2-Jun-08	18 (0-5 cm)	320	18	350	27	0.22
MM-19	2-Jun-08	19 (0-5 cm)	310	26	360	23	0.28
MM-20	2-Jun-08	20 (0-5 cm)	330	23	320	17	0.33
MM-21	2-Jun-08	21 (0-5 cm)	200	20	160	19	0.25
MM-22	2-Jun-08	22 (0-5 cm)	330	43	240	62	0.29
MM-23	2-Jun-08	23 (0-5 cm)	68	98	68	120	0.17
MM-23	2-Jun-08	23 (0-3 cm)	250	110	220	70	0.32
MM-23	2-Jun-08	23 (3-5 cm)	43	64	42	70	0.13
MM-24	2-Jun-08	24 (0-5 cm)	73	98	55	110	0.16
MM-25	2-Jun-08	25 (0-5 cm)	110	160	91	190	0.24
MM-26	2-Jun-08	26 (0-5 cm)	76	17	91	20	0.12
MM-26	2-Jun-08	26 (0-2 cm)	210	22	210	22	0.2
MM-26	2-Jun-08	26 (2-5 cm)	11	16	7.1	19	0.02
MM-27	2-Jun-08	27 (0-5 cm)	340	50	210	40	0.21
MM-28	2-Jun-08	28 (0-5 cm)	64	2100	53	2600	0.15
MM-28	2-Jun-08	28 (0-3 cm)	210	1100	230	770	0.44
MM-28	2-Jun-08	28 (3-5 cm)	79	2200	54	2500	0.19
MM-29	2-Jun-08	29 (0-5 cm)	390	77	350	100	0.32
MM-30	2-Jun-08	30 (0-5 cm)	210	31	230	32	0.31
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

Geological Survey of Canada Open File 7150 (2012)

Sample ID	Sample Date	Depth	TOC (% dry wt.)	Arsenic (mg/kg)	Mercury (µg/kg)
MG-03-1A	11-Jun-03	2.5	1.22	20720	4034
MG-03-1B	11-Jun-03	10	0.23	14299	8392
MG-03-2A	11-Jun-03	1	0.68	25482	3537
MG-03-2B	11-Jun-03	5	0.26	13674	3177
MG-03-3A	11-Jun-03	0	0.09	7130	245
MG-03-3B	11-Jun-03	25	0.16	9580	2243
MG-03-4A	11-Jun-03	7.5	15.55	5312	6684
MG-03-4B	11-Jun-03	20	0.35	2061	1916
MG-03-5A	11-Jun-03	1	0.22	18168	1243
MG-03-5B	11-Jun-03	6	0.05	4282	873
MG-03-6A	11-Jun-03	0	0.16	20707	1392
MG-03-6B	11-Jun-03	4	0.10	23682	1585
MG-03-6C	11-Jun-03	10	0.11	6229	1498
MG-03-7A	11-Jun-03	5	0.12	13946	1058
MG-03-7B	11-Jun-03	15	0.04	2139	1029
MG-03-8A	11-Jun-03	2.5	0.10	41299	3224
MG-03-10A	11-Jun-03	5	0.08	31652	1388
MG-03-10B	11-Jun-03	15	0.06	23249	1573
MG-03-11A	11-Jun-03	6	0.11	9574	454
MG-03-11B	11-Jun-03	15	0.07	2373	746
MG-03-11C	11-Jun-03	25	0.09	5704	1807
MG-03-12A	11-Jun-03	2.5	0.06	2691	166
MG-03-12B	11-Jun-03	25	0.04	2783	1584
MG-03-13A	11-Jun-03	0	0.05	1719	450
MG-03-13B	11-Jun-03	15	0.12	3422	1512
MG 03 T14A	8-May-03	10	0.08	2958	703
MG 03 T15B	8-May-03	5	0.74	14737	2861
MG05-T01	25-Nov-05	0-6	0.06	40100	2328
MG05-T02	25-Nov-05	0-5	0.06	16900	909
MG05-T03	25-Nov-05	0-15	0.06	19100	3146
MG05-T04	25-Nov-05	15-20	0.15	18900	499
MG-06-T1	3-Nov-06	0-10	0.12	16000	1648
MG-06-T2	3-Nov-06	0-10	0.07	24500	1153
MG-06-T3	3-Nov-06	0-10	0.08	17000	1050
MG-06-T4	3-Nov-06	0-10	0.18	13900	917
MG-06-T5	3-Nov-06	0-10	0.33	17700	3164
MG-06-T6	3-Nov-06	0-10	2.46	20500	6559
MG-06-T7	3-Nov-06	0-10	0.23	9117	1188
MG-06-T8	3-Nov-06	0-10	0.08	9199	778
MG-06-T9	3-Nov-06	0-10	0.13	26600	1086
MG-06-T10	3-Nov-06	0-10	0.07	26600	3416
MG-06-T11	3-Nov-06	0-10	0.63	5365	656
MG-06-T12	3-Nov-06	0-5	0.37	13000	6230
MG-06-T13	3-Nov-06	0-5	0.08	1028	751
MG-06-T14	3-Nov-06	0-5	0.35	1001	484
MG07-S28	27-Aug-07	0-5	1.12	1860	69953

Background (Parsons 2007)

Sample ID (Parsons background)	As (mg/kg)	Hg (µg/kg)
S01	4.1	327
S02	12.6	313
S03	101	72
S04	10	319
S05	75.5	81
S06	26.7	221
S07	7.5	286
S08	129	127
S09	32.8	95
S10	28.5	390
S11	123	183
S12	58.3	95
S13	8.7	375
S14	3.9	262
S15	9.3	80
S16	8.9	252
S17	13.4	137
S18	40.4	146
S19	13.6	247
S20	42.7	110
S21	29.3	215
S22	16.7	77
S23	5.2	164
S24	121	99
S25	58.4	106
S26	6.3	101
S27	32.2	137
S28	1640	1950
S29	184	261
S30	233	1190
S31	63	203
S32	162	362
S33	110	170
S34	92.8	80
S35	48.3	438
S36	13.5	131
S37	79.2	162
S38	806	552
S39	145	157
S40	93.8	83
S41	262	279
S42	273	257
S43	132	164
S44	22.5	93
S45	24.1	490
S46	134	103

Nova Scotia DNR

Sample ID				As_2mm (mg/kg)		As _150µm (mg/kg)	
Min				7		6	
Max				17000		35000	
Mean				982		1361	
75% Percentile				595		575	
90% Percentile				2520		3520	

Geological Survey of Canada Open File 7150 (2012)

Sample ID			TOC (% dry wt.)	Arsenic (mg/kg)	Mercury (mg/kg)
Min			0.040	1001	166
Max			15.55	41299	69953
Mean			0.599	13651	3506
75% Percentile			0.278	20552	3151
90% Percentile			0.854	26600	6329

Background (Parsons 2007)

	As (mg/kg)	Hg (µg/kg)
Min	3.900	72
Max	1640.00	1950
Mean	120.374	264
75% Percentile	124.500	293
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	

Transparency in Arc File

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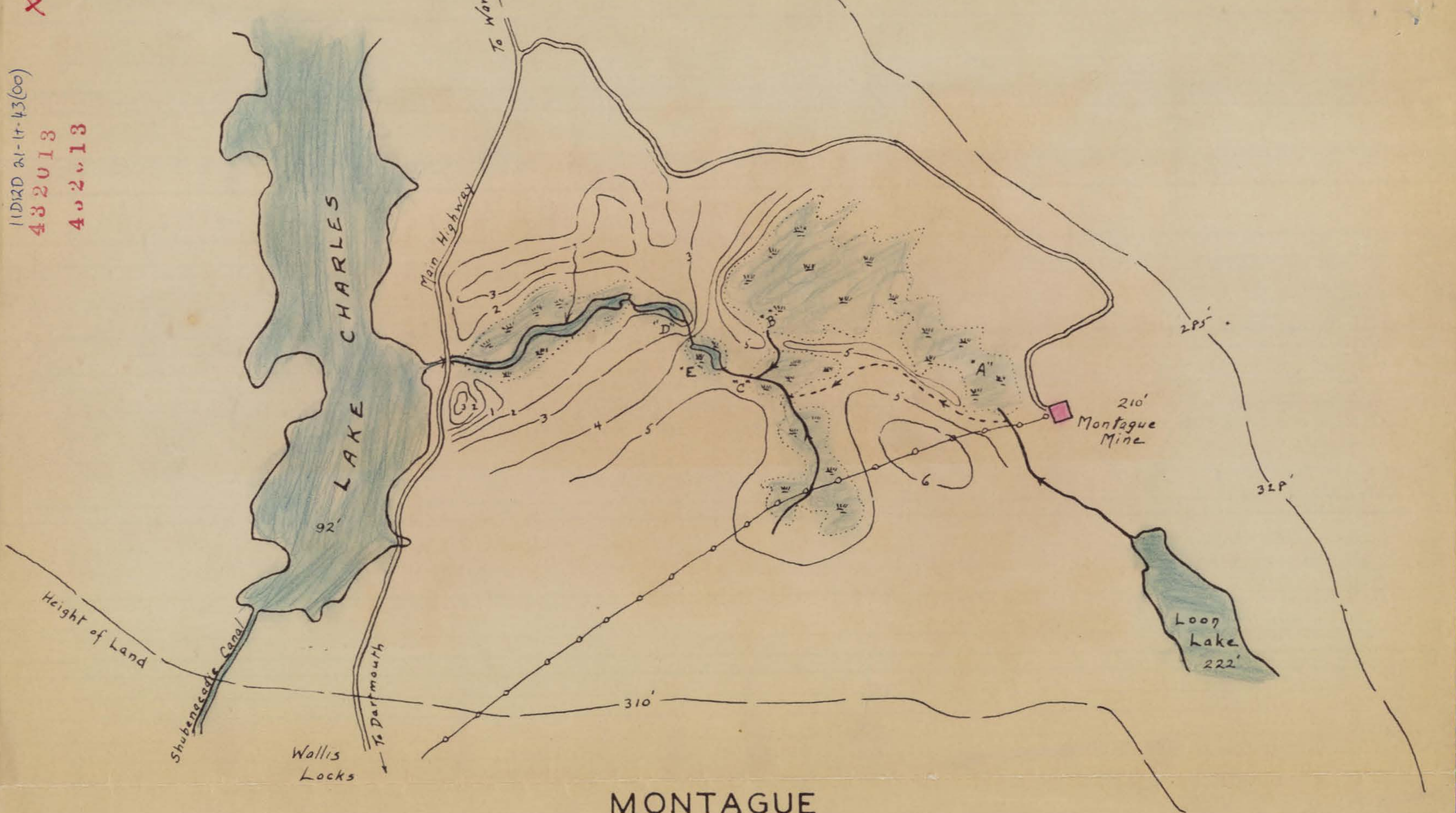

MONTAGUE
TAILINGS DISPOSAL

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:

Technical/operational

- 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.