



**CONCEPTUAL CLOSURE PLAN FOR
THE HISTORIC GOLDENVILLE TAILINGS AREAS
GOLDENVILLE, NOVA SCOTIA**

FINAL REPORT

Submitted to:
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July 24, 2019



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July 25, 2019

Mr. Donnie Burke

Dear Donnie:

Re: Conceptual Closure Study for Historic Tailings at Goldenville, Nova Scotia

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,

A handwritten signature in black ink that reads "Christine Moore".

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



EXECUTIVE SUMMARY

This report presents a high-level conceptual closure plan for the mine tailings that have been deposited in the Goldenville gold district area referred to as the former Goldenville Mine site. The Goldenville Mine was an historical gold mining operation that produced gold from 1862 to 1941 and involved as many as 19 different mines using open pit and underground mining methods. The site produced over 210,000 ounces of gold, from 540,000 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 disposal 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 Goldenville deposit contains naturally occurring arsenopyrite, an iron-arsenic-sulphide mineral. The tailings have arsenic contents ranging from several hundred to up to 200,000 mg/kg (20%) over the tailings area. By comparison, the NS Environment (2014) human health soil quality guideline is 31 mg/kg. Mercury was added during the gold 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 related 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 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 primary tailings area (Crown lands only) had 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 Goldenville 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 than 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;
- The tailings appear to have been transported downstream, by erosion, at least as far as Gegogan Lake, the downstream limit of this investigation, but have likely been deposited further downstream, including in the marine environment;
- 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 of 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; and

- 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 for the Site 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 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 exposed tailings, where arsenic levels exceed the Tier 2 criteria by more than ten times, within a lined containment cell. This will remove the major source of arsenic from entering the environment via direct contact, surface water flow, and groundwater seepage;
 - Low permeability cover: leave tailings that are currently contained within wetland areas and where arsenic levels are between the Tier 2 criteria and 10 times the Tier 2 criteria in place, and cover tailings with a low permeability cover system. This will reduce precipitation infiltration into the underlying tailings and soils, as well as lowering 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 be approximately 5 m in height. One containment cell will measure approximately 180 m by 180 m at the base and the other will measure 135 m by 135 m at the base. 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, to support 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.

TABLE OF CONTENTS

	PAGE
1.0 INTRODUCTION	1
2.0 SITE HISTORY AND GENERAL DESCRIPTION	2
2.1 BACKGROUND ON SITE.....	2
2.2 KEY CONSIDERATIONS AND CHALLENGES	12
2.3 OBJECTIVES OF THIS PROJECT.....	13
3.0 SCOPE OF SERVICES	15
3.1 SUMMARY OF SCOPE THAT WAS EXECUTED.....	15
3.2 DEVIATION FROM SCOPE IN THE PROPOSAL.....	16
4.0 SITE SETTING	18
4.1 MINING AND TAILINGS PRODUCTION	18
4.2 SOILS AND TAILINGS CHEMISTRY.....	19
4.3 GEOLOGY	19
4.4 GEOCHEMISTRY AND GROUNDWATER.....	20
4.5 HUMAN AND ENVIRONMENTAL RISK WORK	21
5.0 DEVELOPMENT OF CLOSURE CRITERIA	23
5.1 APPROACH	23
5.2 CLOSURE CRITERIA FOR ARSENIC AND MERCURY	23
5.2.1 Soils Tier 2 Values	24
5.2.2 Sediment Tier 2 Values.....	25
5.2.3 Surface Water Tier 2 Values	25
5.2.4 Groundwater Tier 2 Values	26
5.2.5 Tissue Residue Tier 2 Values.....	26
5.2.6 Tier 3 Criteria	26
5.3 CLOSURE CRITERIA FOR OTHER INORGANICS (APART FROM ARSENIC AND MERCURY).....	28
6.0 SITE CHARACTERIZATION	32
6.1 HYDROLOGY.....	32
6.2 FIELD PROGRAM	34
6.3 SUMMARY OF FIELD PROGRAM RESULTS	34
6.3.1 Rinse pH	34
6.3.2 Acid Base Accounting (ABA).....	37
6.3.3 Arsenic and Mercury Contents in the Tailings Solids.....	42
6.3.4 Surface Water – Arsenic and Mercury.....	48
6.3.5 Porewater – Arsenic and Mercury Concentrations in Porewater.....	54
6.3.6 Piezometers - Shallow Subsurface Water	60
6.3.7 Additional Characterization	66
6.3.8 Historical Tailings Deposition Areas	70
6.4 DEVELOPMENT OF A CONCEPTUAL SITE MODEL.....	71
6.5 CLOSURE AREAS	75

6.5.1	Area 1	76
6.5.2	Area 2	76
6.5.3	Area 3	76
7.0	CONCEPTUAL CLOSURE PLAN	79
7.1	CONSTRUCTION STAGE 1	79
7.2	EXCAVATION AND CONSOLIDATION FOR AREAS 1A AND 1B	79
7.2.1	Containment Cell	80
7.2.2	Ditching	81
7.2.3	Access Roads	81
7.2.4	Laydown Areas	83
7.2.5	Cut-off Wall/Soil Cement Bentonite (SCB) Cut-Off Wall	83
7.2.6	Water Treatment System	85
7.2.7	Water Treatment Pond	85
7.2.8	Site Control Measures	85
7.3	LOW PERMEABILITY COVER FOR AREA 3A	85
7.3.1	Cover	86
7.3.2	Ditching	86
7.3.3	Site Control Measures	86
7.4	CONSTRUCTION STAGE 2 – CROWN LAND	86
7.5	CONSTRUCTION STAGE 2 - OFF CROWN LAND	87
7.6	CONSTRUCTION STAGE 3 - OFF CROWN LAND	87
7.7	OTHER CLOSURE OPTIONS CONSIDERED	87
8.0	CLOSURE COSTS	88
8.1	CONSTRUCTION STAGE 1 – CROWN LAND AND MAIN TAILINGS AREA	88
9.0	IMPLEMENTATION SCHEDULE	90
10.0	STAGE 2 TERMS OF REFERENCE	91
11.0	CLOSING REMARKS	93
12.0	REFERENCES	94



TABLE OF CONTENTS (cont'd)
LIST OF TABLES

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).....	24
Table 5-2:	Tier 2 Closure Criteria for Arsenic and Mercury for Protection of Human and Ecological Health	27
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).....	29
Table 5-4:	Screening of Inorganic Compounds Against NS Tier 1 Sediment Quality Standards: Number of Samples Exceeding Standards (# samples exceeding standard/number of samples taken).....	30
Table 5-5:	Primary Chemicals of Potential Concern, Based on Surface Water Data (2018)	31
Table 6-1:	Goldenville Mines – Classification of Acid Generation Status.....	39
Table 6-2:	Surface Water: Total and Dissolved Arsenic and Mercury.....	49
Table 6-3:	Shallow Subsurface Water: Dissolved Arsenic and Mercury	61
Table 6-4:	Approximate Size of Tailings Areas	78
Table 8-1:	Goldenville Gold Mine Class D Closure Cost Estimate – Construction Stage 1 Summary	89

LIST OF FIGURES

Figure 2-1:	Location of Goldenville Mines	3
Figure 2-2:	Goldenville Mine – Study Area	4
Figure 3-1:	Goldenville Mine – Study Area	17
Figure 6-1:	Goldenville Mines Surface Water Catchment Areas	33
Figure 6-2:	Goldenville Mines - Surficial Solids Rinse pH	35
Figure 6-3:	Goldenville Mines – Distribution of Near-Surface Tailings Types (DeSisto 2014)	36
Figure 6-4:	Goldenville Mines - Carb-NP vs. Modified Sobek-NP	38
Figure 6-5:	Goldenville Mines - Carb-NP/AP vs. Sulphide	38
Figure 6-6:	Goldenville Mines – Carb-NPR	40
Figure 6-7:	Goldenville Mines – Carb-NPR	41
Figure 6-8:	Goldenville Mines – Near-Surface Arsenic Contents – All Locations	43
Figure 6-9:	Goldenville Mines – Near-Surface Arsenic Contents – Central Region	44
Figure 6-10:	Goldenville Mines – Near-Surface Mercury Contents – All Locations	46
Figure 6-11:	Goldenville Mines – Near-Surface Mercury Contents – Central Region	47
Figure 6-12:	Goldenville Mines – Surface Water Total Arsenic Concentrations	50
Figure 6-13:	Goldenville Mines – Surface Water Total Mercury Concentrations	51
Figure 6-14:	Goldenville Mines – Surface Water Total Mercury Concentrations – Central Region	52
Figure 6-15:	Goldenville Mines – Surface Water Total Mercury Concentrations – Gegogan Lake	53
Figure 6-16:	Goldenville Mines – Maximum Porewater Arsenic Concentrations – Central Region	55
Figure 6-14:	Goldenville Mines – Maximum Porewater Arsenic Concentrations – Gegogan Lake	56
Figure 6-18:	Goldenville Mines – Maximum Porewater Mercury Concentrations – Central Region	58
Figure 6-19:	Goldenville Mines – Maximum Porewater Mercury Concentrations – Gegogan Lake	59
Figure 6-20:	Goldenville Mines – Mini Piezometer Locations	60
Figure 6-21:	Goldenville Mines – G-Pz1 Arsenic Chemistry	62
Figure 6-22:	Goldenville Mines – G-Pz2 Arsenic Chemistry	63
Figure 6-23:	Goldenville Mines – G-Pz3 Arsenic Chemistry	63
Figure 6-24:	Goldenville Mines – G-Pz4 Arsenic Chemistry	65
Figure 6-25:	Goldenville Mines – Sulphide vs. Arsenic Contents in Tailings and Sediments	67
Figure 6-26:	Goldenville Mines – Sulphide vs. Arsenic Contents in Tailings and Sediments - Sulphide Less than 0.6% and Arsenic Content Less than 20,000 mg/kg	67
Figure 6-27:	Goldenville Mines – Iron vs. Arsenic Contents in Tailings and Sediments	69
Figure 6-28:	Goldenville Mines – Iron vs. Arsenic Contents in Tailings and Sediments – Iron Less than 100,000 mg/kg and Arsenic Content Less than 50,000 mg/kg	69
Figure 6-29:	Conceptual Site Model for the Goldenville Site.	72
Figure 6-30:	Study Areas and Locations of Historical Tailings	73
Figure 6-31:	Areas of Known and Potentially Impacted by Historical Mining	77
Figure 7-1:	Containment Cell Typical Details	82
Figure 7-2:	Design Items Typical Details	84



LIST OF APPENDICES

- Appendix A – Background Information review
- Appendix B – Closure Criteria and Screening of Datasets
- Appendix C – Detailed Data Assessment
- Appendix D – Historic Tailings Maps
- Appendix E – Site Water Management Strategy and Treatment
- Appendix F – Detailed Cost Table
- Appendix G – Decision Analysis

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
Carb-NP	carbonate-NP
COPC	constituents of potential concern
LOM	Life of mine
m	metres
m ³	cubic metres
Mm ³	million cubic metres
Mt	million tonnes
MAD	median absolute deviation
MOECC	Ontario Ministry of Environment and Climate Change
NP	neutralization potential
non-PAG	non-potentially acid generating
NS Lands	Nova Scotia Lands
PAG	potentially acid generating
SCB	soil cement bentonite
SEL	Severe Effect Level
Sobek-NP	Sobek neutralization potential
SSD	Species Sensitivity Distribution



1.0 INTRODUCTION

This report presents a high-level conceptual closure plan for the mine tailings that have been deposited in the historic Goldenville gold district area referred to as the former Goldenville Mine site. The mining at Goldenville involved several different mines using open pit 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.

Parsons et al (2012a) provides a summary of historic gold mining activities at this site, which included the discovery of gold in 1862, with mining being carried out continuously over a period of 79 years from 1862 to 1941. Ore was milled on-site, using stamp mills to crush and pulverize mined rock and utilizing mercury amalgamation to recover gold from the crushed ore. There were as many as 19 different mining companies operating at the same time. The Site produced over 540,617 tonnes of crushed ore, and 210,153 ounces of gold (Drage, 2015).

Goldenville was the most productive of the 64 abandoned historic gold mining districts defined across Nova Scotia. 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 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, whereas mercury was added during the gold extraction process and is also present in the tailings. Section 2 provides a detailed overview of the site history and description.

This project was undertaken by Intrinsic, who led a team of specialist consultants (Ecometrix, Wood, and Klohn Crippen Berger), for Nova Scotia Lands (NS Lands Inc.) in accordance with a contract established between Intrinsic 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 Goldenville gold district is located in the community of Goldenville, Guysborough County, Nova Scotia. Figure 2-1 provides the location of Goldenville Mines, while Figure 2-2 provides a closer view of the Goldenville Mine site, with Crown lands identified. In Figure 2-2, the main tailings area is clearly identified, as well as several more distant tailings areas which are part of the current scope of this project.

This section focuses on the main tailings area at Goldenville Mines, since all previous studies in this historic mining district have been conducted only in this area. The main tailings area appears as a dry area, which descends into an open wetland and Gegogan Brook, with tailings distributed throughout the wetland and are visible on the floodplain for at least 6 km downstream (Wong et al, 1999). Drage (2015) estimated that approximately 0.54 million tons of tailings are present in this area, which have elevated levels of arsenic and mercury, as well as several other metals. According to Wong et al (1999), the Goldenville tailings area extends downstream to Gegogan Harbour, which opens to the Atlantic Ocean.

In 2006, an annual truck rally was halted at this site due to concerns related to high levels of arsenic. The racetrack contained well-oxidized tailings, with visible hardpan formation (Parsons et al, 2012a). Government warning signs are present indicating high levels of arsenic on some areas of the site, however there continues to be evidence of some ATV 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 Goldenville Mines District 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 200,000 mg/kg. The arsenic concentrations are elevated over a wide area throughout the main tailings, relative to the NS Environment (2014) human health soil quality guideline of 31 mg/kg. Mercury contents in the tailings range up to 48 mg/kg in the main tailings (Parsons et al., 2012a). The mercury concentrations 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).

In addition to tailings chemistry data, soils characterization within and off the tailings area and some preliminary groundwater characterization within the main tailings area has also been conducted (C. J. McLellan and Associates Inc., 2009). The C. J. McLellan and Associates 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. Arsenic concentrations ranged from 12 mg/kg to 9,600 mg/kg, with mercury ranging from 0.02 mg/kg up to 20 mg/kg. (C. J. McLellan and Associates, 2009).

Groundwater data collected as part of the C.J. McLellan and Associates (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.



Figure 2-1: Location of Historic Goldenville Mines

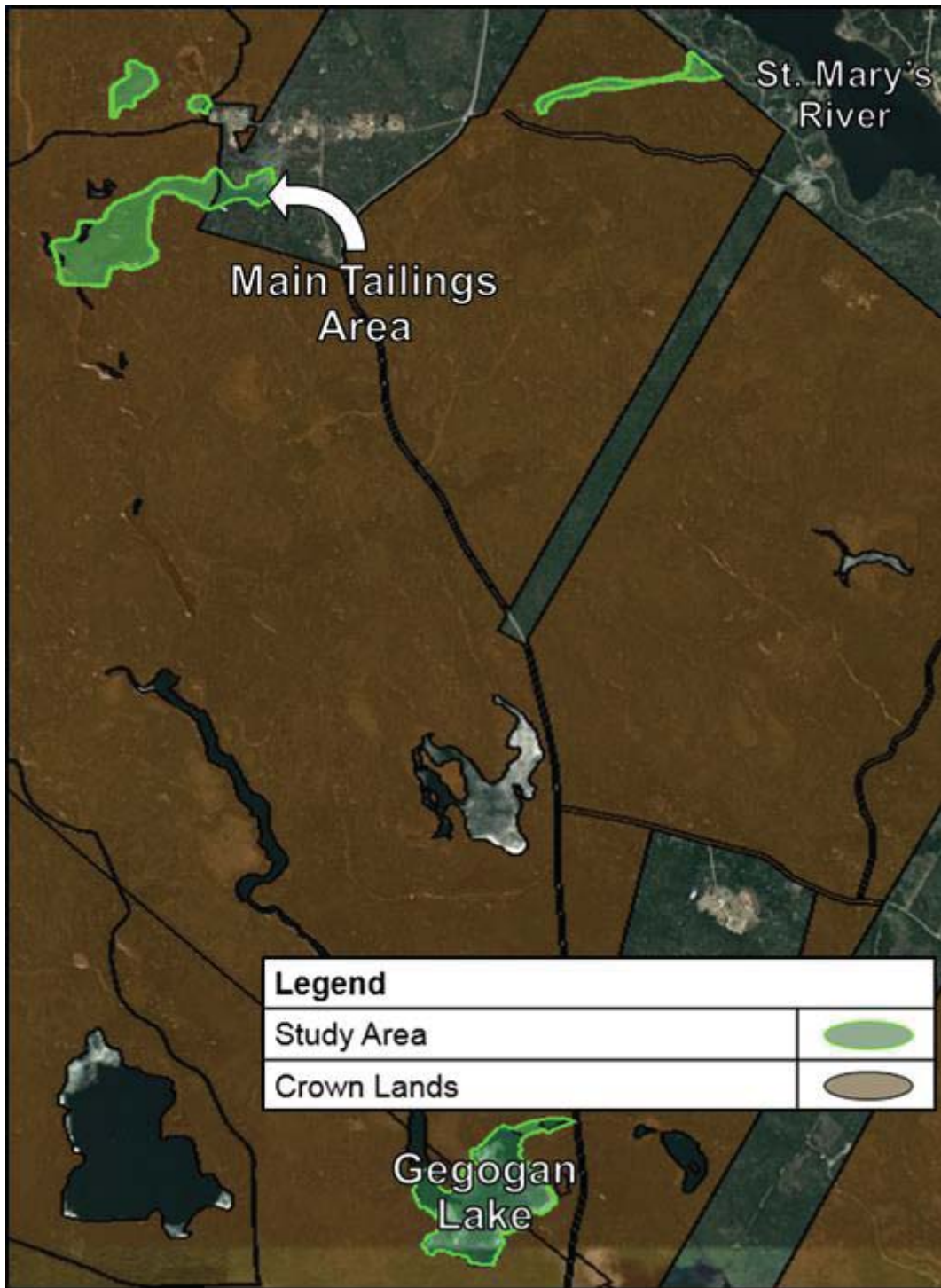


Figure 2-2: Historic Goldenville Mine – Study Area



Photo 1: Former Stamp Mill Location, Historic Goldenville Mines (2018)



Photo 2: Hard Pan Area below Former Stamp Mill, with View to Gegogan Brook and Wetland Receiving Environment (2018)



Photo 3: Gegogan Brook and Wetland Below Stamp Mill Containing Tailings (2018)



Photo 4: View Looking Back from Wetland Towards Stamp Mill, with Waste Rock Pile (2018)



Photo 5: Tailings in Wetland Area, Adjacent to Stamp Mill Goldenville Mine District (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 two former mining districts, 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):

- Due to the complex geochemistry of the tailings, which has been altered due to chemical weathering over the last 70 years, excavation and storage in an engineered management area will require an appropriate site-specific containment protocol be developed. The original mineral hosts for arsenic have been altered over time, which has resulted in new arsenic-bearing minerals with varying solubility and stability.
- Deposition of the tailings in wetland areas present additional complications, with respect to possible remedial approaches to limit further dispersion of contaminants
- 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 Goldenville. When disturbed and exposed to the atmosphere, they tend to generate acid drainage, and release high concentrations of arsenic.
- 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 geosynthetic clay liner (GCL).

- The authors point out that attempts to re-process tailings in mining could have significant adverse impacts, particularly if wetland located tailings are disturbed without due consideration to managing any effluents generated to prevent the release of potential contaminants.
- 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 as a result of reductive dissolution of the iron hydroxide solids that contain the arsenic.
- 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 describes the most effective and cost-effective approaches to reclaiming tailings at these sites.

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

2.2 Key Considerations and Challenges

As shown in the above sections, the Goldenville 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 Goldenville covers a vast wetland area as the tailings were sluiced from a number of mining areas into Gegogan Brook, and subsequently spread out over a large wetland, extending downstream into Gegogan Lake, and beyond (up to 6 km, according to Wong et al, 1999).
- 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 Un-investigated Additional Tailings Deposits:

- The main tailings areas at Goldenville have undergone geochemical characterization in several previous studies, 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 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 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 relatively 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 are 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.
- Mercury in the tailings is less of a concern from a human health perspective (relative to arsenic); however, 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-Goldenville Mines is currently on-going and has revealed some biomagnification of mercury in emergent insects (e.g, LeBlanc et al, 2018).

2.3 Objectives of this Project

NS Lands Inc. 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 project commenced in October 2018 with the following objectives:

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

As noted above, the objective of Design Stage 1 involved the development of a conceptual closure plan for the historic tailings at Goldenville within Crown land and provide an associated cost estimate and schedule. During the project implementation, the Study Team became aware that part of the main tailings area is on privately held lands, and that there is an active mining lease covering much of the area.

When developing the conceptual closure plan for the Crown land, the Intrinsic 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 Intrinsic 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 for the Crown Land area. More detailed modelling and predictions will be used to refine and support a risk-based investigation of closure options as part of Stage 2.

The 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.

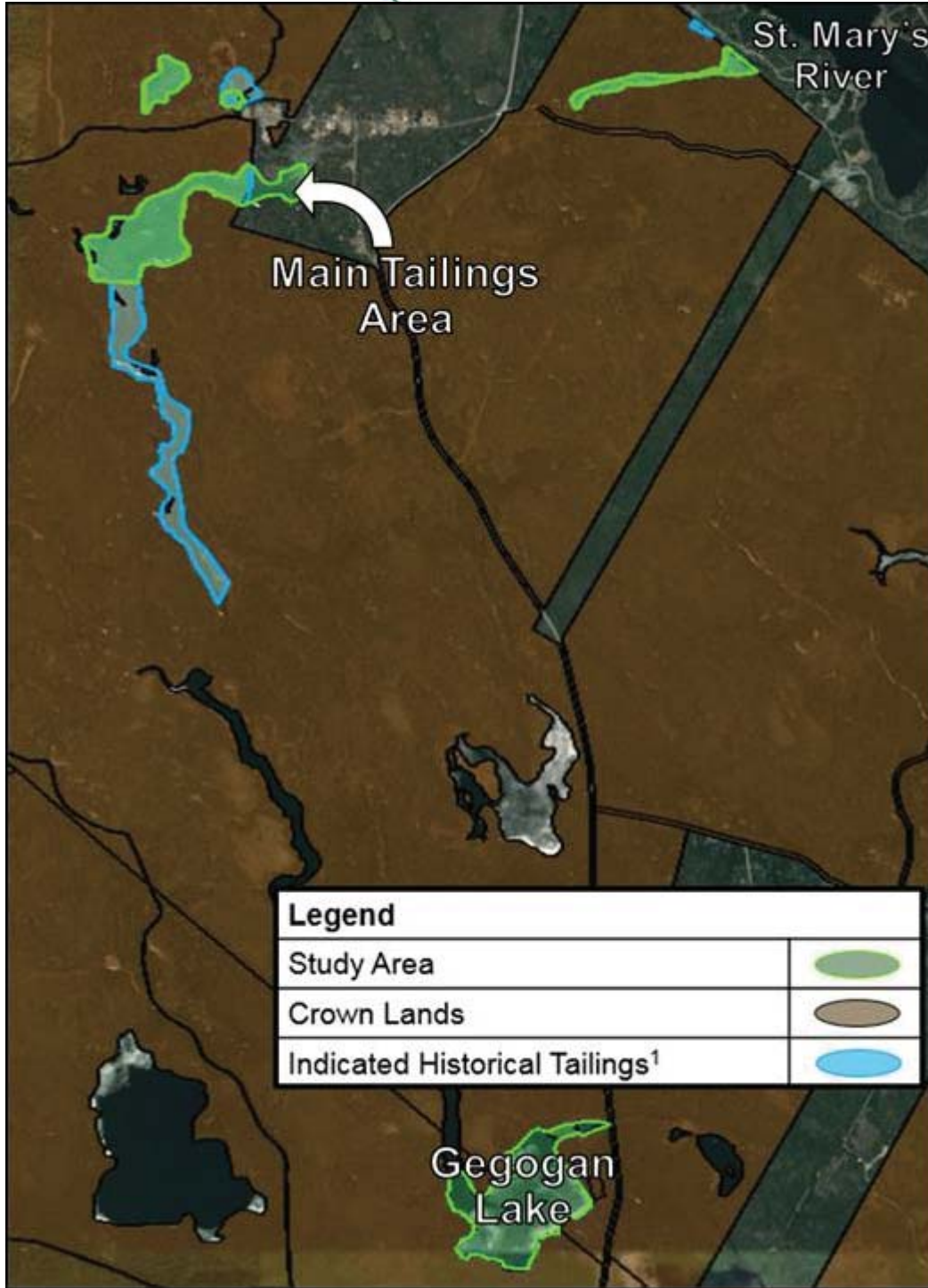


Figure 3-1: Goldenville Mine – Study Area



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 that were 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 Goldenville Historic Mining District, the main tailings were directly deposited into Gegogan Brook, whereas tailings near the Sawmill creek area and additional tailings areas north of the main tailings were deposited into either small streams extending down into wetland areas, or directly into wetland areas. The main area of the abandoned mine has considerable volumes of tailings extending kilometres down Gegogan brook, and includes areas which have been characterized and studied quite extensively (e.g., Parsons et al., 2012a) and tailings areas which have never undergone any sampling and chemical analysis, or quantification of approximately volumes, such as the Sawmill Creek and north of site tailings areas.

The primary issues of concern at Goldenville 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 to 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 (C. J. McLellan and Associates, 2009). The C. J. McLellan and Associates 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. A total of 56 samples were collected (including surface and cored samples). Arsenic concentrations ranged from 12 mg/kg to 9,600 mg/kg in the < 2mm fraction (C. J. McLellan and Associates, 2009). Elevated mercury results were reported in locations of the former Stamp Mill but also included two samples in areas off of the main tailings (C.J. McLellan and Associates, 2009). 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. 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 Goldenville area. Arsenic (0 – 5 cm; <2 mm size fraction) ranged from 1.6–140 mg/kg (median 13 mg/kg; median + 2 median absolute deviations 31 mg/kg; 98th percentile 121 mg/kg), with mercury ranging from 39–312 µg/kg (median 114 µg/kg; median + 2 median absolute deviations 233 µg/kg; 98th percentile 302 µg/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 metasedimentary-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 Goldenville tailings are typically shallow in the main areas ranging up to 1.0 to 1.5 m for maximum depths sampled. 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 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 (2014), 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 Goldenville site was found to represent an important loadings pathway, with similar changes in chemistry observed between the surface waters and porewaters. However, the vertical hydraulic gradients observed from the piezometers indicated mixed flow directions, with some groundwater reporting to Gegogan Brook and others the opposite, suggesting that follow-up work is needed to understand the conceptual loadings model for the site.



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-Goldenville 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.

4.5 Human and Environmental Risk Work

No human health risk assessments have been conducted for the Site, or the adjacent uncharacterized tailings areas. Other areas of research have included a considerable amount of work to characterize the bioaccessibility of arsenic within tailings samples at Goldenville (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 mineralogy on bioaccessibility and environmental mobility of arsenic. These authors concluded that the mineralogy of arsenic in weathered tailings is highly variable, and the mineralogy was controlled by a number of factors, including presence/absence of mill concentrates, water saturation, and carbonate minerals). 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 Goldenville ranged from 0.1 to 49 % bioaccessible arsenic, showing the widest variation of all sites tested.

Air quality studies have been conducted at Goldenville, during the annual truck rally (Corriveau et al, 2011). Total concentrations of arsenic in air in particles less than 8 microns were 66 ng/m³.

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 Wong et al (1999). Wong et al (1999) investigated surface water concentrations of metals upstream, within the main tailings area and downstream as far as just past Gegogan Lake. Arsenic concentrations ranged from 30 – 50 µg/L upstream (suggesting some natural enrichment, relative to the CCME aquatic life guideline of 5 µg/L, or influence from another upgradient tailings deposit or source), to 50 – 230 µg/L in the mine area. Stream sediments in the tailings field ranged from 920 – 1980 mg/kg, and decreased at the tailing field outflow to 230 – 660 mg/kg. Mercury concentrations were non detect in surface waters (<0.05 µg/L) both upstream and within the tailings field. The authors indicate that the tailings field was totally devoid of vegetation, but some grasses and shrubs further down the site along Gegogan Brook were sampled and analyzed for metals. Benthic invertebrate investigations revealed that upstream areas had a total of 7 families, with a total number of individuals of 198, whereas only three families totally 17 individuals were found at the tailing field outflow (Wong et al, 1999). Benthic toxicity tests were conducted using surface sediment (0 - 10 cm) depth from Gegogan Lake (which is considerably downstream). The sediments were determined to be non-toxic to *Tubifex tubifex*, marginally toxic to *Chironomus riparius*, toxic to *Hexagenis sp.* (low survival rate, negative growth) and highly toxic to *Hyaella azteca* (zero survival after 28 days). No terrestrial wildlife or other aquatic life studies were



found in the literature reviewed. Goldenville is a remote site, and hence, much of the research has been focused on geochemistry-related topics.

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; and,
- 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 petrel, 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 ATV use. 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 of Crown lands, in the instance that tailings may have impacted private properties.

The ecological health Tier 2 closure criteria for arsenic were based on background data, which, at the Goldenville site, is equal to the 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). 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; C. J. McLellan and Associates, 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 Goldenville 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 petrel used in the guideline development. The storm petrel 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	400 ^a	31 ^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 Goldenville site specific value; recreational land use

B Goldenville 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); Intrinsic, 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 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 thallium. Thallium is frequently exceeded in the Parsons et al (2012a) data set, but not in the 2018 dataset. Other elements exceeded the standards on a more sporadic basis, as seen in Table 5-3. For ecological health comparisons, antimony, lead, chromium and selenium 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	0/54	1/30	NGA	NGA
Antimony	21/54	8/30	12/54; NGA	2/30; NGA
Chromium	0/54	0/30	0/NGA	12/30; NGA
Cobalt	2/54	2/30	3/54; NGA	2/30; NGA
Copper	0/54	0/30	0/54; 0/54	3/30; 0/30
Iron	53/54	30/30	NGA	NGA
Lead	10/54	3/30	6/54; 13/54	2/30; 9/30
Nickel	0/54	0/30	0/54; 0/54	2/30; 0/30
Selenium	0/54	0/30	6/54; 5/54	3/30; 0/30
Thallium	51/54	0/30	3/54; 3/54	0/30; NGA

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 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
Arsenic	24 / 24
Mercury	19 / 24
Chromium	2 / 24
Iron	2 / 24
Lead	3 / 24
Manganese	2 / 24
Nickel	4 / 24

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)

COPCs	Main Tailings and Gegogan Brook to Gegogan Lake	North East Tailings Area	North West Tailings Area/Sawmill Creek
Primary COPC	As; Hg	As; Hg	As; Hg
Secondary COPC	Fe; Al (?)	Al; Fe; Cu (?)	Al; Fe; Cu; Pb (?)

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 remedial attention (based on arsenic concentrations) have been identified. Exceedances of other contaminants will be investigated to evaluate whether 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 merits development. In general, the frequency and degree of exceedance for other inorganics (such as antimony, cobalt, lead, 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 and a site specific ecological or human health risk assessment 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 Goldenville Site. Detailed water management for the final design and phased construction water management should be completed in future stages of work. 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 further appreciation of the site would be valuable to support future, detailed design work.

The overall objectives of the water management strategy during construction are 1) capture and treat runoff from disturbed areas and 2) divert, where possible, clean water away from the disturbed areas. An area of excavation and disturbance was defined and surrounding watersheds were delineated. Very limited undisturbed catchment area exists upstream of the disturbed area and therefore, no clean water diversions were identified for this site. The downstream boundary of the site is located within the floodplain of the Gegogan River. Due to nature of the floodplain, a diversion berm or equivalent, will need to be installed in order to keep any flooded waters from the Gegogan River separate from the disturbed area and treatment pond. The conceptual water management strategy and watershed boundaries are shown on Figure 6-1. Verification of flow direction and / or water monitoring will be required to support future work.

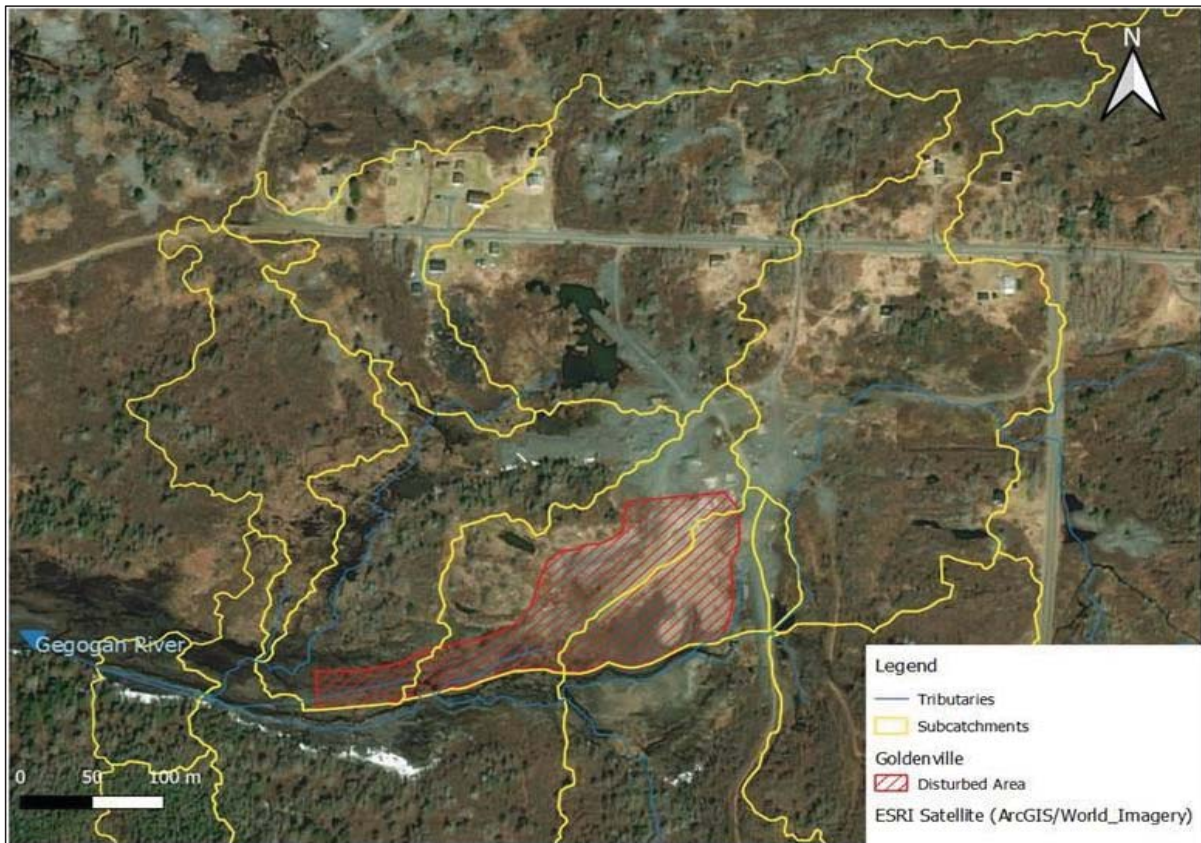


Figure 6-1: Goldenville Mines Surface Water Catchment Areas

6.2 Field Program

The field sampling program was completed over the period Nov 22 to Dec 30, 2018. The sampling program included the collection of water and solids across the site as well as from both upstream and downstream locations. Where available, water samples were collected from the shallow subsurface, local water bodies, and at lakes both upstream and downstream of the site. Solid samples were collected across the site with a hand auger to provide samples from the uppermost 20 cm below ground surface. An upper (within 10 cm mbgs) and a lower (10-20 cm mbgs) solid sample from each location were subjected to rinse pH measurements. 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 (between 1 and 2 mbgs) screens downgradient of the exposed surficial tailings. Water samples were collected from each piezometer and analysed. Sediment from lakes, streams, creeks and wetland areas was collected by coring to the depths up to 1.55 m. A subset of sediment samples was also processed to extract porewater that was analysed.

6.3 Summary of Field Program Results

The following sections provide a summary of the field sampling and analytical results for the Goldenville Mine 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 below 4.0 were observed immediately downgradient of the former stamp mill ruins. In addition, low rinse pH values of 4.0 were observed in a hardpan layer approximately 150 m downgradient of the former stamp mill. 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.

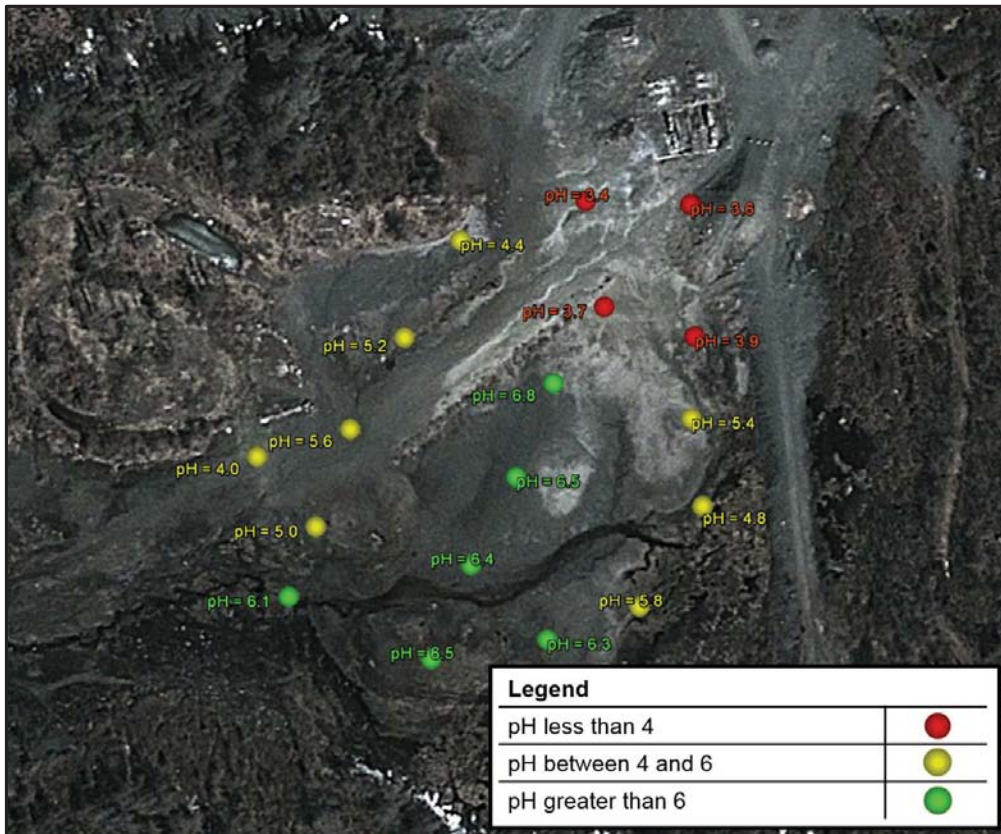


Figure 6-2: Goldenville Mines - Surficial Solids Rinse pH

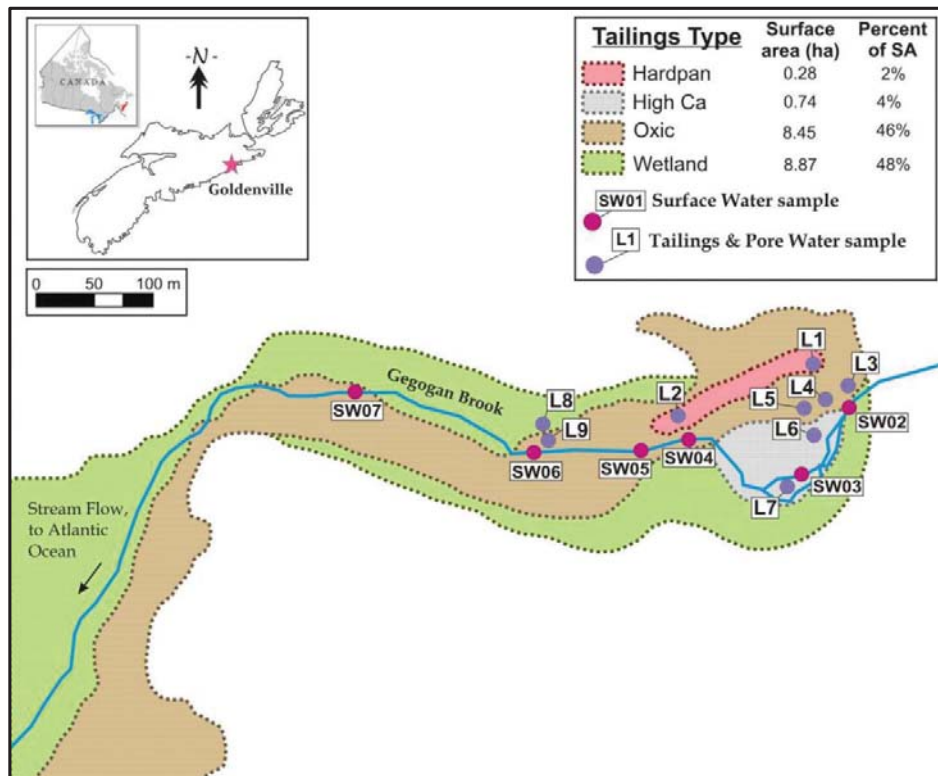


Figure 6-3: Goldenville Mines – Distribution of Near-Surface Tailings Types (DeSisto 2014)

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 CaCO₃ per tonne of tailings (kg-CaCO₃/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 -5 to +25 kg-CaCO₃/t and the Carb-NP values ranged from about 0 to 22 kg CaCO₃/t. The negative values are the result of materials that have already generated free acidity and have pH values less than 6. The Sobek-NP and Carb-NP of these samples correlate well. It was assumed that the Carb-NP values represented the effective NP, as more data are available. 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 half 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, 48% of the tailings are likely PAG, as summarized in Table 6-1, and are expected to generate acid at some time in the future in the absence of any mitigating factors.

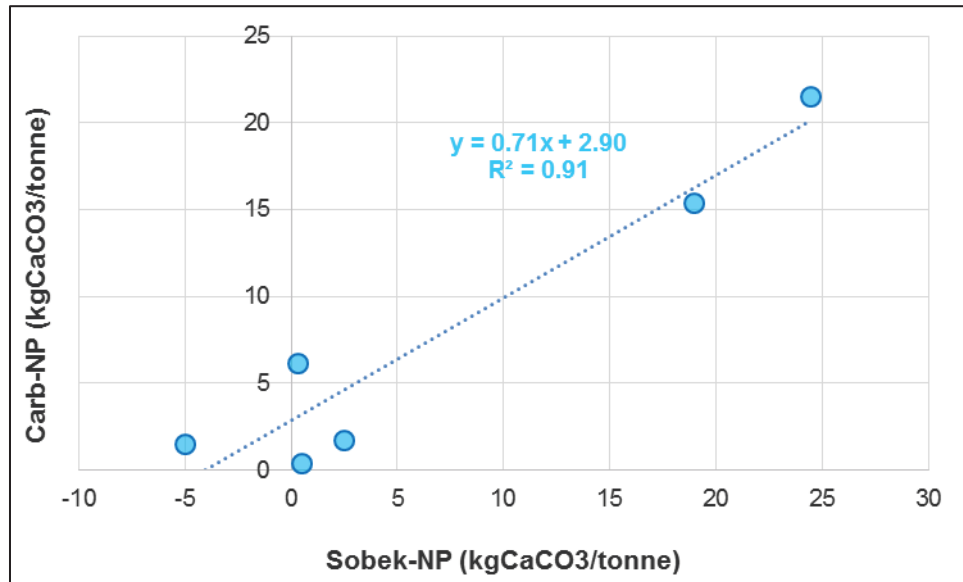


Figure 6-4: Goldenville Mines - Carb-NP vs. Modified Sobek-NP

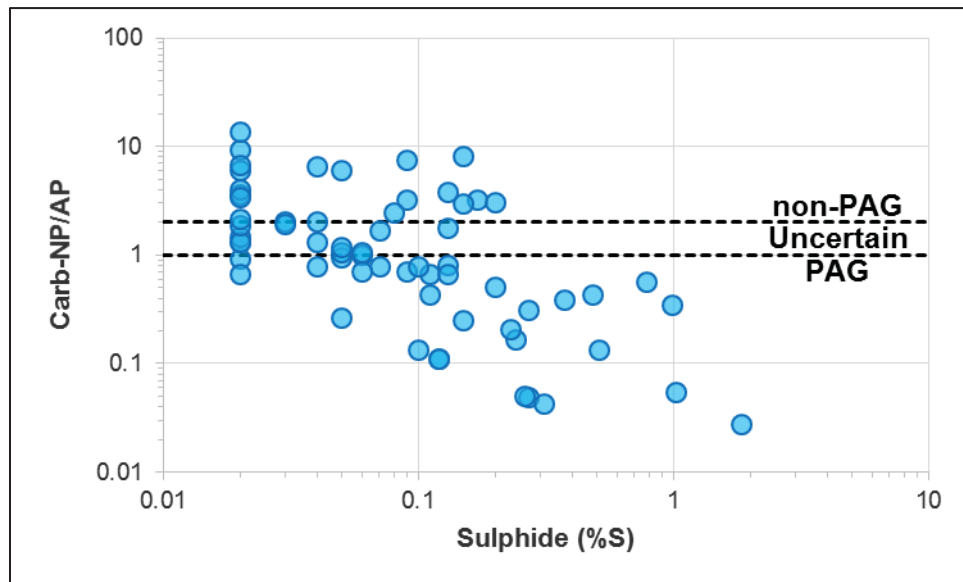


Figure 6-5: Goldenville Mines - Carb-NP/AP vs. Sulphide

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

Location	Count	Carb-NPR		
		PAG Carb-NPR < 1	Uncertain 1 ≤ Carb-NPR < 2	Non-PAG Carb-NPR ≥ 2
Goldenville	64	31	12	21
		48%	19%	33%

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 Figures 6-5 and 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 the main Tailings Deposit Areas, Northeast Zone close to St. Mary’s Lake, Northwest Zone close to a historical crusher, and Gegogan Lake. 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.

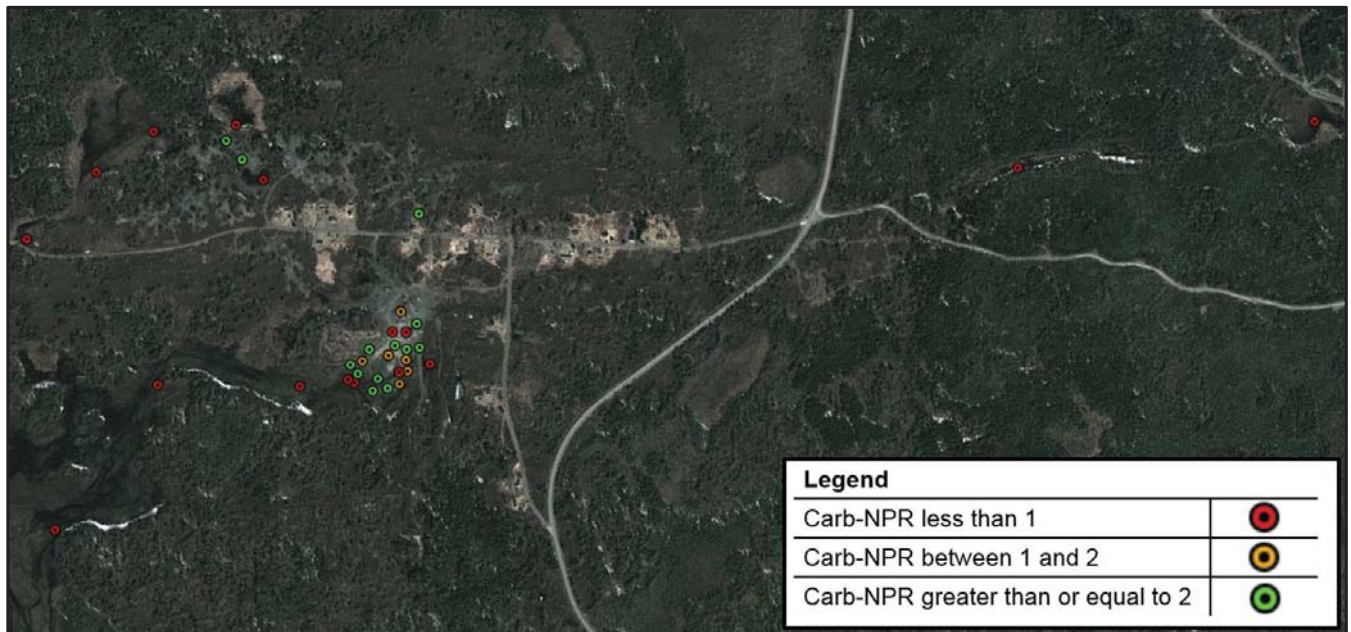


Figure 6-6: Goldenville Mines – Carb-NPR

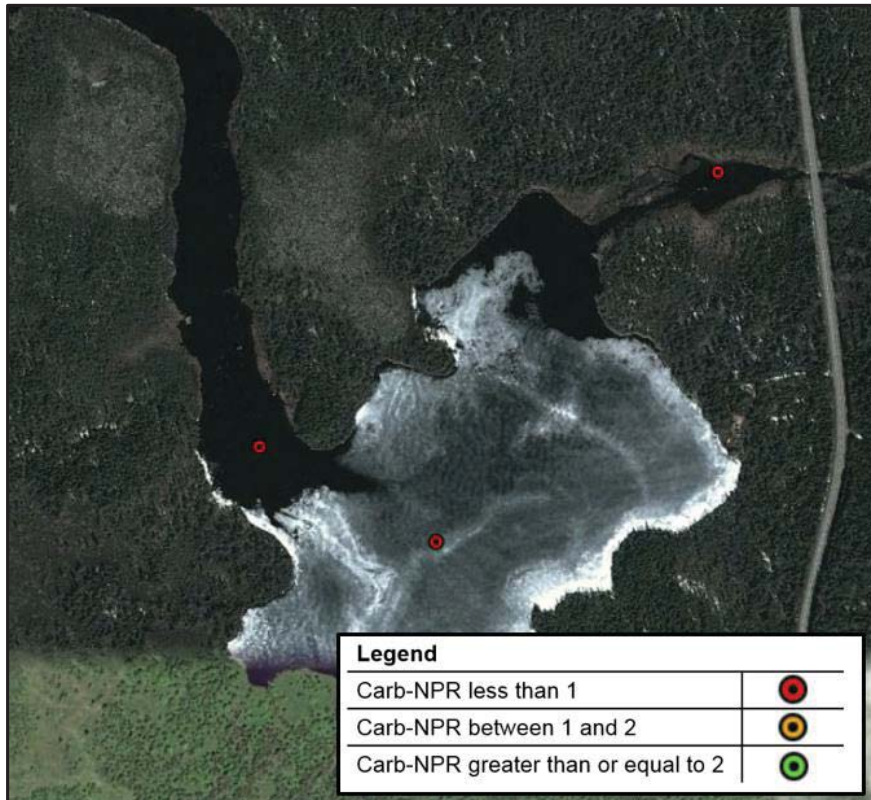


Figure 6-7: Goldenville Mines – Carb-NPR

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 6-8, those for the central area of the site are shown in Figure 6-9. In these figures, the red symbols represent concentrations of arsenic that are greater than 10 times of 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.

The highest arsenic concentrations, greater than 10 times of the Tier 2 criterion, are within the Northeast Zone close to a historical crusher and the St. Mary's River, although all historical arsenic concentrations are lower than Tier 1 criterion. There is a clustering of samples with the arsenic concentration higher than Tier 2 criterion 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. Northwest of the former Stamp Mill at the north side of Goldenville Road, and within Gegogan Lake) and several locations that have levels between the Tier 1 and Tier 2 criteria. These results provide an indication of emerging elevated arsenic concentration in the Northeast Zone. This area, together with the priority tailings areas, Northwest Zone and Gegogan Lake that should be considered for further assessment at Stage II of the site investigation.

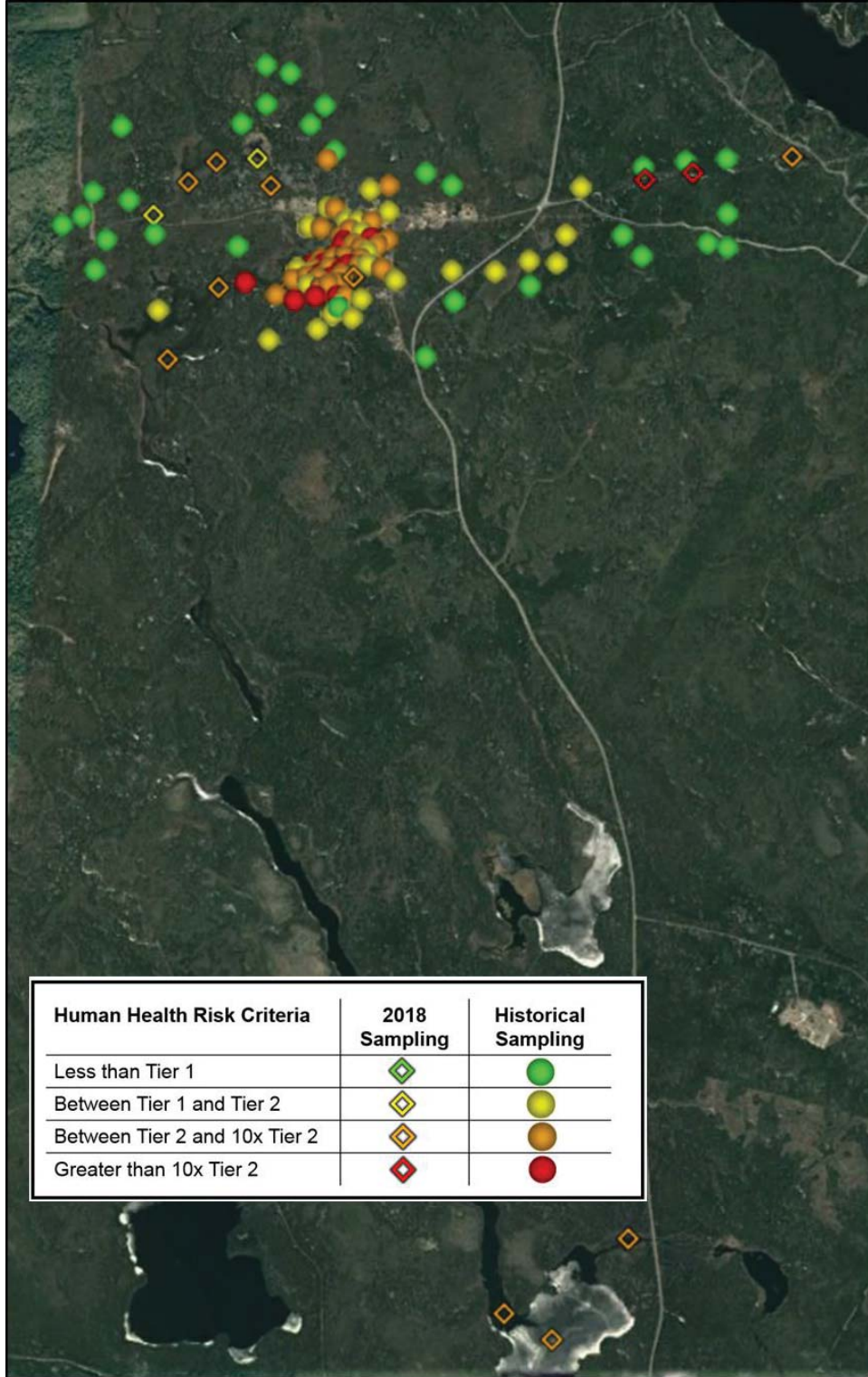


Figure 6-8: Goldenville Mines – Near-Surface Arsenic Contents – All Locations

Note:

Tier 1 Arsenic Criteria = 31 mg/kg

Tier 2 Arsenic Criteria = 400 mg/kg

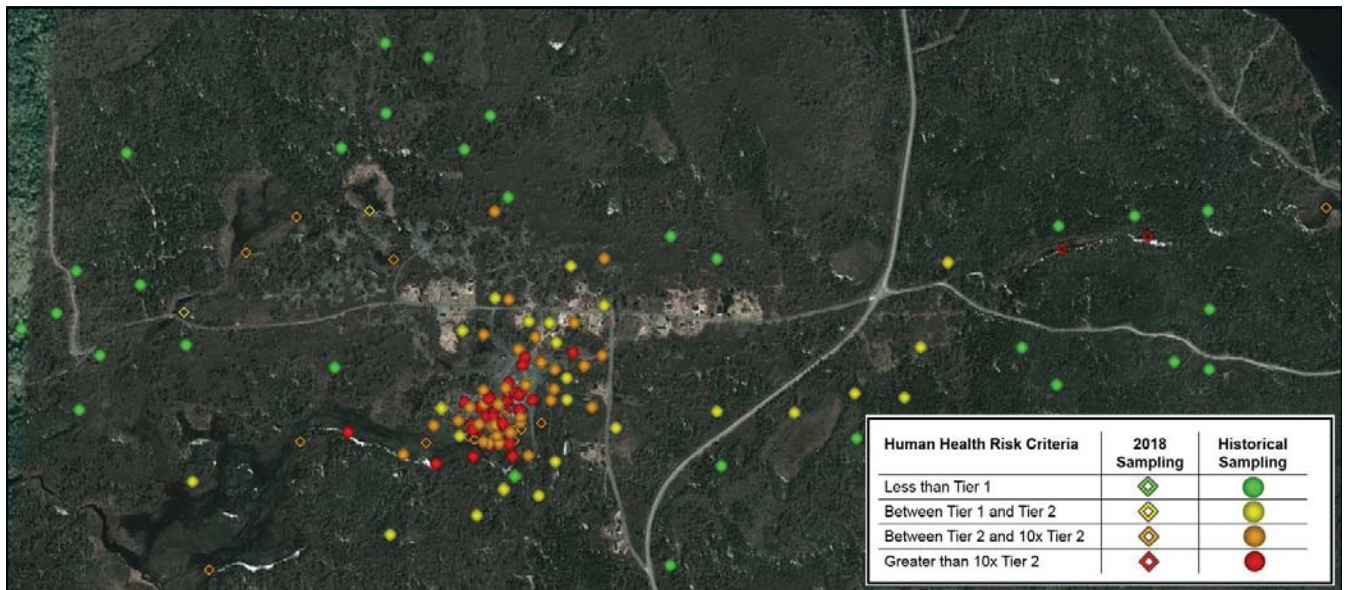


Figure 6-9: Goldenville Mines – Near-Surface Arsenic Contents – Central Region

Note:
Tier 1 Arsenic Criteria = 31 mg/kg
Tier 2 Arsenic Criteria = 400 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 6-10 and Figure 6-11, 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 within the main tailings area. All samples that exceeded the Tier 1 criteria were less than the Tier 2 value, and are situated within the Northeast and Northwest Zones, within the proximity to historical crushers. 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.

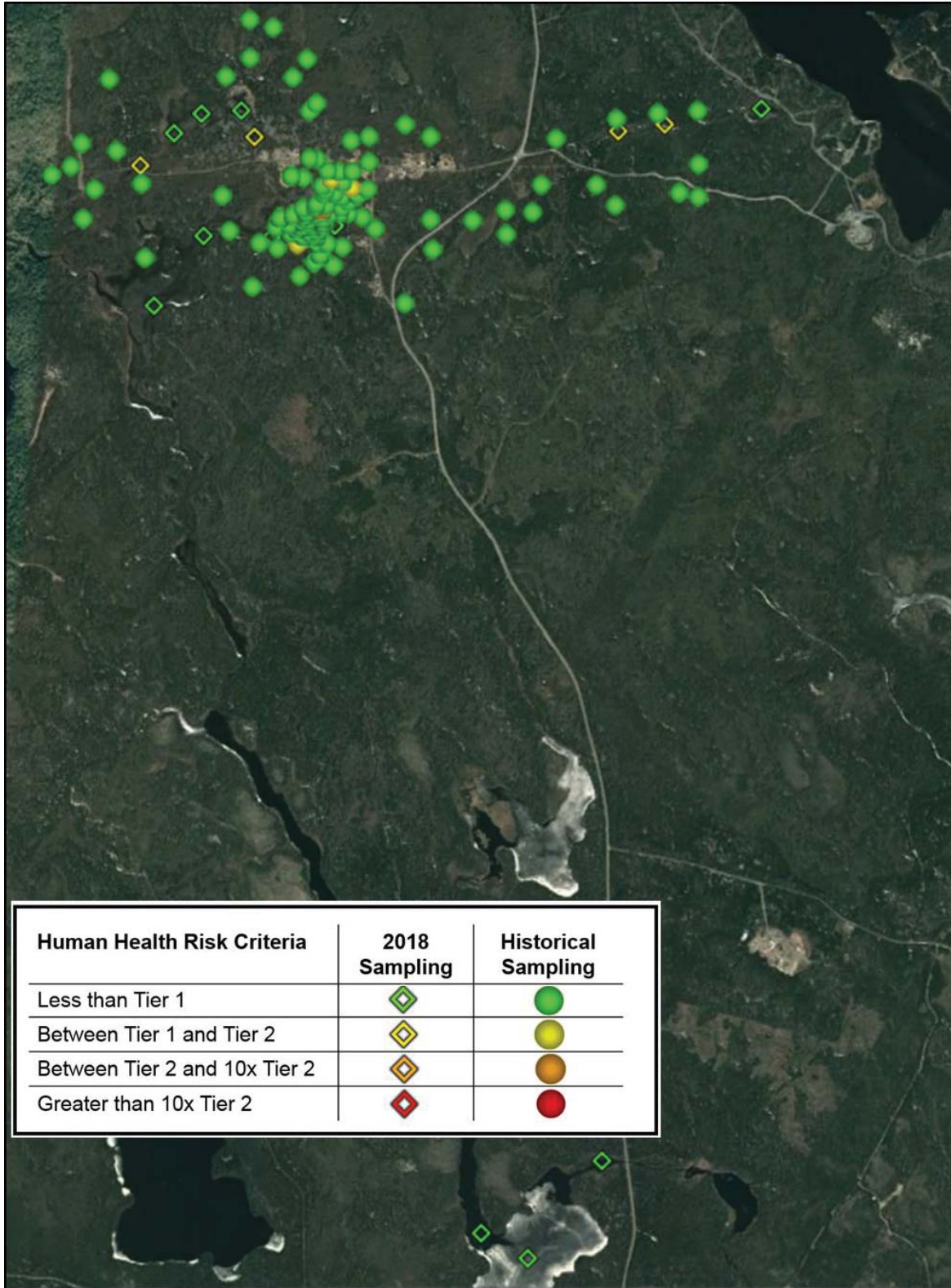


Figure 6-10: Goldenville Mines – Near-Surface Mercury Contents – All Locations

Note:

Tier 1 Mercury Criteria = 6.6 mg/kg

Tier 2 Mercury Criteria = 29 mg/kg

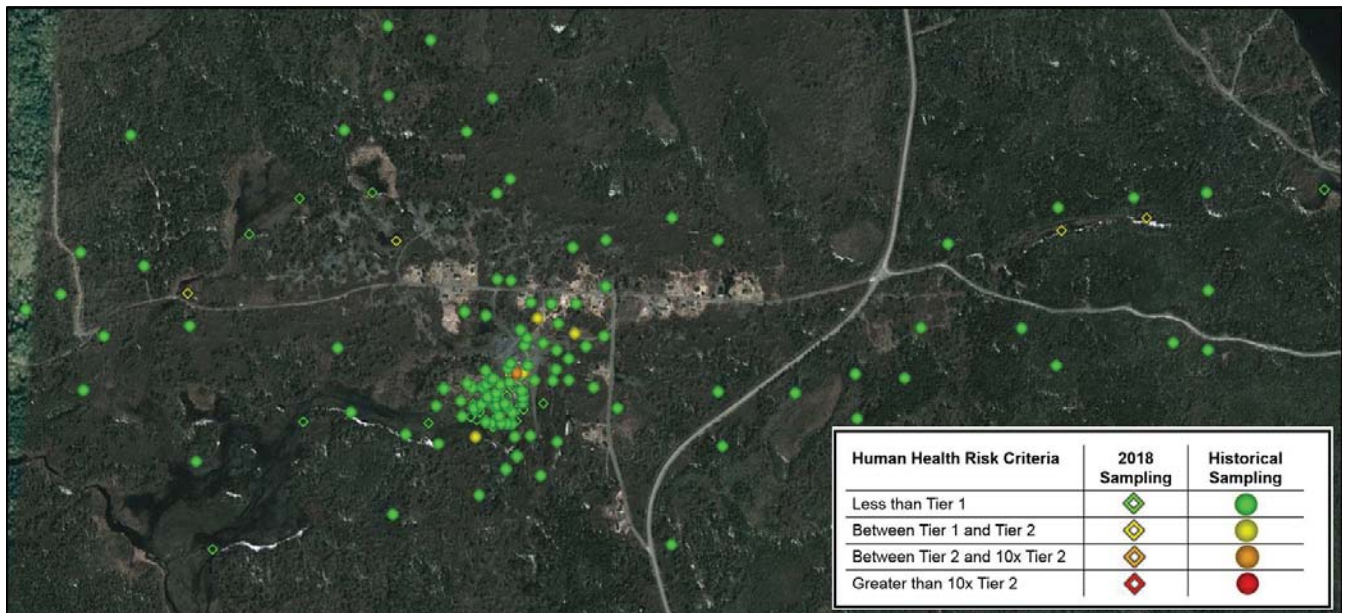


Figure 6-11: Goldenville Mines – Near-Surface Mercury Contents – Central Region

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 6-12 and Figure 6-13. Locations included in the surface water analysis are: Gegogan Brook, Gegogan Lake, Northeast Zone, and Northwest Zone. 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. Within Gegogan Brook, the concentrations of total arsenic in the surface water range between 0.027 to 0.36 mg/L, with the majority of samples observed to be greater than the Tier 2 criterion. The arsenic concentrations of both samples collected at the Northeast Zone and two of three samples collected from Gegogan Lake were greater than the Tier 2 criterion. In Northwest zone, arsenic concentrations were between the Tier 1 and Tier 2 criteria.

The results for total mercury concentrations in surface water are summarized in Figure 6-14 (Central area), Figure 6-15 (Gegogan Lake), and the total and dissolved concentrations are provided in Table 6-2. Most surface water samples had mercury concentrations less than the Tier 1/2 criteria, except two samples from Gegogan Brook, and two samples from the Northeast Zone. All samples with mercury concentrations greater than the Tier 1/2 criteria were within the same magnitude as the 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, except at a few locations. At G-SW16 and G-SW14 within the Gegogan Brook, the total concentrations were greater than two times of the dissolved concentrations for arsenic and mercury, respectively. The Gegogan Brook has high flowrate, and it is expected to include suspended solids. Sample G-SW10 from Northwest Zone has arsenic concentrations that were observed to be higher in the dissolved phase. This QA/QC discrepancy does not affect the Tier 1 and Tier 2 criteria classification of this sample. Dissolved mercury was reported to be greater than total mercury concentrations for two samples, G-SW15 and G-SW10, and this QA/QC discrepancy potentially affects the Tier 1/2 classification of these samples. However, the dissolved mercury concentrations were close to the method detection limit and may be prone to error. Additional monitoring is warranted to evaluate the discrepancy between total and dissolved mercury concentration for selected samples.

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

Location	Sample ID	Arsenic (mg/L)		Mercury (mg/L)	
		Total	Dissolved	Total	Dissolved
Gegogan Brook	G-Pz4	0.027	0.0232	<0.00002	<0.00002
	G-Pz1	0.0721	0.0673	<0.00002	<0.00002
	G-Pz2	0.0999	0.0897	<0.00002	<0.00002
	G-SW16	0.262	0.0906	0.000031	0.0000238
	G-SW14	0.358	0.225	0.000036	0.0000177
	G-SW15	0.138	0.124	<0.00002	0.0000315
Gegogan Lake	G-SW13	0.0382	0.0348	<0.00002	0.0000055
	G-SW12	0.0364	0.0331	<0.00002	<0.000002
	G-SW11	0.0128	0.0124	<0.00002	0.0000154
Northeast Zone	G-SW5	0.13	0.104	0.000045	0.0000453
	G-SW6 (NE-Nov28)	0.0882	0.0837	0.000028	0.0000216
Northwest Zone	G-SW10	0.0125	0.0249	<0.00002	0.0000298



Figure 6-12: Goldenville Mines – Surface Water Total Arsenic Concentrations

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

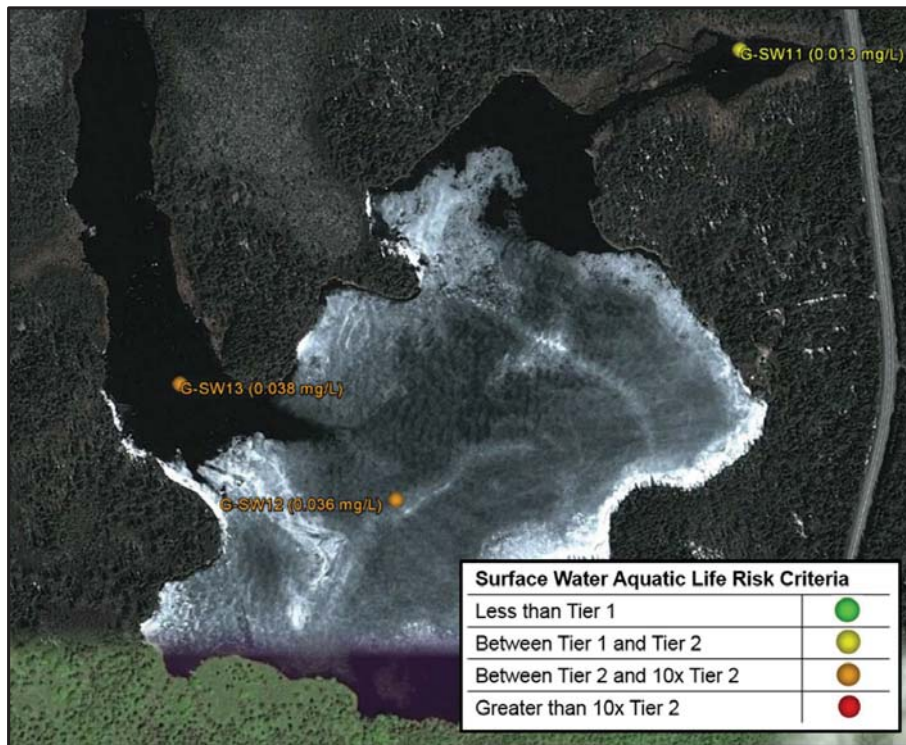


Figure 6-13: Goldenville Mines – Surface Water Total Arsenic Concentrations

Notes:

Tier 1 Arsenic Criteria = 0.005 mg/L

Tier 2 Arsenic Criteria = 0.03 mg/L



Figure 6-14: Goldenville Mines – Surface Water Total Mercury Concentrations – Central Region

Note:

Tier 1 and Tier 2 Criteria = 0.000026 mg/L

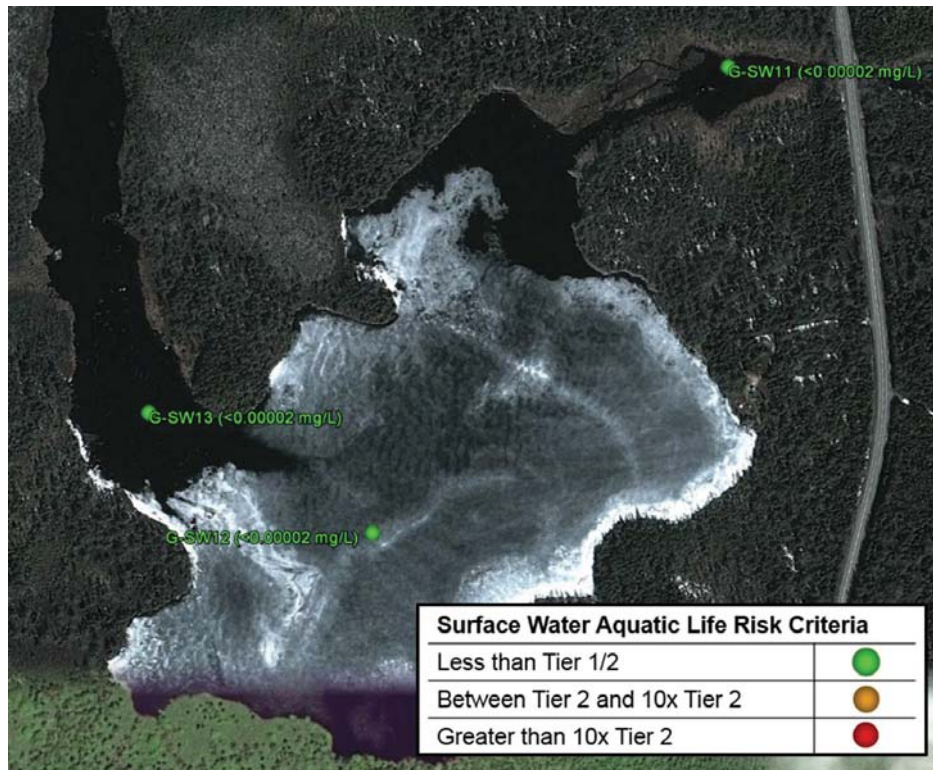


Figure 6-15: Goldenville Mines – Surface Water Total Mercury Concentrations – Gegogan Lake

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 various depths collected at each sampling location, are summarized for the entire site and with a focus on the main tailings area in Figure 6-16 and for Gegogan Lake in Figure 6-17. 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 Gegogan Brook, Gegogan Lake, Northeast Zone and Northwest Zone are also shown in these figures. Porewater samples from all but one locations in the Gegogan Brook (the main Tailings area below Stamp Mill) and Northeast Zone were greater than 10 times of the Tier 2 criterion, with the majority of samples greater than 100 times of the Tier 2 criterion. Porewater at the Northwest Zone ranged between below Tier 2 criterion to 100 times of the Tier 2 criterion. Porewater samples at the Gegogan Lake were all between the Tier 2 criterion to 10 times of the Tier 2 criterion.

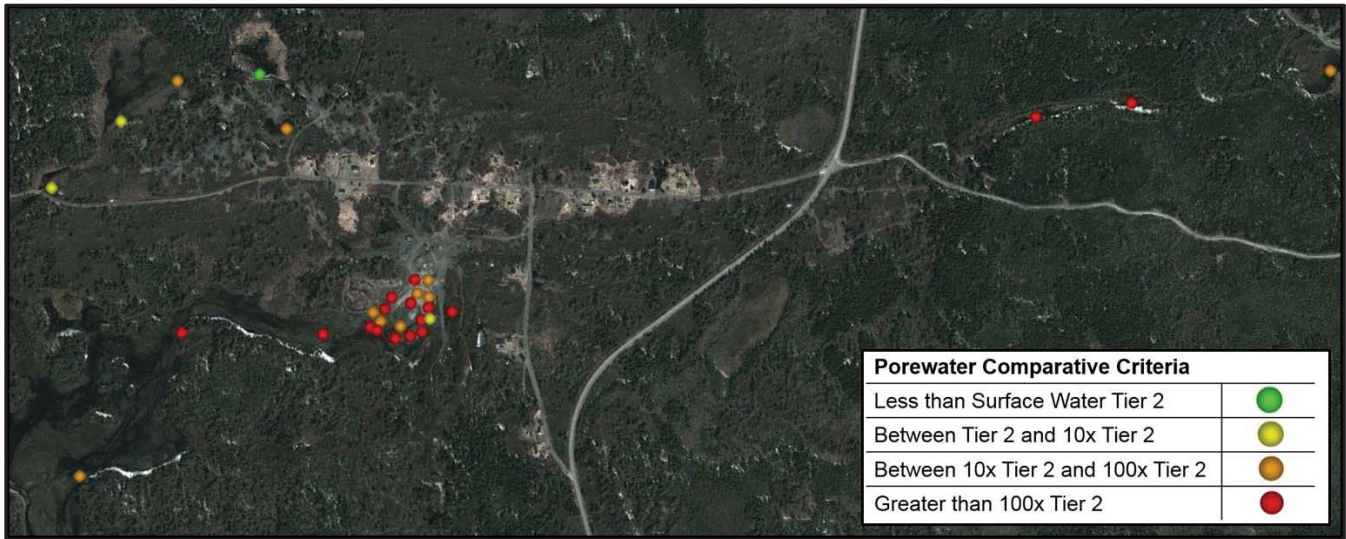


Figure 6-16: Goldenville Mines – Maximum Porewater Arsenic Concentrations – Central Region

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).

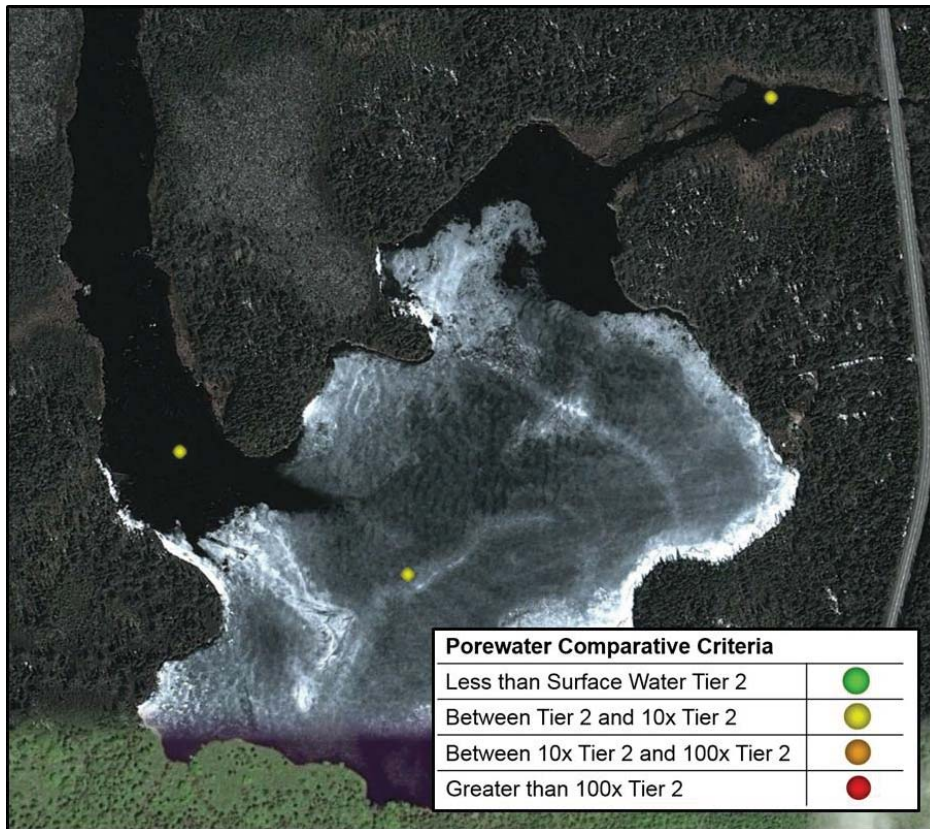


Figure 6-17: Goldenville Mines – Maximum Porewater Arsenic Concentrations – Gegogan Lake

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 Figure 6-18 and Figure 6-19, 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.

Porewater concentrations from sediment core samples from surface water locations including Gegogan Brook, Gegogan Lake, Northeast Zone and Northwest Zone are also shown in these figures. The mercury concentrations in the majority of porewater samples from Gegogan Brook (the main Tailings area below Stamp Mill) and the Northwest Zone ranged between Tier 2 criterion to 100 times of the tier 2 criterion, except two locations at the Gegogan Brook and two locations within the Northwest Zone, where mercury concentrations in the pore water were greater than 100 times of the Tier 2 value. Mercury concentrations ranged between Tier 2 criterion and 100 times of the Tier 2 criterion in the Northeast Zone and ranged between Tier 2 criterion and 10 times of the Tier 2 criterion at Gegogan Lake.

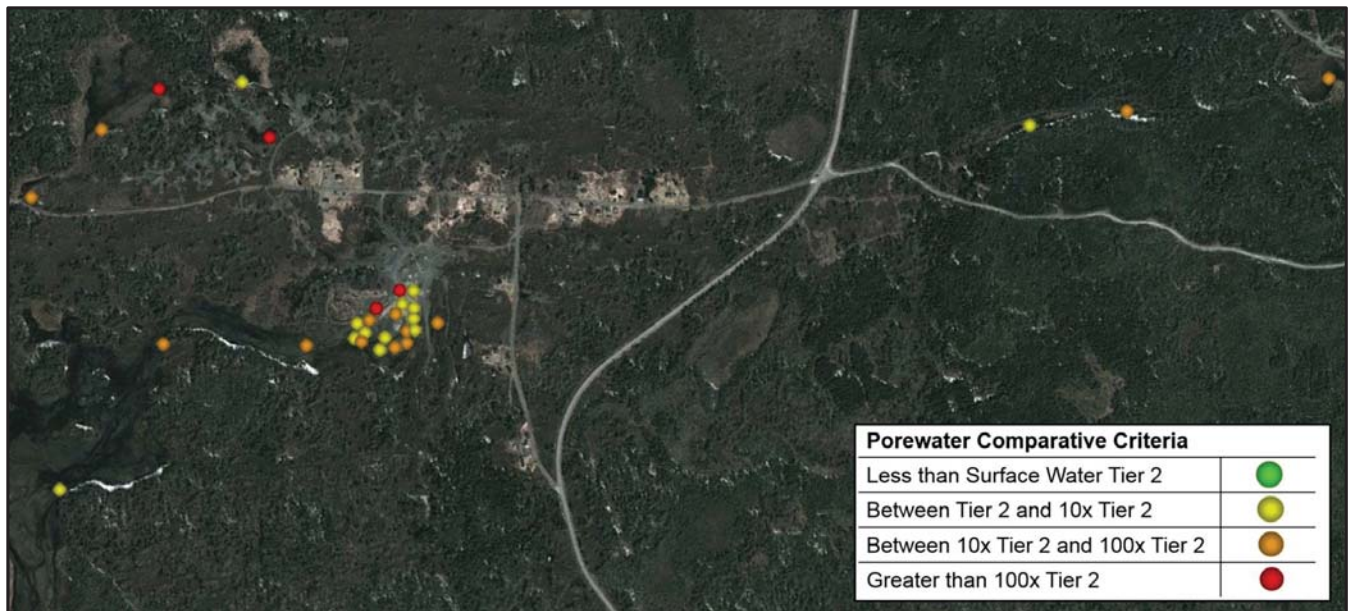


Figure 6-18: Goldenville Mines – Maximum Porewater Mercury Concentrations – Central Region

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).

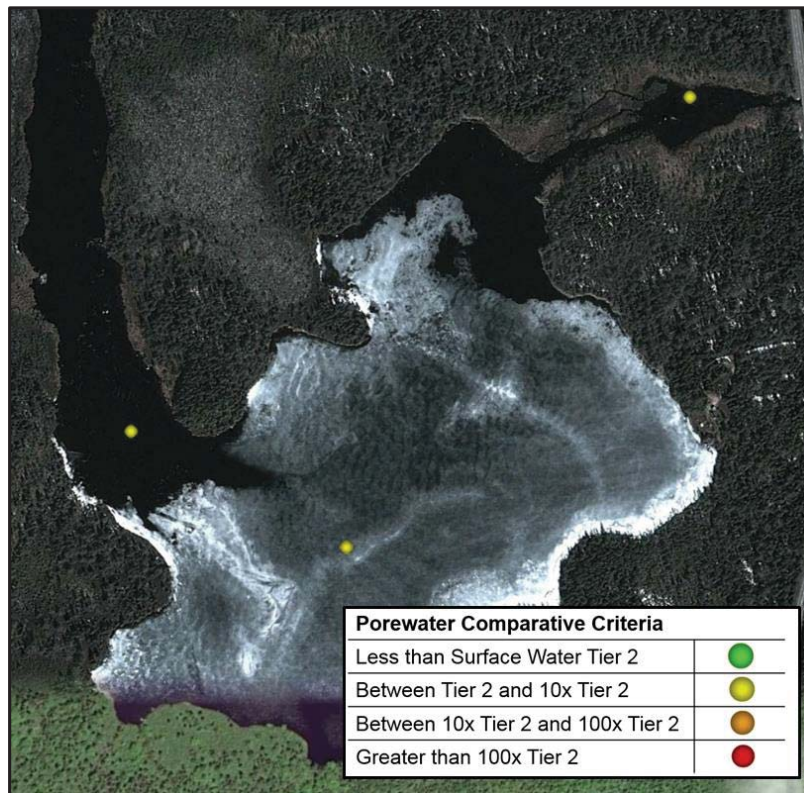


Figure 6-19: Goldenville Mines – Maximum Porewater Mercury Concentrations – Gegogan Lake

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 6-20. 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 6-20: Goldenville 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	
G-Pz1	Shallow	57 to 70	0.935	0.000032
	Deep	142 to 155	0.815	<0.00002
G-Pz2	Shallow	57 to 70	0.576	0.000113
	Deep	107 to 120	0.96	<0.00002
G-Pz3	Shallow	52 to 65	2.93	<0.00002
	Deep	107 to 120	0.548	0.000025
G-Pz4	Shallow	57 to 70	0.518	0.000784

The dissolved arsenic concentrations in surface water, porewaters and subsurface piezometer samples at each station are summarized in Figures 6-21 to Figure 6-23. For reference, the water concentrations were also compared to the arsenic contents of the solids at each depth at all mini piezometer stations.

The results for G-Pz1, located at the east side of upper main tailings area, are presented in Figure 6-21.

At this station, the dissolved arsenic concentration in the surface water was less than 1 mg/L, while the concentrations in porewaters ranged from about 4 mg/L near surface to values on the order of 1 mg/L at depths greater than 30 cm below ground surface. In comparison, the concentration of dissolved arsenic in the subsurface piezometer sample at the 2 m depth was on the order of 3 mg/L. The arsenic contents in the solids varied from a low of about 500 mg/kg to 2100 mg/kg. At this station, the dissolved arsenic concentrations in porewater were the highest at the surface and lowest at a depth of 30 cm below ground surface. The piezometer subsurface water sample exhibited concentrations of approximately 1 mg/L for dissolved arsenic, which was in good agreement with the concentration in the porewater at the same depth.

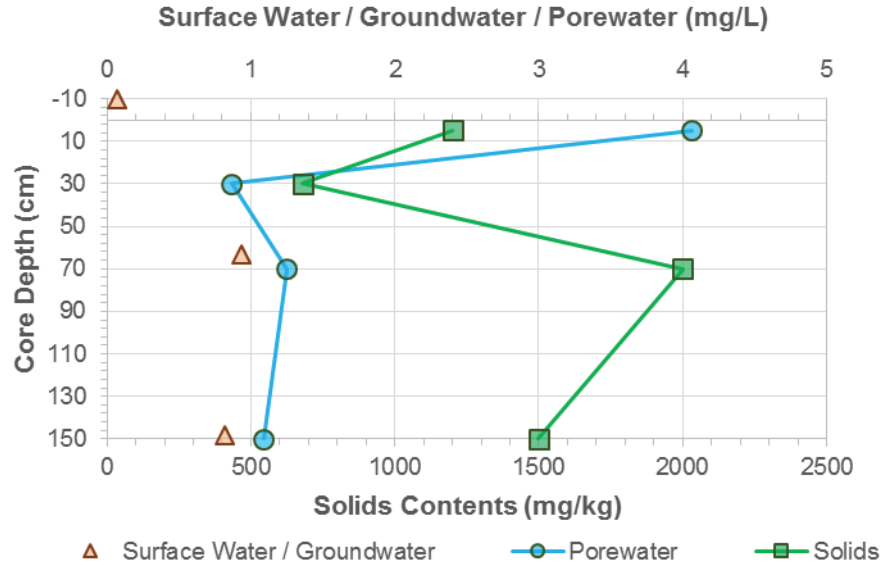


Figure 6-21: Goldenville Mines – G-Pz1 Arsenic Chemistry

The results from the core at piezometer station G-Pz2 are shown in Figure 6-22.

The concentration of dissolved arsenic in the surface water sample from this station was less than 0.09 mg/L, while the concentrations in porewaters ranged from about 17 mg/L in the shallow subsurface to about 3 mg/L in porewater at a depth of 30 cm. The arsenic contents in the solids varied from a low of about 1,000 mg/kg to a high of 18,000 mg/kg at a depth of 30 cm below ground surface, and decreased to about 7,000 mg/L at a depth of 70 cm.

Conversely, the two piezometer samples exhibited dissolved arsenic concentrations of about 0.5 mg/L at the depth of 60 cm and 1 mg/L at the depth of 1.1 m below ground surface, respectively. There is a discrepancy between the concentrations in the porewater at 60 cm depth and the piezometer sample at the similar depth. Additional sampling of the piezometers is warranted to evaluate the discrepancy between these results.

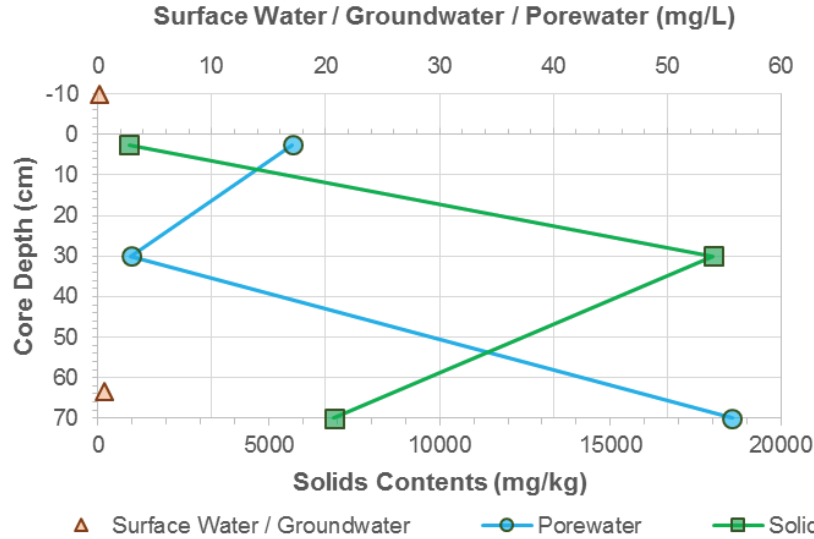


Figure 6-22: Goldenville Mines – G-Pz2 Arsenic Chemistry

The results from piezometer monitoring station G-Pz3 are presented in Figure 6-23.

The concentrations of dissolved arsenic in the surface water at this station was 1.5 mg/L, greater than that collected within the vicinity of other piezometers. This corresponds to the greater arsenic concentration of the porewater close to the surface compared to station G-Pz1 and G-Pz2. The arsenic contents in the solids varied from a low of about 2000 mg/kg at the surface and a depth of 1.1 m, to a high of over 5000 mg/kg at a depth of 30 and 70 cm below ground surface. The two piezometer samples exhibited dissolved arsenic concentrations of 2.9 mg/L at a depth of 60 cm and 0.54 mg/L at a depth of 1.1 m below ground surface, respectively, which is in accordance with arsenic concentrations in the porewater from similar depth.

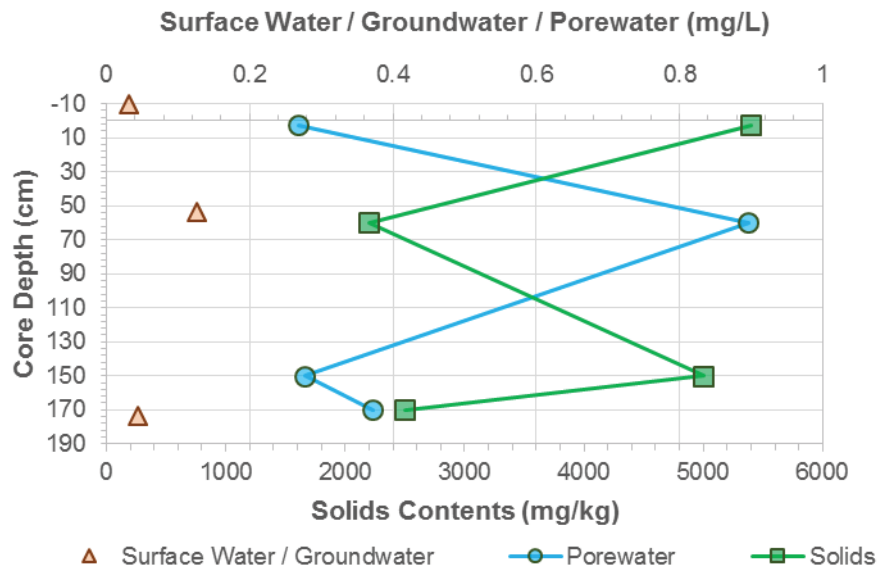


Figure 6-23: Goldenville Mines – G-Pz3 Arsenic Chemistry

The arsenic results at piezometer station G-Pz4 are shown in Figure 6-24.

The dissolved arsenic concentration observed in the surface water at this station was 0.023 mg/L, while those observed in the porewaters were much higher, ranging from approximately 11 mg/L to 0.3 mg/L. Measured values in the porewater decreased from the surficial area to a depth of 15 cm below ground surface.

At this station, the concentration in the piezometer sample at a depth of 60 cm was about 0.5 mg/L. The maximum depth of available porewater concentration was 15 cm, where the arsenic concentration was about 0.3 mg/L. The arsenic contents in the solids ranged from about 3300 mg/kg close to the surface to 500 mg/kg at a depth of 30 cm below ground surface. At this station, additional piezometer and porewater sampling appears warranted to evaluate correlation between these two types of samples at the similar depth.

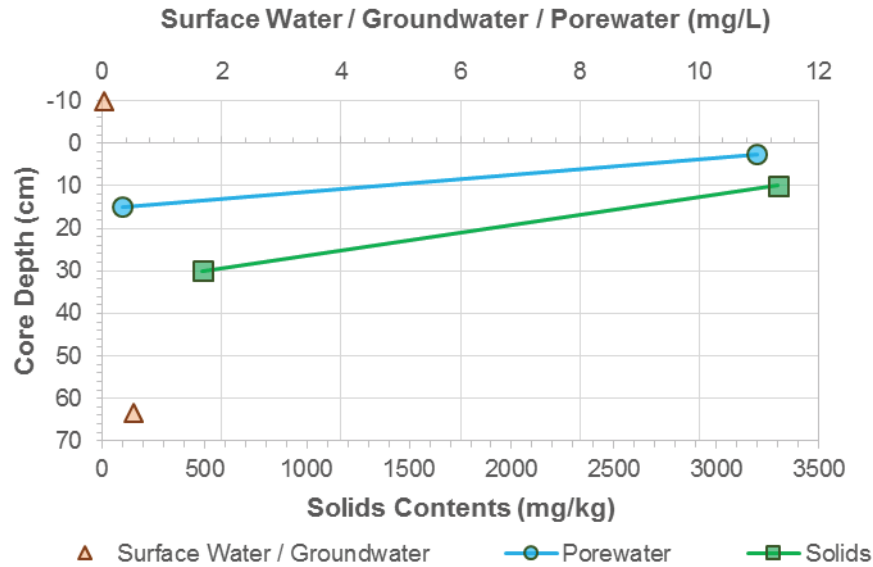


Figure 6-24: Goldenville Mines – G-Pz4 Arsenic Chemistry

These results above show that there are samples with solids arsenic contents that are consistent with those expected for tailings materials at all stations. The dissolved arsenic concentrations in the porewaters and the piezometer samples are consistently higher than those observed in the surface water. The higher concentrations in the porewaters from the shallow subsurface compared to those in the overlying water indicate that dissolved arsenic can be transported by diffusion, and the diffusive flux occurs from the higher concentration at the shallow subsurface towards the lower concentration in the overlying water. Therefore, 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.

In addition, 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. 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 all stations, the higher concentration of arsenic in porewater was near the water tailings interface followed by a lower concentration at depth. At these stations, the arsenic concentration gradient is downward, where 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 6-25 and Figure 6-26. Although the correlations are not strong between sulphide and arsenic contents, it is evident that they do correlate for the Main Site and Northeast Zone. 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-Goldenville 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 ($\text{Fe}(\text{OH})_3$) 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.

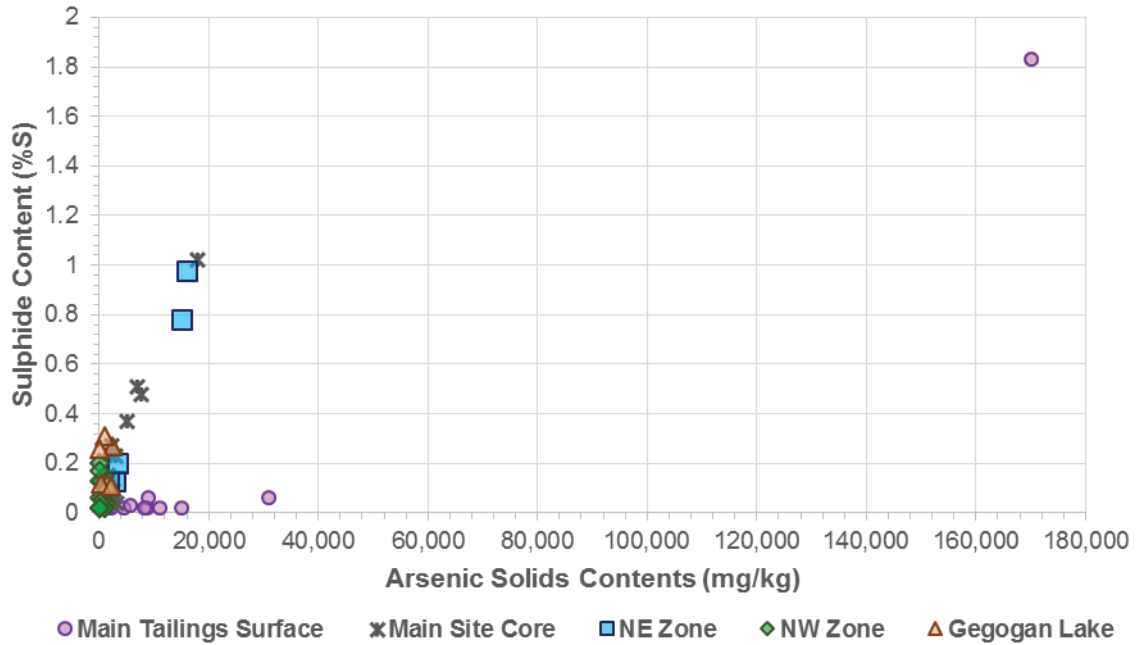


Figure 6-25: Goldenville Mines – Sulphide vs. Arsenic Contents in Tailings and Sediments

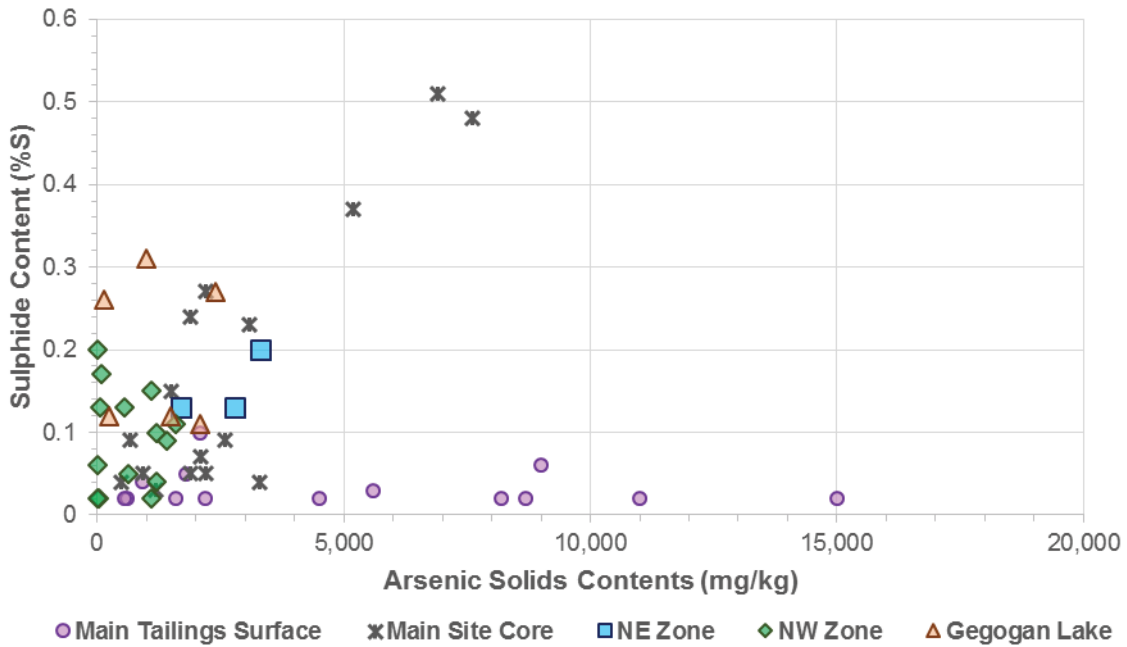


Figure 6-26: Goldenville Mines – Sulphide vs. Arsenic Contents in Tailings and Sediments - Sulphide Less than 0.6% and Arsenic Content Less than 20,000 mg/kg

Additional assessment of elemental correlations show that arsenic and iron are associated in the tailings solids as shown in Figure 6-27 and Figure 6-28 (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 attenuated 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.

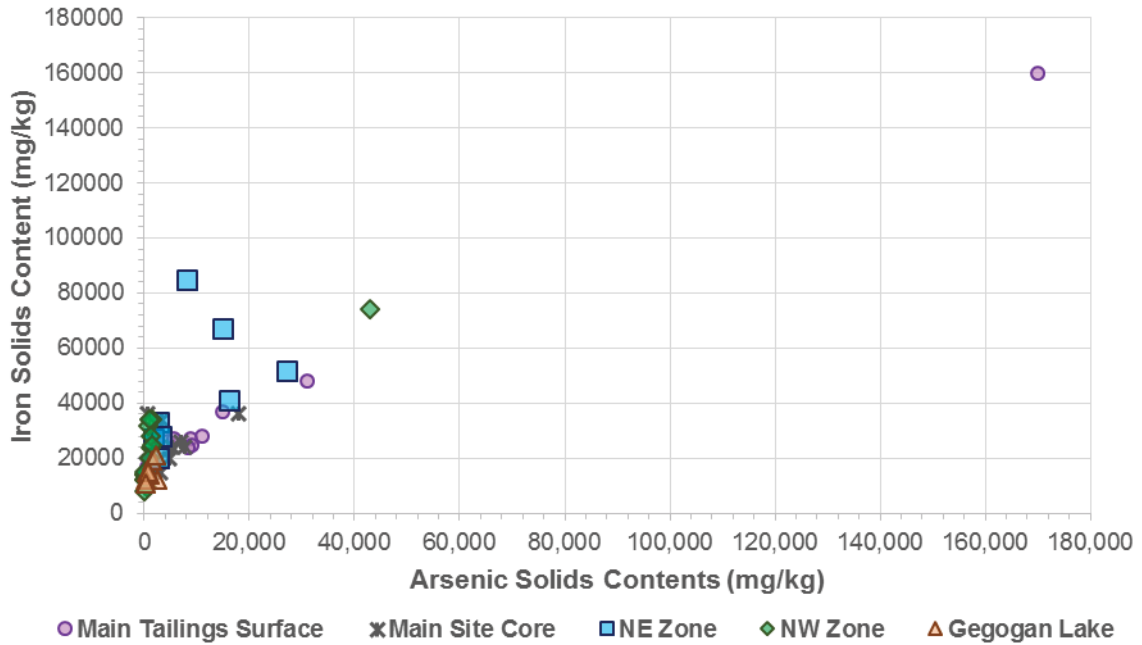


Figure 6-27: Goldenville Mines – Iron vs. Arsenic Contents in Tailings and Sediments

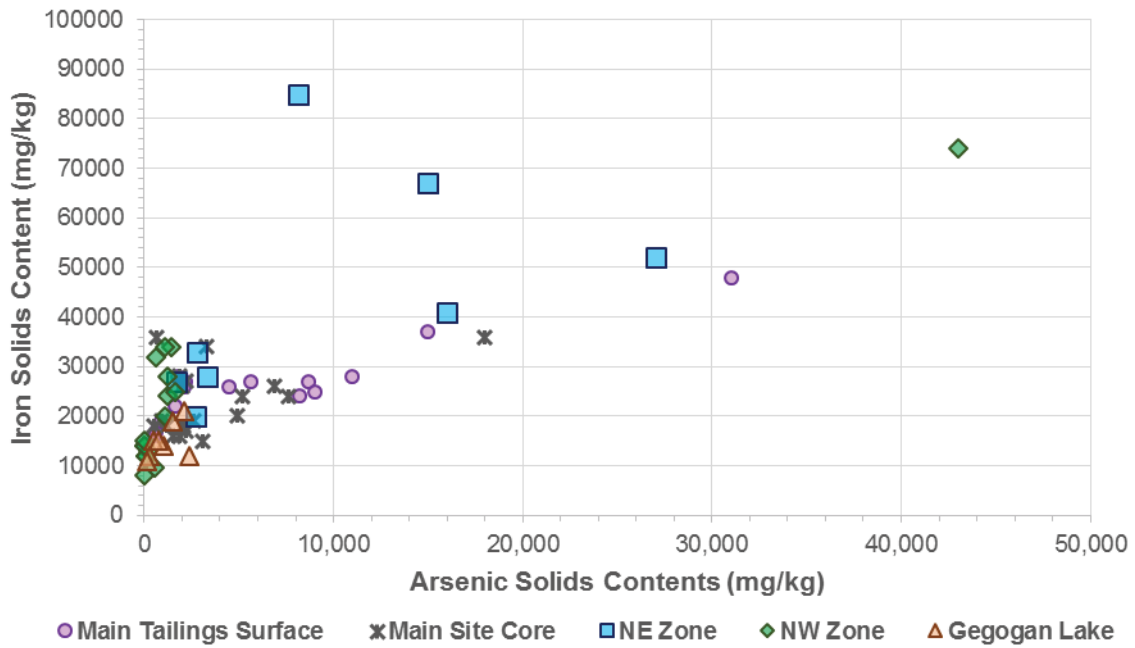


Figure 6-28: Goldenville Mines – Iron vs. Arsenic Contents in Tailings and Sediments – Iron Less than 100,000 mg/kg and Arsenic Content Less than 50,000 mg/kg

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 6.4.

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 crusher locations. Mercury concentrations in water are very limited, and so are the loadings of mercury from the tailings to the environment. 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 believed to have been impacted by historical tailings deposition. Following the conclusion of the Stage 1 field program, the historical deposition areas have most been covered, except a small indicated historical tailing area within the Northeast Zone (**Error! Reference source not found.**). The downstream of Gegogan Brook was included in the 2018 field program, but it was not sampled due to weather conditions. Efforts should be made to characterize these areas during additional Stage 2 investigation.

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 6-29.

At the Goldenville 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 6-29. 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 as well as the solid phase ferric oxyhydroxide, simplified as $\text{Fe}(\text{OH})_3$.

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 winds. 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.

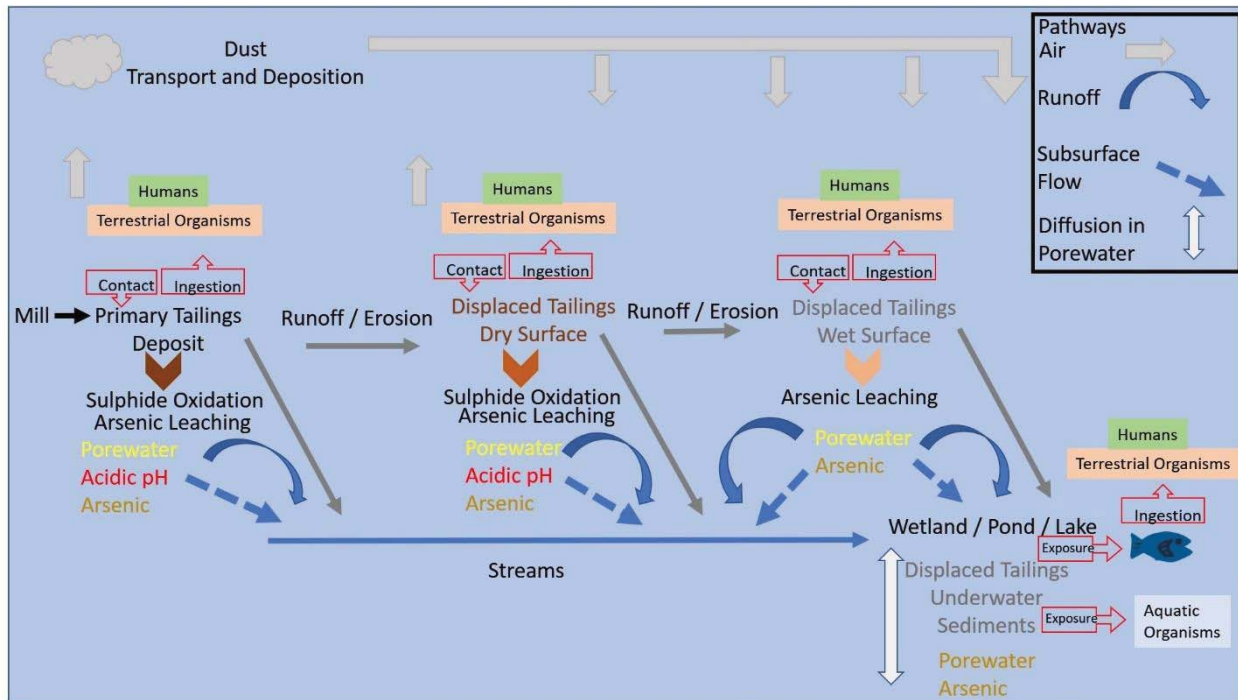


Figure 6-29: Conceptual Site Model for the Goldenville Site.

Water represents the primary pathway for both tailings solids and dissolved COPCs at the Goldenville 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 finer silty particles downstream, including within the wetland areas.

The main tailings area, the tailings area to the north and the area to the east are shown in Figure 6-30. 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 wetlands and ponds draining to Gegogan Lake, and into the ocean to the south and to a small stream west of Highway 7 toward Lake Saint Marys River.

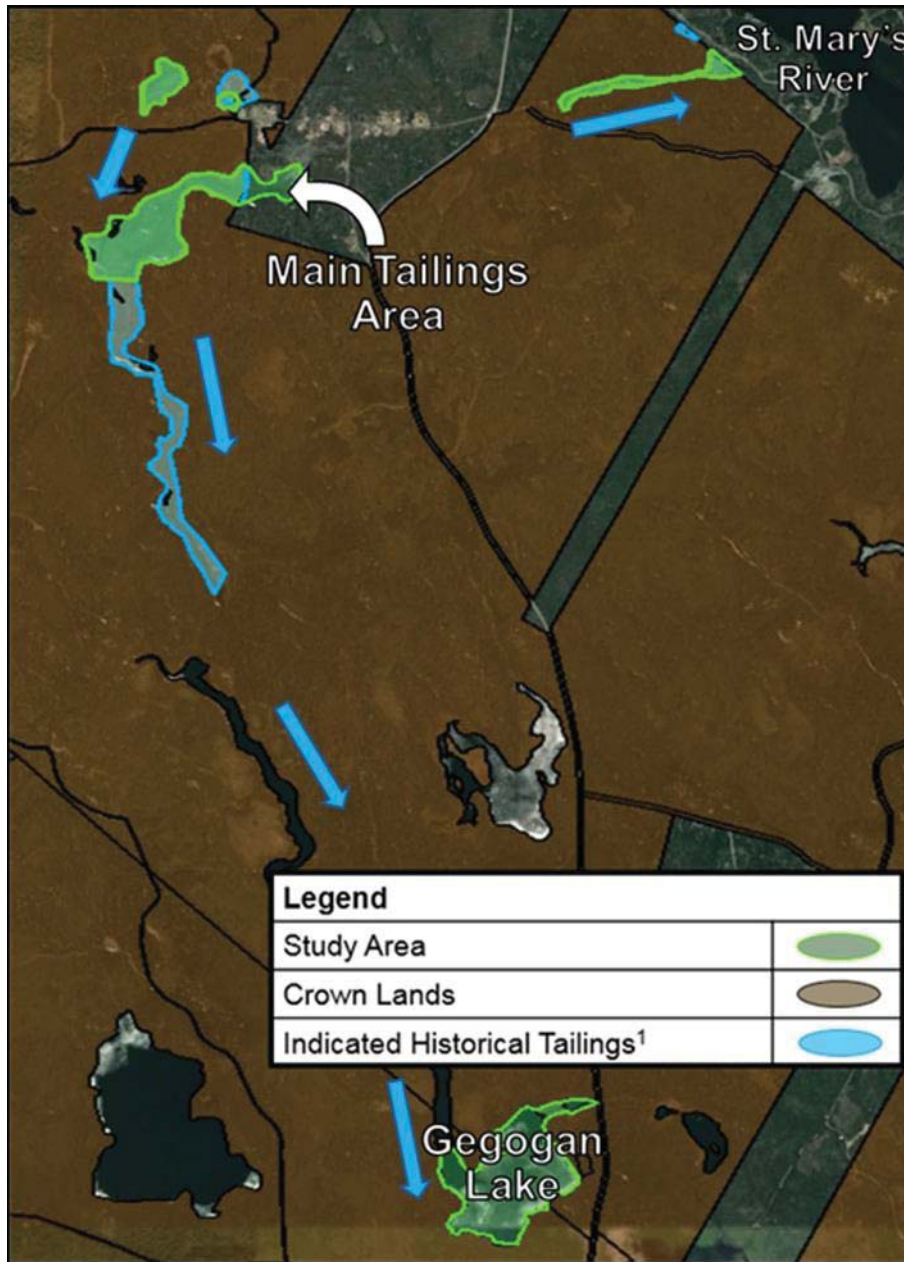


Figure 6-30: Study Areas and Locations of Historical Tailings

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 sulphide 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 sulphide 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 and Gegogan Lake 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 ponds 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 porewaters 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 sulphide 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 sulphide 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 known and assumed tailings areas at the Site. Known tailings were identified by reviewing recent sampling and analysis completed by EcoMetrix, where past and present sampling data was compared to Nova Scotia tiered environmental quality standards. Tailings areas were also inferred based upon reviewing a map created by Nova Scotia Department of Natural Resources (NSDNR, 2018).

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, water bodies, 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.

Recent sampling and analysis by the study team provides additional confirmation to portions of the assumed extent of tailings obtained from the NSDNR (2018) map; 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 6-31 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 in the vicinity of the former mill location, and downstream of the former mill location. The extent of Area 1 was inferred based on the site conditions including: exposed tailings, wetlands, water bodies, forested lands, and the known levels of contamination. Area 1A is subdivided into three sub-areas including Area 1A, 1B, and 1C.

Area 1A - this area consists mainly of exposed tailings, this area is frequently used by locals as a racing track. A stream runs along the south side of this area, dividing Area 1A from 1B. This area is located off Crown land.

Area 1B - this area is south of 1A, on the other side of the stream that divides the two areas, and comprises exposed tailings, wetland, and a forested area to the south. This area is located off Crown land.

Area 1C – is located west of 1A and 1B. This area consists of wetland, streams, and water bodies and primarily runs southward from the former mill location. This area is on Crown land.

6.5.2 Area 2

Area 2 is identified as the tailings area located northwest of the former mill location, on the north side of Goldenville Road Extension, and is based on recent sampling and analysis by the study team and the NSDNR historical mapping. Area 2 is divided into two sub-areas including Areas 2A and 2B.

Area 2A – is a wetland area, that drains to the southwest toward Goldenville Extension. This area is on Crown land.

Area 2B – is a small wetland area, located east of 2A, that drains toward 2A. This area adjacent to several residential houses and is on Crown land.

6.5.3 Area 3

Area 3 – covers several small areas located east of Nova Scotia Trunk 7 Highway, and is based on recent sampling and analysis by the study team and the NSDNR historical mapping. Area 3 is divided into three sub-areas including areas 3A, 3B, and 3C.

Area 3A – is a stream and wetland area that drains westward toward Mill Cove. Based on recent sampling and analysis, this area is identified as having high levels of contamination. This area is on Crown land.

Area 3B – is a continuation 3A but slightly more forested. Based on recent sampling and analysis, this area is identified as having lower levels of contamination than 3A. This area is both on and off Crown land.

Area 3C – is a forested area with a small stream running through it and is based on NSDNR historical mapping. This area is located northwest of Area 3B, and is on Crown land.

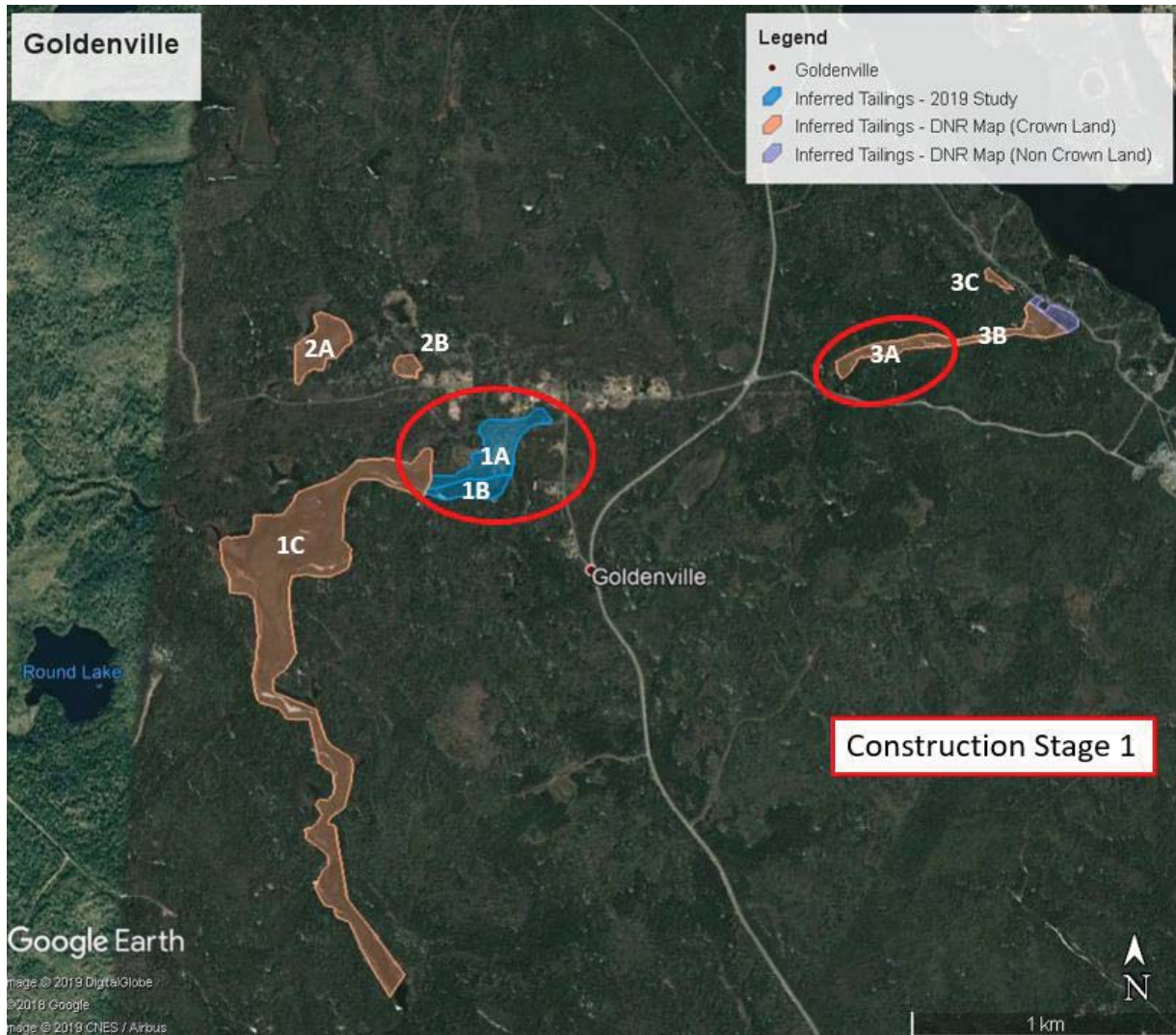


Figure 6-31: Areas of Known and Potentially Impacted by Historical Mining



Table 6-4: Approximate Size of Tailings Areas

Area	Size (m2)	Crown / Non-Crown
1A	42,600	Non-Crown
1B	17,500	Non-Crown
1C	304,200	Crown
2A	30,500	Crown
2B	6,400	Crown
3A	21,500	Crown
3B	17,600	Crown
	8,500	Non-Crown
3C	3,000	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

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 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, and 3A were considered as noted above. It should be noted that according to the NSDNR Mapping (NSDNR, 2018), Areas 1A and 1B are not on Crown land; however, due to the known high levels of contamination in these areas, they have been identified for Construction Stage 1. It will be necessary to engage with the local land owner on the remediation plan for these areas.

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

7.2 Excavation and Consolidation for Areas 1A and 1B

This closure strategy involves the excavation of approximately 2 m depth of tailings and overburden soils in Areas 1A and 1B and consolidating these materials into two impermeable containment cells. 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 and prevent the stream that runs through the site from entering 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.

7.2.1 Containment Cell

In general, the containment cells for the tailings excavated in Areas 1A and 1B 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 Areas 1A and 1B where high levels of arsenic have been found. By placing these tailings in the containment cells, the major source of arsenic is removed from entering the environment via surface water flow and groundwater leaching. A typical section of the containment cells 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: one measuring 180 m long by 180 m wide along the base (for Area 1A tailings), and one measuring 135 m long by 135 m wide along the base (for Area 1B tailings);
- 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.

7.2.2 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.

7.2.3 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.

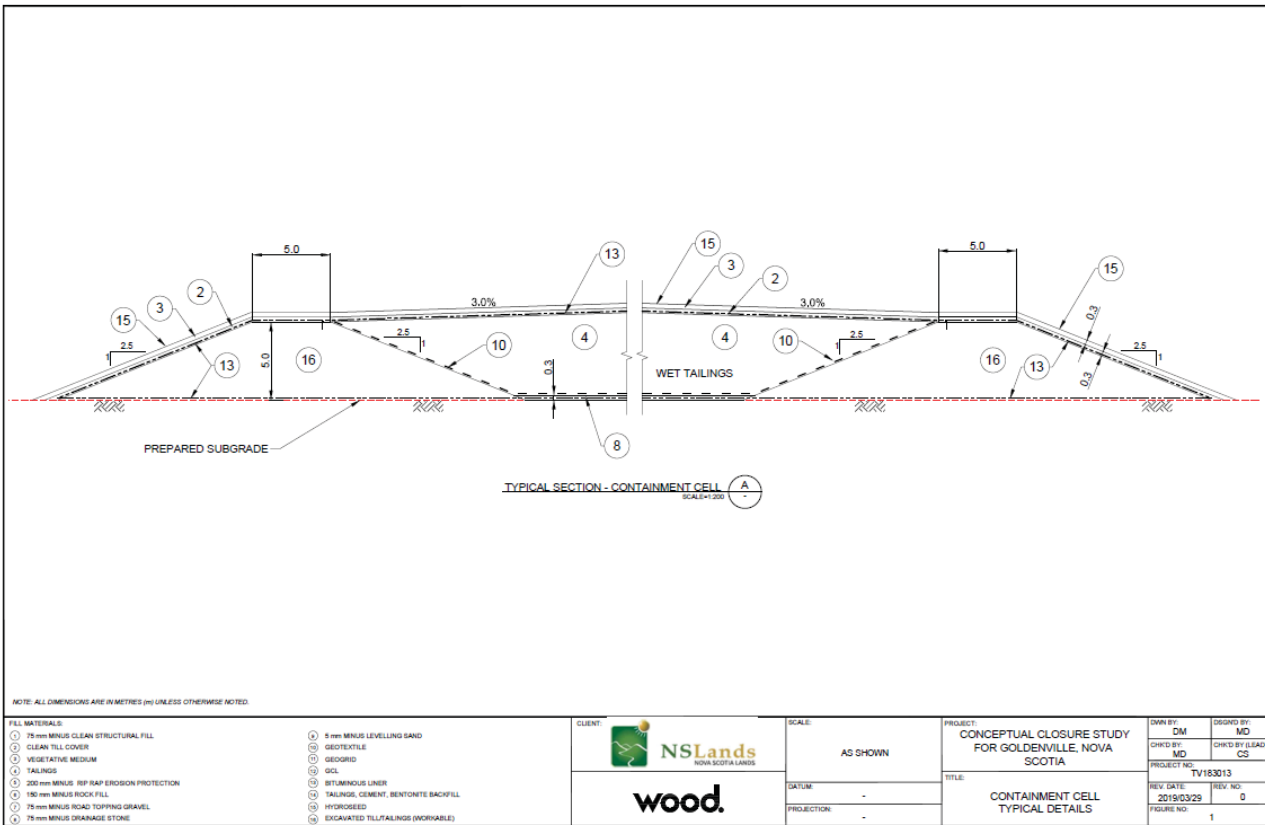


Figure 7-1: Containment Cell Typical Details

7.2.4 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.

7.2.5 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.

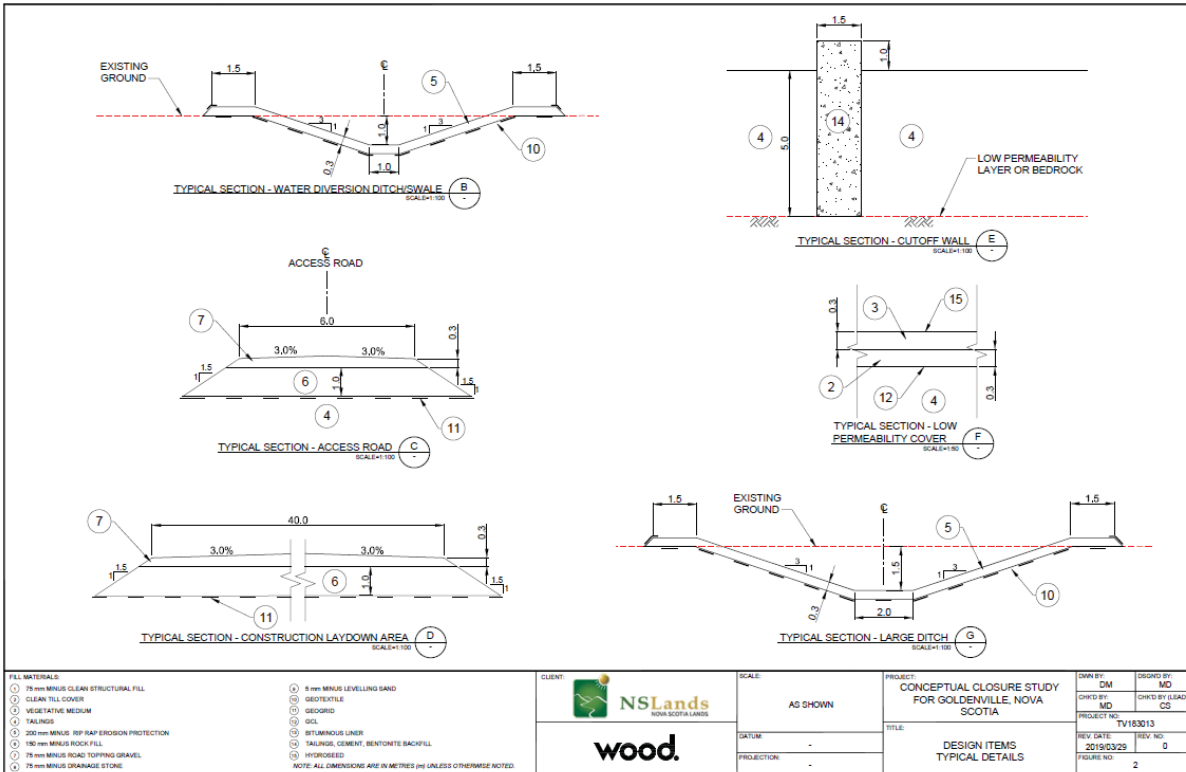


Figure 7-2: Design Items Typical Details

7.2.6 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.

7.2.7 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 3.45-ha catchment area;
- 4,665 m³ total volume of storage;
- 2 m depth excavation into tailings, with 50 m length and 50 m width;
- Containment on the downstream side of the pond by the SCB cut-off wall described in Section 7.2.5; and,
- Backfilling the pond with “clean” backfill once construction has been completed

7.2.8 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.

7.3 Low Permeability Cover for Area 3A

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.

7.3.1 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.

7.3.2 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 7.2.2; 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. Also, since a stream passes through Area 3A, a larger ditch section is required as shown in Section G, Figure 7-2. The larger ditch section is 1.5 m deep, with a 2 m base width, and 3H:1V side slopes.

7.3.3 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.

7.4 Construction Stage 2 – Crown Land

Construction Stage 2 involves lower priority areas that are on Crown lands that includes Areas 2A, 2B, 3B, and 3C. 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 areas could be explored and may offer more cost effective solutions.

7.5 Construction Stage 2 - off Crown Land

Construction Stage 2 involves the lower priority areas that is off Crown land within Area 3B. Based on the limited information within this area, the level of contamination is 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 this area. Similar statements to those made in Section 7.3 apply for this area (ie., that further delineation and risk assessment could reduce size of area requiring remedial attention), as well as in Section 7.4.

7.6 Construction Stage 3 - off Crown Land

Construction Stage 3 involves lower priority areas that are on Crown lands that include Area 1C and potentially other historical areas yet to be delineated. Based on the limited information within these areas. Although, additional field investigations will be required to further delineate the areas of contamination and determine the most appropriate closure measures based on the site conditions.

7.7 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 option of “do noting”. This option would involve leaving the tailings in-situ and to not disturb the areas with excavation or covers.

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 to 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.

8.0 CLOSURE COSTS

This section provides 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 lands, as well as the main tailings area (which is on privately held lands) are provided in Section 8.1

As part of this exercise, conceptual closure strategies were also considered for the other areas that require remediation that exceed the closure criteria but have been identified as a lower priority, as described in Section 7.0.

8.1 Construction Stage 1 – Crown Land and Main Tailings Area

The estimated cost for the Construction Stage 1 remediation for the Goldenville site is \$21,900,000 (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: Goldenville 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 Crown									
3A	21,500	Low Permeability Cover	\$1,290,000	\$430,000	\$350,000	\$2,070,000	\$30,000	\$40,000	\$2,140,000
Total:						\$2,070,000			\$2,140,000
-20%						\$1,660,000			\$1,720,000
+30%						\$2,700,000			\$2,790,000
Construction Stage 1 Non Crown									
1A (Non-Crown)	42,600	Excavate, Consolidate and Cover	\$8,820,000	\$2,910,000	\$2,350,000	\$14,080,000	\$620,000	\$270,000	\$14,970,000
1B (Non-Crown)	17,500	Excavate, Consolidate and Cover	\$2,910,000	\$960,000	\$780,000	\$4,650,000	\$60,000	\$90,000	\$4,800,000
Total:						\$18,730,000			\$19,770,000
-20%						\$14,990,000			\$15,820,000
+30%						\$24,350,000			\$25,710,000

10.0 STAGE 2 TERMS OF REFERENCE

This report has presented the conceptual closure plan for the Goldenville 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 developed 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 Crown and 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.
 - 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 Crown and 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, one for each site.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. Regulatory Approval Package:
 - a. Prepare necessary documents and supporting information for submission to NS ENV for regulatory approval for the proposed plan.
10. 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 (list of authors to be provided for final). 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: Donnie Burke, NS Lands

From: Christine Moore, Intrinsic; Sarah Barabash, EcoMetrix; Ron Nicholson; EcoMetrix; Andy Small, Kholn; Carman Stevens, Wood

Date: November 16 2018

Subject: Task 2 - Background Information Review: Goldenville Mines - Final

CC: Elliot Sigal, Intrinsic

Task 2: Goldenville Mines Background Data Review

The purpose of this memo is to outline data and research which has been conducted at the former Goldenville 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 complex 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 Goldenville Historic Mine district is located in the community of Goldenville, within the county of Guysborough, Nova Scotia. Figure 1-1 provides the location of Goldenville Mines, as well as Montague Mines, which is discussed in a separate memo.

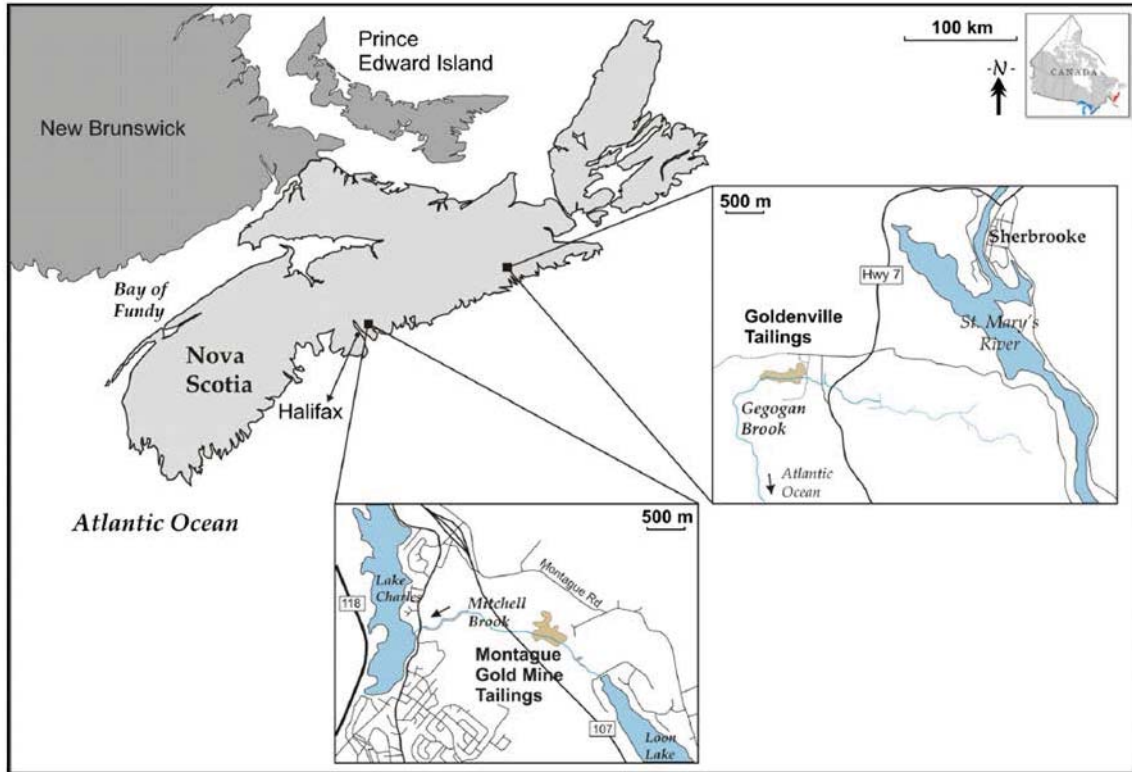


Figure 1-1: Location of Goldenville Mines

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 1862 to 1941. Ore was milled on-site, using a variety of stamp mills with mercury amalgamation. There were as many as 19 different mining companies operating at this site at the same time. The tailings were discharged into nearby Gegogan Brook and are visible on the floodplain for at least 6 km downstream (Wong et al, 1999). This site produced over 540,617 tonnes of crushed ore, and 210,153 ounces of gold (Drage, 2015). Goldenville was the most productive of all of the total 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. Wong et al (1999) estimated that approximately 3 million tons of tailings are present in this area, within a tailings field of approximately 2 km², which has elevated levels of arsenic and mercury, as well as several other metals including lead and thallium. The Goldenville tailings area extends downstream to Geogogan Harbour, which opens to the Atlantic Ocean.

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 Goldenville deposit contains naturally occurring arsenopyrite, an iron arsenic mineral, at elevated concentrations (up into the percent range). These elevated concentrations are related to processing methods undertaken, and disposal of arsenic rich wastes from the mining activities. 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 Goldenville, relative to environmental quality guidelines.

The area at Goldenville Mines now appears as a dry and dusty open area, with tailings distributed throughout Geogogan Brook. Government warning signs are present indicating high levels of arsenic. In 2006, a former truck rally was halted at this site due to concerns related to high levels of arsenic. The racetrack contained well-oxidized tailings, with visible hardpan formation (Parsons et al, 2012).

There has been considerable geochemical characterization of the tailings and surrounding soils present at this site, with arsenic concentrations ranging up to 20 wt. %, and mercury in tailings ranging up to 48 mg/kg in the main tailings (Parsons et al, 2012). The mercury data generally meet the human health and ecological soil quality guidelines established for inorganic mercury, but there are some samples which exceed this guideline within the tailings area (6.6 mg/kg, CCME, 1999; NS Environment, 2014). The arsenic concentrations are elevated over a wide area, relative to the NS Environment (2014) guideline of 31 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 (C. J. McLellan and Associates Inc., 2009). The C. J. McLellan and Associates 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 56 samples were collected (including surface and cored samples). Arsenic concentrations ranged from 12 mg/kg to 9,600 mg/kg in the < 2mm fraction (C. J. McLellan and Associates, 2009). Arsenic in the < 150 μm fraction ranged from 12 mg/kg up to 17,000 mg/kg. Mercury results from within the < 2 mm fraction sized samples ranged from 0.02 mg/kg up to 20 mg/kg. Elevated mercury results were reported in locations of the former Stamp Mill but also included two samples in areas close to residential properties (C.J. McLellan and Associates, 2009). No < 150 μm analysis was conducted for mercury. Groundwater data collected as part of the C.J. McLellan and Associates (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 $\mu\text{g/L}$, but all arsenic data exceeded the drinking water quality guideline of 10 $\mu\text{g/L}$, and ranged up to 96 $\mu\text{g/L}$. The data from Parsons et al (2012) and C. J. McLellan (2009 – also referred to as DNR, 2009) are provided in Figure 1-2.

Goldenville Site Samples - Arsenic, Total Organic Content & Mercury

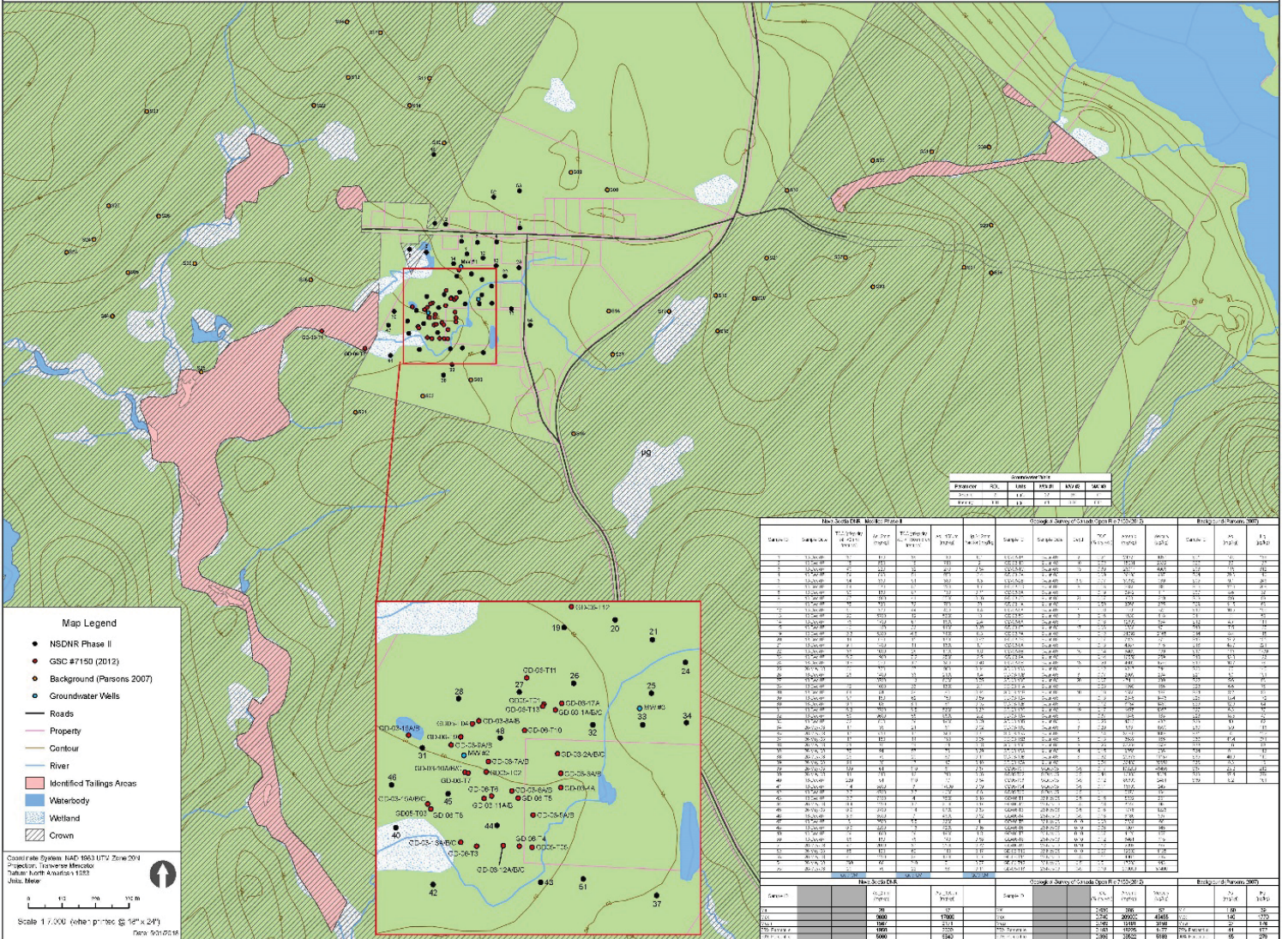


Figure 1-2: Background Arsenic and Mercury Concentrations within the study area



In addition to site-related investigations, Parsons and Little (2015) conducted a study to determine possible background levels of arsenic in the Goldenville 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 39 sampling locations near Goldenville. 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 1.6–140 mg/kg (median 13 mg/kg; median + 2 median absolute deviations 31 mg/kg; 98th percentile 121 mg/kg), with mercury ranging from 39–312 µg/kg (median 114 µg/kg; median + 2 median absolute deviations 233 µg/kg; 98th percentile 302 µg/kg). These data are presented on Figure 1-2 and can be used to characterize background arsenic and mercury concentrations within the study area.

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 and benthic invertebrates in this district have been studied by Wong et al, 1999. Wong et al (1999) investigated surface water concentrations of metals upstream, within the main tailings area and downstream as far as just part Gegogan Lake. Arsenic concentrations ranged from 30 – 50 µg/L upstream (suggesting some natural enrichment, relative to the CCME aquatic life guideline of 5 µg/L, or influence from another upgradient tailings deposit or source), to 50 – 230 µg/L in the mine area. Stream sediments in the tailings field ranged from 920 – 1980 mg/kg and decreased at the tailing field outflow to 230 – 660 mg/kg. Mercury concentrations were non detect in surface waters (<0.05 µg/L) both upstream and within the tailings field. Data for several other metals and metalloids are available in this study. The authors indicate that the tailings field was totally devoid of vegetation, but some grasses and shrubs further down the site along Gegogan Brook were sampled and analyzed for metals. Benthic invertebrate investigations revealed that upstream areas had a total of 7 families, with a total number of individuals of 198, whereas only three families totally 17 individuals were found at the tailing field outflow (Wong et al, 1999). Benthic toxicity tests were conducted using surface sediment (0 - 10 cm) depth from Gegogan Lake (which is considerably downstream). The sediments were determined to be non-toxic to *Tubifex tubifex*, marginally toxic to *Chironomus riparius*, toxic to *Hexagenis sp.* (low survival rate, negative growth) and highly toxic to *Hyaella azteca* (zero survival after 28 days).

No terrestrial wildlife or other aquatic life studies were found in the literature reviewed. Goldenville is a remote site, and hence, much of the research has been focused on geochemistry-related topics.

Other areas of research have included a considerable amount work to characterize the bioaccessibility of arsenic within tailings samples at Goldenville (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 Goldenville tailings ranged from 0.1% to 49 % bio accessible, and showed the widest variation of all sites tested. 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.

An important 3-year NSERC research grant (2009 – 2011; Jamieson, 2012) 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 results of the Ph.D. study (DeSisto, 2014) provide data on tailings solids chemistry, porewater chemistry, shallow groundwater and surface water. These data are directly relevant to the options assessment and selection. The detailed assessment of the solids also provide information on the types of phases associated with arsenic and sulphides. The information is valuable to develop the appropriate reclamation strategies. The data can also be used to classify tailings materials in terms of potential to generate acid as well as to identify materials that were acidic at the time of sampling.

The Hosney thesis is also relevant to the current project and appears to be in progress. The objective of this thesis was to test the effectiveness of 3 geosynthetic clay liners (GCLs) for the gold tailings. Although the field test plots were established at the Montague site, the tailings similarities suggest the results can also apply to the Goldenville site. 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). The effectiveness of the various geosynthetic clay liners (GCL) were tested to address interactions with the geochemical characteristics of the tailings. The results will be reviewed in the context of potential options selection.

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);
 - Oxidic 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 Goldenville 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).

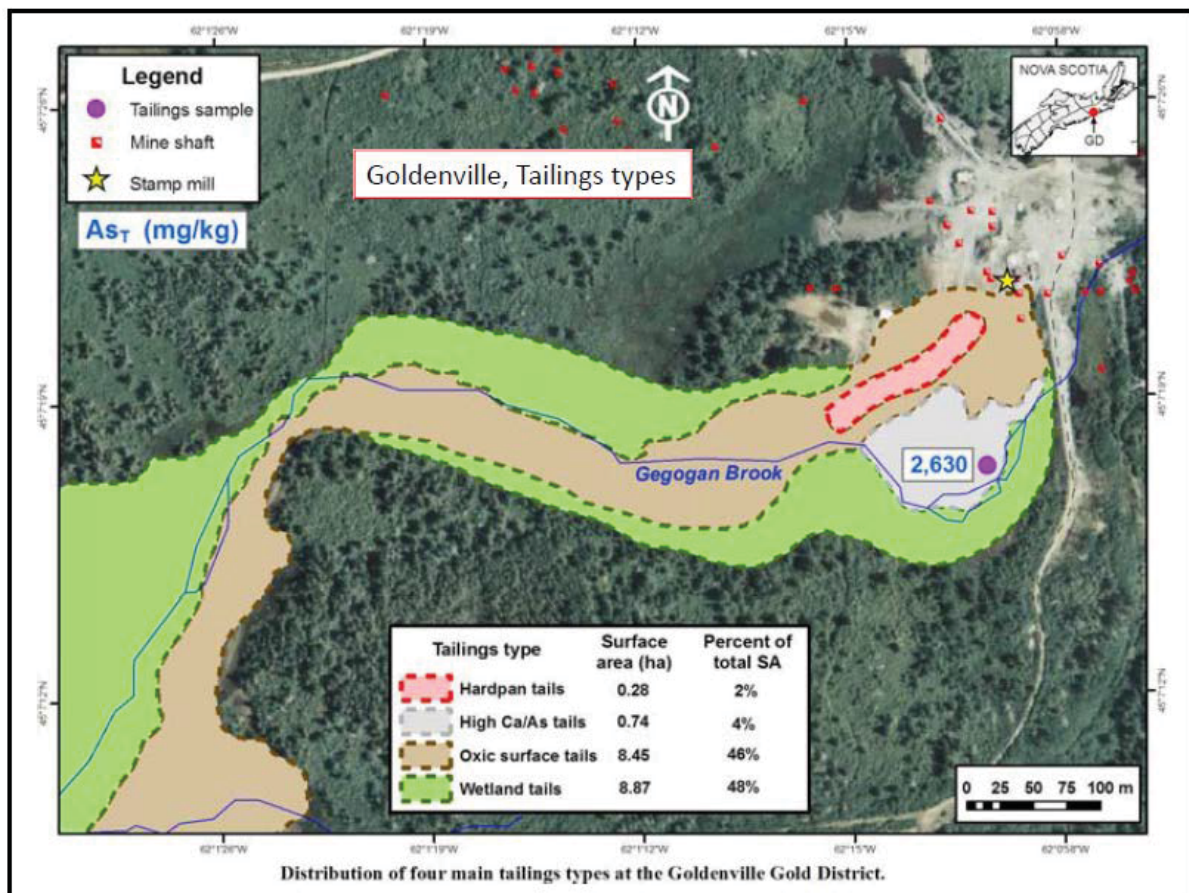


Figure 1-3: Distribution of Tailings Types at Goldenville Mines (from Jamieson, 2012)

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

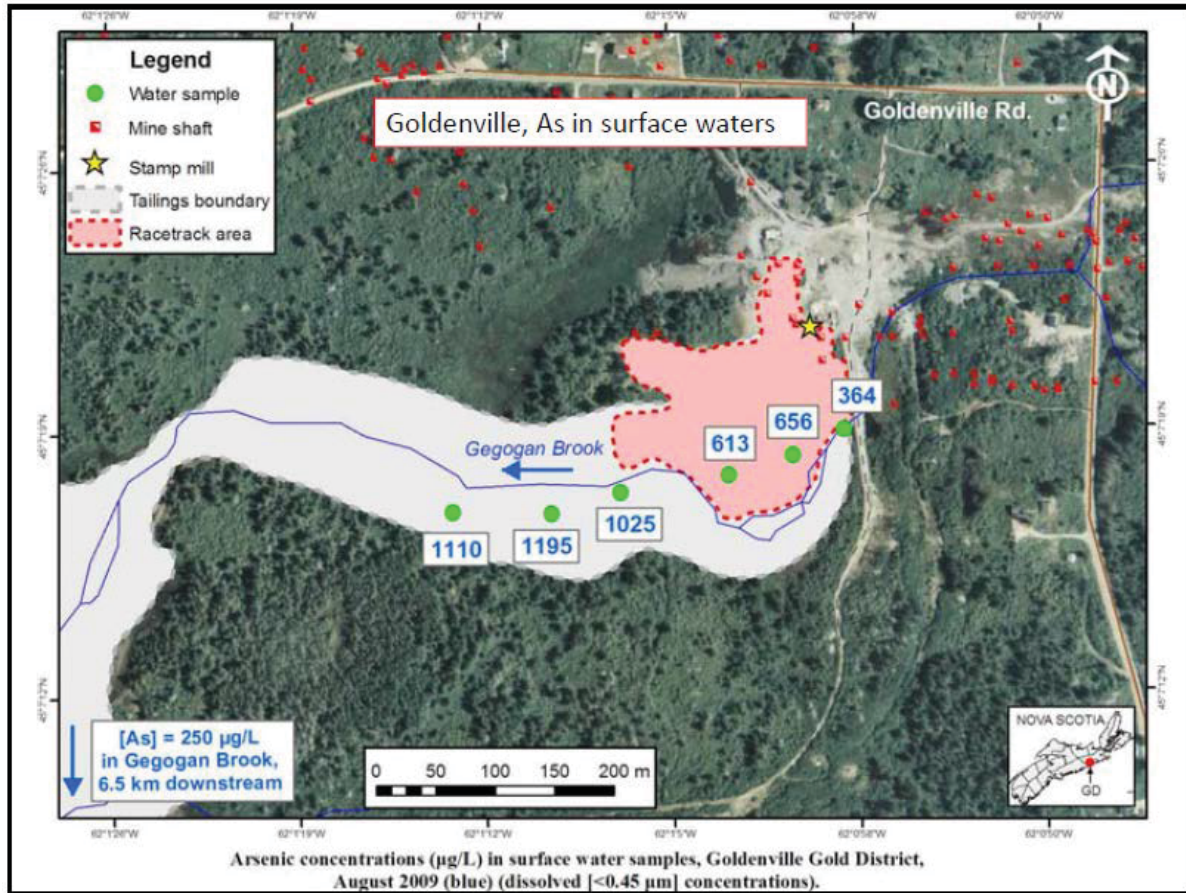


Figure 1-4 Arsenic Concentrations in surface water (Goldenville Gold District) µg/L; August 2009 (Blue) (dissolved < 0.45 µm) (from Jamieson, 2012)

Water table elevations were estimated for measured depths to the water table (see Figure 1-5), and groundwater at Goldenville was concluded to flow parallel with the stream. The water table depths will be relevant to rehabilitation options selection. Similar to tailings in wetlands that are geochemically stable, tailings located permanently below the water table are also expected to remain geochemically stable.

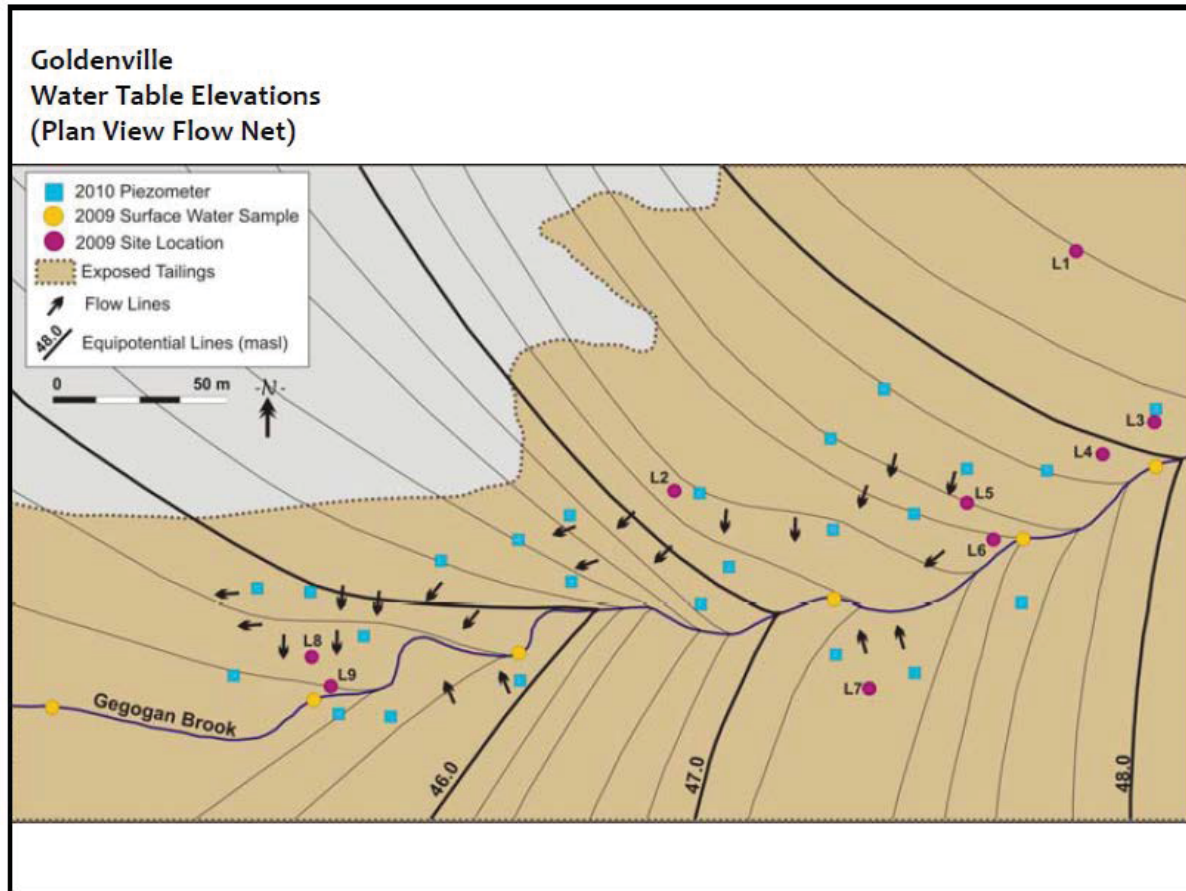


Figure 1-5 Goldenville Water Table Elevations (from Jamieson, 2012).

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 Goldenville (48% - see Figure 1-3). 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.

A list of pertinent studies is provided below for reference.



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Parsons, M. and Little, M. 2015. Establishing geochemical baselines in forest soils for environmental risk assessment in the Montague and Goldenville gold districts, Nova Scotia, Canada. *Atlantic Geology*, 51:364-386.

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Walker, S.R., Parsons, M.B., Jamieson, H. E. and Lanzirrotti, A. 2009. Arsenic mineralogy of near-surface tailings and soils: influences on arsenic mobility and bioaccessibility in the nova scotia gold mining districts. *The Canadian Mineralogist*, 47:533-556.

Wong, H.K. T, and A. Gauthier and J. O. Nriagu. 1999 Dispersion and Toxicity of Metals from Abandoned gold mine tailings at Goldenville, Nova Scotia Canada. *The Science of the Total Environment* 288 (1999) 35-47.



APPENDIX B

Closure Criteria and Screening of Datasets

APPENDIX B
ARSENIC SITE-SPECIFIC WATER QUALITY OBJECTIVE
AND DATA SCREENING AGAINST NS TIER 1 ENVIRONMENTAL QUALITY
GUIDELINES

Table of Contents

B-1. ARSENIC SPECIES SENSITIVITY DISTRIBUTION	3
INTRODUCTION.....	3
B-1.1 Data Considered in the Derivation of the Existing CCME Arsenic Guideline	3
B-1.2 Review of Available Arsenic Toxicity Data.....	4
2.4.1 Identifying Relevant Chronic Toxicity Data.....	4
B-1.3 Arsenic SSD	10
SSD Modelling.....	10
SSD Results	14
2.4.4 Proposed SSWQO for Arsenic.....	16
B-2. SCREENING OF HISTORICAL TAILINGS AND SOILS DATASETS:	20
B-2.1 Screening of 2018 Tailings and Soils Datasets Against Soil Quality Guidelines:	23
B-2.2 Screening of 2018 Tailings and Soils Datasets Against Sediment Quality Guidelines:	26
B-2.3 Screening of 2018 Surface Water Sampling Against Aquatic Life Standards	26

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 (WQGI - 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 WQGI 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) WQGI-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 WQGI-FW Derivation¹

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

<i>Melosira granulata</i>	Growth	14 day EC50	75	NA	Planas and Healey, 1978
<i>Ochromonas vallesiaca</i>	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.

2.4.1 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 as 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							
<i>Daphnia magna</i> (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
<i>Daphnia magna</i>	Sodium arsenite (As III)	7.2 – 8.1	20.8	37 – 45/46 - 49	28 day survival; reproduction LOEC	1320	Lima et al., 1984
<i>Daphnia magna</i>	Arsenite (As III)	7.4	21.5 +/-3	45.5/47.2	28 day (growth and reproduction) NOEC	630	Call et al, 1983
<i>Daphnia magna</i>	Arsenite (As III)	7.4	21.5 +/-3	45.5/47.2	28 day (growth and reproduction) LOEC	1320	Call et al, 1983
<i>Daphnia magna</i>	Sodium arsenate (Na ₂ HAsO ₄)	7.4 – 8.2	NR	42.3 / 45.3	21 day EC16 (16% ↓ in reproduction)	520	Biesinger and Christensen, 1972
<i>Daphnia magna</i>	Arsenic III	6.9 – 7.3	14 - 16	40 – 44/42 - 45	14 day Survival and Reproduction; NOEC	955	Spehar et al, 1980
<i>Daphnia magna</i>	Arsenic V	6.9 – 7.3	14 - 16	40 – 44/42 - 45	14 day Survival and Reproduction; NOEC	932	Spehar et al, 1980
<i>Daphnia magna</i>	Arsenic trioxide (As ₂ O ₃)	Measured but NR	21+1	NR	21 day IC10 (reproduction)	1300	Tisler and Zagorc-Koncan, 2002
<i>Cyclops vernalis</i> ; <i>C. bicuspidatusthomasii</i> (Copepod)	Sodium arsenite (As III)	7.6 - 8.8	15	88 / 139	14 day EC20	320	Borgmann et al., 1980
<i>Hyalalela azteca</i> (Amphipod)	Sodium arsenate (Na ₂ HAsO ₄)	7.23 – 8.83	25	84 / 124	7 day LC50	483	Borgmann et al., 2005
<i>Ceriodaphnia dubia</i> (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
<i>Ceriodaphnia dubia</i>	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
<i>Ceriodaphnia dubia</i>	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
<i>Ceriodaphnia dubia</i>	Sodium arsenite (As III)	8.1 – 8.2	25 +/- 2	97 – 112/100 – 165	7 day MATC (immobilization)	1140	Spehar and Fiandt, 1986

<i>Pteronarcys dorstata</i> (Stonefly)	Arsenic III	6.9 – 7.3	14 - 16	40 – 44/42 - 45	28 day Survival; NOEC	961	Spehar et al, 1980
<i>Pteronarcys dorstata</i>	Arsenic V	6.9 – 7.3	14 - 16	40 – 44/42 - 45	28 day Survival; NOEC	973	Spehar et al, 1980
<i>G. fossarum</i> (Amphipod)	As ³⁺ (sodium arsenite)	8	12 +/- 2	NR	10-day LC50	200	Canivet et al, 2001
<i>G. pseudolimnaeus</i> (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
<i>G. pseudolimnaeus</i> (amphipod)	As V	6.9 – 7.3	14 - 16	40 – 44/42 - 45	14 day LC20	973	Spehar et al, 1980
<i>H. campanulate</i> (snail)	As ³⁺	6.9 – 7.3	14 - 16	40 – 44/42 - 45	28 day LC5 (LOEC)	960	Spehar et al, 1980
<i>H. campanulate</i> (snail)	As V	6.9 – 7.3	14 - 16	40 – 44/42 - 45	28 day LC10 (LOEC)	973	Spehar et al, 1980
<i>S. emarginata</i> (snail)	As ³⁺	6.9 – 7.3	14 - 16	40 – 44/42 - 45	28 day LC0 (NOEC)	960	Spehar et al, 1980
<i>S. emarginata</i> (snail)	As V	6.9 – 7.3	14 - 16	40 – 44/42 - 45	28 day LC10 (LOEC)	973	Spehar et al, 1980
<i>H. sulfurea</i> (Ephemeroptera)	As ³⁺	8	12 +/- 2	NR	10-day LC50	1650	Canivet et al, 2001 ^a
<i>A. aquaticus</i> (Isopod)	As ³⁺	8	12 +/- 2	NR	10-day LC50	2300	Canivet et al, 2001
<i>N. rhenorhodanensis</i> (Amphipod)	As ³⁺	8	12 +/- 2	NR	10-day LC50	3900	Canivet et al, 2001
<i>H. pellucidula</i> (Trichoptera)	As ³⁺	8	12 +/- 2	NR	10-day LC50	2400	Canivet et al, 2001
<i>Physa fontinalis</i> (Snail)	As ³⁺	8	12 +/- 2	NR	10-day LC50	2200	Canivet et al, 2001
<i>G. pulex</i> (amphipod)	Arsenic acid (H ₃ AsO ₄)	NR	10.0	NR	10 day Survival; LC10	376.5	Vellinger et al. 2013 ^a
Aquatic Plant / Algae							
<i>Melosira granulata</i> (Diatom)	Na ₃ AsO ₄ (arsenate)	NR	20	NR	IC20/ LOEC (growth) (8 – 24 days)	75	Planas and Healey, 1978
<i>Ochromonas vallesiaca</i> (Algae)	Na ₃ AsO ₄ (arsenate)	NR	20	NR	IC35/ LOEC (growth) (8 – 24 days)	75	Planas and Healey, 1978
<i>Ankistrodesmus falcatus</i> (Algae)	Disodium arsenate	7	24 +/- 2	-/-	14 day EC50 (growth)	256	Vocke et al, 1980
<i>Scenedesmus obliquus</i> (Green algae)	Disodium arsenate	7	24 +/- 2	-/-	14 day EC50 (growth)	48	Vocke et al, 1980
<i>Scenedesmus subspicatus</i> (Green algae)	Arsenic trioxide (As ₂ O ₃)	NR	21+1	NR	72 hour EC10 (growth – biomass)	9400	Tisler and Zagorc- Koncan, 2002
<i>Chlorella sp.</i> (Algae)	As (III)	7.6	27	NR	72 IC50 growth	25,200	Levy et al, 2005

<i>Chlorella sp.</i> (Algae)	As (V)	7.6	27	NR	LOEC/72 h IC50 growth	1930/ 25400	Levy et al, 2005
<i>Monoraphidium arcuatum</i> (Algae)	As (III)	7.6	27	NR	LOEC/ 72 h IC50 growth	3750/ 14600	Levy et al, 2005
<i>Monoraphidium arcuatum</i> (Algae)	As(V)	7.6	27	NR	LOEC/ 72 h IC50 growth	81/254	Levy et al, 2005
Freshwater Fish and Amphibians							
<i>Pimephales promelas</i> (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
<i>Pimephales promelas</i>	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
<i>Pimephales promelas</i>	Sodium arsenite (As III)	7.4	25 +/- 3	42.4/43.9	32 day (growth) MATC	3330	Spehar and Fiantd, 1986
<i>Pimephales promelas</i>	Arsenite (As III)	7.2	23 +/- 2.7	38/49.2	30 day post fertilization (growth) NOEC	2130	Call et al, 1983
<i>Pimephales promelas</i>	Arsenite (As III)	7.2	23 +/- 2.7	38/49.2	30 day post fertilization (growth) LOEC	4300	Call et al, 1983
<i>Pimephales promelas</i>	Sodium arsenate (As V)	6.7 - 7.8	25	- /45 - 48	30 day early life stage test ; growth; NOEC	530	DeFoe, 1982
<i>Pimephales promelas</i>	Sodium arsenate (As V)	6.7 - 7.8	25	- /45 - 48	30 day early life stage test ; growth; LOEC	1500	DeFoe, 1982
<i>Rana pipiens</i> (Northern leopard frog)	Arsenic V	7.9	22 - 23	170	113-day survival, growth, and metamorphosis NOEC	1000	Chen et al. 2009
<i>Micropterus salmoides</i> (Largemouth bass)	NaAsO ₂	NR	NR	NR	28-day LC1	4601	Birge et al, 1978
<i>Oncorhynchus kisutch</i> (Coho salmon)	As ₂ O ₃	8.2	3.8 – 13.8	88/ 69	6 month LOEC (juvenile migration)	300	Nichols et al, 1984
<i>Oncorhynchus kisutch</i>	As ₂ O ₃	8.2	3.8 – 13.8	88/ 69	6 month NOEC (juvenile survival, growth)	300	Nichols et al, 1984
<i>Oncorhynchus mykiss</i> (Rainbow trout)	NaAsO ₂	NR	NR	NR	28-day LC1	40	Birge et al, 1978
<i>Oncorhynchus mykiss</i>	Arsenic III	6.9 – 7.3	14 - 16	40 – 44/42 - 45	28 day Survival; NOEC	961	Spehar et al, 1980
<i>Oncorhynchus mykiss</i>	Arsenic V	6.9 – 7.3	14 - 16	40 – 44/42 - 45	28 day Survival; NOEC	973	Spehar et al, 1980
<i>Oncorhynchus mykiss</i>	NaAsO ₂	7.4	13 +/- 0.5	-/104	28 day LC1	39.7	Birge, 1978
<i>Oncorhynchus mykiss</i>	NaAsO ₂	7.4	13 +/- 0.5	-/104	28 day LC50	540	Birge, 1978



<i>Oncorhynchus mykiss</i>	Arsenic III (As ₂ O 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
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Notes:

T = temperature; NR = not reported

A Data generated by Canivet et al, 2001 and Vellinger et al, 2013 are included in Table B-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-1.3 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 WQGI - 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 WQGI - FWAL, growth and reproduction endpoints (non-lethal) are preferred. Ideally, the data used to generate the SSD would be regression based (EC_x/LC_x) for no to low toxic effects (*e.g.*, EC_{<25}). The preferred order of endpoints is: EC_x/IC_x 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 WQGI - 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 WQGI Type A approach, based on the data available. The one exception is for aquatic plants. There are few aquatic plant studies available that are relevant and of acceptable quality. The available data report only LOECs, EC50 and EC10 data for growth (Table B-2), but all of these studies are of an acceptable duration to represent chronic exposures. While only LOECs, EC50 and EC10 data were available for use in the SSD modeling, the effects reported occurred at much lower concentration than were associated with no-effects in other studies, with the exception of the EC10 (growth – biomass) for *Scenedesmus subspicatus* of 9400µg/L (Tisler and Zagorc-Koncan, 2002). As such, all of these data with alternative endpoints (non – NOEC studies) were considered appropriate for use in the SSD modeling.

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

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

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

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

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

Species	Chemical	Water Quality Parameters			Test Duration / Life Stage	Chronic Value (µg/L)	Geometric Mean Value (µg/L)	End Point	Reference	Rating
		pH	T (°C)	Alkalinity / Hardness (mg/L; CaCO ₃)						
Aquatic Invertebrates										
<i>Daphnia magna</i>	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
<i>Daphnia magna</i>	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
<i>Ceriodaphnia dubia</i>	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
<i>Ceriodaphnia dubia</i>	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
<i>Cyclops vernalis</i> ; <i>C. bicuspidatus thomasi</i> (Copepod)	Sodium arsenite (As III)	7.6 - 8.8	15	88 / 139	14 day EC20	320		EC20	Borgmann et al., 1980	S
<i>H. campanulate</i> (snail)	As ³⁺	6.9 – 7.3	14 - 16	40 – 44/42 - 45	28 day LC5 (LOEC)	960		LOEC	Spehar et al, 1980	P
<i>S. emarginata</i> (snail)	As ³⁺	6.9 – 7.3	14 - 16	40 – 44/42 - 45	28 day LC0 (NOEC)	960		LOEC	Spehar et al, 1980	P
<i>Pteronarcys dorstata</i>	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										
<i>Ankistrodesmus falcatus</i> (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)						
<i>Chlorella sp.</i> (Algae)	As (V)	7.6	27	NR	LOEC/72 h IC50 growth	1930		LOEC	Levy et al, 2005	S
<i>Monoraphidium Arcuatum</i> (Algae)	As(V)	7.6	27	NR	LOEC/ 72 h IC50 growth	81		LOEC	Levy et al, 2005	S
<i>Scenedesmus obliquus</i> (Green algae)	Disodium arsenate	7	24 +/- 2	-/-	14 day EC50 (growth)	48		EC50	Vocke et al, 1980	P
<i>Scenedesmus subspicatus</i> (Green algae)	Arsenic trioxide (As ₂ O ₃)	NR	21+1	NR	72 hour EC10 (growth – biomass)	9400	9400	EC10	Tisler and Zagorc-Koncan, 2002	P
<i>Melosira granulata</i>	Na ₃ AsO ₄ (arsenate)	NR	20	NR	LOEC (growth) (8 – 24 days)	75	75	LOEC	Planas and Healey, 1978	S
<i>Ochromonas vallesiaca</i>	Na ₃ AsO ₄ (arsenate)	NR	20	NR	LOEC (growth) (8 – 24 days)	75	75	LOEC	Planas and Healey, 1978	S
Freshwater Fish and Amphibians										
<i>Pimephales promelas</i>	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
<i>Pimephales promelas</i>	Arsenite	7.2	23 +/- 2.7	38/49.2	30 day post fertilization (growth) NOEC	2130		NOEC	Call et al, 1983	P
<i>Pimephales promelas</i>	Sodium arsenate	6.7 - 7.8	25	- /45 - 48	30 day early life stage test ; growth; NOEC	530		NOEC	DeFoe, 1982	S
<i>Oncorhynchus kisutch</i>	As ₂ O ₃	8.2	3.8 – 13.8	88/ 69	6 month survival and growth (juvenile): NOEC	300		NOEC	Nichols et al, 1984	P
<i>Oncorhynchus mykiss</i>	Arsenic III	7.8	13.4	282/380	181-d growth NOEC	2480		NOEC	Rankin and Dixon, 1994	P
<i>Rana pipiens</i> (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	<i>Scenedesmus obliquus</i>	48	1.681241237	0.03	1
Plant	<i>Melosira granulata</i>	75	1.875061263	0.08	2
Plant	<i>Ochromonas vallesiaca</i>	75	1.875061263	0.14	3
Plant	<i>M. arcuatum</i>	81	1.908485019	0.19	4
Plant	<i>Ankistrodesmus falcatus</i>	256	2.408239965	0.25	5
Fish	<i>Oncorhynchus kisutch</i>	300	2.477121255	0.31	6
Invertebrate	<i>Cyclops vernalis</i> ; <i>C. bicuspidatus thomasi</i>	320	2.505149978	0.36	7
Invertebrate	<i>Gammarus pulex</i>	376.5	2.575764981	0.42	8
Invertebrate	<i>Daphnia magna</i>	631.5	2.800373355	0.47	9
Invertebrate	<i>H. campanulate</i>	960	2.982271233	0.53	10
Invertebrate	<i>S. emarginata</i>	960	2.982271233	0.58	11
Invertebrate	<i>Pteronarcys dorstata</i>	961	2.982723388	0.64	12
Amphibian_Reptile	<i>rana pipens</i>	1000	3	0.69	13
Invertebrate	<i>Ceriodaphnia dubia</i>	1224.7	3.088029718	0.75	14
Fish	<i>Pimephales promelas</i>	1339.7	3.127007557	0.81	15
Plant	<i>Chlorella</i>	1930	3.285557309	0.86	16
Fish	<i>Oncorhynchus mykiss</i>	2480	3.394451681	0.92	17
Plant	<i>Scenedesmus subspicatus</i>	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 B-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 B-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 B-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).

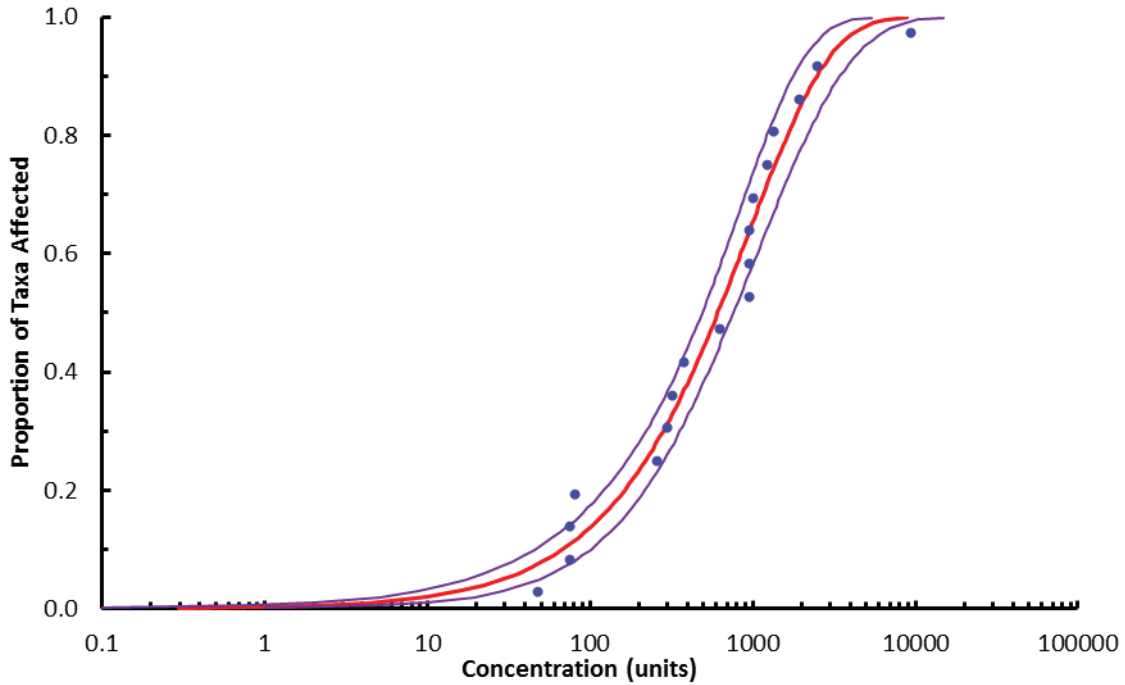


Figure B-1 SSD Based on the Sensitivity of the Freshwater Aquatic Community to Arsenic using the Extreme Value Model

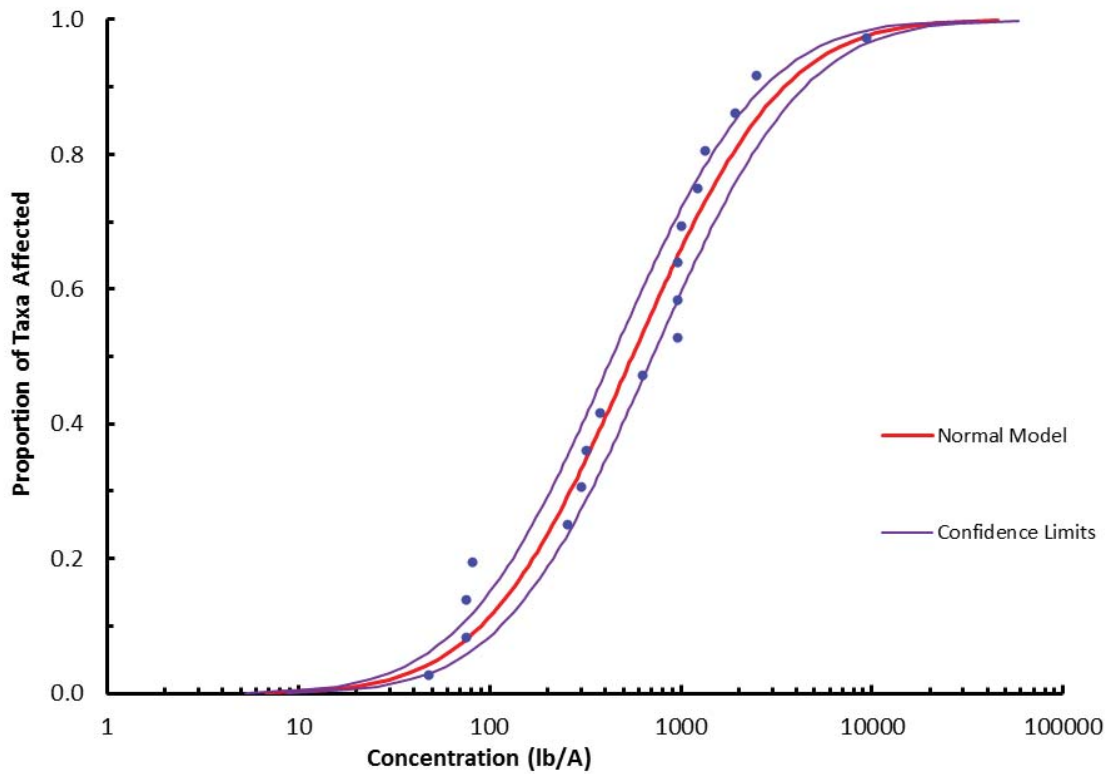


Figure B-2 SSD Based on the Sensitivity of the Freshwater Aquatic Community to Arsenic using the Normal Model

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

2.4.4 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 WQGI-FWAL of 5 µg/L (2001), it is more conservative than the toxicity endpoint upon which the CCME WQGI-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 Goldenville Mines. These studies include the following:

- Parsons et al, 2012 (Sampling conducted between 2003 – 2006)
- CJ McLellan and Associates Inc. (2009)

The Parsons et al (2012) dataset includes a full ICP metals scan, whereas the CJ McLellan and Associates Inc. (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 CJ McLellan and Associates Inc. (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: Goldenville Mines – Tier 1 Human Health Soil Screen, Parsons et al, 2012 Data
- Table B-2: Goldenville Mines – Tier 1 Ecological Soil Screen, Parsons et al, 2012 Data
- Table B-3: Goldenville Mines – Tier 1 Human Health Soil Screen, CJ McLellan and Associates Inc. (2009)
- Table B-4: Goldenville Mines – Tier 1 Ecological Soil Screen, CJ McLellan and Associates Inc. (2009)
- Table B-5: Goldenville Mines – Tier 2 Human Health Soil Screen, Parsons et al, 2012 Data
- Table B-6: Goldenville Mines- Tier 2 Ecological Soil Screen, Parsons et al, 2012 Data
- Table B-7: Goldenville Mines – Tier 2 Human Health Soil Screen, CJ McLellan and Associates Inc. (2009)
- Table B-8: Goldenville Mines – Tier 2 Ecological Soil Screen, CJ McLellan and Associates Inc. (2009)

The screening resulted in the following outcomes for Goldenville 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 Goldenville Mines

Metals/Metalloid	Parsons et al, 2012		C. J. McLellan and Associates, 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; 54 of 54 samples > Tier 1 standard	Yes; 54 of 54 samples > Tier 1 standard	Yes; 53 of 54 samples > Tier 1 standard	Yes; 31 of 54 samples > Tier 2 recreational criteria
Mercury	Yes; 4 of 54 samples > Tier 1 standard of 6.6 mg/kg	Yes; 2 of 54 samples > Tier 2 recreational criteria of 29 mg/kg	Yes; 3 of 54 samples > Tier 1 Standard	No; 0 > Tier 2 criteria
Antimony	Yes; 21 of 54 samples > Tier 1 standard	See analysis below	No other analytes available	No other analytes available
Cobalt	Yes; 2 of 54 samples > Tier 1 standard	See analysis below		
Iron	Yes; 53 of 54 samples > Tier 1 standard	See analysis below		
Lead	Yes; 10 of 54 samples > Tier 1 standard	See analysis below		
Thallium	Yes; 51 of 54 samples > Tier 1 Standard	See analysis below		

Notes:

^a Soil samples from CJ MacLellan and Associates (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 Goldenville Mines

Metals/Metalloid	Parsons et al, 2012			C. J. McLellan and Associates, 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 Soil Contact Standards ^e	>NS Tier 1 Food and Soil Ingestion Criteria ^f	>Tier 2 NS Lands Project Specific Criteria ^g
Arsenic	Yes; 54 of 54 samples > Tier 1 Soil Contact standard	Yes; 54 of 54 samples > Tier 1 Food and Soil Ingestion standard	Yes; 54 of 54 samples > Tier 2 Ecological standard of 31 mg/kg	Yes; 54 of 54 samples > Tier 1 soil contact standard	Yes; 31 of 54 samples > Tier 1 soil and food ingestion criteria	53 of 54 samples > 31 mg/kg arsenic
Mercury	Yes; 3 of 54 samples > Tier 1 Soil Contact standard	No standard available	Yes; 3 of 54 samples > Tier 2 Ecological criteria	Yes; 2 of 54 samples > Tier 1 Soil Contact Standard	No standard available	Yes; 2 of 54 samples > Tier 2 Ecological criteria
Antimony	Yes; 12 of 54 samples > Tier 1 standard	No standard available	See analysis below	No other analytes available		
Cobalt	Yes; 3 of 54 samples > Tier 1 standard	No standard available	See analysis below			
Lead	Yes; 6 of 54 samples > Tier 1 soil contact standard	Yes; 13 of 54 samples > Tier 1 food and soil ingestion standard	See analysis below			
Selenium	Yes; 6 of 54 samples > Tier 1 soil contact standard	No; 5 of 54 samples > Tier 1 soil and food ingestion standard				
Thallium	Yes; 3 of 54 samples > Tier 1 soil contact standard	No; 3 of 54 samples > Tier 1 soil and food ingestion standard				

Notes:

^a Soil samples from CJ MacLellan and Associates (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-evaluated 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 (53 of 54 samples), followed by thallium (51 of 54 samples). Other elements were less frequent in terms of exceedances (antimony; 21 of 54 samples; cobalt 2 of 54 samples; lead 10 of 54 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, thallium, 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, yttrium 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.

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

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

The screening resulted in the following outcomes for the 2018 dataset for Goldenville 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 Inorganics Exceeding NS Tier 1 Soil Standards and Project-Specific Tier 2 Human Health Criteria from 2018 Sampling Program on Goldenville 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; 28 of 30 samples > Tier 2 recreational criteria
Mercury	Yes; 5 of 30 samples > Tier 1 standard	No; all samples < Tier 2 recreational criteria
Aluminum	Yes; 1 of 30 samples > Tier 1 standard	See analysis below
Antimony	Yes; 8 of 30 samples > Tier 1 standard	See analysis below
Cobalt	Yes; 2 of 30 samples > Tier 1 standard	See analysis below
Iron	Yes; 30 of 30 samples > Tier 1 standard	See analysis below
Lead	Yes; 3 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 Goldenville 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; 30 of 30 samples > Tier 2 Ecological standard of 139 mg/kg
Mercury	Yes; 4 of 30 samples > Tier 1 soil contact standard	No standard available	Yes; 4 of 30 samples > Tier 2 Ecological criteria
Antimony	Yes; 2 of 30 samples > Tier 1 soil contact standard	No standard available	See analysis below
Chromium	Yes; 12 of 30 samples > Tier 1 soil contact standard	No standard available	See analysis below
Cobalt	Yes; 2 of 30 samples > Tier 1 soil contact standard	No standard available	See analysis below
Copper	Yes; 3 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; 2 of 30 samples > Tier 1 soil contact standard	Yes; 9 of 30 samples > Tier 1 food and soil ingestion standard	See analysis below
Nickel	Yes; 2 of 30 samples > Tier 1 soil contact standard	No; 0 of 30 samples > Tier 1 soil and food	See analysis below

		ingestion standard	
Selenium	Yes; 3 of 30 samples > Tier 1 soil contact standard	No; 0 of 30 samples > Tier 1 soil and food ingestion standard	See analysis below
Zinc	Yes; 1 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 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 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 (30 of 30 samples), followed by antimony (8 of 30 samples). Other elements were less frequent in terms of exceedances (Aluminium; 1 of 30 samples; cobalt 2 of 30 samples; and, lead 3 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 aluminum, antimony, cobalt, 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 yttrium. 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; 24 of 24 samples > Tier 1 standard
Mercury	Yes; 19 of 24 samples > Tier 1 standard
Chromium	Yes; 2 of 24 samples > Tier 1 standard
Iron	Yes; 2 of 24 samples > Tier 1 standard
Lead	Yes; 3 of 24 samples > Tier 1 standard
Manganese	Yes; 2 of 24 samples > Tier 1 standard
Nickel	Yes; 1 of 24 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 and with 19 of 24 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 chromium (2 of 24 samples), iron (2 of 24 samples), lead (3 of 24 samples), manganese (2 of 24 samples), and nickel (1 of 24 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

Screening of 2018 Datasets

All data collected in 2018 at Goldenville Mines were evaluated relative to the NS Tier 1 standards for soils, surface water and groundwater. 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).

Surface Water and Shallow Piezometer Data:

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 range was limited for Goldenville area, and sample G-SW-13 was used to represent background, as it was upgradient of the main tailings area);
- 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 Goldenville main tailings area data (samples across the main wetland site, not including upgradient or remote tailings sites), 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 Goldenville Mines, Table 1 provides a summary of outcomes of Step 1 and 2, with the detailed screening being provided in Table B-14 and B-15 (attachment):

Table 1: Total Metals Surface Water or Shallow Piezometer Samples Exceeding NS Tier 1, Adjusted NS Tier 1 and Maximum Background Metals Concentrations – Goldenville Mines 2018 Data

Chemical of Potential Concern	Along Geogogan Brook to Geogogan Lake – Samples Exceeding NS Tier 1; Adjusted NS Tier 1; and Background (N=10)	NE Zone – Samples Exceeding NS Tier 1; Adjusted NS Tier 1; and Background (N=3)	NW Zone – Samples Exceeding NS Tier 1; Adjusted NS Tier 1; and Background (N=3)
Mercury	G-Pz3; G-SW16; G-SW14	G-SW5; G-SW6; G-SW17	G-SW9
Aluminium	G-Pz4; G-Pz1; G-Pz2; G-Pz3; G-SW16; G-SW15; G-SW12; G-SW11	G-SW5	G-SW6; G-SW7; G-SW9; G-SW10
Arsenic	G-Pz1; G-Pz2; G-Pz3; G-SW16; G-SW14; G-SW15	G-SW5; G-SW6; G-SW17	G-SW9
Cadmium	G-Pz3	None	None
Copper	G-Pz3; G-SW14	G-SW5	G-SW6
Iron	G-Pz4; G-Pz1; G-Pz2; G-Pz3; G-SW16; G-SW12	G-SW5	G-SW6; G-SW9
Lead	G-Pz3; G-SW16	None	G-SW6; G-SW9
Manganese	G-Pz3	None	None
Selenium	G-Pz3	None	None
Silver	G-Pz3	None	None
Vanadium	G-Pz3	None	None
Zinc	G-Pz3	None	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 Goldenville Mines are presented in Table 2 and 3.

Table 2 Evaluation of Total and Dissolved Metals Data, relative to Total and Dissolved Metals Guidelines for Tailings Located Along Geogogan Brook to Geogogan Lake – Goldenville Mine (2018 dataset)

Chemical of Potential Concern	Total Metals Adjusted Guideline	Dissolved Metals Guideline	Along Geogogan Brook to Geogogan Lake (N=10) mg/L																	
			G-Pz4 Total	G-Pz4 Dissolved	G-Pz1 Total	G-Pz1 Dissolved	G-Pz2 Total	G-Pz2 Dissolved	G-Pz3 Total	G-Pz3 Dissolved	G-SW16 Total	G-SW16 Dissolved	G-SW14 Total	G-SW14 Dissolved	G-SW15 Total	G-SW15 Dissolved	G-SW12 Total	G-SW12 Dissolved	G-SW11 Total	G-SW11 Dissolved
Mercury	0.000026	NGA	NA	NA	NA	NA	NA	NA	0.00039	0.00014	0.000031	0.0000238	0.000036	0.0000177	NA	NA	NA	NA	NA	NA
Aluminium	0.1/0.005/0.005/ 0.1/0.1/0.1/0.1/0.005 ^a	NGA	0.289	0.24	0.253	0.237	0.3	0.255	1.4	0.0176	0.318	0.202	NA	NA	0.199	0.186	0.226	0.216	0.282	0.254
Arsenic	0.005/0.031 ^b	0.150	NA	NA	0.0721	0.0673	0.0999	0.0897	18.4	1.51	0.262	0.0906	0.358	0.225	0.138	0.124	NA	NA	NA	NA
Cadmium	0.00012 ^a	0.00043 ^c	NA	NA	NA	NA	NA	NA	0.0003	0.000033	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	0.002/0.002 ^a	0.00017 ^d /0.00037 ^e	NA	NA	NA	NA	NA	NA	0.0125	0.00117	NA	NA	0.00273	0.0117	NA	NA	NA	NA	NA	NA
Iron	0.3	0.35 (BC – short term)	0.518	0.447	0.7	0.647	1.04	0.953	80	10.9	0.866	0.301	NA	NA	NA	NA	0.484	0.427	NA	NA
Lead	0.00211/0.001 ^a	NGA ^f	NA	NA	NA	NA	NA	NA	0.0132	0.00008	0.00153	0.000342	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	0.82	NGA	NA	NA	NA	NA	NA	NA	2.01	1.34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	0.001	NGA	NA	NA	NA	NA	NA	NA	0.002	<0.0002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	0.0001	NGA	NA	NA	NA	NA	NA	NA	0.0005	<0.000025	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	0.006	NGA	NA	NA	NA	NA	NA	NA	0.01	<0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	0.03	0.010 ^g	NA	NA	NA	NA	NA	NA	0.05	0.00871	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 Tier 2 site specific arsenic guideline (SSD)

^c Cadmium dissolved criterion based on hardness of 50 mg/L- sample specific hardness values for G-Pz3 is 68.8 mg/L CaCO₃ (USEPA, 2016)

^d Copper dissolved criterion for G-Pz3 based on hardness of 68.8 mg/L CaCO₃, pH of 6.59, temperature of 0.8 C, and assumed DOC of 0.3 mg/L.

^e Copper dissolved criterion for G-SW14 based on hardness of 9.42 mg/L CaCO₃, pH of 7.04, temperature of 1.1 C, and assumed DOC of 0.3 mg/L.

^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 0.5 mg/L; and hardness of 50 mg/L, with pH between 6.5 and 7.0.

Table 3 Evaluation of Total and Dissolved Metals Data, relative to Total and Dissolved Metals Guidelines for Tailings Located in the NE Zone and the NW Zone

Chemical of Potential Concern	Total Metals Adjusted Guideline	Dissolved Metals Guideline	NE Zone (N=3) mg/L						NW Zone (N=5) mg/L							
			G-SW5 Total	G-SW5 Dissolved	G-SW6 NE Total	G-SW6 NE Dissolved	G-SW17 Total	G-SW17 Dissolved	G-SW6 NW Total	G-SW6 NW Dissolved	G-SW7 Total	G-SW7 Dissolved	G-SW9 Total	G-SW9 Dissolved	G-SW10 Total	G-SW10 Dissolved
Mercury	0.000026	NGA	0.000045	0.0000453	0.000028	0.0000216	0.00003	0.0000248	NA	NA	NA	NA	0.000049	0.0000081	NA	NA
Aluminium	0.005/0.1/0.005/ 0.1/0.1 ^a	NGA	0.213	0.2	NA	NA	NA	NA	0.196	0.192	0.341	0.345	0.287	0.083	0.207	0.23
Arsenic	0.005	0.150	0.13	0.104	0.0882	0.0837	0.124	0.103	NA	NA	NA	NA	0.0883	0.00719	NA	NA
Copper	0.002/0.002 ^a	0.00004 ^c / 0.00013 ^d	0.00269	0.00258	NA	NA	NA	NA	0.00573	0.00197	NA	NA	NA	NA	NA	NA
Iron	0.3	0.35 (BC – short term)	0.515	0.299	NA	NA	NA	NA	1.13	1.06	NA	NA	2.78	0.124	NA	NA
Lead	0.001/0.001 ^a	NGA ^e	NA	NA	NA	NA	NA	NA	0.00186	0.000852	NA	NA	0.00191	0.0000762	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 CaCO₃ (USEPA, 2016)

^c Copper dissolved criterion for G-SW5 based on hardness of 11.6 mg/L CaCO₃, pH of 6.04, temperature of 2.5 C, and assumed DOC of 0.3 mg/L.

^d Copper dissolved criterion for G-SW6 NW based on hardness of 30.4 mg/L CaCO₃, pH of 6.51, temperature of 5.2 C, and assumed DOC of 0.3 mg/L.

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

Based on the outcomes of Table 2, the following can be stated:

Main Tailings Area and Geogogan Brook to Geogogan Lake:

- From Table 1, mercury, aluminum, arsenic, cadmium, copper, iron, lead, manganese, selenium, silver, vanadium and zinc are elevated in the main tailings area, or downstream of the main tailings area, in at least 1 sample, relative to FWAL guidelines (Total metals), and therefore merit further discussion.
- No dissolved guideline is available for mercury, aluminum, lead, manganese, selenium, silver, or vanadium. Selenium, silver and vanadium are non-detect in the dissolved dataset of G-Pz3 (the only sample where total values were elevated, relative to guidelines), and unlikely to pose a risk to aquatic life. Therefore, these elements were not considered to require any further assessment. Mercury is elevated in 3 samples (G-Pz3; G-SW16 and G-SW14). There is little difference between the total mercury and dissolved mercury results in Table 2 (1.3 – 3 fold difference). Mercury will be assessed further, as it is associated with historic mining activities, and due to its potential to biomagnify in wetland settings. Aluminum total and dissolved concentrations are fairly similar on most samples, with the exception of G-Pz3, wherein there is an 80-fold difference, suggesting suspended particulate matter within the sample. The waters in this area are soft, with total hardness ranging from 4.8 to 72 mg/L (caCO₃). Additional understanding of Dissolved Organic Carbon (DOC) levels in the receiving environment would assist in better understanding the toxicity potential, as DOC is a major modifying factor for aluminium toxicity and could be elevated in wetland receiving environments. In addition, aluminium is frequently naturally enriched in Nova Scotia waters. The concentrations reported are within the natural range (200 – 300 µg/L is commonly encountered) with the exception of G-Pz3, which is noticeably elevated in the total metals sample (1.4 mg/L). It is plausible that aluminum could be within natural occurring ranges, and/or toxicity associated with this element could be modified by naturally occurring DOC. Further data collection in Stage 2 would assist in confirming this. Lead was only elevated in two samples in the main tailings areas; G-Pz3 and G-SW16, relative to total metals guidelines. It is markedly lower in the dissolved data for G-Pz3 (165-fold lower than the total lead), but only 4-fold lower in the dissolved sample for G-CW16. Since it is not elevated in any other samples, lead is not a widespread issue, and unlikely to be a toxicity driver in the main tailings area. Similar comments can be made for manganese, which is only elevated in a single sample (G-Pz3), hence, manganese was not considered further.
- Zinc and cadmium are elevated in only a single sample (G-Pz3), and the dissolved concentrations are lower than the CCME (2018) dissolved zinc guideline, and the US EPA dissolved cadmium guideline. Hence, zinc and cadmium were not considered further.
- Copper is elevated in 2 samples – G-Pz3 and G-SW14. As mentioned previously, DOC is currently not known in this area, and is a major modifying factor for copper toxicity. The Biotic Ligand model (BLM) was run to obtain a dissolved guideline, but a low DOC content was assumed (0.3 mg/L), in order to ensure a conservative outcome. While both dissolved samples exceed the calculated dissolved guideline, suggesting toxicity potential in these areas, copper is considered unlikely to be a driver in terms of toxicity, as much of the main tailings area did not exceed the total guideline. Further data collection with respect to DOC will assist in confirming this in Stage 2.
- As expected, arsenic is elevated in a number of samples in the total metals results, even following consideration of the Tier 2 total metals guideline. Many samples are less than the dissolved

metals guideline from the US EPA (150 µg/L), with the exception of G-Pz3, and G-SW14. Arsenic is considered a primary COPC. Iron is also elevated and is above the BC MOE dissolved iron guideline for acute exposures. As per aluminium, iron is frequently naturally elevated in Nova Scotia waters, and hence, iron may be within naturally occurring ranges in several samples. Further data collection for background in Stage 2 will assist in clarifying toxicity potential.

- Based on the outcomes of the screening for the main tailings area in Goldenville, the primary COPCs are considered to be arsenic and mercury, with additional consideration of iron and aluminium, albeit both of these may be within naturally occurring ranges in several areas that were sampled. Other inorganic compounds are unlikely to be drivers in toxicity, particularly considering the general lack of exceedances over total metal guidelines across the site.
- From a spatial perspective, arsenic concentrations are most elevated in G-Pz3 (downstream of exposed tailings), as well as G-SW-14; 15 and 16 (Geogogan Brook, downstream of main tailings). Concentrations reduce further down Geogogan Brook, where the brook meets Geogogan Lake, where they remain elevated over the CCME guideline of 5 µg/L, but are less than the Tier 2 guideline of 30 µg/L at the outfall of Geogogan Lake (near the highway; sample G-SW11; 12.8 µg/L), but are slightly above the guideline in the lower reach of the brook (G-SW-13; 38.2 µg/L), and the central lake sample (G-SW-12; 36.4 µg/L). Mercury is below detection in the total metals scan (and FWAL guidelines) in G-SW-15, and all samples further downstream in Geogogan Brook and Lake. The only samples above FWAL guidelines are located close to the main tailings area, in G-Pz3, as well as G-SW-14 and 16.
- Site specific risk assessment of the main tailings area, and areas downstream, would assist in confirming areas requiring remediation, as some areas may have limited ecological impacts.

From Table 3, the following can be stated:

North East Tailings Zone:

- From Table 1, mercury, aluminium, arsenic, copper, and iron were elevated in this area, above total metals guidelines, and therefore merit further discussion.
- Mercury is elevated in all 3 samples, relative to the FWAL guideline for this element. The dissolved concentrations are similar to the total metals data. Hence, mercury is considered further, due to its potential to biomagnify in wetland settings.
- Aluminium is elevated relative to the single background sample in one sample but could be well within the typical background range for Nova Scotia waters, if more data were available. Further sampling for background data, as well as toxicity modifying factors (DOC), in Stage 2, will assist in clarifying whether aluminium concentrations in the NE tailings area could be of concern.
- Arsenic is elevated in the total metals scan for all three samples, relative to the CCME guideline (5 µg/L), and the Tier 2 guideline of 30 µg/L. It is not elevated in any sample, relative to the US EPA dissolved guideline of 150 µg/L. Arsenic will be considered further, due to its association with the historic mining activities.
- Copper and iron are elevated in only a single sample (G-SW5). Dissolved concentrations of these elements are similar to the total concentrations. Copper exceeds a site specific guideline developed using the BLM, but DOC data are not available and was assumed to be 0.3 mg/L, and hence, this guideline is likely conservative. Further evaluation in Stage 2 of DOC, and other modifying factors would be helpful to clarify toxicity potential. Iron may be present in naturally occurring ranges, and hence, is unlikely to be a toxicity driver.

- Further data gathering and site specific risk assessment of this area may indicate limited need for remediation.

North West Tailings Zone:

- From Table 1, mercury, aluminium, arsenic, copper, iron and lead were elevated in this area, above total metals guidelines, and therefore merit further discussion.
- Most exceedances occurred in G-SW9, which is downgradient from a large tailings deposit. The dissolved data in this sample is approximately an order of magnitude lower than the total metals data, suggesting some influence of particulate matter. Other samples in this area have similar results between the total and dissolved datasets (see Table 3).
- For aluminium and iron, as discussed previously, the measured concentrations could be within typical background ranges for the area, and additional background data would be helpful in further understanding the measured concentrations. Iron concentrations could have more of a tailings influence than aluminium, based on the available data (see Table 3).
- A site specific copper guideline was developed using the BLM, but DOC was assumed to be low at 0.3 mg/L. Copper is only elevated in G-SW6 (northwest zone of the tailings pad), and hence exceedances are not widespread. Based on this, copper is unlikely to be a driver in terms of toxicity in the area. The dissolved lead data are less than 1 µg/L (G-SW6) and less than 0.08 µg/L (G-SW9) and hence, unlikely to be toxicity drivers in this area (see Table 3). Further understanding of modifying factors, such as DOC, would assist in refining the understanding of potential risk for both copper and lead.
- Arsenic is only elevated in a single sample (G-SW9; 0.0883 mg/L Total metals; 0.00719 mg/L dissolved metals; see Table 3). This sample is also elevated relative to the Tier 2 guideline of 0.030 mg/L (Total metals), but is not elevated relative to the US EPA dissolved guideline of 0.150 mg/L. Similarly, mercury is only elevated in G-SW9, relative to the FWAL guideline.
- Further data gathering and site specific risk assessment of this area may indicate limited need for remediation.

Summary information for the areas samples is provided in Table 4. For areas distant from the main tailings (such as downstream areas of the main tailings, and the North East and North west tailings areas), additional samples, and risk assessment would assist in confirming need for, and focus of, remediation or reclamation.

Table 4: Primary Chemicals of Potential Concern, Based on Surface Water Data (2018) - Goldenville

COPCs	Main Tailings	North East Tailings	North West Tailings
Primary COPC	As; Hg;	As; Hg	As; Hg
Secondary COPC	Fe; Al (?)	Al; Fe; Cu (?)	Al; Fe; Cu; Pb (?)
Data Gaps	Background data (all); modifying factors (DOC), and additional sampling in remote tailings areas		

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

Metal	Tier 1 Criteria	Sampling Locations																		
		T1	T1	T1	T2	T2	T2	T3	T3	T4	T5	T5	T6	T6	T7	T7	T8	T8	T9	T9
Aluminum ^a	15400	5300	11000	6500	4400	4200	5600	5700	6900	5300	5600	9900	9100	6600	5300	5800	11300	5800	6600	13400
Antimony	7.5	19.13	10.76	20.14	34.52	29.54	1.33	2.64	0.85	4.12	0.77	2.55	8.54	5.88	23.72	3.24	3.76	6.17	9.7	2.9
Arsenic	31	21527.4	15031.2	23917	29195.9	39381.6	6630.2	2942.4	858.4	3765.5	795.5	1630.3	12599.6	6238.7	21298.9	7423.9	4086.8	6469.4	10557.6	4301.7
Barium	10000	18.2	37.2	45.6	13	14.7	12	19.5	17.3	16.3	13.2	24.2	21.1	13.3	15.4	15.8	22	13.8	14.6	36.7
Beryllium	38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bismuth	NA	1.16	1.27	2.18	2.39	2.08	0.27	0.31	0.25	0.26	0.13	0.37	0.62	0.31	1.9	0.4	0.54	0.97	0.72	0.76
Boron	4300	< 1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1	1
Cadmium	14	0.08	0.12	0.09	0.09	0.15	0.08	0.1	0.15	0.09	0.05	0.26	0.28	0.04	0.1	0.02	0.17	0.17	0.08	0.41
Caesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium ^a	NA	700	800	1200	700	200	700	1300	2000	1000	4000	6100	2000	1100	700	900	1600	900	1100	1300
Cerium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	220	8	16.4	11.5	7.8	6.8	8.8	8.3	10.3	6.8	8.3	14.2	11.2	8.5	8.6	7.8	14.2	8.4	9.2	18.8
Cobalt	22	3.4	4.4	7.6	1.6	1.6	1.8	4.9	7.5	2.5	4	12.3	7.1	3.2	3.9	1.5	25.7	17.9	5.1	16.8
Copper	1100	12.74	12.67	14.86	6.82	15.18	4.02	17.38	29.8	10.18	8.88	34.52	16.32	8.9	10.56	4.33	37.43	14.52	13.85	6.46
Gallium	NA	1.7	3.5	2.2	1.6	1.5	1.7	1.7	2.1	1.6	1.8	3	2.8	1.9	2	3.2	1.7	2	4.1	NA
Germanium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gold	NA	0.7473	0.3873	1.1554	0.5184	0.7439	0.0151	0.1818	0.0195	0.1157	0.0085	0.0844	0.3439	0.8134	0.3148	0.1344	0.2307	1.9764	0.8034	0.2587
Hafnium	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
Iron ^a	11000	31200	36700	41200	37900	42600	22900	16600	17600	20600	33000	22500	34000	23800	31600	25500	27900	19100	25200	29900
Lanthium	NA	7.4	16.3	16.3	5.8	5.6	6.2	12	14.7	9.4	11.4	24.9	22.6	12.5	7.6	3.6	25.6	20.6	9.8	18.2
Lead	140	94.5	96.99	201.29	173.82	176.85	28.02	28.9	19.15	28.11	11.07	27.95	33.7	25.81	95.09	22.87	42.01	59	42.97	61.16
Lithium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium ^a	NA	3900	7700	4700	3400	3300	4000	4200	5000	3900	4100	6900	7000	4800	3900	4200	7500	4500	4700	8800
Manganese	NA	184	346	286	112	101	114	275	487	145	301	474	395	191	157	128	596	424	212	462
Mercury	6.6	1.637	2.332	4.008	0.897	0.088	0.111	0.219	0.325	0.052	0.418	0.354	0.171	2.165	0.271	0.715	0.709	0.259	1.579	NA
Molybdenum	110	0.87	2.53	2	1.09	1.08	0.66	0.51	0.33	0.38	0.62	0.8	0.44	0.4	0.9	2.17	0.54	0.26	0.47	0.74
Nickel	330	8.3	12.5	10.7	9.1	9.3	9	12.4	20.4	8.1	12.2	42.4	16.2	10.8	10	6.6	28.5	10.7	11.3	15.7
Niobium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus ^a	NA	470	480	740	550	390	400	510	520	420	360	710	550	580	470	680	630	430	530	620
Potassium ^a	NA	900	1700	1000	800	700	900	800	1400	700	1100	1900	1500	1100	1000	1200	1400	1000	1000	1900
Rhenium	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
Scandium	NA	0.6	1.1	0.7	0.5	0.5	0.4	0.5	0.7	0.5	0.5	1	0.9	0.6	0.6	0.6	1.1	0.6	0.6	1.3
Selenium	80	0.3	0.3	0.5	0.6	0.6	0.1	0.1	<0.1	0.1	<0.1	0.1	0.3	0.1	0.4	0.1	0.1	0.2	0.2	0.1
Silver	77	0.356	0.408	0.562	0.591	0.53	0.068	0.073	0.072	0.074	0.021	0.109	0.18	0.103	0.43	0.11	0.182	0.409	0.202	0.19
Sodium ^a	NA	20	20	20	10	10	10	20	10	20	10	20	20	10	10	10	30	10	20	30
Strontium	9400	11.2	12.8	15	8.7	2.6	8.2	16.8	23.5	11.9	28.2	43.9	26.4	15.1	9.9	16.2	23.1	11.5	14.6	17
Sulfur ^a	NA	1000	300	500	3400	3200	400	<100	200	300	100	2000	100	400	2100	1000	<100	100	900	200
Tantalum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tellurium	NA	0.45	0.36	1.35	0.87	0.82	0.12	0.07	0.05	0.09	0.02	0.06	0.25	0.14	0.58	0.1	0.11	0.17	0.21	0.13
Thorium	NA	0.07	0.1	0.08	0.08	0.09	0.05	0.06	0.07	0.05	0.05	0.12	0.11	0.07	0.07	0.07	0.09	0.07	0.07	0.1
Thallium	1	3.1	5.7	5.8	3.9	3.7	2.5	3.6	3.3	2.8	2.8	5.6	6.8	4.3	3.9	2.7	6.5	4.7	7	8.9
Tin	9400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Titanium ^a	NA	210	250	230	210	220	200	210	250	200	200	330	300	230	210	240	260	210	220	240
Tungsten	NA	3.4	1.7	3.5	9.2	12.7	0.3	1	0.4	0.4	0.1	0.9	1.7	0.9	4.6	0.9	1.4	0.8	2.3	1.8
Uranium	23	0.2	0.6	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.5	0.4	0.3	0.3	0.2	0.5	0.4	0.8	0.7
Vanadium	39	6	12	9	6	5	6	6	6	4	6	11	8	5	5	6	11	5	7	13
Yttrium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	5600	26.2	48.6	31	25.3	22.8	31.5	44.1	50.6	33.1	33.9	67.6	48.9	36.2	27.3	38.2	67.6	31.9	31.7	58.4
Zirconium	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) Goldenville Mines – Tier 1 Human Health Soil Screen, Parsons et al. 2012 Data (mg/kg dw)

Metal	Tier 1 Criteria	Sampling Locations																
		T10	T10	T10	T11	T11	T12	T12	T12	T13	T13	T13	T15	T15	T15	T16	T17	
Aluminum ^a	15400	5900	6600	4500	6400	6600	13600	12900	15200	6700	11800	14900	3100	600	700	7200	400	200
Antimony	7.5	7.33	2.34	28.49	1.02	0.88	2.71	1.69	0.94	1.56	2.63	1.11	65	6.56	597.39	7.05	359.19	260.98
Arsenic	31	9217.1	2609.1	47414.2	1089.9	1529.9	2846.3	3134	1475.3	1845.9	4712.4	685.5	39661.5	3689.2	33264.4	8256.1	29677.8	30429.7
Barium	10000	12.8	16.7	18	16.3	17.7	33.7	40.9	45.4	16.9	37.7	49	11.2	3.9	16	17.5	6.8	13.7
Beryllium	38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bismuth	NA	0.49	0.33	0.85	0.2	0.21	0.43	0.46	0.37	0.18	0.43	0.36	1.27	0.25	21.69	0.53	15.05	21.54
Boron	4300	< 1	< 1	< 1	< 1	< 1	< 1	1	1	< 1	< 1	1	< 1	< 1	< 1	1	< 1	< 1
Cadmium	14	0.06	0.09	0.21	0.13	0.09	0.11	0.15	0.1	0.1	0.23	0.11	0.04	<0.01	0.12	0.12	0.16	0.29
Caesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium ^a	NA	700	900	100	4900	2800	9400	3200	7400	6800	7400	7400	300	<100	100	1100	<100	<100
Cerium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	220	7.1	8.9	11.7	9.5	10.1	16.6	17.4	21.2	8	15.1	19.7	4.2	0.5	5	10	7.6	5
Cobalt	22	2.4	9	2.5	8.1	22.7	9.2	10.5	9.5	5.3	12.1	7.6	2	0.5	8.1	6.7	19.1	4.1
Copper	1100	8.13	9.9	12.24	25.96	22.13	27.27	30.98	21.77	17.66	32.8	22.67	12.06	2.23	76.22	9.08	138.33	136.85
Gallium	NA	1.5	2	1.5	1.9	2	3.8	3.7	4.1	1.9	3.4	4.1	1	0.1	1	2.3	0.5	0.3
Germanium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gold	NA	0.1127	0.0678	1.2515	0.0611	0.0512	0.3792	0.17	0.1167	0.2381	0.2599	0.1639	0.322	0.1705	16.9903	0.118	9.4135	5.5087
Hafnium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iridium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron ^a	11000	21600	19300	48200	15700	19300	26800	33900	29600	16000	31900	28000	105000	3700	162600	25400	202100	179400
Lanthium	NA	7.5	9.3	8.2	15.3	15.9	30.2	31.4	35.8	16.4	30.5	35.1	5.9	8.4	3.3	10.9	3.1	3.3
Lead	140	34.17	25.31	51.2	16.05	14.66	28.31	30.66	26.32	13.66	29.84	22.43	53.43	5.98	533.01	31.41	797.2	1796.79
Lithium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium ^a	NA	4200	4600	3300	4600	4800	9100	8400	9600	5000	8400	9400	2000	300	200	4800	100	100
Manganese	NA	174	222	140	510	566	533	956	682	370	1445	669	107	13	31	291	38	7
Mercury	6.6	0.744	0.294	0.33	0.166	0.187	1.443	1.43	1.357	0.168	0.932	1.39	1.696	0.165	6.358	0.686	11.137	28.652
Molybdenum	110	0.56	0.87	2.38	1.09	0.57	4.28	3.04	1.2	0.71	2.68	3.05	3.88	0.96	12.08	0.52	7.34	3.07
Nickel	330	7.1	11.9	11.7	24.5	47.4	21.9	24.6	26.9	15.1	23.5	17.1	4.8	0.8	12	9.5	29.6	7.6
Niobium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus ^a	NA	400	500	370	440	490	620	660	530	480	780	610	390	30	700	550	290	310
Potassium ^a	NA	800	1200	600	1100	1100	2100	1900	2000	1100	2100	2000	500	200	100	1300	100	100
Rhenium	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
Scandium	NA	0.5	0.6	0.6	0.6	0.6	1.4	1.4	1.4	0.7	1.4	1.6	0.4	0.1	0.9	0.8	0.2	0.3
Selenium	80	0.1	0.1	0.4	0.1	<0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.8	0.2	9.5	0.2	6.4	6
Silver	77	0.119	0.096	0.271	0.056	0.084	0.135	0.143	0.107	0.051	0.141	0.11	0.231	0.053	4.263	0.125	4.774	7.314
Sodium ^a	NA	10	10	10	20	10	60	50	60	20	60	70	10	20	20	20	10	20
Strontium	9400	11.6	11.5	2.6	33.7	23.6	73.2	36	54.9	51.5	72.7	54.6	7	0.6	1.4	13	3.3	6.5
Sulfur ^a	NA	500	200	1700	200	500	800	400	1200	300	300	700	1500	300	15800	600	22500	21900
Tantalum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tellurium	NA	0.18	0.11	0.42	0.04	0.04	0.08	0.06	0.04	0.05	0.07	0.04	1.79	0.25	28.48	0.18	8.42	8.88
Thorium	NA	0.05	0.06	0.12	0.06	0.06	0.1	0.09	0.09	0.06	0.11	0.09	0.09	<0.02	0.18	0.08	0.2	0.22
Thallium	1	3.1	3.7	4.1	3.5	3.8	7.3	8.1	8.3	3.9	7.3	8.1	2.1	1.8	4.8	3.9	2.8	1
Tin	9400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Titanium ^a	NA	210	230	230	230	230	260	270	210	220	310	260	130	20	230	240	80	140
Tungsten	NA	2.2	0.7	2.2	0.4	0.4	1.7	1.5	0.6	0.7	1.9	1.3	0.8	0.1	1.6	1	30	65.8
Uranium	23	0.2	0.3	0.2	0.3	0.3	0.7	0.7	1	0.3	0.6	0.9	0.1	0.2	0.2	0.3	0.3	0.1
Vanadium	39	4	5	3	7	7	12	13	14	6	12	14	2	< 2	< 2	7	< 2	< 2
Yttrium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	5600	23.9	34.5	22.3	47.3	84.3	66.9	69.8	67.9	39.8	67.6	64.5	12.6	1.9	14.4	29	13.6	12.9
Zirconium	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) Goldenville Mines – Tier 1 Human Health Soil Screen, Parsons et al. 2012 Data (mg/kg dw)

Metal	Tier 1 Criteria	Sampling Locations																	
		T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13
Aluminum ^a	15400	400	6400	1500	6400	9700	6800	6000	13300	9700	4600	6300	6100	6500	6700	6300	4400	13600	100
Antimony	7.5	291.54	11.68	162.5	14.25	3.83	3.83	2.48	1.5	4.73	5.06	1	4.2	11.01	2.62	12.38	5.3	9.36	340.28
Arsenic	31	193200	13300	86600	13500	5372.6	5221.7	3144.3	1775.6	6185.9	7238.7	1006.7	4119.8	8460.8	2698.3	12600	4967.4	17200	209000
Barium	10000	8.7	12.2	16.5	11.3	18.2	13	11.7	34.2	95.6	9.9	12.8	14.3	15.3	12.4	15.9	11.9	61.5	6.8
Beryllium	38	<0.1	<0.1	<0.1	0.1	<0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.3	<0.1
Bismuth	NA	19.25	0.75	7.24	0.8	0.34	0.37	0.25	0.41	0.32	0.21	0.21	0.45	0.77	0.46	1.09	0.38	0.65	15.12
Boron	4300	<1	<1	<1	<1	<1	<1	<1	1	1	1	2	<1	<1	1	<1	<1	2	<1
Cadmium	14	0.41	0.13	0.07	0.1	0.2	0.17	0.11	0.15	0.19	0.07	0.17	0.21	0.13	0.15	0.17	0.05	0.17	0.22
Caesium	NA	0.18	0.77	0.43	0.75	1.19	0.82	0.82	1.1	1.28	0.65	0.79	0.88	0.91	0.79	0.82	0.59	3.1	0.1
Calcium ^a	NA	<100	800	100	1000	7300	1200	800	10200	3900	500	3400	1000	900	800	600	1100	<100	
Cerium	NA	5.3	20.1	14.5	18.6	48.3	27.1	21.2	59.9	48.5	11.5	26.9	26.3	28.3	29.7	27.9	13.5	24.4	4.9
Chromium	220	4.3	7.8	5.2	8.3	10.5	9.9	9	18.6	10.8	6.1	8.3	8.3	9.9	9.1	9.2	6.9	24.9	2.8
Cobalt	22	5.4	3.1	21.2	4.1	7.7	3.5	2.7	9.5	7.4	1.1	6.9	8.6	4.8	10.4	10.2	2.5	4.6	10.9
Copper	1100	198.39	11.52	49.87	7.35	27.91	11.37	7.55	29.29	24.74	2.21	26.81	19.48	12.2	23.38	16.92	6.73	11.68	176.2
Gallium	NA	0.1	1.9	1.1	2	2.4	2	2	3.9	2.7	1.7	1.8	2.1	2.2	2	2.1	1.5	5.8	0.1
Germanium	NA	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	0.2
Gold	NA	7.6086	0.1773	3.4406	0.1143	0.3153	0.1716	0.0212	0.1599	0.187	0.0409	0.093	0.0562	0.1749	0.1008	0.5984	0.0409	0.4568	5.5738
Hafnium	NA	1.37	0.05	0.18	0.11	0.2	0.08	0.08	0.54	0.33	0.2	0.13	0.17	0.13	0.22	0.15	0.12	0.07	1.72
Indium	NA	0.29	<0.02	0.08	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	0.26
Iron ^a	11000	182000	27500	121100	30600	23300	20800	16200	26400	23800	38500	15500	19000	22500	18200	24900	14500	41200	209100
Lanthium	NA	2.9	8.5	7.5	8.3	22.6	12.7	9.9	29	22.1	5.4	12.5	11.7	13	13.4	11.7	5.9	10.9	2.9
Lead	140	1967.86	59.64	387.06	59.01	23.43	28.74	24.44	29.35	19.48	11.51	18.49	35.09	41.18	38.88	61.35	33.25	158.42	1404.02
Lithium	NA	0.7	10.5	2.3	10.4	17	12.2	11.8	23.6	17.8	8.5	12.2	11.5	11.8	12.7	12.9	9.4	33.9	0.1
Magnesium ^a	NA	200	4200	800	4500	7100	5000	4400	9300	7600	3600	4600	4400	4700	5000	4400	3300	8300	<100
Manganese	NA	<1	179	37	178	510	186	156	551	448	110	357	326	203	419	243	123	260	5
Mercury	6.6	48.455	1.621	2.481	0.243	0.494	0.201	0.093	1.223	0.567	0.068	0.145	0.457	0.715	0.387	1.125	0.293	0.143	37.4
Molybdenum	110	2.68	0.71	9.2	0.68	0.68	0.53	0.48	4.54	0.45	0.25	0.64	0.76	1.32	0.31	0.89	0.42	0.92	2.36
Nickel	330	13.9	7.9	33	10.5	22	11.1	8.8	24.1	19.6	6.6	19.7	14.6	9.5	11.6	12.9	6.4	11.1	22.2
Niobium	NA	1.33	0.37	1.41	0.3	0.16	0.39	0.36	0.1	0.12	0.18	0.1	0.14	0.25	0.12	0.22	0.21	0.67	0.79
Phosphorus ^a	NA	510	500	660	520	630	670	450	730	620	510	460	510	620	450	490	370	510	370
Potassium ^a	NA	100	1100	400	1100	1900	1200	1000	2500	1800	1000	1100	1300	1200	1200	1300	800	6200	100
Rhenium	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	0.001	<0.001	0.002
Rubidium	NA	1.2	7.9	3.3	8.6	13.3	7.9	7.2	16.6	12.6	6.5	8.1	8.7	8.5	7.8	8.6	6.3	47.2	0.7
Scandium	NA	<0.1	0.8	0.4	0.6	1	0.7	0.6	1.3	0.9	0.5	0.6	0.7	0.8	0.7	0.8	0.5	3.2	0.1
Selenium	80	5.5	0.1	2.5	0.1	<0.1	<0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.4	0.1	0.6	5.4
Silver	77	8.085	0.217	2.151	0.219	0.107	0.074	0.047	0.123	0.092	0.061	0.076	0.127	0.186	0.149	0.306	0.086	0.224	5.161
Sodium ^a	NA	20	10	10	10	20	20	10	40	20	10	20	20	10	10	10	10	100	10
Strontium	9400	7.8	11.9	2.9	15.4	57.1	13	9.9	76.5	40.1	7.5	28.2	11.8	15.6	9.8	10.2	8.4	8.1	5.6
Sulfur ^a	NA	25400	700	19200	1000	1100	100	<100	1200	1500	300	<100	<100	300	100	600	200	3100	38300
Tantalum	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
Tellurium	NA	9.17	0.25	5.56	0.36	0.06	0.13	0.06	0.03	0.11	0.07	0.04	0.15	0.43	0.06	0.36	0.11	0.18	6.97
Thorium	NA	0.29	0.08	0.19	0.07	0.1	0.08	0.07	0.12	0.1	0.06	0.07	0.11	0.09	0.07	0.09	0.05	0.4	0.27
Thallium	1	0.9	3.5	3.7	3.1	7	4.4	3.3	6.8	5.6	2.9	2.9	3.3	3.8	3.7	3.6	2.3	3.9	1
Tin	9400	1.9	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	1.2	1.2
Titanium ^a	NA	130	200	220	230	310	250	220	300	280	190	200	220	230	200	220	170	850	70
Tungsten	NA	54.8	5.9	1.4	7.2	3	6	0.9	1.9	2.3	1.3	0.4	1.8	2.9	0.5	2.4	0.6	0.2	68.4
Uranium	23	0.1	0.3	0.3	0.3	0.7	0.5	0.4	0.9	0.6	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.6	0.2
Vanadium	39	<2	6	2	7	9	8	7	12	9	6	6	6	7	6	7	5	33	<2
Yttrium	NA	0.46	3.48	1.44	3.47	6.87	3.73	3.46	7.7	6.35	2.49	3.33	3.92	3.74	3.97	3.67	2.36	3.62	0.54
Zinc	5600	36.5	28	9.3	52.3	57.8	37.2	34.3	67.3	57.8	23.8	43.2	36.6	34.2	36.2	37	25.7	90.1	16.8
Zirconium	NA	44.4	3.4	6.4	3.4	6.7	4.2	3.8	17.8	10.6	6.3	4.3	5.9	5.6	6.7	5.9	4.8	3.1	49.9

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 Goldenville Mines – Tier 1 Ecological Soil Screen, Parsons et al. 2012 Data (mg/kg dw)

Metal	Tier 1 Criteria		Sampling Locations																		
	Soil Contact	Soil and Food Ingestion	T1	T1	T1	T2	T2	T2	T3	T3	T4	T5	T5	T6	T6	T7	T7	T8	T8	T9	T9
Aluminum ^a	NA	NA	5300	11000	6500	4400	4200	5600	5700	6900	5300	5600	9900	9100	6600	5300	5800	11300	5800	6600	13400
Antimony	20	NA	19.13	10.76	20.14	34.52	29.54	1.33	2.64	0.85	4.12	0.77	2.55	8.54	5.88	23.72	3.24	3.76	6.17	9.7	2.9
Arsenic	17	380	21527.4	15031.2	23917	29195.9	39381.6	6630.2	2942.4	858.4	3765.5	795.5	1630.3	32599.6	6238.7	21298.9	7423.9	4086.8	6469.4	10557.6	4301.7
Barium	750	400	18.2	37.2	45.6	13	14.7	12	19.5	17.3	16.3	13.2	24.2	21.1	13.3	15.4	15.8	22	13.8	14.6	36.7
Beryllium	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bismuth	NA	NA	1.16	1.27	2.18	2.39	2.08	0.27	0.31	0.25	0.26	0.13	0.37	0.62	0.31	1.9	0.4	0.54	0.97	0.72	0.76
Boron	NA	NA	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	1
Cadmium	10	3.8	0.08	0.12	0.09	0.09	0.15	0.08	0.1	0.15	0.09	0.05	0.26	0.28	0.04	0.1	0.02	0.17	0.17	0.08	0.41
Caesium	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	700	800	1200	700	200	700	1300	2000	1000	4000	6100	2000	1100	700	900	1600	900	1100	1300
Cerium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	64	NA	8	16.4	11.5	7.8	6.8	8.8	8.3	10.3	6.8	8.3	14.2	11.2	8.5	8.6	7.8	14.2	8.4	9.2	18.8
Cobalt	20	NA	3.4	4.4	7.6	1.6	1.6	1.8	4.9	7.5	2.5	4	12.3	7.1	3.2	3.9	1.5	25.7	17.9	5.1	16.8
Copper	63	300	12.74	12.67	14.86	6.82	15.18	4.02	17.38	29.8	10.18	8.88	34.52	16.32	8.9	10.56	4.33	37.43	14.52	13.85	6.46
Gallium	NA	NA	1.7	3.5	2.2	1.6	1.5	1.7	1.7	2.1	1.6	1.8	3	2.8	1.9	1.9	2	3.2	1.7	2	4.1
Germanium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gold	NA	NA	0.7473	0.3873	1.1554	0.5184	0.7439	0.0151	0.1818	0.0195	0.1157	0.0085	0.0844	0.3439	0.8134	0.3148	0.1344	0.2307	1.9764	0.8034	0.2587
Hafnium	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
Iron ^a	NA	NA	31200	36700	41200	37900	42600	22900	16600	17600	20600	13000	22500	34000	23800	31600	25500	27900	19100	25200	29900
Lanthium	NA	NA	7.4	16.3	16.3	5.8	5.6	6.2	12	14.7	9.4	11.4	24.9	22.6	12.5	7.6	3.6	25.6	20.6	9.8	18.2
Lead	300	70	94.5	96.99	201.29	173.82	176.85	28.02	28.9	19.15	28.11	11.07	27.95	33.7	25.81	95.09	22.87	42.01	59	42.97	61.16
Lithium	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	3900	7700	4700	3400	3300	4000	4200	5000	3900	4100	6900	7000	4800	3900	4200	7500	4500	4700	8800
Manganese	NA	NA	184	346	286	112	101	114	275	487	145	301	474	395	191	157	128	596	424	212	462
Mercury	12	NA	1.637	2.332	4.008	0.897	0.98	0.088	0.111	0.219	0.325	0.052	0.418	0.354	0.171	2.165	0.271	0.715	0.709	0.259	1.579
Molybdenum	40	NA	0.87	2.53	2	1.09	1.08	0.66	0.51	0.33	0.38	0.62	0.8	0.44	0.4	0.9	2.17	0.54	0.26	0.47	0.74
Nickel	50	355	8.3	12.5	10.7	9.1	9.3	9	12.4	20.4	8.1	12.2	42.4	16.2	10.8	10	6.6	28.5	10.7	11.3	15.7
Niobium	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	470	480	740	550	390	400	510	520	420	360	710	550	580	470	680	630	430	530	620
Potassium ^a	NA	NA	900	1700	1000	800	700	900	800	1400	700	1100	1900	1500	1100	1000	1200	1400	1000	1000	1900
Rhenium	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
Scandium	NA	NA	0.6	1.1	0.7	0.5	0.5	0.4	0.5	0.7	0.5	0.5	1	0.9	0.6	0.6	0.6	1.1	0.6	0.6	1.3
Selenium	1	4.5	0.3	0.3	0.5	0.6	0.6	0.1	0.1	<0.1	0.1	<0.1	0.1	0.3	0.1	0.4	0.1	0.1	0.2	0.2	0.1
Silver	20	NA	0.356	0.408	0.562	0.591	0.53	0.068	0.073	0.072	0.074	0.021	0.109	0.18	0.103	0.43	0.11	0.182	0.409	0.202	0.19
Sodium ^a	NA	NA	20	20	20	10	10	10	20	10	20	10	20	20	10	10	10	30	10	20	30
Strontium	NA	NA	11.2	12.8	15	8.7	2.6	8.2	16.8	23.5	11.9	28.2	43.9	26.4	15.1	9.9	16.2	23.1	11.5	14.6	17
Sulfur ^a	NA	NA	1000	300	500	3400	3200	400	<100	200	300	100	2000	100	400	2100	1000	<100	100	900	200
Tantalum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tellurium	NA	NA	0.45	0.36	1.35	0.87	0.82	0.12	0.07	0.05	0.09	0.02	0.06	0.25	0.14	0.58	0.1	0.11	0.17	0.21	0.13
Thorium	NA	NA	0.07	0.1	0.08	0.08	0.09	0.05	0.06	0.07	0.05	0.05	0.12	0.11	0.07	0.07	0.07	0.09	0.07	0.07	0.1
Thallium	1.4	1	3.1	5.7	5.8	3.9	3.7	2.5	3.6	3.3	2.8	2.8	5.6	6.8	4.3	3.9	2.7	6.5	4.7	7	8.9
Tin	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Titanium ^a	NA	NA	210	250	230	210	220	200	210	250	200	200	330	300	230	210	240	260	210	220	240
Tungsten	NA	NA	3.4	1.7	3.5	9.2	12.7	0.3	1	0.4	0.4	0.1	0.9	1.7	0.9	4.6	0.9	1.4	0.8	2.3	1.8
Uranium	500	33	0.2	0.6	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.5	0.4	0.3	0.3	0.2	0.5	0.4	0.8	0.7
Vanadium	130	NA	6	12	9	6	5	6	6	6	4	6	11	8	5	5	6	11	5	7	13
Yttrium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	200	640	26.2	48.6	31	25.3	22.8	31.5	44.1	50.6	33.1	33.9	67.6	48.9	36.2	27.3	38.2	67.6	31.9	31.7	58.4
Zirconium	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 Goldenville Mines – Tier 1 Ecological Soil Screen, Parsons et al. 2012 Data (mg/kg dw)

Metal	Tier 1 Criteria		Sampling Locations																		
	Soil Contact	Soil and Food Ingestion	T10	T10	T10	T11	T11	T12	T12	T12	T13	T13	T13	T15	T15	T15	T16	T16	T17	T1	T2
Aluminum ^a	NA	NA	5900	6600	4500	6400	6600	13600	12900	15200	6700	11800	14900	3100	600	700	7200	400	200	400	6400
Antimony	20	NA	7.33	2.34	28.49	1.02	0.88	2.71	1.69	0.94	1.56	2.63	1.11	65	6.56	597.39	7.05	359.19	260.98	291.54	11.68
Arsenic	17	380	9217.1	2609.1	47414.2	1089.9	1529.9	2846.3	3134	1475.3	1845.9	4712.4	685.5	39661.5	3689.2	33264.4	8256.1	23677.8	30429.7	193200	13300
Barium	750	400	12.8	16.7	18	16.3	17.7	33.7	40.9	45.4	16.9	37.7	49	11.2	3.9	16	17.5	6.8	13.7	8.7	12.2
Beryllium	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	<0.1
Bismuth	NA	NA	0.49	0.33	0.85	0.2	0.21	0.43	0.46	0.37	0.18	0.43	0.36	1.27	0.25	21.69	0.53	15.05	21.54	19.25	0.75
Boron	NA	NA	<1	<1	<1	<1	<1	<1	1	1	<1	<1	1	<1	<1	1	<1	<1	<1	<1	<1
Cadmium	10	3.8	0.06	0.09	0.21	0.13	0.09	0.11	0.15	0.1	0.1	0.23	0.11	0.04	<0.01	0.12	0.12	0.16	0.29	0.41	0.13
Caesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.18	0.77
Calcium ^a	NA	NA	700	900	100	4900	2800	9400	3200	7400	6800	7400	7400	300	<100	100	1100	<100	<100	<100	800
Cerium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3	20.1
Chromium	64	NA	7.1	8.9	11.7	9.5	10.1	16.6	17.4	21.2	8	15.1	19.7	4.2	0.5	5	10	7.6	5	4.3	7.8
Cobalt	20	NA	2.4	9	2.5	8.1	22.7	9.2	10.5	9.5	5.3	12.1	7.6	2	0.5	8.1	6.7	19.1	4.1	5.4	3.1
Copper	63	300	8.13	9.9	12.24	25.96	22.13	27.27	30.98	21.77	17.66	32.8	22.67	12.06	2.23	76.22	9.08	138.33	136.85	198.39	11.52
Gallium	NA	NA	1.5	2	1.5	1.9	2	3.8	3.7	4.1	1.9	3.4	4.1	1	0.1	1	2.3	0.5	0.3	0.1	1.9
Germanium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.2	0.1
Gold	NA	NA	0.1127	0.0678	1.2515	0.0611	0.0512	0.3792	0.17	0.1167	0.2381	0.2599	0.1639	0.322	0.1705	16.9903	0.118	9.4135	5.5087	7.6086	0.1773
Hafnium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.37	0.05
Indium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.29	<0.02
Iron ^a	NA	NA	21600	19300	48200	15700	19300	26800	33900	29600	16000	31900	28000	105000	3700	162600	25400	202100	179400	182000	27500
Lanthium	NA	NA	7.5	9.3	8.2	15.3	15.9	30.2	31.4	35.8	16.4	30.5	35.1	5.9	8.4	3.3	10.9	3.1	3.3	2.9	8.5
Lead	300	70	34.17	25.31	51.2	16.05	14.66	28.31	30.66	26.32	13.66	29.84	22.43	53.43	5.98	533.01	31.41	797.2	1796.79	1967.86	59.64
Lithium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10.5
Magnesium ^a	NA	NA	4200	4600	3300	4600	4800	9100	8400	9600	5000	8400	9400	2000	300	200	4800	100	100	200	4200
Manganese	NA	NA	174	222	140	510	566	533	956	682	370	1445	669	107	13	31	291	38	7	<1	179
Mercury	12	NA	0.744	0.294	0.33	0.166	0.187	1.443	1.43	1.357	0.168	0.932	1.39	1.696	0.165	6.358	0.686	11.137	28.652	48.455	1.621
Molybdenum	40	NA	0.56	0.87	2.38	1.09	0.57	4.28	3.04	1.2	0.71	2.68	3.05	3.88	0.96	12.08	0.52	7.34	3.07	2.68	0.71
Nickel	50	355	7.1	11.9	11.7	24.5	47.4	21.9	24.6	26.9	15.1	23.5	17.1	4.8	0.8	12	9.5	29.6	7.6	13.9	7.9
Niobium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.33	0.37
Phosphorus ^a	NA	NA	400	500	370	440	490	620	660	530	480	780	610	390	30	700	550	290	310	510	500
Potassium ^a	NA	NA	800	1200	600	1100	1100	2100	1900	2000	1100	2100	2000	500	200	100	1300	100	100	100	1100
Rhenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.001
Rubidium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.001
Scandium	NA	NA	0.5	0.6	0.6	0.6	0.6	1.4	1.4	1.4	0.7	1.4	1.6	0.4	0.1	0.9	0.8	0.2	0.3	<0.1	0.8
Selenium	1	4.5	0.1	0.1	0.4	0.1	<0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.8	0.2	9.5	0.2	6.4	6	5.5	0.1
Silver	20	NA	0.119	0.096	0.271	0.056	0.084	0.135	0.143	0.107	0.051	0.141	0.11	0.231	0.053	4.263	0.125	4.774	7.314	8.085	0.217
Sodium ^a	NA	NA	10	10	10	20	10	60	50	60	20	60	70	10	20	20	20	10	20	20	10
Strontium	NA	NA	11.6	11.5	2.6	33.7	23.6	73.2	36	54.9	51.5	72.7	54.6	7	0.6	1.4	13	3.3	6.5	7.8	11.9
Sulfur ^a	NA	NA	500	200	1700	200	500	800	400	1200	300	300	700	1500	300	15800	600	22500	21900	25400	700
Tantalum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05
Tellurium	NA	NA	0.18	0.11	0.42	0.04	0.04	0.08	0.06	0.04	0.05	0.07	0.04	1.79	0.25	28.48	0.18	8.42	8.88	9.17	0.25
Thorium	NA	NA	0.05	0.06	0.12	0.06	0.06	0.1	0.09	0.09	0.06	0.11	0.09	0.09	<0.02	0.18	0.08	0.2	0.22	0.29	0.08
Thallium	1.4	1	3.1	3.7	4.1	3.5	3.8	7.3	8.1	8.3	3.9	7.3	8.1	2.1	1.8	4.8	3.9	2.8	1	0.9	3.5
Tin	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.9
Titanium ^a	NA	NA	210	230	230	230	230	260	270	210	220	310	260	130	20	230	240	80	140	130	200
Tungsten	NA	NA	2.2	0.7	2.2	0.4	0.4	1.7	1.5	0.6	0.7	1.9	1.3	0.8	0.1	1.6	1	30	65.8	54.8	5.9
Uranium	500	33	0.2	0.3	0.2	0.3	0.3	0.7	1	1	0.3	0.6	0.9	0.1	0.2	0.2	0.3	0.3	0.1	0.1	0.3
Vanadium	130	NA	4	5	3	7	7	12	13	14	6	12	14	2	<2	7	<2	<2	<2	<2	6
Yttrium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.46
Zinc	200	640	23.9	34.5	22.3	47.3	84.3	66.9	69.8	67.9	39.8	67.6	64.5	12.6	1.9	14.4	29	13.6	12.9	36.5	28
Zirconium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	44.4	3.4

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 Goldenville Mines – Tier 1 Ecological Soil Screen, Parsons et al. 2012 Data (mg/kg dw)

Metal	Tier 1 Criteria		Sampling Locations															
	Soil Contact	Soil and Food Ingestion	T3	T4	T5	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13
Aluminum ^a	NA	NA	1500	6400	9700	6800	6000	13300	9700	4600	6300	6100	6500	6700	6300	4400	15600	100
Antimony	20	NA	162.5	14.25	3.83	3.83	2.48	1.5	4.73	5.06	1	4.2	11.01	2.62	12.38	5.3	9.36	340.28
Arsenic	17	380	8660.0	1350.0	5372.6	5221.7	3144.3	1775.6	6185.9	7238.7	1006.7	4119.8	8468.8	2698.3	1260.0	4867.4	1720.0	20900.0
Barium	750	400	15.5	11.3	18.2	13	11.7	34.2	95.6	9.9	12.8	14.3	15.3	12.4	15.9	11.9	61.5	6.8
Beryllium	5	NA	<0.1	0.1	<0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.3	<0.1
Bismuth	NA	NA	7.24	0.8	0.34	0.37	0.25	0.41	0.32	0.21	0.21	0.45	0.77	0.46	1.09	0.38	0.65	15.12
Boron	NA	NA	<1	<1	<1	<1	<1	1	1	1	2	<1	<1	1	<1	<1	2	<1
Cadmium	10	3.8	0.07	0.1	0.2	0.17	0.11	0.15	0.19	0.07	0.17	0.21	0.13	0.15	0.17	0.05	0.17	0.22
Caesium	NA	NA	0.43	0.75	1.19	0.82	0.82	1.1	1.28	0.65	0.79	0.88	0.91	0.79	0.82	0.59	3.1	0.1
Calcium ^a	NA	NA	100	1000	7300	1200	800	10200	3900	500	3400	900	1000	900	800	600	1100	<100
Cerium	NA	NA	14.5	18.6	48.3	27.1	21.2	59.9	48.5	11.5	26.9	26.3	28.3	29.7	27.9	13.5	24.4	4.9
Chromium	64	NA	5.2	8.3	10.5	9.9	9	18.6	10.8	6.1	8.3	8.3	9.9	9.1	9.2	6.9	24.9	2.8
Cobalt	20	NA	21.2	4.1	7.7	3.5	2.7	9.5	7.4	1.1	6.9	8.6	4.8	10.4	10.2	2.5	4.6	10.9
Copper	63	300	49.87	7.35	27.91	11.37	7.55	29.29	24.74	2.21	26.81	19.48	12.2	23.38	16.92	6.73	11.68	176.2
Gallium	NA	NA	1.1	2	2.4	2	2	3.9	2.7	1.7	1.8	2.1	2.2	2	2.1	1.5	5.8	0.1
Germanium	NA	NA	<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	0.2
Gold	NA	NA	3.4406	0.1143	0.3153	0.1716	0.0212	0.1599	0.187	0.0409	0.093	0.0562	0.1749	0.1008	0.5984	0.0409	0.4568	5.5738
Hafnium	NA	NA	0.18	0.11	0.2	0.08	0.08	0.54	0.33	0.2	0.13	0.17	0.13	0.22	0.15	0.12	0.07	1.72
Indium	NA	NA	0.08	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.02	<0.02	0.04	0.26
Iron ^a	NA	NA	121100	30600	23300	20800	16200	26400	23800	18500	15500	19000	22500	18200	24900	14500	41200	209100
Lanthium	NA	NA	7.5	8.3	22.6	12.7	9.9	29	22.1	5.4	12.5	11.7	13	13.4	11.7	5.9	10.9	2.9
Lead	300	70	387.06	59.01	23.43	28.74	24.44	29.35	19.48	11.51	18.49	35.09	41.18	38.88	61.35	33.25	158.42	1404.02
Lithium	NA	NA	2.3	10.4	17	12.2	11.8	23.6	17.8	8.5	12.2	11.5	11.8	12.7	12.9	9.4	33.9	0.1
Magnesium ^a	NA	NA	800	4500	7100	5000	4400	9300	7600	3600	4600	4400	4700	5000	4400	3300	8300	<100
Manganese	NA	NA	37	178	510	186	156	551	448	110	357	326	203	419	243	123	260	5
Mercury	12	NA	2.481	0.243	0.494	0.201	0.093	1.223	0.567	0.068	0.145	0.457	0.715	0.387	1.125	0.293	0.143	37.4
Molybdenum	40	NA	9.2	0.68	0.68	0.53	0.48	4.54	0.45	0.25	0.64	0.76	1.32	0.31	0.89	0.42	0.92	2.36
Nickel	50	355	33	10.5	22	11.1	8.8	24.1	19.6	6.6	19.7	14.6	9.5	11.6	12.9	6.4	11.1	22.2
Niobium	NA	NA	1.41	0.3	0.16	0.39	0.36	0.1	0.12	0.18	0.1	0.14	0.25	0.12	0.22	0.21	0.67	0.79
Phosphorus ^a	NA	NA	660	520	630	670	450	730	620	510	460	510	620	450	490	370	510	370
Potassium ^a	NA	NA	400	1100	1900	1200	1000	2500	1800	1000	1100	1300	1200	1200	1300	800	6200	100
Rhenium	NA	NA	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	0.001	<0.001	0.002
Rubidium	NA	NA	3.3	8.6	13.3	7.9	7.2	16.6	12.6	6.5	8.1	8.7	8.5	7.8	8.6	6.3	47.2	0.7
Scandium	NA	NA	0.4	0.6	1	0.7	0.6	1.3	0.9	0.5	0.6	0.7	0.8	0.7	0.8	0.5	3.2	0.1
Selenium	1	4.5	2.5	0.1	<0.1	<0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.4	0.1	0.6	5.4
Silver	20	NA	2.151	0.219	0.107	0.074	0.047	0.123	0.092	0.061	0.076	0.127	0.186	0.149	0.306	0.086	0.224	5.161
Sodium ^a	NA	NA	10	10	20	20	10	40	20	10	20	20	10	10	10	10	100	10
Strontium	NA	NA	2.9	15.4	57.1	13	9.9	76.5	40.1	7.5	28.2	11.8	15.6	9.8	10.2	8.4	8.1	5.6
Sulfur ^a	NA	NA	19200	1000	1100	100	<100	1200	1500	300	<100	<100	300	100	600	200	3100	38300
Tantalum	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
Tellurium	NA	NA	5.56	0.36	0.06	0.13	0.06	0.03	0.11	0.07	0.04	0.15	0.43	0.06	0.36	0.11	0.18	6.97
Thorium	NA	NA	0.19	0.07	0.1	0.08	0.07	0.12	0.1	0.06	0.07	0.11	0.09	0.07	0.09	0.05	0.4	0.27
Thallium	1.4	1	3.7	3.1	7	4.4	3.3	6.8	5.6	2.9	2.9	3.3	3.8	3.7	3.6	2.3	3.9	1
Tin	5	NA	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	1.2	1.2	1.2
Titanium ^a	NA	NA	220	230	310	250	220	300	280	190	200	220	230	200	220	170	850	70
Tungsten	NA	NA	1.4	7.2	3	6	0.9	1.9	2.3	1.3	0.4	1.8	2.9	0.5	2.4	0.6	0.2	68.4
Uranium	500	33	0.3	0.3	0.7	0.5	0.4	0.9	0.6	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.6	0.2
Vanadium	130	NA	2	7	9	8	7	12	9	6	6	6	7	6	7	5	33	<2
Yttrium	NA	NA	1.44	3.47	6.87	3.73	3.46	7.7	6.35	2.49	3.33	3.92	3.74	3.97	3.67	2.36	3.62	0.54
Zinc	200	640	9.3	52.3	57.8	37.2	34.3	67.3	57.8	23.8	43.2	36.6	34.2	36.2	37	25.7	90.1	16.8
Zirconium	NA	NA	6.4	3.4	6.7	4.2	3.8	17.8	10.6	6.3	4.3	5.9	5.6	6.7	5.9	4.8	3.1	49.9

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 Goldenville Mines - Tier 1 Human Health Soil Screen, CJ McLellan and Associates Inc. 2009 (mg/kg dw)

Metal	Tier 1 Guideline	Sampling Locations																	
		1	2	3	4	5	6	8	9	11	12	13	14	15	19	20	21	22	23
Arsenic <2 mm (mg/kg)	31	180	650	220	880	350	230	130	1900	730	370	5700	1700	1100	5300	960	1400	1600	1900
Mercury <2 mm (mg/kg)	6.6	0.1	2	0.54	2.4	1.3	1.7	0.71	0.06	20	1.4	13	2.4	0.38	0.3	0.92	1.1	1.6	2.5

Metal	Tier 1 Guideline	Sampling Locations																	
		24	25	26	27	28	30	30	30	31	32	33	34	35	37	38	38	38	39
Arsenic <2 mm (mg/kg)	31	290	770	1400	3700	1000	51	150	68	2700	9600	960	35	410	180	70	91	79	20
Mercury <2 mm (mg/kg)	6.6	0.46	0.44	1.4	0.55	2.1	0.44	0.59	0.05	0.32	2.2	0.09	0.02	0.31	0.05	0.08	0.29	0.11	0.18

Metal	Tier 1 Guideline	Sampling Locations																	
		39	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Arsenic <2 mm (mg/kg)	31	61	240	51	5800	4700	7100	1200	3700	3500	2500	2200	1600	130	2000	120	1200	69	76
Mercury <2 mm (mg/kg)	6.6	0.37	0.06	0.84	0.09	8.6	0.18	0.17	0.33	0.52	1	0.16	1.8	0.68	0.32	0.17	0.07	0.57	0.11

Notes:
Shaded values indicate an exceedance of the Tier 1 criteria

Table B-4 Goldenville Mines - Ecological Soil Screen, CJ McLellan and Associates Inc. 2009 (mg/kg dw)

Metal	Tier 1 Guideline		Sampling Locations																	
	Soil Contact	Soil and Food Ingestion	1	2	3	4	5	6	8	9	11	12	13	14	15	19	20	21	22	23
Arsenic <2 mm (mg/kg)	17	380	180	650	220	880	350	230	130	1900	730	370	5700	1700	1100	5300	960	1400	1600	1900
Mercury <2 mm (mg/kg)	12	NA	0.1	2	0.54	2.4	1.3	1.7	0.71	0.06	20	1.4	13	2.4	0.38	0.3	0.92	1.1	1.6	2.5

Metal	Tier 1 Guideline		Sampling Locations																
	Soil Contact	Soil and Food Ingestion	24	25	26	27	28	30	30	30	31	32	33	34	35	37	38	38	38
Arsenic <2 mm (mg/kg)	17	380	290	770	1400	3700	1000	51	150	68	2700	9600	960	35	410	180	70	91	79
Mercury <2 mm (mg/kg)	12	NA	0.46	0.44	1.4	0.55	2.1	0.44	0.59	0.05	0.32	2.2	0.09	0.02	0.31	0.05	0.08	0.29	0.11

Metal	Tier 1 Guideline		Sampling Locations																		
	Soil Contact	Soil and Food Ingestion	39	39	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Arsenic <2 mm (mg/kg)	17	380	20	61	240	51	5800	4700	7100	1200	3700	3500	2500	2200	1600	130	2000	120	1200	68	76
Mercury <2 mm (mg/kg)	12	NA	0.18	0.37	0.06	0.84	0.09	8.6	0.18	0.17	0.33	0.52	1	0.16	1.8	0.68	0.32	0.17	0.07	0.57	0.11

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 Goldenville Mines – Tier 2 Human Health Soil Screen, Parsons et al. 2012 (mg/kg dw)

Metal	Tier 2 Criteria	Sampling Locations																
		T1	T1	T1	T2	T2	T2	T3	T3	T4	T5	T5	T6	T6	T7	T7	T8	T8
Antimony	NA	19.13	10.76	20.14	34.52	29.54	1.33	2.64	0.85	4.12	0.77	2.55	8.54	5.88	23.72	3.24	3.76	6.17
Arsenic	400	21527.4	15031.2	23917	29195.9	39381.6	6630.2	2942.4	858.4	3765.5	795.5	1630.3	12599.6	6238.7	21298.9	7423.9	4086.8	6469.4
Cobalt	NA	3.4	4.4	7.6	1.6	1.6	1.8	4.9	7.5	2.5	4	12.3	7.1	3.2	3.9	1.5	25.7	17.9
Lead	NA	94.5	96.99	201.29	173.82	176.85	28.02	28.9	19.15	28.11	11.07	27.95	33.7	25.81	95.09	22.87	42.01	59
Mercury	29	1.637	2.332	4.008	0.897	0.98	0.088	0.111	0.219	0.325	0.052	0.418	0.354	0.171	2.165	0.271	0.715	0.709
Thallium	NA	3.1	5.7	5.8	3.9	3.7	2.5	3.6	3.3	2.8	2.8	5.6	6.8	4.3	3.9	2.7	6.5	4.7

Metal	Tier 2 Criteria	Sampling Locations																	
		T9	T9	T10	T10	T10	T11	T11	T12	T12	T13	T13	T13	T15	T15	T15	T16	T16	
Antimony	NA	9.7	2.9	7.33	2.34	28.49	1.02	0.88	2.71	1.69	0.94	1.56	2.63	1.11	65	6.56	597.39	7.05	359.19
Arsenic	400	10557.6	4301.7	9217.1	2609.1	47414.2	1089.9	1529.9	2846.3	3134	1475.3	1845.9	4712.4	685.5	39661.5	3689.2	33264.4	8256.1	29677.8
Cobalt	NA	5.1	16.8	2.4	9	2.5	8.1	22.7	9.2	10.5	9.5	5.3	12.1	7.6	2	0.5	8.1	6.7	19.1
Lead	NA	42.97	61.16	34.17	25.31	51.2	16.05	14.66	28.31	30.66	26.32	13.66	29.84	22.43	53.43	5.98	533.01	31.41	797.2
Mercury	29	0.259	1.579	0.744	0.294	0.33	0.166	0.187	1.443	1.43	1.357	0.168	0.932	1.39	1.696	0.165	6.358	0.686	11.137
Thallium	NA	7	8.9	3.1	3.7	4.1	3.5	3.8	7.3	8.1	8.3	3.9	7.3	8.1	2.1	1.8	4.8	3.9	2.8

Metal	Tier 2 Criteria	Sampling Locations																		
		T17	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13
Antimony	NA	260.98	291.54	11.68	162.5	14.25	3.83	3.83	2.48	1.5	4.73	5.06	1	4.2	11.01	2.62	12.38	5.3	9.36	340.28
Arsenic	400	30429.7	193200	13300	86600	13500	5372.6	5221.7	3144.3	1775.6	6185.9	7238.7	1006.7	4119.8	8460.8	2698.3	12600	4967.4	17200	209000
Cobalt	NA	4.1	5.4	3.1	21.2	4.1	7.7	3.5	2.7	9.5	7.4	1.1	6.9	8.6	4.8	10.4	10.2	2.5	4.6	10.9
Lead	NA	1796.79	1967.86	59.64	387.06	59.01	23.43	28.74	24.44	29.35	19.48	11.51	18.49	35.09	41.18	38.88	61.35	33.25	158.42	1404.02
Mercury	29	28.652	48.455	1.621	2.481	0.243	0.494	0.201	0.093	1.223	0.567	0.068	0.145	0.457	0.715	0.387	1.125	0.293	0.143	37.4
Thallium	NA	1	0.9	3.5	3.7	3.1	7	4.4	3.3	6.8	5.6	2.9	2.9	3.3	3.8	3.7	3.6	2.3	3.9	1

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 Goldenville Mines – Tier 2 Ecological Soil Screen, Parsons et al. 2012 (mg/kg dw)

Metal	Tier 2 Criteria	Sampling Locations																		
		T1	T1	T1	T2	T2	T2	T3	T3	T4	T5	T5	T6	T6	T7	T7	T8	T8	T9	T9
Antimony	NA	19.13	10.76	20.14	34.52	29.54	1.33	2.64	0.85	4.12	0.77	2.55	8.54	5.88	23.72	3.24	3.76	6.17	9.7	2.9
Arsenic	31	21527.4	15031.2	23917	29195.9	39381.6	6630.2	2942.4	858.4	3765.5	795.5	1630.3	12599.6	6238.7	21298.9	7423.9	4086.8	6469.4	10557.6	4301.7
Cobalt	NA	3.4	4.4	7.6	1.6	1.6	1.8	4.9	7.5	2.5	4	12.3	7.1	3.2	3.9	1.5	25.7	17.9	5.1	16.8
Copper	NA	12.74	12.67	14.86	6.82	15.18	4.02	17.38	29.8	10.18	8.88	34.52	16.32	8.9	10.56	4.33	37.43	14.52	13.85	6.46
Lead	NA	94.5	96.99	201.29	173.82	176.85	28.02	28.9	19.15	28.11	11.07	27.95	33.7	25.81	95.09	22.87	42.01	59	42.97	61.16
Mercury	12	1.637	2.332	4.008	0.897	0.98	0.088	0.111	0.219	0.325	0.052	0.418	0.354	0.171	2.165	0.271	0.715	0.709	0.259	1.579
Selenium	NA	0.3	0.3	0.5	0.6	0.6	0.1	0.1	<0.1	0.1	<0.1	0.1	0.3	0.1	0.4	0.1	0.1	0.2	0.2	0.1
Thallium	NA	3.1	5.7	5.8	3.9	3.7	2.5	3.6	3.3	2.8	2.8	5.6	6.8	4.3	3.9	2.7	6.5	4.7	7	8.9

Metal	Tier 2 Criteria	Sampling Locations																		
		T10	T10	T10	T11	T11	T12	T12	T12	T13	T13	T13	T15	T15	T15	T16	T16	T17		
Antimony	NA	7.33	2.34	28.49	1.02	0.88	2.71	1.69	0.94	1.56	2.63	1.11	65	6.56	597.39	7.05	359.19	260.98		
Arsenic	31	9217.1	2609.1	47414.2	1089.9	1529.9	2846.3	3134	1475.3	1845.9	4712.4	685.5	39661.5	3689.2	33264.4	8256.1	29677.8	30429.7		
Cobalt	NA	2.4	9	2.5	8.1	22.7	9.2	10.5	9.5	5.3	12.1	7.6	2	0.5	8.1	6.7	19.1	4.1		
Copper	NA	8.13	9.9	12.24	25.96	22.13	27.27	30.98	21.77	17.66	32.8	22.67	12.06	2.23	76.22	9.08	138.33	136.85		
Lead	NA	34.17	25.31	51.2	16.05	14.66	28.31	30.66	26.32	13.66	29.84	22.43	53.43	5.98	533.01	31.41	797.2	1796.79		
Mercury	12	0.744	0.294	0.33	0.166	0.187	1.443	1.43	1.357	0.168	0.932	1.39	1.696	0.165	6.358	0.686	11.137	28.652		
Selenium	NA	0.1	0.1	0.4	0.1	<0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.8	0.2	9.5	0.2	6.4	6		
Thallium	NA	3.1	3.7	4.1	3.5	3.8	7.3	8.1	8.3	3.9	7.3	8.1	2.1	1.8	4.8	3.9	2.8	1		

Metal	Tier 2 Criteria	Sampling Locations																		
		T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	
Antimony	NA	291.54	11.68	162.5	14.25	3.83	3.83	2.48	1.5	4.73	5.06	1	4.2	11.01	2.62	12.38	5.3	9.36	340.28	
Arsenic	31	193200	13300	86600	13500	5372.6	5221.7	3144.3	1775.6	6185.9	7238.7	1006.7	4119.8	8460.8	2698.3	12600	4967.4	17200	209000	
Cobalt	NA	5.4	3.1	21.2	4.1	7.7	3.5	2.7	9.5	7.4	1.1	6.9	8.6	4.8	10.4	10.2	2.5	4.6	10.9	
Copper	NA	198.39	11.52	49.87	7.35	27.91	11.37	7.55	29.29	24.74	2.21	26.81	19.48	12.2	23.38	16.92	6.73	11.68	176.2	
Lead	NA	1967.86	59.64	387.06	59.01	23.43	28.74	24.44	29.35	19.48	11.51	18.49	35.09	41.18	38.88	61.35	33.25	158.42	1404.02	
Mercury	12	48.455	1.621	2.481	0.243	0.494	0.201	0.093	1.223	0.567	0.068	0.145	0.457	0.715	0.387	1.125	0.293	0.143	37.4	
Selenium	NA	5.5	0.1	2.5	0.1	<0.1	<0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.4	0.1	0.6	5.4	
Thallium	NA	0.9	3.5	3.7	3.1	7	4.4	3.3	6.8	5.6	2.9	2.9	3.3	3.8	3.7	3.6	2.3	3.9	1	

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 Goldenville Mines - Tier 1 Human Health Soil Screen, CJ McLellan and Associates Inc. 2009 (mg/kg dw)

Metal	Tier 2 Criteria	Sampling Locations																		
		1	2	3	4	5	6	8	9	11	12	13	14	15	19	20	21	22	23	
Arsenic <2 mm (mg/kg)	400	180	650	220	880	350	230	130	1900	730	370	5700	1700	1100	5300	960	1400	1600	1900	
Mercury <2 mm (mg/kg)	29	0.1	2	0.54	2.4	1.3	1.7	0.71	0.06	20	1.4	13	2.4	0.38	0.3	0.92	1.1	1.6	2.5	

Metal	Tier 2 Criteria	Sampling Locations																
		24	25	26	27	28	30	30	30	31	32	33	34	35	37	38	38	38
Arsenic <2 mm (mg/kg)	400	290	770	1400	3700	1000	51	150	68	2700	9600	960	35	410	180	70	91	79
Mercury <2 mm (mg/kg)	29	0.46	0.44	1.4	0.55	2.1	0.44	0.59	0.05	0.32	2.2	0.09	0.02	0.31	0.05	0.08	0.29	0.11

Metal	Tier 2 Criteria	Sampling Locations																		
		39	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	
Arsenic <2 mm (mg/kg)	400	61	240	51	5800	4700	7100	1200	3700	3500	2500	2200	1600	130	2000	120	1200	69	76	
Mercury <2 mm (mg/kg)	29	0.37	0.06	0.84	0.09	8.6	0.18	0.17	0.33	0.52	1	0.16	1.8	0.68	0.32	0.17	0.07	0.57	0.11	

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 Goldenville Mines - Ecological Soil Screen, CJ McLellan and Associates Inc. 2009 (mg/kg dw)

Metal	Tier 2 Criteria	Sampling Locations																	
		1	2	3	4	5	6	8	9	11	12	13	14	15	19	20	21	22	23
Arsenic <2 mm (mg/kg)	31	180	650	220	880	350	230	130	1900	730	370	5700	1700	1100	5300	960	1400	1600	1900
Mercury <2 mm (mg/kg)	12	0.1	2	0.54	2.4	1.3	1.7	0.71	0.06	20	1.4	13	2.4	0.38	0.3	0.92	1.1	1.6	2.5

Metal	Tier 2 Criteria	Sampling Locations																
		24	25	26	27	28	30	30	30	31	32	33	34	35	37	38	38	38
Arsenic <2 mm (mg/kg)	31	290	770	1400	3700	1000	51	150	68	2700	9600	960	35	410	180	70	91	79
Mercury <2 mm (mg/kg)	12	0.46	0.44	1.4	0.55	2.1	0.44	0.59	0.05	0.32	2.2	0.09	0.02	0.31	0.05	0.08	0.29	0.11

Metal	Tier 2 Criteria	Sampling Locations																		
		39	39	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Arsenic <2 mm (mg/kg)	31	20	61	240	51	5800	4700	7100	1200	3700	3500	2500	2200	1600	130	2000	120	1200	69	76
Mercury <2 mm (mg/kg)	12	0.18	0.37	0.06	0.84	0.09	8.6	0.18	0.17	0.33	0.52	1	0.16	1.8	0.68	0.32	0.17	0.07	0.57	0.11

Notes:
Shaded values indicate an exceedance of the Tier 2 criteria

Table B-9 Goldenville Mines - Tier 1 Human Health
Soil Screen, 2018 Data (mg/kg dw)

Metal	Tier 1 Criteria	Sampling Locations														
		G-C1 (0-10cm)	G-C2 (0-5cm)	G-C3 (0-5cm)	G-C4 (0-5cm)	G-C5 (2.5-10cm)	G-C6 (28NOV) (2.5-10cm)	G-C6 (29NOV) (0-7.5cm)	G-C7 (2.5-10cm)	G-C8 (0-5cm)	G-C9 (0-7.5cm)	G-C10 (2.5-10cm)	G-C14 (2.5-10cm)	G-C15 (2.5-10cm)	G-C17 (0-5cm)	G-SFC-1 (0-20cm)
Aluminum	15400	7000	7100	9400	9200	8600	13000	8900	8900	11000	11000	6500	6300	12000	16000	5100
Antimony	7.5	1.5	1.2	2.6	1.6	15	6.1	2.5	0.96	5	3.2	<0.80	3.2	2.6	2.9	33
Arsenic	31	1200	920	2200	3300	15000	8100	1200	53	640	1200	82	2600	1900	2800	31000
Barium	10000	30	30	36	40	66	110	58	59	40	40	34	33	56	77	34
Beryllium	38	0.17	0.18	0.21	0.25	0.42	0.66	0.36	0.45	0.24	0.29	0.31	0.17	0.33	0.46	0.12
Bismuth	NA	0.38	0.33	0.62	0.34	1.6	1	1.5	0.23	0.81	1.1	0.35	0.3	0.41	0.43	2.6
Cadmium	14	0.096	0.15	0.12	0.13	0.85	1.1	0.65	0.51	0.36	0.41	0.14	0.1	0.17	0.36	0.09
Calcium	NA	2100	1400	1800	1400	3000	4000	2400	4800	3000	5100	1600	1300	1700	3000	160
Chromium	220	82	86	78	12	100	14	12	9.1	15	14	7.6	80	57	21	8.8
Cobalt	22	5.1	5.1	5.7	7.4	44	35	8.3	6.9	9.1	8.5	2.7	5.1	10	13	1.9
Copper	1100	20	20	33	18	50	43	25	23	70	65	19	13	26	43	8.6
Iron	11000	18000	19000	27000	34000	67000	85000	24000	12000	32000	28000	12000	19000	28000	33000	48000
Lead	140	21	21	36	24	100	85	99	37	55	77	920	18	25	36	170
Lithium	NA	11	11	14	10	12	8.4	14	6.1	21	19	3.5	9.3	18	25	6.5
Magnesium	NA	4500	4400	6000	3000	4200	2800	4900	1800	6200	5700	1200	3700	7700	9900	2800
Manganese	NA	280	190	250	490	1200	3000	320	320	420	520	170	160	290	460	110
Mercury	6.6	0.3	0.8	1.5	0.4	29	11	29	1.3	2.1	4	20	1.1	1.6	3	6
Molybdenum	110	0.91	0.89	1.1	0.96	1.2	1.2	0.52	0.86	0.77	0.95	1.1	0.65	0.51	0.49	1.3
Nickel	330	16	19	20	14	79	55	23	14	32	31	6.7	14	25	29	9
Potassium	NA	1900	1900	2000	1300	1300	1200	1900	840	1700	1500	680	1700	2800	3300	1800
Selenium	80	<0.70	<0.70	<0.70	<0.70	0.74	1.3	<0.70	1.4	<0.70	<0.70	1	<0.70	<0.70	<0.70	<0.70
Silver	77	0.089	0.07	0.18	0.11	0.59	0.35	0.65	0.29	0.16	0.25	0.27	0.052	0.12	0.19	0.77
Strontium	9400	23	17	20	15	29	35	28	49	35	52	19	17	20	31	3.7
Sulphur	NA	310	760	770	410	8600	2500	1100	3300	850	2200	890	1400	940	2100	1800
Thallium	1	0.072	0.069	0.088	0.077	0.17	0.21	0.12	0.13	0.13	0.092	0.14	0.058	0.12	0.15	0.11
Tin	9400	<0.50	<0.50	<0.50	<0.50	1	1.2	<0.50	1.1	<0.50	0.51	1.1	<0.50	<0.50	<0.50	<0.50
Titanium	NA	250	260	330	260	210	210	150	170	260	220	140	220	290	260	200
Uranium	23	0.27	0.28	0.36	0.39	0.53	0.54	0.41	1.4	0.31	0.42	0.62	0.24	0.46	0.46	0.19
Vanadium	39	8	8.3	11	13	12	18	9.7	12	12	12	7.8	7.6	14	16	6.5
Yttrium	NA	4.3	4.7	6.1	5.2	7	11	4.8	6	4.3	5.2	3.7	3.9	6.8	7.5	1.7
Zinc	5600	40	47	51	31	140	210	89	34	140	110	13	35	66	92	24

Notes:
Shaded values indicate an exceedance of the Tier 1
criteria

Table B-9 Goldenville Mines - Tier 1 Human Health
Soil Screen, 2018 Data (mg/kg dw)

Metal	Tier 1 Criteria	Sampling Locations															
		G-SFC-2	G-SFC-3	G-SFC-4	G-SFC-5	G-SFC-6	G-SFC-7	G-SFC-8	G-SFC-10	G-SFC-11	G-SFC-12	G-SFC-13	G-SFC-14	G-SFC-15	G-SFC-16	G-SFC-18	
Aluminum	15400	8100	7000	8400	6600	11000	9000	7500	7200	5500	370	7900	5700	6100	9600	6500	
Antimony	7.5	13	1.3	2.8	1.2	1.8	4.5	1.3	2	8.3	240	6.1	11	12	3.3	16	
Arsenic	31	15000	600	2200	550	1800	4500	920	1600	8700	170000	5600	9000	8200	2100	11000	
Barium	10000	48	35	45	28	57	39	32	30	28	13	34	27	29	42	31	
Beryllium	38	0.19	0.18	0.22	0.17	0.33	0.25	0.19	0.21	0.11	0.024	0.2	0.14	0.14	0.27	0.14	
Bismuth	NA	1.4	0.28	0.61	0.24	0.51	0.47	0.33	0.66	1.6	25	1.1	1	0.93	0.72	1.2	
Cadmium	14	0.091	0.05	0.37	0.089	0.16	0.24	0.14	0.67	<0.02	0.16	0.21	0.1	0.077	0.23	0.12	
Calcium	NA	1100	1300	1100	1300	6500	5000	4800	1400	810	38	1800	1300	1000	3400	890	
Chromium	220	12	10	12	100	47	62	65	66	68	13	63	67	67	14	66	
Cobalt	22	3.4	2.5	12	4.2	10	9.7	7.7	9.6	1.4	3	13	5.3	4.4	9.4	4.9	
Copper	1100	7.3	14	32	20	34	35	25	45	3.7	82	33	13	13	36	11	
Iron	11000	37000	17000	27000	16000	28000	26000	19000	22000	27000	160000	27000	25000	24000	26000	28000	
Lead	140	93	16	46	14	28	23	19	39	93	1400	63	47	41	47	48	
Lithium	NA	11	11	12	10	18	14	12	11	8	<2.00	11	8.4	8.7	15	9	
Magnesium	NA	4800	4200	5000	4200	7000	6300	4900	4600	3400	97	5000	3700	3800	6000	4000	
Manganese	NA	210	190	490	190	710	500	400	500	110	9.8	360	190	200	400	200	
Mercury	6.6	2.6	0.1	0.2	0.3	1	0.6	0.4	0.2	0.3	18	1.7	0.7	0.7	1.2	1.1	
Molybdenum	110	1	0.93	1.1	0.74	0.89	0.8	1	1.2	1	2.2	0.61	0.87	1.5	1.1	1.6	
Nickel	330	9.9	9	24	15	28	29	23	41	8.1	5.1	27	13	10	28	11	
Potassium	NA	2500	2100	2600	1700	3400	2600	2100	2200	1700	320	2000	1700	1800	2300	1700	
Selenium	80	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	3.7	<0.70	<0.70	<0.70	<0.70	<0.70	
Silver	77	0.37	0.068	0.15	0.052	0.13	0.12	0.083	0.18	0.31	6.2	0.31	0.23	0.19	0.22	0.25	
Strontium	9400	14	16	15	15	51	57	37	18	11	5.8	27	17	16	31	13	
Sulphur	NA	530	59	180	100	1000	240	610	110	1000	17000	410	840	290	1300	460	
Thallium	1	0.09	0.069	0.1	0.065	0.11	0.11	0.081	0.1	0.066	0.18	0.09	0.072	0.083	0.098	0.088	
Tin	9400	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	<0.50	<0.50	<0.50	
Titanium	NA	230	250	270	250	260	310	270	270	210	120	250	220	210	310	230	
Uranium	23	0.33	0.26	0.33	0.26	0.6	0.42	0.29	0.33	0.2	0.064	0.34	0.24	0.26	0.45	0.29	
Vanadium	39	10	8.1	9.3	7.7	12	10	8.7	8.2	7.8	1.4	9.2	6.9	7.4	12	8	
Yttrium	NA	4	3.8	5.2	4.3	7.1	8.2	5.1	6.5	2.4	0.32	5.4	3.5	3.6	6.5	3.8	
Zinc	5600	31	32	51	35	61	57	48	78	23	11	57	27	27	64	28	

Notes:
Shaded values indicate an exceedance of the Tier 1
criteria

Table B-10 Goldenville Mines - Tier 1 Ecological Soil Screen,
2018 Data (mg/kg dw)

Metal	Tier 1 Criteria		Sampling Locations														
	Soil Contact	Soil and Food Ingestion	G-C1 (0-10cm)	G-C2 (0-5cm)	G-C3 (0-5cm)	G-C4 (0-5cm)	G-C5 (2.5-10cm)	G-C6 (28NOV) (2.5-10cm)	G-C6 (29NOV) (0-7.5cm)	G-C7 (2.5-10cm)	G-C8 (0-5cm)	G-C9 (0-7.5cm)	G-C10 (2.5-10cm)	G-C14 (2.5-10cm)	G-C15 (2.5-10cm)	G-C17 (0-5cm)	G-SFC-1 (0-20cm)
Aluminum	NA	NA	7000	7100	9400	9200	8600	13000	8900	8900	11000	11000	6500	6300	12000	16000	5100
Antimony	20	NA	1.5	1.2	2.6	1.6	15	6.1	2.5	0.96	5	3.2	<0.80	3.2	2.6	2.9	33
Arsenic	17	380	1200	920	2200	3300	15000	8100	1200	53	640	1200	82	2600	1900	2800	31000
Barium	750	400	30	30	36	40	66	110	58	59	40	40	34	33	56	77	34
Beryllium	5	NA	0.17	0.18	0.21	0.25	0.42	0.66	0.36	0.45	0.24	0.29	0.31	0.17	0.33	0.46	0.12
Bismuth	NA	NA	0.38	0.33	0.62	0.34	1.6	1	1.5	0.23	0.81	1.1	0.35	0.3	0.41	0.43	2.6
Cadmium	10	3.8	0.096	0.15	0.12	0.13	0.85	1.1	0.65	0.51	0.36	0.41	0.14	0.1	0.17	0.36	0.09
Calcium	NA	NA	2100	1400	1800	1400	3000	4000	2400	4800	3000	5100	1600	1300	1700	3000	160
Chromium	64	NA	82	86	78	12	100	14	12	9.1	15	14	7.6	80	57	21	8.8
Cobalt	20	NA	5.1	5.1	5.7	7.4	44	35	8.3	6.9	9.1	8.5	2.7	5.1	10	13	1.9
Copper	63	300	20	20	33	18	50	43	25	23	70	65	19	13	26	43	8.6
Iron	NA	NA	18000	19000	27000	34000	67000	85000	24000	12000	32000	28000	12000	19000	28000	33000	48000
Lead	300	70	21	21	36	24	100	85	99	37	55	77	920	18	25	36	170
Lithium	NA	NA	11	11	14	10	12	8.4	14	6.1	21	19	3.5	9.3	18	25	6.5
Magnesium	NA	NA	4500	4400	6000	3000	4200	2800	4900	1800	6200	5700	1200	3700	7700	9900	2800
Manganese	NA	NA	280	190	250	490	1200	3000	320	320	420	520	170	160	290	460	110
Mercury	12	NA	0.3	0.8	1.5	0.4	29	11	29	1.3	2.1	4	20	1.1	1.6	3	6
Molybdenum	40	NA	0.91	0.89	1.1	0.96	1.2	1.2	0.52	0.86	0.77	0.95	1.1	0.65	0.51	0.49	1.3
Nickel	50	355	16	19	20	14	79	55	23	14	32	31	6.7	14	25	29	9
Potassium	NA	NA	1900	1900	2000	1300	1300	1200	1900	840	1700	1500	680	1700	2800	3300	1800
Selenium	1	4.5	<0.70	<0.70	<0.70	<0.70	0.74	1.3	<0.70	1.4	<0.70	<0.70	1	<0.70	<0.70	<0.70	<0.70
Silver	20	NA	0.089	0.07	0.18	0.11	0.59	0.35	0.65	0.29	0.16	0.25	0.27	0.052	0.12	0.19	0.77
Strontium	NA	NA	23	17	20	15	29	35	28	49	35	52	19	17	20	31	3.7
Sulphur	NA	NA	310	760	770	410	8600	2500	1100	3300	850	2200	890	1400	940	2100	1800
Thallium	1.4	1	0.072	0.069	0.088	0.077	0.17	0.21	0.12	0.13	0.13	0.092	0.14	0.058	0.12	0.15	0.11
Tin	5	NA	<0.50	<0.50	<0.50	<0.50	1	1.2	<0.50	1.1	<0.50	0.51	1.1	<0.50	<0.50	<0.50	<0.50
Titanium	NA	NA	250	260	330	260	210	210	150	170	260	220	140	220	290	260	200
Uranium	500	33	0.27	0.28	0.36	0.39	0.53	0.54	0.41	1.4	0.31	0.42	0.62	0.24	0.46	0.46	0.19
Vanadium	130	NA	8	8.3	11	13	12	18	9.7	12	12	12	7.8	7.6	14	16	6.5
Yttrium	NA	NA	4.3	4.7	6.1	5.2	7	11	4.8	6	4.3	5.2	3.7	3.9	6.8	7.5	1.7
Zinc	200	640	40	47	51	31	140	210	89	34	140	110	13	35	66	92	24

Notes:
Shaded values indicate an exceedance of the Tier 1 soil contact
Bolted values indicate an exceedance of the Tier 1 soil and

Table B-10 Goldenville Mines - Tier 1 Ecological Soil Screen,
2018 Data (mg/kg dw)

Metal	Tier 1 Criteria		Sampling Locations														
	Soil Contact	Soil and Food Ingestion	G-SFC-2	G-SFC-3	G-SFC-4	G-SFC-5	G-SFC-6	G-SFC-7	G-SFC-8	G-SFC-10	G-SFC-11	G-SFC-12	G-SFC-13	G-SFC-14	G-SFC-15	G-SFC-16	G-SFC-18
Aluminum	NA	NA	8100	7000	8400	6600	11000	9000	7500	7200	5500	370	7900	5700	6100	9600	6500
Antimony	20	NA	13	1.3	2.8	1.2	1.8	4.5	1.3	2	8.3	240	6.1	11	12	3.3	16
Arsenic	17	380	15000	600	2200	550	1800	4500	920	1600	8700	170000	5600	9000	8200	2100	11000
Barium	750	400	48	35	45	28	57	39	32	30	28	13	34	27	29	42	31
Beryllium	5	NA	0.19	0.18	0.22	0.17	0.33	0.25	0.19	0.21	0.11	0.024	0.2	0.14	0.14	0.27	0.14
Bismuth	NA	NA	1.4	0.28	0.61	0.24	0.51	0.47	0.33	0.66	1.6	25	1.1	1	0.93	0.72	1.2
Cadmium	10	3.8	0.091	0.05	0.37	0.089	0.16	0.24	0.14	0.67	<0.02	0.16	0.21	0.1	0.077	0.23	0.12
Calcium	NA	NA	1100	1300	1100	1300	6500	5000	4800	1400	810	38	1800	1300	1000	3400	890
Chromium	64	NA	12	10	12	100	47	62	65	66	68	13	63	67	67	14	66
Cobalt	20	NA	3.4	2.5	12	4.2	10	9.7	7.7	9.6	1.4	3	13	5.3	4.4	9.4	4.9
Copper	63	300	7.3	14	32	20	34	35	25	45	3.7	82	33	13	13	36	11
Iron	NA	NA	37000	17000	27000	16000	28000	26000	19000	22000	27000	160000	27000	25000	24000	26000	28000
Lead	300	70	93	16	46	14	28	23	19	39	93	1400	63	47	41	47	48
Lithium	NA	NA	11	11	12	10	18	14	12	11	8	<2.00	11	8.4	8.7	15	9
Magnesium	NA	NA	4800	4200	5000	4200	7000	6300	4900	4600	3400	97	5000	3700	3800	6000	4000
Manganese	NA	NA	210	190	490	190	710	500	400	500	110	9.8	360	190	200	400	200
Mercury	12	NA	2.6	0.1	0.2	0.3	1	0.6	0.4	0.2	0.3	18	1.7	0.7	0.7	1.2	1.1
Molybdenum	40	NA	1	0.93	1.1	0.74	0.89	0.8	1	1.2	1	2.2	0.61	0.87	1.5	1.1	1.6
Nickel	50	355	9.9	9	24	15	28	29	23	41	8.1	5.1	27	13	10	28	11
Potassium	NA	NA	2500	2100	2600	1700	3400	2600	2100	2200	1700	320	2000	1700	1800	2300	1700
Selenium	1	4.5	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	3.7	<0.70	<0.70	<0.70	<0.70	<0.70
Silver	20	NA	0.37	0.068	0.15	0.052	0.13	0.12	0.083	0.18	0.31	6.2	0.31	0.23	0.19	0.22	0.25
Strontium	NA	NA	14	16	15	15	51	57	37	18	11	5.8	27	17	16	31	13
Sulphur	NA	NA	530	59	180	100	1000	240	610	110	1000	17000	410	840	290	1300	460
Thallium	1.4	1	0.09	0.069	0.1	0.065	0.11	0.11	0.081	0.1	0.066	0.18	0.09	0.072	0.083	0.098	0.088
Tin	5	NA	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	<0.50	<0.50	<0.50
Titanium	NA	NA	230	250	270	250	260	310	270	270	210	120	250	220	210	310	230
Uranium	500	33	0.33	0.26	0.33	0.26	0.6	0.42	0.29	0.33	0.2	0.064	0.34	0.24	0.26	0.45	0.29
Vanadium	130	NA	10	8.1	9.3	7.7	12	10	8.7	8.2	7.8	1.4	9.2	6.9	7.4	12	8
Yttrium	NA	NA	4	3.8	5.2	4.3	7.1	8.2	5.1	6.5	2.4	0.32	5.4	3.5	3.6	6.5	3.8
Zinc	200	640	31	32	51	35	61	57	48	78	23	11	57	27	27	64	28

Notes:
Shaded values indicate an exceedance of the Tier 1 soil contact
Bolded values indicate an exceedance of the Tier 1 soil and

Table B-11 Goldenville Mines - Tier 2 Human Health Soil Screen, 2018 Data (mg/kg dw)

Metal	Tier 2 Criteria	Sampling Locations														
		G-C1 (0-10cm)	G-C2 (0-5cm)	G-C3 (0-5cm)	G-C4 (0-5cm)	G-C5 (2.5-10cm)	G-C6 (28NOV) (2.5-10cm)	G-C6 (29NOV) (0-7.5cm)	G-C7 (2.5-10cm)	G-C8 (0-5cm)	G-C9 (0-7.5cm)	G-C10 (2.5-10cm)	G-C14 (2.5-10cm)	G-C15 (2.5-10cm)	G-C17 (0-5cm)	G-SFC-1 (0-20cm)
Aluminum	NA	7000	7100	9400	9200	8600	13000	8900	8900	11000	11000	6500	6300	12000	16000	5100
Antimony	NA	1.5	1.2	2.6	1.6	15	6.1	2.5	0.96	5	3.2	<0.80	3.2	2.6	2.9	33
Arsenic	400	1200	920	2200	3300	15000	8100	1200	53	640	1200	82	2600	1900	2800	31000
Cobalt	NA	5.1	5.1	5.7	7.4	44	35	8.3	6.9	9.1	8.5	2.7	5.1	10	13	1.9
Iron	NA	18000	19000	27000	34000	67000	85000	24000	12000	32000	28000	12000	19000	28000	33000	48000
Lead	NA	21	21	36	24	100	85	99	37	55	77	920	18	25	36	170
Mercury	29	0.3	0.8	1.5	0.4	29	11	29	1.3	2.1	4	20	1.1	1.6	3	6

Metal	Tier 2 Criteria	Sampling Locations															
		G-SFC-2	G-SFC-3	G-SFC-4	G-SFC-5	G-SFC-6	G-SFC-7	G-SFC-8	G-SFC-10	G-SFC-11	G-SFC-12	G-SFC-13	G-SFC-14	G-SFC-15	G-SFC-16	G-SFC-18	
Aluminum	NA	8100	7000	8400	6600	11000	9000	7500	7200	5500	370	7900	5700	6100	9600	6500	
Antimony	NA	13	1.3	2.8	1.2	1.8	4.5	1.3	2	8.3	240	6.1	11	12	3.3	16	
Arsenic	400	15000	600	2200	550	1800	4500	920	1600	8700	170000	5600	9000	8200	2100	11000	
Cobalt	NA	3.4	2.5	12	4.2	10	9.7	7.7	9.6	1.4	3	13	5.3	4.4	9.4	4.9	
Iron	NA	37000	17000	27000	16000	28000	26000	19000	22000	27000	160000	27000	25000	24000	26000	28000	
Lead	NA	93	16	46	14	28	23	19	39	93	1400	63	47	41	47	48	
Mercury	29	2.6	0.1	0.2	0.3	1	0.6	0.4	0.2	0.3	18	1.7	0.7	0.7	1.2	1.1	

Notes:
Shaded values indicate an exceedance of the Tier 2 criteria

Table B-12 Goldenville Mines - Tier 2 Ecological Soil Screen, 2018 Data (mg/kg dw)

Metal	Tier 2 Criteria	Sampling Locations														
		G-C1 (0-10cm)	G-C2 (0-5cm)	G-C3 (0-5cm)	G-C4 (0-5cm)	G-C5 (2.5-10cm)	G-C6 (28NOV) (2.5-10cm)	G-C6 (29NOV) (0-7.5cm)	G-C7 (2.5-10cm)	G-C8 (0-5cm)	G-C9 (0-7.5cm)	G-C10 (2.5-10cm)	G-C14 (2.5-10cm)	G-C15 (2.5-10cm)	G-C17 (0-5cm)	G-SFC-1 (0-20cm)
Antimony	NA	1.5	1.2	2.6	1.6	15	6.1	2.5	0.96	5	3.2	<0.80	3.2	2.6	2.9	33
Arsenic	31	1200	920	2200	3300	15000	8100	1200	53	640	1200	82	2600	1900	2800	31000
Chromium	NA	82	86	78	12	100	14	12	9.1	15	14	7.6	80	57	21	8.8
Cobalt	NA	5.1	5.1	5.7	7.4	44	35	8.3	6.9	9.1	8.5	2.7	5.1	10	13	1.9
Copper	NA	20	20	33	18	50	43	25	23	70	65	19	13	26	43	8.6
Lead	NA	21	21	36	24	100	85	99	37	55	77	920	18	25	36	170
Mercury	12	0.3	0.8	1.5	0.4	29	11	29	1.3	2.1	4	20	1.1	1.6	3	6
Nickel	NA	16	19	20	14	79	55	23	14	32	31	6.7	14	25	29	9
Selenium	NA	<0.70	<0.70	<0.70	<0.70	0.74	1.3	<0.70	1.4	<0.70	<0.70	1	<0.70	<0.70	<0.70	<0.70
Zinc	NA	40	47	51	31	140	210	89	34	140	110	13	35	66	92	24

Metal	Tier 2 Criteria	Sampling Locations															
		G-SFC-2	G-SFC-3	G-SFC-4	G-SFC-5	G-SFC-6	G-SFC-7	G-SFC-8	G-SFC-10	G-SFC-11	G-SFC-12	G-SFC-13	G-SFC-14	G-SFC-15	G-SFC-16	G-SFC-18	
Antimony	NA	13	1.3	2.8	1.2	1.8	4.5	1.3	2	8.3	240	6.1	11	12	3.3	16	
Arsenic	31	15000	600	2200	550	1800	4500	920	1600	8700	170000	5600	9000	8200	2100	11000	
Chromium	NA	12	10	12	100	47	62	65	66	68	13	63	67	67	14	66	
Cobalt	NA	3.4	2.5	12	4.2	10	9.7	7.7	9.6	1.4	3	13	5.3	4.4	9.4	4.9	
Copper	NA	7.3	14	32	20	34	35	25	45	3.7	82	33	13	13	36	11	
Lead	NA	93	16	46	14	28	23	19	39	93	1400	63	47	41	47	48	
Mercury	12	2.6	0.1	0.2	0.3	1	0.6	0.4	0.2	0.3	18	1.7	0.7	0.7	1.2	1.1	
Nickel	NA	9.9	9	24	15	28	29	23	41	8.1	5.1	27	13	10	28	11	
Selenium	NA	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	3.7	<0.70	<0.70	<0.70	<0.70	<0.70	
Zinc	NA	31	32	51	35	61	57	48	78	23	11	57	27	27	64	28	

Notes:
Shaded values indicate an exceedance of the Tier 2 criteria

Table B-13 Goldenville Mines - Tier 1 Ecological Sediment Screen, 2018 Data (mg/kg dw)

Metal	Tier 1 Criteria (Freshwater Sediment Values in mg/kg)	Sampling Locations																							
		G-C1 (0-10cm)	G-C2 (0-5cm)	G-C3 (0-5cm)	G-C4 (0-5cm)	G-C5 (2.5-10cm)	G-C6 (28NOV) (2.5-10cm)	G-C6 (29NOV) (0.7-5cm)	G-C7 (2.5-10cm)	G-C8 (0-5cm)	G-C9 (0-7.5cm)	G-C10 (2.5-10cm)	G-C11 (0-7.5cm)	G-C12 (2.5-10cm)	G-C13 (2.5-10cm)	G-C14 (2.5-10cm)	G-C15 (2.5-10cm)	G-C17 (0-5cm)	G-SFC-3	G-SFC-4	G-SFC-5	G-SFC-6	G-SFC-7	G-SFC-15	G-SFC-16
Aluminum	NA	7000	7100	9400	9200	8600	13000	8900	8900	11000	11000	6500	9300	11000	13000	6300	12000	16000	7000	8400	6600	11000	9000	6100	9600
Antimony	25	1.5	1.2	2.6	1.6	15	6.1	2.5	0.96	5	3.2	<0.80	1.6	<0.80	1.8	3.2	2.6	2.9	1.3	2.8	1.2	1.8	4.5	12	3.3
Arsenic	17	1200	920	2200	3300	15000	8100	1200	53	640	1200	82	2400	1500	2100	2600	1900	2800	600	2200	550	1800	4500	8200	2100
Barium	NA	30	30	36	40	66	110	58	59	40	40	34	57	72	73	33	56	77	35	45	28	57	39	29	42
Beryllium	NA	0.17	0.18	0.21	0.25	0.42	0.66	0.36	0.45	0.24	0.29	0.31	0.38	0.45	0.48	0.17	0.33	0.46	0.18	0.22	0.17	0.33	0.25	0.14	0.27
Bismuth	NA	0.38	0.33	0.62	0.34	1.6	1	1.5	0.23	0.81	1.1	0.35	0.6	0.34	0.73	0.3	0.41	0.43	0.28	0.61	0.24	0.51	0.47	0.93	0.72
Cadmium	3.5	0.096	0.15	0.12	0.13	0.85	1.1	0.65	0.51	0.36	0.41	0.14	0.77	0.26	0.46	0.1	0.17	0.36	0.05	0.37	0.089	0.16	0.24	0.077	0.23
Calcium	NA	2100	1400	1800	1400	3000	4000	2400	4800	3000	5100	1600	2100	1700	1800	1300	1700	3000	1300	1100	1300	6500	5000	1000	3400
Chromium	90	82	86	78	12	109	14	12	9.1	15	14	7.6	28	15	17	80	57	21	10	12	100	47	62	67	14
Cobalt	NA	5.1	5.1	5.7	7.4	44	35	8.3	6.9	9.1	8.5	2.7	14	7.5	14	5.1	10	13	2.5	12	4.2	10	9.7	4.4	9.4
Copper	197	20	20	33	18	50	43	25	23	70	65	19	21	12	19	13	26	43	14	32	20	34	35	13	36
Iron	43766	18000	19000	27000	34000	67000	85000	24000	12000	32000	28000	12000	12000	19000	21000	19000	28000	33000	17000	27000	16000	28000	26000	24000	26000
Lead	91.3	21	21	36	24	100	85	99	37	55	77	920	82	21	52	18	25	36	16	46	14	28	23	41	47
Lithium	NA	11	11	14	10	12	8.4	14	6.1	21	19	3.5	6.7	14	16	9.3	18	25	11	12	10	18	14	8.7	15
Magnesium	NA	4500	4400	6000	3000	4200	2800	4900	1800	6200	5700	1200	2600	4800	3700	7700	9900	4200	5000	4200	7000	6300	3800	6000	6000
Manganese	1100	280	190	250	490	1200	3000	320	320	420	520	170	500	390	470	160	290	460	190	490	190	710	500	200	400
Mercury	0.486	0.3	0.8	1.5	0.4	29	11	29	1.3	2.1	4	20	2.1	2.2	2.3	1.1	1.6	3	0.1	0.2	0.3	1	0.6	0.7	1.2
Molybdenum	NA	0.91	0.89	1.1	0.96	1.2	1.2	0.52	0.86	0.77	0.95	1.1	1.3	1.1	1.2	0.65	0.51	0.49	0.93	1.1	0.74	0.89	0.8	1.5	1.1
Nickel	75	16	19	20	14	79	55	23	14	32	31	6.7	14	16	21	14	25	29	9	24	15	28	29	10	28
Potassium	NA	1900	1900	2000	1300	1300	1200	1900	840	1700	1500	680	2200	2700	2900	1700	2800	3300	2100	2600	1700	3400	2600	1800	2300
Selenium	2	<0.70	<0.70	<0.70	<0.70	0.74	1.3	<0.70	1.4	<0.70	<0.70	1	1.7	1.1	0.99	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Silver	1	0.089	0.07	0.18	0.11	0.59	0.35	0.65	0.29	0.16	0.25	0.27	0.22	0.16	0.18	0.052	0.12	0.19	0.068	0.15	0.052	0.13	0.12	0.19	0.22
Strontium	NA	23	17	20	15	29	35	28	49	35	52	19	22	19	20	17	20	31	16	15	15	51	57	16	31
Sulphur	NA	310	760	770	410	8500	2500	1100	3300	850	2200	890	3500	1600	2100	1400	940	2100	35	180	100	1000	240	290	1300
Thallium	NA	0.072	0.069	0.088	0.077	0.17	0.21	0.12	0.13	0.13	0.092	0.14	0.18	0.11	0.15	0.058	0.12	0.15	0.069	0.11	0.065	0.11	0.11	0.083	0.099
Tin	NA	<0.50	<0.50	<0.50	<0.50	1	1.2	<0.50	1.1	<0.50	0.51	1.1	1.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Titanium	NA	250	260	330	260	210	210	150	170	260	220	140	190	170	210	220	290	260	250	270	250	260	310	210	310
Uranium	NA	0.27	0.28	0.36	0.39	0.53	0.54	0.41	1.4	0.31	0.42	0.62	0.49	0.55	0.56	0.24	0.46	0.46	0.26	0.33	0.26	0.6	0.42	0.26	0.45
Vanadium	NA	8	8.3	11	13	12	18	9.7	12	12	12	7.8	16	11	13	7.6	14	16	8.1	9.3	7.7	12	10	7.4	12
Yttrium	NA	4.3	4.7	6.1	5.2	7	11	4.8	6	4.3	5.2	3.7	7.1	6.4	7	3.9	6.8	7.5	3.8	5.2	4.3	7.1	8.2	3.6	6.5
Zinc	315	40	47	51	31	140	210	89	34	140	110	13	53	61	67	35	66	92	32	51	35	61	57	27	64

Notes:
Shaded values indicate an exceedance of the Tier 1 criteria

Table B-14 Total Metals Screening Against NS Tier 1 Guidelines - Goldenville 2018 Data

Goldenville	ERA Surface Water Tier 1 Screening Criteria (Freshwater Surface Water Values in mg/L)		COPC?	Surface Water - Along Gogegan Brook to Gogegan Lake									
	Maxim ID	Sampling Date		COCC Number	Sample ID	UZ2896	UZ2893	UZ2894	UZ2895	UZ2891	UZ2898	UZ2890	UZ2887	UZ2886	UZ2885
Maxim ID	--	--	--	UZ2896	UZ2893	UZ2894	UZ2895	UZ2891	UZ2898	UZ2890	UZ2887	UZ2886	UZ2885
Sampling Date	--	--	--	2018/11/27	2018/11/27	2018/11/27	2018/11/27	2018/11/29	2018/11/29	2018/11/29	2018/11/28	2018/11/28	2018/11/28
COCC Number	--	--	--	B8X4697-M058-02-01	B8X4697-M058-02-01	B8X4697-M058-02-01	B8X4697-M058-02-01	B8X4697-M058-02-01	B8X4697-M058-02-01	B8X4697-M058-02-01	B8X4697-M058-01-01	B8X4697-M058-01-01	B8X4697-M058-01-01
Sample ID	--	--	--	G-P24	G-P21	G-P22	G-P23	G-SW16	G-SW14	G-SW15	G-SW13	G-SW12	G-SW11
Notes	Note 1 - Sample Type -- Note 2 - Location Context -- Surface Water Ponded area. Upstream of Tailings. East of rock dam. Surface Water Sampled Gogegan Brook. Southeast of tailings area. Surface Water Sampled Gogegan Brook. Just southwest of the exposed tailings area. Surface Water Side channel of Gogegan Brook. Further downstream of exposed tailings area. Surface Water Sampled Gogegan Brook. Further downstream. Surface Water Sampled Gogegan Brook. Further downstream. Surface Water At Gogegan Brook. Furthest reach sampled from the main site. Surface Water Gogegan Lake. Furthest upstream. Surface Water Gogegan Lake. Central location. Surface Water Gogegan Lake, near highway.												
Field Data	--	--	--	6.87	5.07	5.42	6.59	7.76	7.04	6.83	4.92	N/A	4.72
Field pH	--	--	--	34	50	59	176	30	47	45	35	N/A	38
Field EC	--	--	--	0.3	2	2.2	0.8	0.5	1.1	0.9	N/A	3.7	
Field Temp	--	--	--	45.121996	45.12183096	45.12188302	45.12154103	45.12174396	45.12157079	45.118683	45.07952778	45.07847222	45.08256946
Latitude	--	--	--	-62.01568597	-62.016598	-62.01805604	-62.01943503	-62.02045999	-62.02362688	-62.02648999	-62.02694444	-62.03416567	-61.99973647
Longitude	--	--	--										
Lab Results													
Total Hardness (CaCO3)	mg/L	NG		4.81	6.43	10.6	72.3	9.98	8.86	9.4	4.38	4.55	3.61
Total Mercury (Hg)	mg/L	0.000026	Yes	0.00002	0.00002	0.00002	0.000339	0.000331	0.000395	0.00002	0.00002	0.00002	0.00002
Total Aluminum (Al)	mg/L	0.005	Yes	0.289	0.253	0.3	1.4	0.318	0.187	0.199	0.19	0.226	0.282
Total Antimony (Sb)	mg/L	0.02		0.000069	0.000136	0.000161	0.0016	0.000303	0.000527	0.000229	0.000055	0.000059	0.000033
Total Arsenic (As)	mg/L	0.005	Yes	0.027	0.0721	0.0995	16.4	0.262	0.358	0.138	0.0382	0.0364	0.0128
Total Barium (Ba)	mg/L	1		0.00251	0.00254	0.00253	0.0437	0.00259	0.00291	0.00194	0.00202	0.00226	0.00215
Total Beryllium (Be)	mg/L	0.0053		0.000012	0.000018	0.000014	0.000014	0.000021	0.00001	0.000012	0.00001	0.000012	0.000011
Total Bismuth (Bi)	mg/L	NG		0.00001	0.00001	0.00001	0.00005	0.000017	0.00001	0.00001	0.00001	0.00001	0.00001
Total Boron (B)	mg/L	1.2		0.01	0.01	0.01	0.5	0.01	0.01	0.01	0.01	0.01	0.01
Total Cadmium (Cd)	mg/L	0.00001	Yes	0.0000168	0.0000259	0.0000354	0.0003	0.0000237	0.000023	0.0000179	0.0000141	0.0000158	0.0000155
Total Chromium (Cr)	mg/L	NG		0.00034	0.00028	0.00033	0.005	0.00038	0.00019	0.00018	0.00019	0.00021	0.00024
Total Cobalt (Co)	mg/L	0.01		0.000428	0.000597	0.00144	0.00896	0.000908	0.000457	0.000716	0.000256	0.000314	0.000653
Total Copper (Cu)	mg/L	0.002	Yes	0.008	0.00191	0.00127	0.0126	0.00165	0.00273	0.00129	0.00035	0.00041	0.00038
Total Iron (Fe)	mg/L	0.3	Yes	0.518	0.7	1.04	80	0.866	0.363	0.377	0.445	0.484	0.418
Total Lead (Pb)	mg/L	0.001	Yes	0.000591	0.000656	0.000775	0.0132	0.00153	0.000386	0.000368	0.000237	0.000278	0.000387
Total Lithium (Li)	mg/L	NG											
Total Manganese (Mn)	mg/L	0.82	Yes	0.0492	0.0595	0.105	2.01	0.0583	0.0309	0.0585	0.0584	0.0691	0.0636
Total Molybdenum (Mo)	mg/L	0.073		0.00005	0.00005	0.00008	0.0025	0.000061	0.000102	0.00005	0.00005	0.00005	0.00005
Total Nickel (Ni)	mg/L	0.025		0.00091	0.00139	0.00324	0.0241	0.00205	0.00218	0.00166	0.00057	0.00069	0.00048
Total Selenium (Se)	mg/L	0.001		0.00007	0.000069	0.000068	0.002	0.000067	0.000056	0.000052	0.000069	0.000074	0.00006
Total Silicon (Si)	mg/L	NG		1.63	1.64	1.76	5.3	1.45	1.28	1.39	1.39	1.33	1.55
Total Silver (Ag)	mg/L	0.0001	Yes	0.00001	0.00001	0.00001	0.00005	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Total Strontium (Sr)	mg/L	21		0.0031	0.0129	0.0225	0.216	0.0199	0.0182	0.0192	0.00881	0.00728	0.00923
Total Thallium (Tl)	mg/L	0.0008		0.0000039	0.0000037	0.0000043	0.0001	0.0000047	0.0000027	0.0000003	0.0000022	0.0000028	0.0000027
Total Tin (Sn)	mg/L	NG		0.0002	0.0002	0.0002	0.01	0.0002	0.0002	0.0002	0.0002	0.0002	0.00032
Total Titanium (Ti)	mg/L	NG		0.0063	0.003	0.0031	0.1	0.0075	0.0024	0.0024	0.002	0.0023	0.0034
Total Uranium (U)	mg/L	0.3		0.0000096	0.0000091	0.000015	0.00025	0.0000108	0.0000082	0.0000007	0.0000067	0.0000081	0.0000083
Total Vanadium (V)	mg/L	0.006	Yes	0.00032	0.00027	0.00025	0.01	0.00038	0.0002	0.0002	0.0002	0.0002	0.00022
Total Zinc (Zn)	mg/L	0.03	Yes	0.0036	0.0045	0.0063	0.05	0.0056	0.0051	0.0042	0.002	0.0029	0.0022
Total Zirconium (Zr)	mg/L	NG		0.0001	0.00016	0.0001	0.005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Total Calcium (Ca)	mg/L	NG		1.17	1.78	3.19	29	2.96	2.85	3.05	1.05	1.08	0.79
Total Magnesium (Mg)	mg/L	NG		0.46	0.48	0.64	13	0.63	0.55	0.63	0.43	0.45	0.4
Total Potassium (K)	mg/L	NG		0.25	0.25	0.25	13	0.31	0.33	0.3	0.25	0.25	0.25
Total Sodium (Na)	mg/L	NG		6.88	5.97	6.32	19	4.52	4.3	4.13	3.51	3.82	3.4
Total Phosphorus	mg/L	NG		0.0117	0.0102	0.0122	0.28	0.0202	0.0091	0.0102	0.0101	0.0093	0.0084
Total Sulphur	mg/L	NG		0.6	0.7	1.68	30	1.17	1.26	1.2	0.6	0.6	0.6

Goldenville		ERA Surface Water Tier 1 Screening Criteria (Freshwater Surface Water Values in mg/L)	COPC?	NE Zone			NW Zone				
Maxsam ID				UZ2879	UZ2880	UZ2892	UZ2954	UZ2881	UZ2882	UZ2883	UZ2884
Sampling Date	--			2018/11/28	2018/11/28	2018/11/30	2018/11/28	2018/11/29	2018/11/29	2018/11/29	2018/11/29
COC Number	--			BBX4697-M058-01-01	BBX4697-M058-01-01	BBX4697-M058-02-01	BBX6196-M058-01-01	BBX4697-M058-01-01	BBX4697-M058-01-01	BBX4697-M058-01-01	BBX4697-M058-01-01
Sample ID	--			G-SW5	G-SW6 (NE-Nav28)	G-SW11	G-SW6 (NW-Nav29)	G-SW7	G-SW8	G-SW9	G-SW10
Notes											
Note 1 - Sample Type	--			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Note 2 - Location Context	--			Northwest zone, Southwest location.	Northwest zone, Central location.	Northwest zone, Northeast location.	Northwest zone, Tailings Pad.	Northwest zone, Possible (?) Tailings Pad.	Northwest zone, Start (Northeast) of large tailings pad.	Northwest zone, Further (downgradient along large tailings pad).	Northwest zone, Outlet of large tailings pad. Near roadway.
Field Data											
Field pH	--			6.04	7.02	6.9	6.51	6.09	6.99	7.18	6.71
Field EC	uS/cm	--		73	51	45	91	67	58	44	31
Field Temp	Celsius	--		2.5	2.1	2.9	5.2	2.5	0.3	0.4	0.4
Latitude	--			45.12597959	45.12626801	45.12692297	45.12573917	45.12685298	45.12671602	45.12589401	45.12453203
Longitude	--			-61.98875265	-61.98997299	-61.99020197	-62.02049048	-62.02127502	-62.02365297	-62.02529398	-62.02733698
Lab Results											
Total Hardness (CaCO3)	mg/L	NG		12	12.6	7.39	30.6	5.97	16.2	15.2	7.53
Total Mercury (Hg)	mg/L	0.000026	Yes	0.000045	0.000028	0.00003	0.00002	0.00002	0.00002	0.000049	0.00002
Total Aluminum (Al)	mg/L	0.005	Yes	0.013	0.133	0.166	0.196	0.341	0.0358	0.297	0.207
Total Antimony (Sb)	mg/L	0.02		0.000354	0.000173	0.00018	0.000272	0.000042	0.000249	0.000191	0.00007
Total Arsenic (As)	mg/L	0.005	Yes	0.13	0.0883	0.124	0.0303	0.0018	0.0129	0.0883	0.0125
Total Barium (Ba)	mg/L	1		0.0068	0.00283	0.0022	0.00299	0.00254	0.0009	0.00219	0.00214
Total Beryllium (Be)	mg/L	0.0053		0.000011	0.00001	0.000011	0.000029	0.000017	0.00001	0.000014	0.000011
Total Bismuth (Bi)	mg/L	NG		0.00001	0.00001	0.00001	0.000018	0.00001	0.00001	0.000016	0.00001
Total Boron (B)	mg/L	1.2		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Cadmium (Cd)	mg/L	0.00001	Yes	0.0000167	0.000005	0.0000139	0.000005	0.0000158	0.000005	0.0000136	0.000008
Total Chromium (Cr)	mg/L	NG		0.00026	0.00017	0.00022	0.00024	0.00034	0.0001	0.00031	0.00021
Total Cobalt (Co)	mg/L	0.01		0.000227	0.000088	0.000088	0.000883	0.000153	0.000035	0.000609	0.000191
Total Copper (Cu)	mg/L	0.002	Yes	0.00089	0.00119	0.00128	0.00073	0.00082	0.00157	0.0019	0.00051
Total Iron (Fe)	mg/L	0.3	Yes	0.515	0.28	0.21	1.13	0.24	0.0788	2.78	0.351
Total Lead (Pb)	mg/L	0.001	Yes	0.000353	0.000193	0.000121	0.00186	0.000405	0.000072	0.00191	0.000123
Total Lithium (Li)	mg/L	NG					0.00085				
Total Manganese (Mn)	mg/L	0.82		0.0651	0.0258	0.0113	0.314	0.0205	0.0029	0.107	0.0493
Total Molybdenum (Mo)	mg/L	0.073		0.00005	0.00005	0.00005	0.000106	0.00005	0.00005	0.000072	0.00005
Total Nickel (Ni)	mg/L	0.025		0.00223	0.00085	0.00137	0.00233	0.0007	0.00076	0.00131	0.0005
Total Selenium (Se)	mg/L	0.001		0.000074	0.000062	0.00007	0.000063	0.00007	0.00004	0.000066	0.000063
Total Silicon (Si)	mg/L	NG		1.77	1.74	1.28	1.75	1.31	1.02	1.37	1.16
Total Silver (Ag)	mg/L	0.0001		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Total Strontium (Sr)	mg/L	21		0.0246	0.0259	0.0156	0.0782	0.0117	0.0345	0.0026	0.0159
Total Thallium (Tl)	mg/L	0.0008		0.0000055	0.0000031	0.0000031	0.0000037	0.0000052	0.000002	0.0000062	0.0000034
Total Tin (Sn)	mg/L	NG		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Total Titanium (Ti)	mg/L	NG		0.002	0.002	0.002	0.0021	0.0021	0.002	0.0048	0.002
Total Uranium (U)	mg/L	0.3		0.0000169	0.0000104	0.0000072	0.0000089	0.0000131	0.0000078	0.0000247	0.0000113
Total Vanadium (V)	mg/L	0.006		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.00037	0.0002
Total Zinc (Zn)	mg/L	0.03		0.0055	0.0012	0.0019	0.0013	0.0016	0.001	0.0029	0.002
Total Zirconium (Zr)	mg/L	NG		0.0001	0.0001	0.0001	0.00021	0.0001	0.0001	0.0001	0.0001
Total Calcium (Ca)	mg/L	NG		3.78	4.05	2.21	8.36	1.49	4.23	3.92	1.86
Total Magnesium (Mg)	mg/L	NG		0.62	0.6	0.46	2.37	0.54	1.37	1.32	0.7
Total Potassium (K)	mg/L	NG		0.51	0.39	0.25	0.63	0.25	0.31	0.51	0.25
Total Sodium (Na)	mg/L	NG		9.22	4.45	3.54	3.39	2.74	2.22	2.61	2.77
Total Phosphorus	mg/L	NG		0.0083	0.0066	0.0072		0.0065	0.005	0.0342	0.0072
Total Sulfur	mg/L	NG		1.72	1.19	0.6		0.6	1.05	0.94	0.61

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

Goldenville	ERA Surface Water Tier 1 Screening Criteria (Freshwater Surface Water Values in mg/L)		COPC?	Background (Gegogon Lake, Furthest upstream) (mg/L)	Above Background?	Exceeds CCME adjusted guideline?	95th Percentile (main surface water excluding background)	Surface Water - Along Gegogon Brook to Gegogon Lake											
	Maximum ID	Sampling Date						COC Number	Sample ID	UZ2896	UZ2893	UZ2894	UZ2895	UZ2891	UZ2888	UZ2890	UZ2895	UZ2885	UZ2887
Maximum ID	...	...	...	...	...	...	...	UZ2896	UZ2893	UZ2894	UZ2895	UZ2891	UZ2888	UZ2890	UZ2895	UZ2885	UZ2887
Sampling Date	...	...	...	...	...	...	...	20181127	20181127	20181127	20181127	20181129	20181129	20181129	20181129	20181129	20181129
COC Number	...	...	...	...	...	...	...	BX4697-M058-02-01	BX4697-M058-02-01	BX4697-M058-02-01	BX4697-M058-02-01	BX4697-M058-02-01	BX4697-M058-02-01	BX4697-M058-02-01	BX4697-M058-02-01	BX4697-M058-02-01	BX4697-M058-02-01
Sample ID	...	...	...	...	...	...	...	G-P24	G-P21	G-P22	G-P23	G-SW 16	G-SW 14	G-SW 15	G-SW 12	G-SW 11	G-SW 13
Notes	Note 1 - Sample Type: ... Note 2 - Location Context: ...																		
Field Data	Field pH	...	...	...	...	...	...	6.87	5.97	5.42	6.59	7.76	7.04	6.83	N/A	4.72	4.92
Field EC	...	...	...	...	...	...	...	34	59	176	39	47	...	...	...	...	...
Field Temp	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Latitude	...	...	...	...	...	...	...	45.121938	45.12183205	45.12183202	45.12184303	45.12174396	45.12197079	45.1185	45.0264648	45.0262778	45.0262778
Longitude	...	...	...	...	...	...	...	-82.0156497	-82.015658	-82.01805404	-82.01843603	-82.02204599	-82.02202858	-82.02484999	-82.02416667	-81.99973547	-82.00844444
Lab Results	Total Hardness (CaCO3)	mg/L	NO	4.38	Yes		95th Percentile	4.81	6.43	10.6	72.3	2.90	8.86	2.4	4.55	3.61	4.38		
Total Mercury (Hg)	mg/L	0.00026	Yes	0.00022	Yes		0.0002178	0.0002	0.0002	0.0002	0.000339	0.000371	0.00036	0.00022	0.0002	0.0002	0.0002		
Total Aluminum (Al)	mg/L	0.009	Yes	0.19	Yes		0.002	0.291	0.453	0.4	1.4	0.218	0.187	0.159	0.228	0.26	0.19		
Aluminum (CCME FAL guideline)	mg/L	0.005	Yes	0.19	Yes		0.002	0.291	0.453	0.4	1.4	0.218	0.187	0.159	0.228	0.26	0.19		
Total Arsenic (As)	mg/L	0.005	Yes	0.0392	Yes		0.001332	0.007	0.0241	0.0598	18.4	0.262	0.358	0.138	0.0394	0.0129	0.0392		
Total Cadmium (Cd)	mg/L	0.0001	Yes	0.000141	Yes		0.00013416	0.000118	0.000149	0.000164	0.0003	0.000227	0.000262	0.000172	0.000158	0.000145	0.000141		
Cadmium (CCME calculated long-term guideline)	mg/L	0.002	Yes	0.00035	Yes		0.0002	0.0004	0.0004	0.0004	0.00112	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004		
Copper (CCME calculated long-term guideline)	mg/L	0.002	Yes	0.0025	Yes		0.0002	0.008	0.0044	0.0072	0.015	0.014	0.0022	0.002	0.002	0.002	0.002		
Total Iron (Fe)	mg/L	0.3	Yes	0.445	Yes		0.00132	0.018	0.1	0.42	0.81	0.86	0.303	0.077	0.484	0.418	0.445		
Total Lead (Pb)	mg/L	0.001	Yes	0.00027	Yes		0.000332	0.00051	0.00055	0.000775	0.00132	0.0013	0.00056	0.00029	0.00037	0.00037	0.00027		
Lead (CCME calculated guideline)	mg/L	0.02	Yes	0.0084	Yes		0.001	0.001	0.001	0.001	0.00111	0.001	0.001	0.001	0.001	0.001	0.001		
Total Manganese (Mn)	mg/L	0.02	Yes	0.0084	Yes		1.248	0.042	0.056	0.108	2.91	0.0503	0.054	0.051	0.053	0.053	0.054		
Total Selenium (Se)	mg/L	0.001	Yes	0.00069	Yes		0.001232	0.00007	0.00069	0.00068	0.002	0.00067	0.00056	0.00052	0.00074	0.00068	0.00069		
Total Silver (Ag)	mg/L	0.0001	Yes	0.00001	Yes		0.000004	0.00001	0.00001	0.00001	0.00009	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001		
Total Vanadium (V)	mg/L	0.006	Yes	0.002	Yes		0.000352	0.00032	0.00027	0.00025	0.01	0.00028	0.0002	0.0002	0.0002	0.0002	0.0002		
Total Zinc (Zn)	mg/L	0.03	Yes	0.002	Yes		0.00232	0.0036	0.0045	0.0063	0.05	0.0056	0.0051	0.0042	0.0028	0.0022	0.002		

Goldenville	ERA Surface Water Tier 1 Screening Criteria (Freshwater Surface Water Values in mg/L)		COPC?	NE Zone				NW Zone			
	Maximum ID	Sampling Date		UZ2879	UZ2880	UZ2882	UZ2884	UZ2881	UZ2882	UZ2883	UZ2884
Maximum ID	...	...	...	...	...	...	...	...	...	...	...
Sampling Date	...	...	...	...	...	...	...	...	...	...	...
COC Number	...	...	...	...	...	...	...	...	...	...	...
Sample ID	...	...	...	...	...	...	...	...	...	...	...
Notes	Note 1 - Sample Type: ... Note 2 - Location Context: ...										
Field Data	Field pH	...	...	6.04	7.02	6.9	6.91	6.09	6.99	7.18	6.71
Field EC	...	...	...	73	51	45	91	67	58	44	31
Field Temp	...	...	...	2.5	2.1	2.9	2.5	2.5	3.3	0.4	0.4
Latitude	...	...	...	45.12697959	45.12629001	45.12632937	45.1257397	45.12685298	45.12671662	45.12694801	45.12652003
Longitude	...	...	...	-81.9907295	-81.9902197	-81.9902197	-82.0217502	-82.0217502	-82.0217502	-82.0217502	-82.0217502
Lab Results	Total Hardness (CaCO3)	mg/L	NO	12	12.8	7.39	30.6	8.37	16.2	15.2	7.53
Total Mercury (Hg)	mg/L	0.00026	Yes	0.000245	0.00028	0.00033	0.00032	0.00032	0.00049	0.00049	0.00052
Total Aluminum (Al)	mg/L	0.005	Yes	0.213	0.135	0.186	0.186	0.341	0.058	0.287	0.207
Aluminum (CCME FAL guideline)	mg/L	0.005	Yes	0.006	0.1	0.1	0.1	0.006	0.1	0.1	0.1
Total Arsenic (As)	mg/L	0.005	Yes	0.13	0.0882	0.124	0.0303	0.0018	0.0225	0.0883	0.0125
Total Cadmium (Cd)	mg/L	0.0001	Yes	0.000119	0.00005	0.000139	0.00005	0.00005	0.00004	0.00004	0.00005
Cadmium (CCME calculated long-term guideline)	mg/L	0.002	Yes	0.000289	0.00004	0.00026	0.00006	0.00004	0.00004	0.00004	0.00004
Copper (CCME calculated long-term guideline)	mg/L	0.002	Yes	0.00089	0.00119	0.00126	0.00073	0.00082	0.00157	0.0019	0.00061
Total Iron (Fe)	mg/L	0.3	Yes	0.015	0.28	0.21	1.13	0.24	0.078	2.76	0.51
Total Lead (Pb)	mg/L	0.001	Yes	0.000353	0.000193	0.000123	0.00046	0.00046	0.000372	0.000381	0.000123
Lead (CCME calculated guideline)	mg/L	0.02	Yes	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Manganese (Mn)	mg/L	0.02	Yes	0.0061	0.0113	0.0113	0.314	0.0205	0.0209	0.107	0.0488
Total Selenium (Se)	mg/L	0.001	Yes	0.00074	0.00062	0.00007	0.00063	0.00007	0.00004	0.00006	0.00003
Total Silver (Ag)	mg/L	0.0001	Yes	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Total Vanadium (V)	mg/L	0.006	Yes	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Total Zinc (Zn)	mg/L	0.03	Yes	0.0055	0.0012	0.0019	0.0013	0.0016	0.0029	0.0029	0.002

Exceeds Tier 1 Screen
 Exceeds Background
 Exceeds Tier 1 & Background
 CCME adjusted guideline
 Adjusted CCME guideline Exceeded



APPENDIX C

Detailed Data Assessment



GOLDENVILLE MINE TAILINGS AREAS – FIELD REPORT

Report prepared for:

Nova Scotia Lands
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18-2525
July 2019



GOLDENVILLE MINE TAILINGS AREAS – FIELD REPORT

A handwritten signature in black ink, appearing to read "D. Skruch", written over a light gray rectangular background.

Daniel Skruch, M.Eng.
Principal Investigator

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Sarah Barabash, Ph.D.
Project Manager

A handwritten signature in black ink, appearing to read "R. Nicholson", written over a light gray rectangular background.

R.V. (Ron) Nicholson, Ph.D., P.Geo.
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TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION.....	1.1
1.1 Site Background and Historical Tailings and Groundwater Characterization	1.1
1.1.1 Mining and Tailings Production	1.3
1.2 Objectives and Scope of Work	1.4
2.0 FIELD PROGRAM AND METHODS	2.1
2.1 Surface Water Sampling.....	2.1
2.2 Shallow Subsurface Water Sampling	2.5
2.3 Surficial Solids Sampling	2.7
2.4 Core Sampling.....	2.12
2.5 Porewater	2.14
3.0 RESULTS	3.1
3.1 Solids Contents	3.1
3.1.1 Acid Base Accounting	3.1
3.1.2 Arsenic and Mercury Contents in the Tailings Solids	3.6
3.1.3 Surface Water – Arsenic and Mercury	3.12
3.1.4 Porewater – Arsenic and Mercury Concentrations in Porewater.....	3.18
3.1.5 Piezometers - Shallow Subsurface Water	3.24
4.0 DISCUSSION.....	4.1
5.0 CONCLUSIONS.....	5.1
6.0 REFERENCES.....	6.1
Appendix A Solids Results	
Appendix B Surface Water/Standing Water Results	
Appendix C Porewater Results	
Appendix D Laboratory Certificates of Analysis	

LIST OF TABLES

Table 2-1: Surface Water Quality Measurements.....	2.2
Table 2-2: Goldenville – Piezometer Installation Details.....	2.5
Table 2-3: Rinse pH and Conductivity (EC) in Surficial Solids Samples.....	2.9
Table 2-4: Goldenville – Core Sample Depths.....	2.12
Table 3-1: Goldenville Tailings Areas – Classification of Acid Generation Status	3.3
Table 3-2: Surface Water: Total and Dissolved Arsenic and Mercury	3.13
Table 3-3: Inorganic and Organic Arsenic in Porewater	3.19
Table 3-4: Shallow Subsurface Water: Dissolved Arsenic and Mercury	3.24

LIST OF FIGURES

Figure 1-1: Location of Goldenville Mines.....	1.2
Figure 1-2: Goldenville Gold Mines – Study Area.....	1.3
Figure 1-3: Goldenville Gold Mines – Study Area and Historical Tailings.....	1.6
Figure 2-1a: Goldenville Tailings Areas – Main Site Surface Water Sampling Locations..	2.3
Figure 2-2: Goldenville Tailings Areas – Piezometer Locations	2.6
Figure 2-3: Goldenville Tailings Areas – Surficial Solids Sampling Locations	2.8
Figure 2-4: Goldenville Tailings Areas – Surficial Solids Rinse pH.....	2.10
Figure 2-5 Goldenville Tailings Areas – Waste Rock Sampling Locations	2.11
Figure 2-6a: Goldenville Tailings Areas – Main Site Core Sampling Locations.....	2.13
Figure 3-1: Goldenville Tailings Areas – Carb-NP vs. Modified Sobek-NP	3.2
Figure 3-2: Goldenville Tailings Areas – Carb-NP/AP vs. Sulphide.....	3.2
Figure 3-3a: Goldenville Main Tailings Areas – Carb-NPR.....	3.4
Figure 3-4: Goldenville Tailings Areas – Near-Surface Arsenic Contents – All Locations .	3.7
Figure 3-5: Goldenville Tailings Areas – Near-Surface Arsenic Contents – Central Region	3.8
Figure 3-6: Goldenville Tailings Areas – Near-Surface Mercury Contents – All Locations	3.10
Figure 3-7: Goldenville Tailings Areas – Near-Surface Mercury Contents – Central Region	3.11
Figure 3-8a: Goldenville Tailings Areas – Surface Water Total Arsenic Concentrations, Central Region.....	3.14
Figure 3-9a: Goldenville Tailings Areas – Surface Water Total Mercury Concentrations, Central Region.....	3.16
Figure 3-10a: Goldenville Tailings Areas – Maximum Porewater Arsenic Concentrations – Central Region.....	3.20
Figure 3-11a: Goldenville Tailings Areas – Maximum Porewater Mercury Concentrations – Central Region.....	3.22
Figure 3-12: Goldenville Tailings Areas – Mini Piezometer Locations.....	3.25
Figure 3-13: Goldenville Tailings Areas – G-Pz1 Arsenic Chemistry.....	3.26
Figure 3-14: Goldenville Tailings Areas – G-Pz2 Arsenic Chemistry.....	3.27
Figure 3-15: Goldenville Tailings Areas – G-Pz3 Arsenic Chemistry.....	3.27
Figure 3-18: Goldenville Tailings Areas – G-Pz3 Arsenic Chemistry.....	3.28
Figure 4-1: Goldenville Tailings Areas – Sulphide vs. Arsenic Contents in Tailings and Sediments (Sulphide Less than 0.6% and Arsenic Content Less than 20,000 mg/kg).....	4.2
Figure 4-2: Goldenville Tailings Areas – Iron vs. Arsenic Contents in Tailings and Sediments (Iron Less than 100,000 mg/kg and Arsenic Content Less than 50,000 mg/kg)	4.3

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 Goldenville Mine site.

The Goldenville Mine was an historic gold mining operation that involved several different mines with a variety of 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 Goldenville in 1862. Mining was carried out continuously from 1862 to 1941 (Parsons et al., 2012). Ore was milled on-site, using a variety of stamp mills with mercury amalgamation. There were as many as 19 different mining companies operating at this site at the same time. This site produced over 540,617 tonnes of crushed ore, and 210,153 ounces of gold (Drage, 2015). Goldenville was the most productive of all of the total 64 abandoned historic gold mining districts across Nova Scotia. 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 Goldenville Mines tailings locations are close to residential areas and have been used, and in some cases, continue to be used for recreational purposes, despite noticeable 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 Goldenville gold district is located in the community of Goldenville, Guysborough County, Nova Scotia. **Figure 1-1** provides the location of Goldenville Mines, while **Figure 1-2** provides a closer view of the Goldenville Mine site, with Crown lands identified. In **Figure 1-2**, the main tailings area is clearly identified, as well as several more distant tailings areas which are part of the current scope of this project.

This report focuses on the main tailings area at Goldenville Mines, since all previous studies in this historic mining district have been conducted only in this area. The main tailings area appears as a dry area, which descends into an open wetland and Gegogan Brook, with tailings distributed throughout the wetland and are visible on the floodplain for at least 6 km downstream (Wong et al, 1999).

There has been considerable geochemical characterization of the main tailings area and surrounding soils present at this site, with arsenic concentrations ranging up to 200,000 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 from up to 48 mg/kg in the main tailings (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). Geochemical characterization of soil samples between the main tailings areas and nearby residential properties was also conducted, and arsenic concentrations ranged from 12 mg/kg to 9,600 mg/kg, with mercury ranging from 0.02 mg/kg up to 20 mg/kg. (C. J. McLellan and Associates, 2009).

Groundwater data collected as part of the C.J. McLellan and Associates (2009) study within the 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 concentrations exceeded the drinking water quality guideline of 10 µg/L, and ranged up to 96 µg/L.

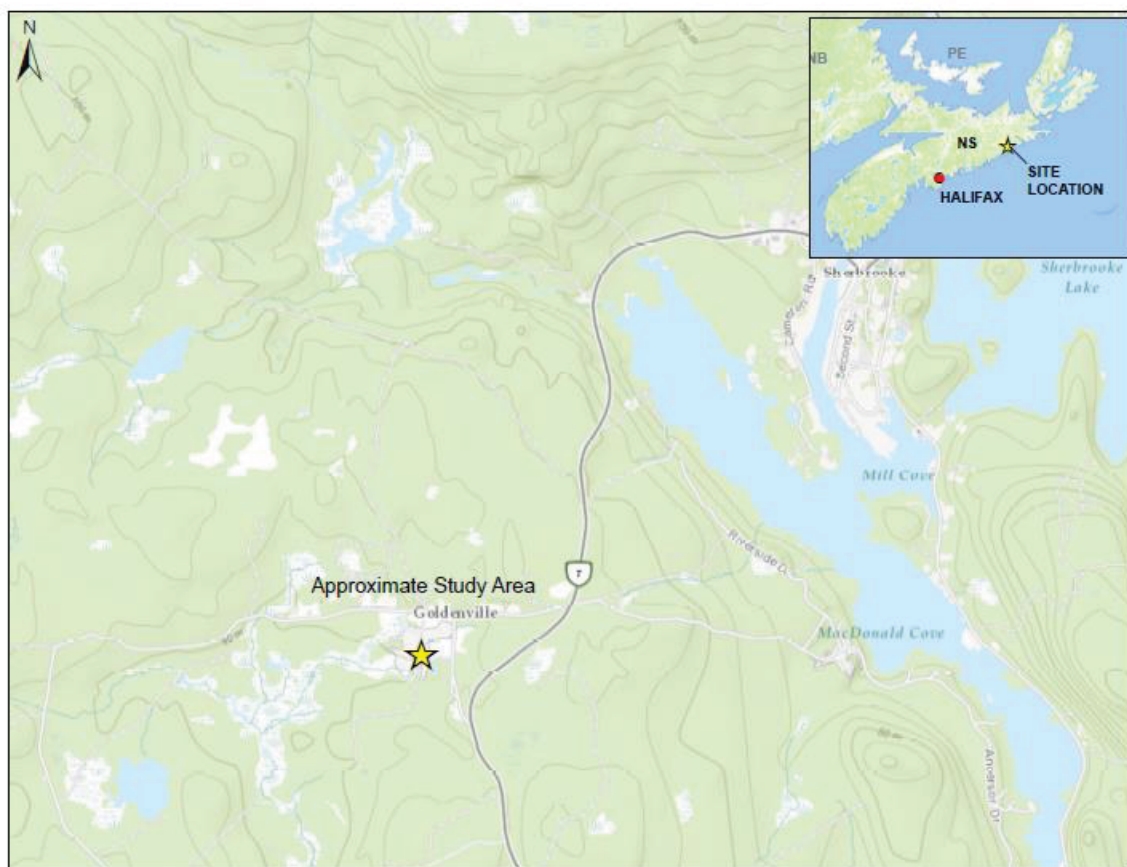


Figure 1-1: Location of Goldenville Mines

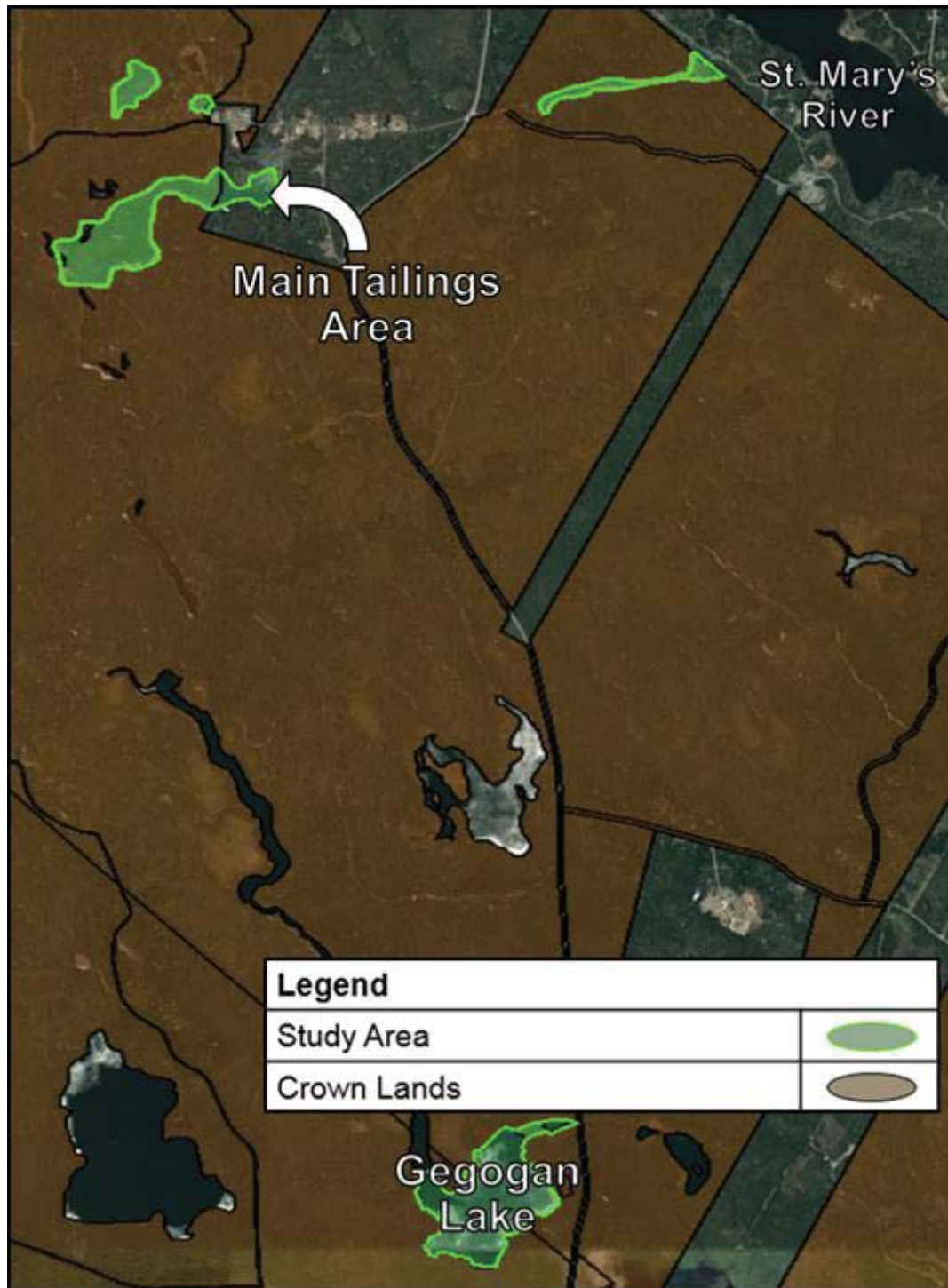


Figure 1-2: Goldenville Gold Mines – Study Area

1.1.1 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 Goldenville Historic Mining District, the main tailings were directly deposited into Gegogan Brook, whereas tailings near the Sawmill creek area and additional tailings areas north of the main tailings were deposited into either small streams extending down into wetland areas, or directly into wetland areas. The main area of the abandoned mine has considerable volumes of tailings extending kilometres down Gegogan brook, and includes 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, such as the Sawmill Creek and north of site tailings areas.

The primary issues of concern at Goldenville 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., 2009). This gold deposits contain naturally occurring arsenopyrite (FeAsS), 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.

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.

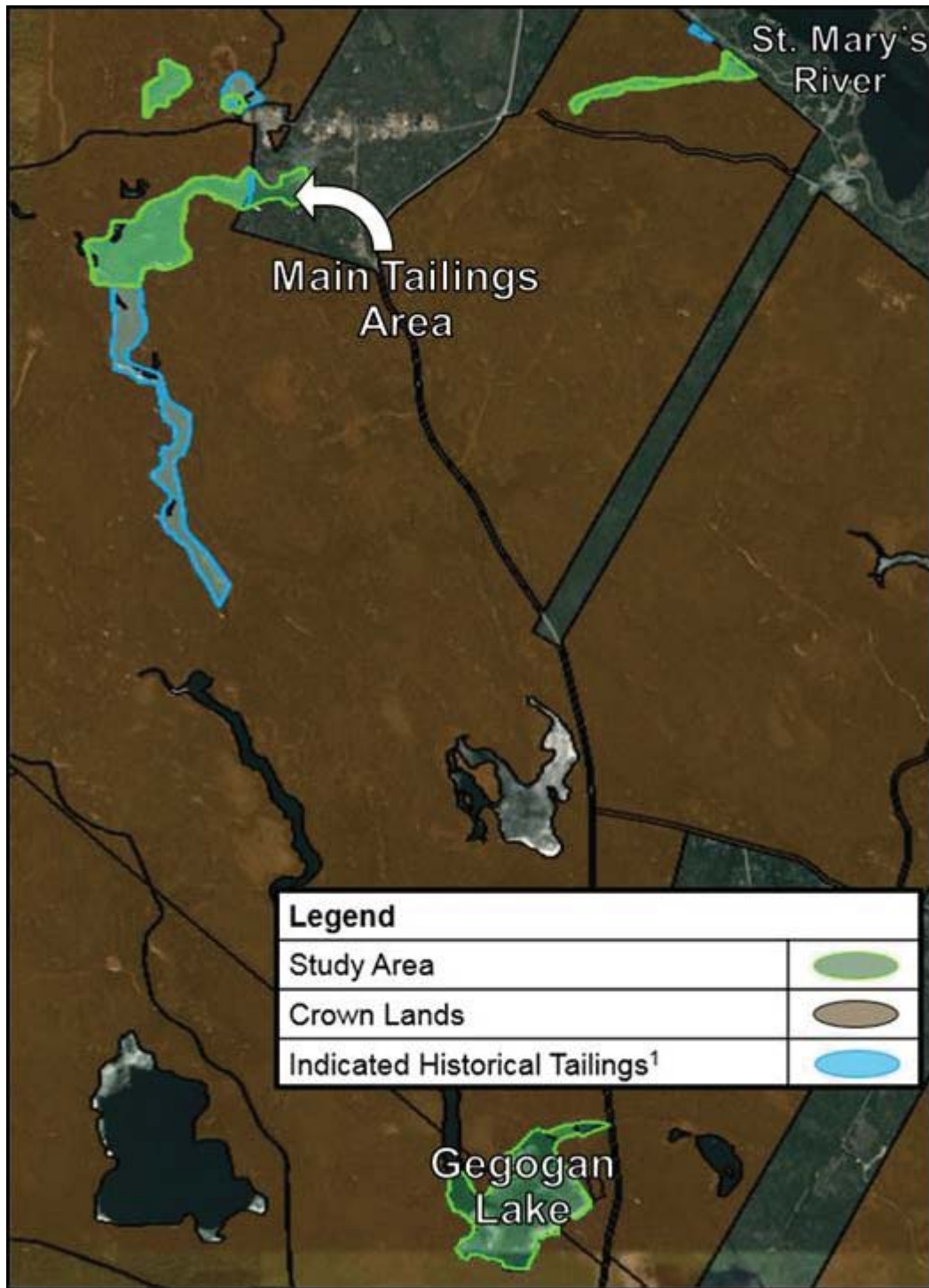


Figure 1-3: Goldenville Gold Mines – Study Area and Historical Tailings

Notes:

- 1) Blue shaded areas from Messervey (1938).

2.0 FIELD PROGRAM AND METHODS

The field sampling campaign involved the collection of samples from locations upgradient, across the Site, and downgradient of the historical Goldenville Gold Mine tailings area. The field program was completed by EcoMetrix and Wood personnel, over the period 22 November and 01 December, 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 2-1a and **2-1b** presents the 14 sites where surface water samples were taken in the vicinity of Goldenville mine, while **Table 2-1** describes the *in situ* surface water quality measurements that were taken at the time of sampling. All surface water samples were sent to Maxxam Analytics for the analysis of total and dissolved metals.

Table 2-1: Surface Water Quality Measurements

Site	pH	EC (uS/cm)	Temp (C)
G-SW5	6.04	73	2.5
G-SW6 (NW-Nov29)	6.51	91	5.2
G-SW6 (NE-Nov29)	7.02	51	2.1
G-SW7	6.09	67	2.5
G-SW8	6.99	58	0.3
G-SW9	7.18	44	0.4
G-SW10	6.71	31	0.4
G-SW11	4.72	36	3.7
G-SW12	N/A	N/A	N/A
G-SW13	4.92	35	N/A
G-SW14	7.04	47	1.1
G-SW15	6.83	45	0.9
G-SW16	7.76	30	0.5
G-SW17	6.9	45	2.9

Note:
Surface water quality parameters not recorded at G-SW12.

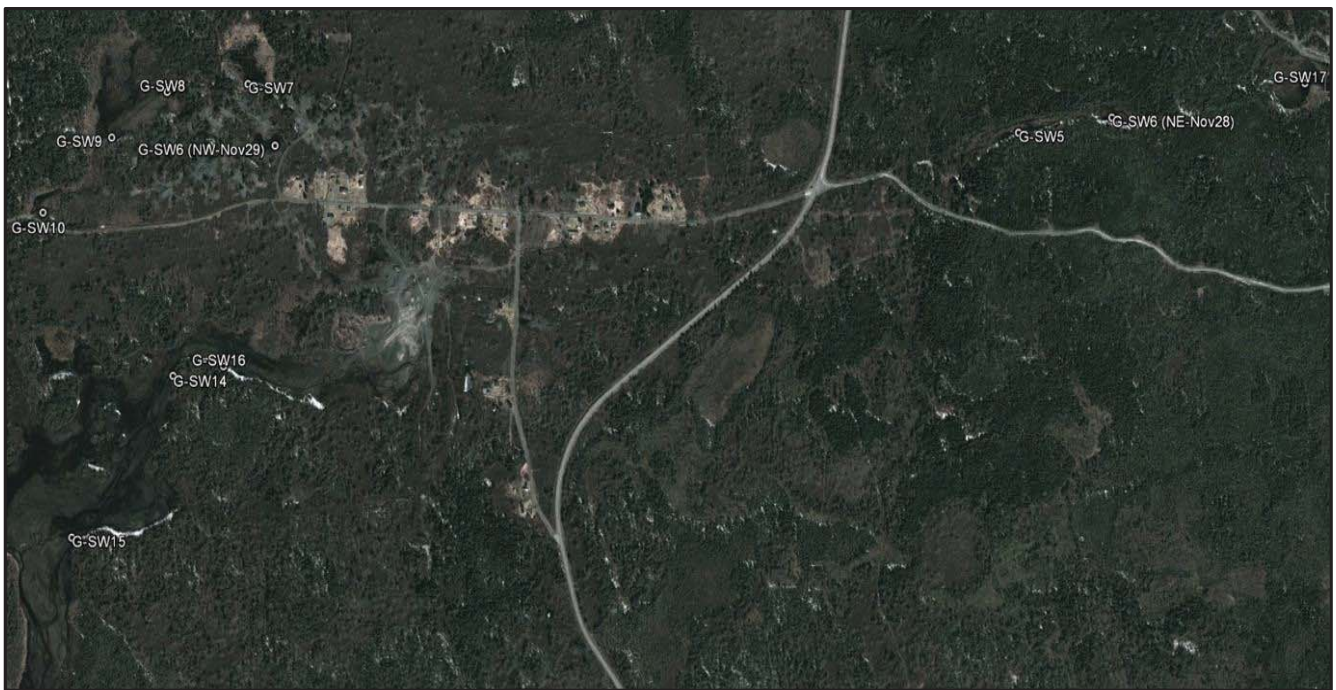


Figure 2-1a: Goldenville Tailings Areas – Main Site Surface Water Sampling Locations



Figure 2-1b: Goldenville Tailings Areas – Gegogan Lake 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 Goldenville study area.

Figure 2-2 presents the four piezometer installation locations. Each piezometer nest included a shallow and deep piezometer, except G-Pz4, where only a shallow piezometer was installed due to refusal prevented any deeper installation attempts. **Table 2-2** outlines the piezometer installation details for the four locations.

Subsurface water samples were recovered from each piezometer using a peristaltic pump and samples were submitted to Maxxam analytics for dissolved metals analysis. Two historical piezometers were also sampled, identified as G-Pz18-Historical and G-Pz19-Historical in **Figure 2-2**. These historical piezometers were installed in Gegogan Brook by DeSisto in an earlier investigation.

Table 2-2: Goldenville – Piezometer Installation Details

Location	Install Type	Screened Depth (from) (cm)	Screened Depth (to) (cm)	Stick-up Height (cm)
G-Pz4	Shallow	57	70	--
G-Pz1	Deep	142	155	61
G-Pz1	Shallow	57	70	41.4
G-Pz2	Deep	107	120	92
G-Pz2	Shallow	57	70	50
G-Pz3	Deep	107	120	96
G-Pz3	Shallow	52	65	49



Figure 2-2: Goldenville Tailings Areas – Piezometer Locations

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 18 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. Regions with the lowest rinse pH values were located immediately downgradient of the former stamp mill ruins (pH 3.4 and 3.6). However, a low rinse pH value of 4.0, were also observed in a hardpan layer approximately 150 m downgradient of the former stamp mill.

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.

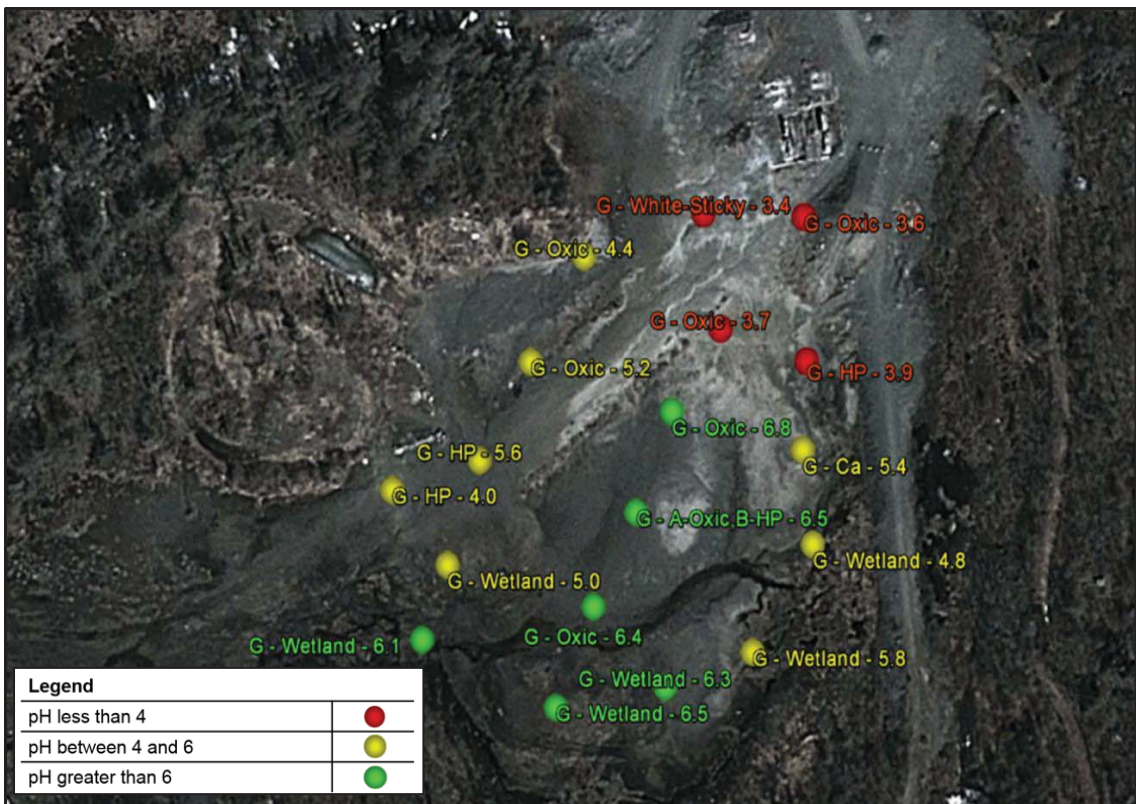
A subset of the surficial solids samples was submitted to SGS Lakefield to determine the total solids contents, moisture content, and the species of carbon and sulphur present. A subset of the surficial solids samples has also been selected for porewater extraction tests. In addition, fine grained waste rock samples were recovered from multiple waste rock piles located across the Goldenville Site. These waste rock piles had not previously been characterized and some sampling was performed to support preliminary characterization and to evaluate if there is an indication of potential waste rock effects on site water quality. Waste rock samples were collected by hand using a trowel to recover waste rock smaller than 2 cm in size. The sampling locations of the fine-grained waste rock samples are shown in **Figure 2-5**.



Figure 2-3: Goldenville Tailings Areas – Surficial Solids Sampling Locations

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

Surficial Tailings ID		A (0-10cm)		B (10-20cm)	
0-10cm	10-20cm	Rinse pH	Rinse E C (µS/cm)	Rinse pH	Rinse E C (µS/cm)
G-SFC-T1A	G-SFC-T1B	3.68	97.2	3.57	113.3
G-SFC-T2A	G-SFC-T2B	4.19	25.3	3.67	92.5
G-SFC-T3A	G-SFC-T3B	5.23	4.23	5.66	10.67
G-SFC-T4A	G-SFC-T4B	4.66	16.04	4.84	8.65
G-SFC-T5A	G-SFC-T5B	5.73	33.5	5.79	8.97
G-SFC-T6A	G-SFC-T6B	6.09	107.5	6.41	46.5
G-SFC-T7A	G-SFC-T7B	6.5	31.3	6.46	39.2
G-SFC-T8A	G-SFC-T8B	6.41	48.5	6.44	63.5
G-SFC-T9A	G-SFC-T9B	6.46	54.6	6.46	77.7
G-SFC-T10A	G-SFC-T10B	6.83	5.37	6.69	8.17
G-SFC-T11A	G-SFC-T11B	3.77	79.8	3.55	123.5
G-SFC-T12A	G-SFC-T12B	3.48	176.7	3.32	316
G-SFC-T13A	G-SFC-T13B	5.14	10.7	5.28	10.94
G-SFC-T14A	G-SFC-T14B	5.6	19.74	5.63	22.2
G-SFC-T15A	G-SFC-T15B	5.53	8.73	4.44	29.19
G-SFC-T16A	G-SFC-T16B	6	107.6	6.21	35
G-SFC-T17A	G-SFC-T17B	4.37	23.51	4.5	17.55
G-SFC-T18A	G-SFC-T18B	4.14	34.4	3.95	57.4



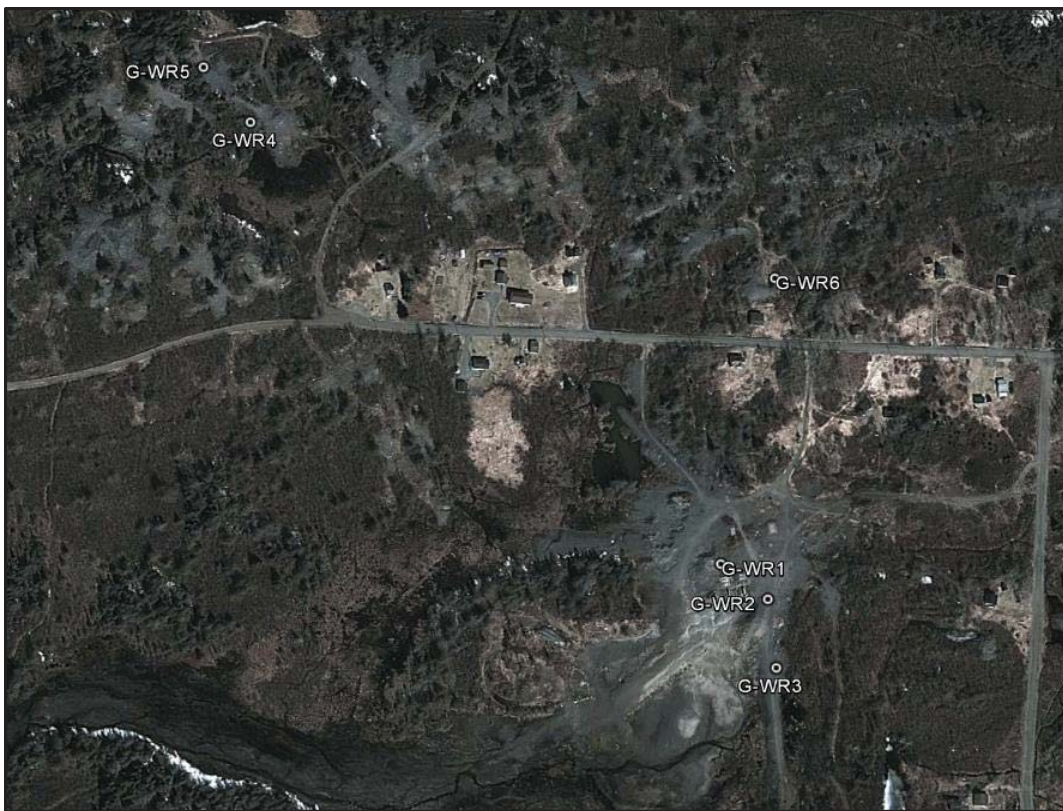


Figure 2-5 Goldenville Tailings Areas – Waste Rock Sampling Locations

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 2-6a** and **2-6b** presents all 18 coring locations.

All core samples were immediately sectioned in the field and partitioned into discrete intervals. A subset of the sectioned samples was 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: Goldenville – Core Sample Depths

Core ID	Core Depth (cm)
G-C1	155
G-C2	70
G-C3	140
G-C4	40
G-C5	30
G-C6 (NE 28Nov)	35
G-C6 (NW 29 Nov)	50
G-C7	30
G-C8	50
G-C9	50
G-C10	50
G-C11	20
G-C12	40
G-C13	40
G-C14	50
G-C15	30
G-C17	50



Figure 2-6a: Goldenville Tailings Areas – Main Site Core Sampling Locations

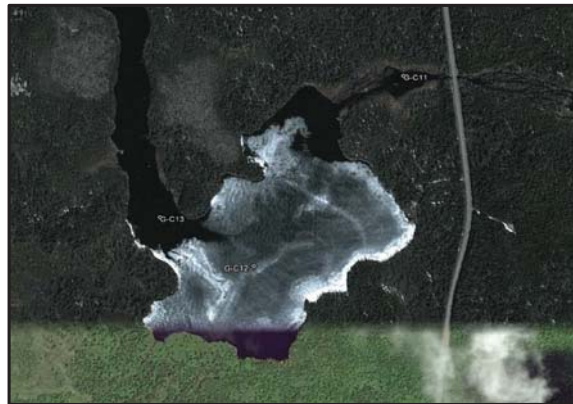


Figure 2-6b: Goldenville Tailings Areas – Gegogan Lake Core Locations

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 ($\text{kg-CaCO}_3/\text{t}$). 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 materials with an uncertain classification 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 -5 to +25 $\text{kg-CaCO}_3/\text{t}$ and the Carb-NP values ranged from about 0 to 22 $\text{kg CaCO}_3/\text{t}$. The negative Sobek NP values are the result of materials that have already generated free acidity and have pH values less than 6. The Sobek-NP and Carb-NP of these samples correlate well. It was assumed that the Carb-NP values represented the

effective NP in the tailings samples, as more data are available. Therefore, all NPR values were calculated using the Carb NP.

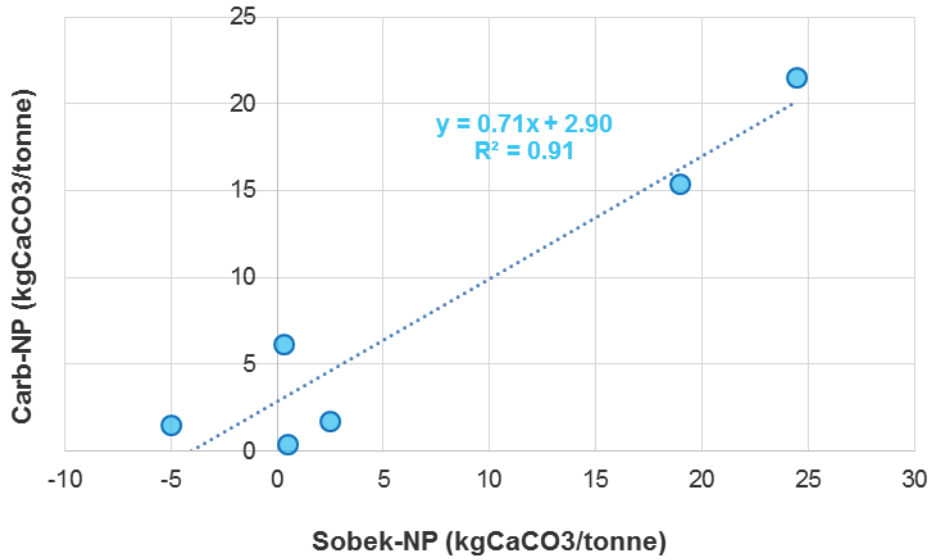


Figure 3-1: Goldenville Tailings Areas – Carb-NP vs. Modified Sobek-NP

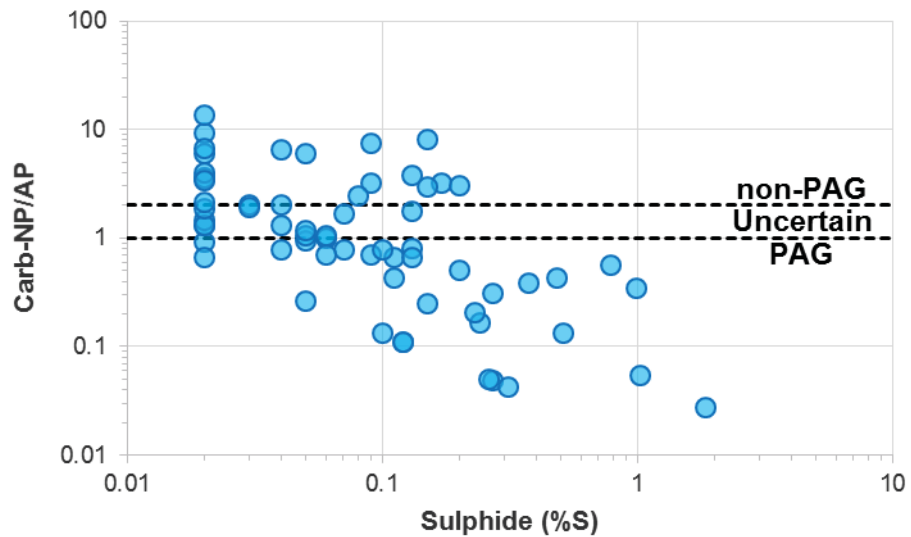


Figure 3-2: Goldenville Tailings Areas – Carb-NP/AP vs. Sulphide

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 half 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, 48% 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.

Table 3-1: Goldenville Tailings Areas – Classification of Acid Generation Status

Location	Carb-NPR			
	Count	PAG Carb-NPR < 1	Uncertain 1 ≤ Carb-NPR < 2	Non-PAG Carb-NPR ≥ 2
Goldenville	64	31	12	21
		48%	19%	33%

The sample locations and the Carb-NPR results are displayed in **Figure 3-3a** and **3-3b**. 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 the main Tailings Deposit Areas, Northeast Zone close to St. Mary’s Lake, Northwest Zone close to a historical crusher, and Gegogan Lake. 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.

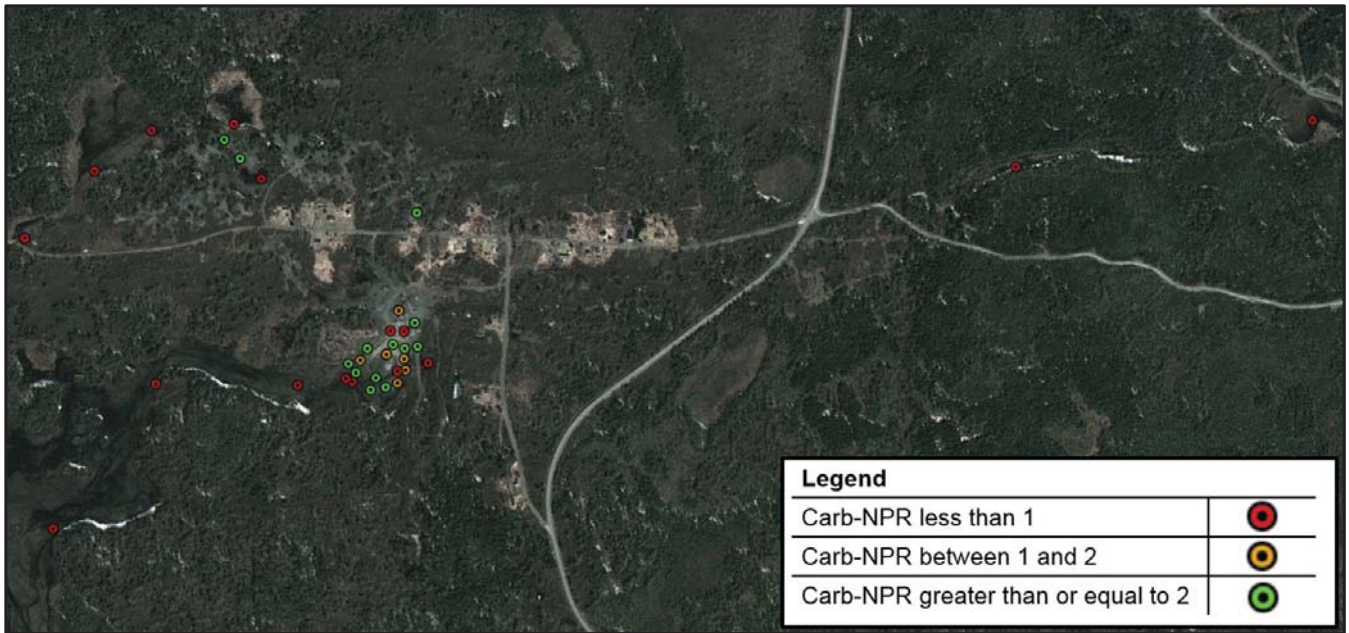


Figure 3-3a: Goldenville Main Tailings Areas – Carb-NPR

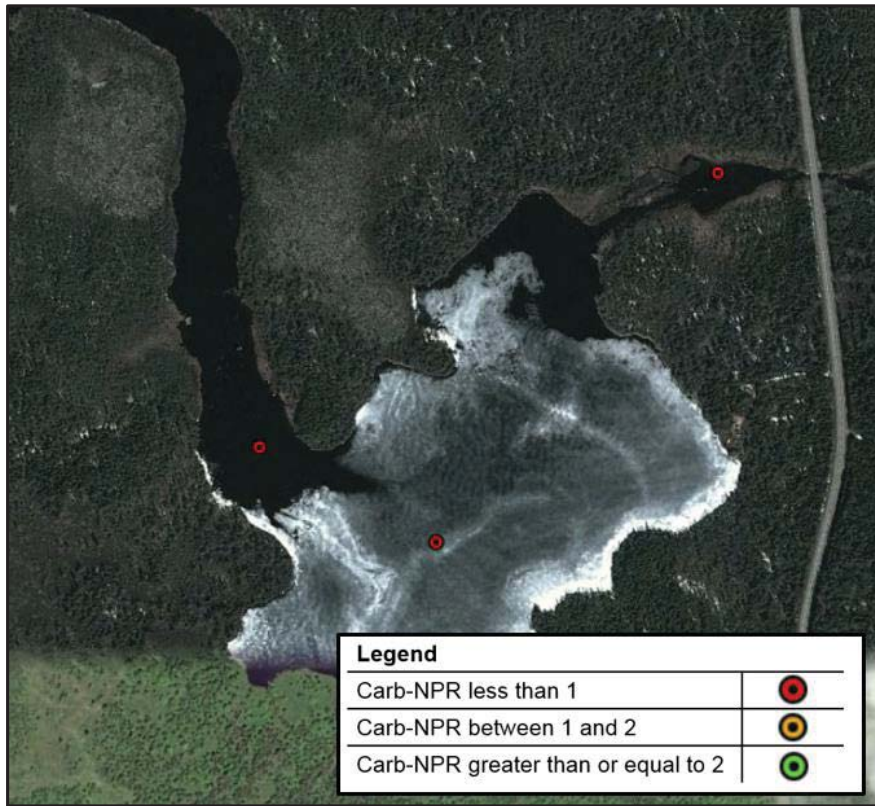


Figure 3-3b: Goldenville Gegogan Lake Area – Carb-NPR

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, representing surface samples, 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**, 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.

The highest arsenic concentrations, greater than 10 times of the Tier 2 criterion, are within the Northeast Zone close to a historical crusher and the St. Mary's River, although all historical arsenic concentrations are lower than Tier 1 criterion. There is a clustering of samples with the arsenic concentration higher than Tier 2 criterion 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. Northwest of the former Stamp Mill at the north side of Goldenville Road, and within Gegogan Lake) and several locations that have levels between the Tier 1 and Tier 2 criteria. These results provide an indication of emerging elevated arsenic concentration in the Northeast Zone. This area, together with the priority tailings areas, Northwest Zone and Gegogan Lake that should be considered for further assessment at Stage II of the site investigation.

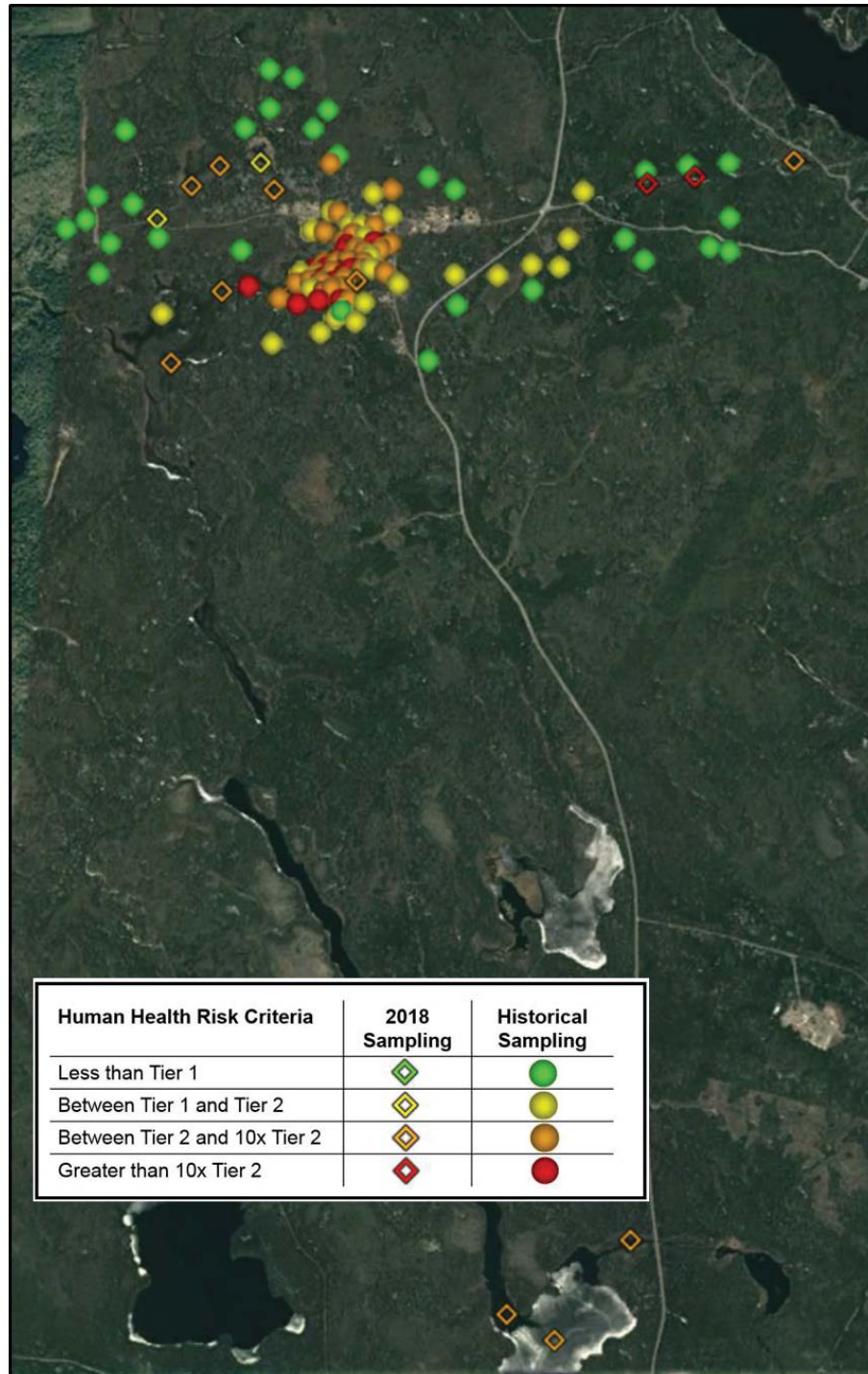


Figure 3-4: Goldenville Tailings Areas – Near-Surface Arsenic Contents – All Locations

Note:

Tier 1 Arsenic Criteria = 31 mg/kg

Tier 2 Arsenic Criteria = 750 mg/kg

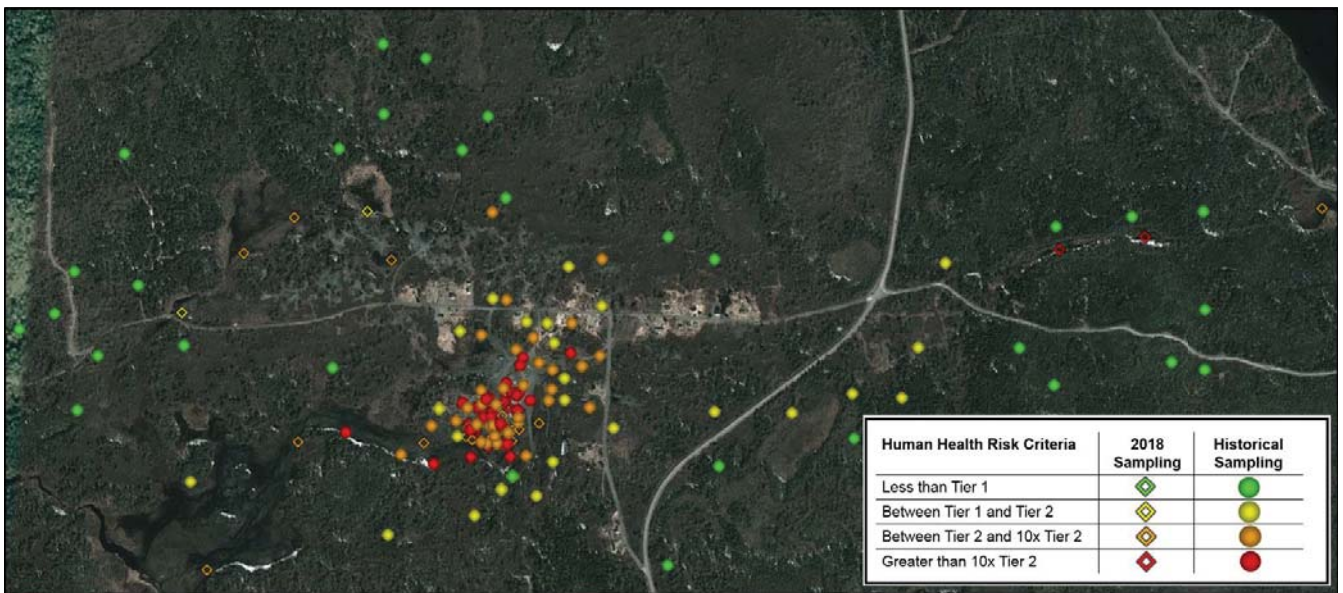


Figure 3-5: Goldenville Tailings Areas – Near-Surface Arsenic Contents – Central Region

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 within the main tailings area have mercury contents that are lower than the Tier 1 criterion. All samples that exceeded the Tier 1 criteria were less than the Tier 2 value, and are situated within the Northeast and Northwest Zones, within the proximity to historical crushers. 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.

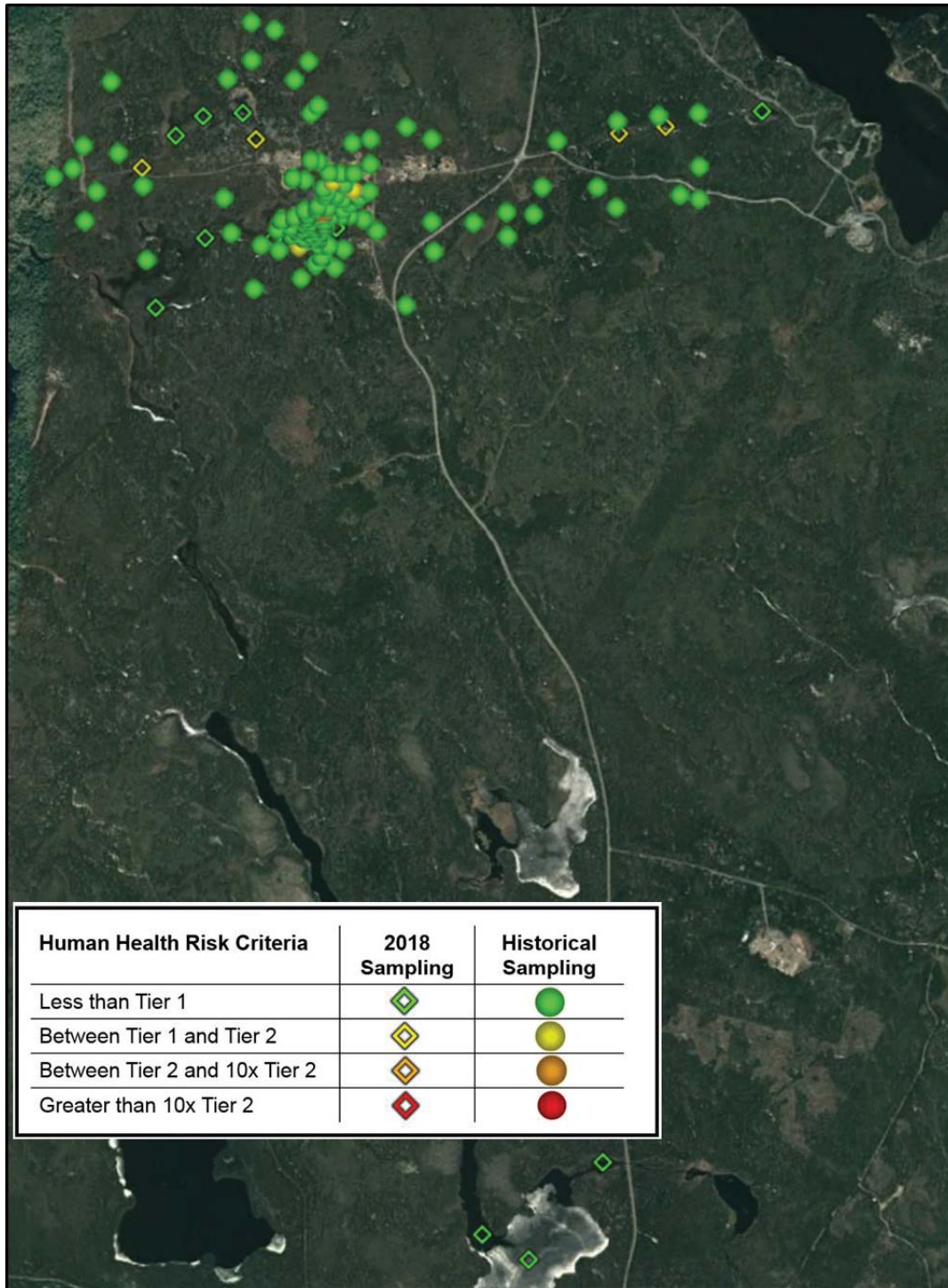


Figure 3-6: Goldenville Tailings Areas – Near-Surface Mercury Contents – All Locations

Note:

Tier 1 Mercury Criteria = 6.6 mg/kg

Tier 2 Mercury Criteria = 29 mg/kg

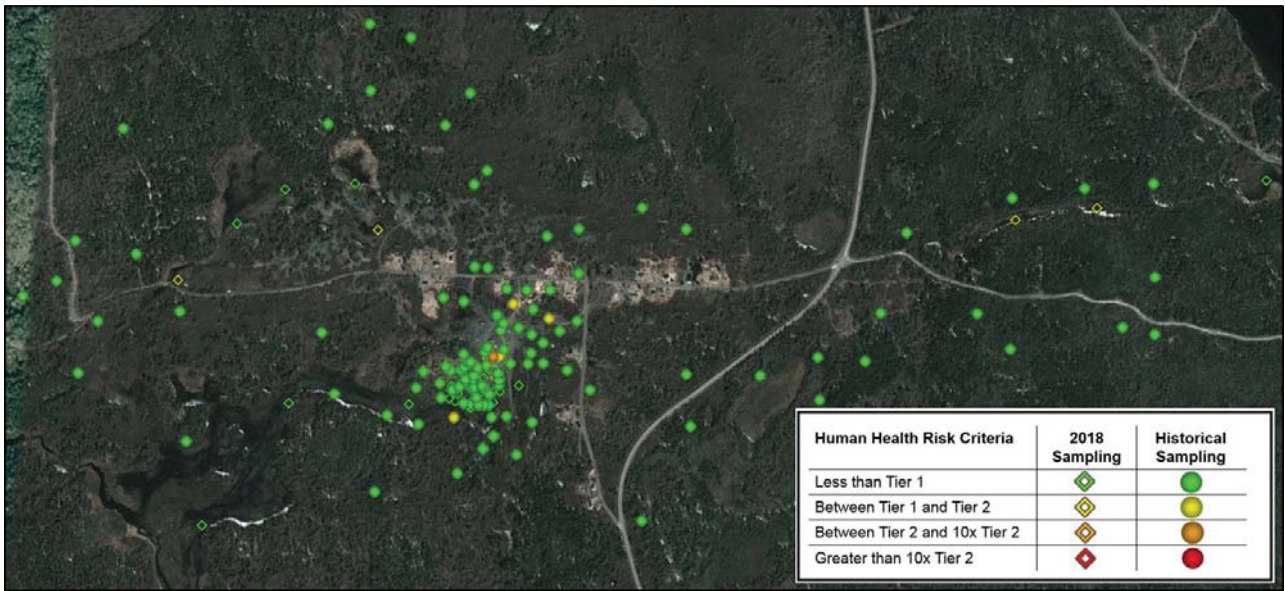


Figure 3-7: Goldenville Tailings Areas – Near-Surface Mercury Contents – Central Region

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 3-8a](#) and [3-8b](#). Locations included in the surface water analysis are: Gegogan Brook, Gegogan Lake, Northeast Zone, and Northwest Zone. 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](#). Within Gegogan Brook, the concentrations of total arsenic in the surface water range between 0.027 to 0.36 mg/L, with the majority of samples observed to be greater than the Tier 2 criterion. The arsenic concentrations of both samples collected at the Northeast Zone and two of three samples collected from Gegogan Lake were greater than the Tier 2 criterion. In Northwest Zone, arsenic concentrations were between the Tier 1 and Tier 2 criteria.

The results for total mercury concentrations in surface water are summarized in [Figure 3-9a](#) (central area) [3.9b](#) (Gegogan Lake), and the total and dissolved concentrations are provided in [Table 3-2](#). Most surface water samples had mercury concentrations less than the Tier 1/2 criteria, except two samples from Gegogan Brook, and two samples from the Northeast Zone. All samples with mercury concentrations greater than the Tier 1/2 criteria were within the same magnitude as the 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, except at a few locations. At G-SW16 and G-SW14 within the Gegogan Brook, the total concentrations were greater than two times of the dissolved concentrations for arsenic and mercury, respectively. The Gegogan Brook has high flowrate, and it is expected to include suspended solids. Sample G-SW10 from Northwest Zone has arsenic concentrations that were observed to be higher in the dissolved phase. This QA/QC discrepancy does not affect the Tier 1 and Tier 2 criteria classification of this sample. Dissolved mercury was reported to be greater than total mercury concentrations for two samples, G-SW15 and G-SW10, and this QA/QC discrepancy potentially affects the Tier 1/2 classification of these samples. However, the dissolved mercury concentrations were close to the method detection limit and may be prone to error. Additional monitoring is warranted to evaluate the discrepancy between total and dissolved mercury concentration for selected samples.

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

Location	Sample ID	Arsenic (mg/L)		Mercury (mg/L)	
		Total	Dissolved	Total	Dissolved
Gegogan Brook	G-Pz4	0.027	0.0232	<0.00002	<0.00002
	G-Pz1	0.0721	0.0673	<0.00002	<0.00002
	G-Pz2	0.0999	0.0897	<0.00002	<0.00002
	G-SW16	0.262	0.0906	0.000031	0.0000238
	G-SW14	0.358	0.225	0.000036	0.0000177
	G-SW15	0.138	0.124	<0.00002	0.0000315
Gegogan Lake	G-SW13	0.0382	0.0348	<0.00002	0.0000055
	G-SW12	0.0364	0.0331	<0.00002	<0.000002
	G-SW11	0.0128	0.0124	<0.00002	0.0000154
Northeast Zone	G-SW5	0.13	0.104	0.000045	0.0000453
	G-SW6 (NE-Nov28)	0.0882	0.0837	0.000028	0.0000216
Northwest Zone	G-SW10	0.0125	0.0249	<0.00002	0.0000298



Figure 3-8a: Goldenville Tailings Areas – Surface Water Total Arsenic Concentrations, Central Region

Note:

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

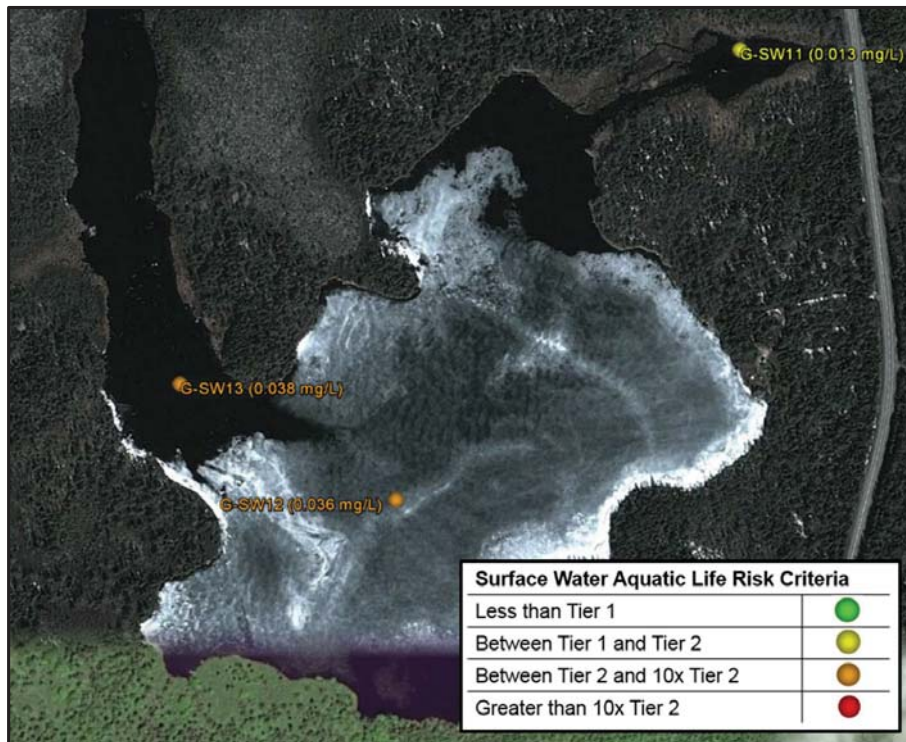


Figure 3-8b: Goldenville Tailings Areas – Surface Water Total Arsenic Concentrations, Gegogan Lake



Figure 3-9a: Goldenville Tailings Areas – Surface Water Total Mercury Concentrations, Central Region

Note:

Tier 1 and Tier 2 Criteria = 0.000026 mg/L

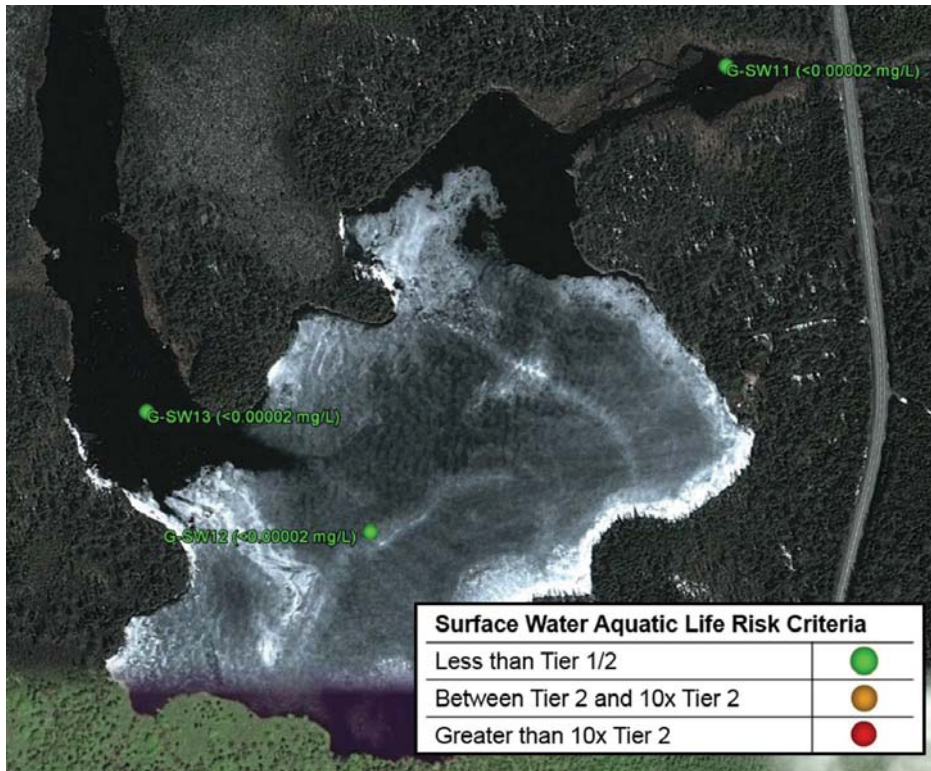


Figure 3-9b: Goldenville Tailings Areas – Surface Water Total Mercury Concentrations, Gegogan Lake

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 3-10a](#) and for Gegogan Lake in [Figure 3-10b](#). There are no established risk criteria for arsenic and mercury in porewater. 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 in sediment core samples from surface water locations including Gegogan Brook, Gegogan Lake, Northeast Zone and Northwest Zone are also shown in these figures. Porewater samples from all but one location in the Gegogan Brook (the main Tailings area below Stamp Mill) and Northeast Zone were greater than 10 times of the Tier 2 criterion, with the majority of samples greater than 100 times of the Tier 2 criterion. Porewater at the Northwest Zone ranged between below Tier 2 criterion to 100 times of the Tier 2 criterion. Porewater samples at the Gegogan Lake were all between the Tier 2 criterion to 10 times of the Tier 2 criterion.

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 3-11a](#) and for Gegogan Lake in [Figure 3-11b](#), 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).

Porewater concentrations in sediment core samples from surface water locations including Gegogan Brook, Gegogan Lake, Northeast Zone and Northwest Zone are also shown in these figures. The mercury concentrations in the majority of porewater samples from Gegogan Brook (the main Tailings area below Stamp Mill) and the Northwest Zone ranged between Tier 2 criterion to 100 times of the tier 2 criterion, except two locations at the Gegogan Brook and two locations within the Northwest Zone, where mercury concentrations in the pore water were greater than 100 times of the Tier 2 value. Mercury concentrations ranged between Tier 2 criterion and 100 times of the Tier 2 criterion in the Northeast Zone, and ranged between Tier 2 criterion and 10 times of the Tier 2 criterion at Gegogan Lake.

A supplemental investigation was undertaken to identify if organoarsenic compounds are present in porewater to identify if potential closure options would have to accommodate treatment for these parameters. As depicted in [Table 3-3](#), all seven samples, representing a range of lab-measured arsenic concentrations in porewater varying between 0.06 mg/L and 12.1 mg/L, have measured organoarsenic concentrations below their respective detection limits. The majority of

dissolved arsenic occurs in the +III oxidation state. 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	G-2018-C3 (0-5cm)	G-2018-C6 (28NOV) (2.5-10cm)	G-2018-C9 (0-7.5cm)	G-2018-SFC-3	G-2018-SFC-8	G-2018-SFC-11	G-2018-C4 (0-5cm)
Dissolved As(III)	mg/L	11.6	1.08	0.061	0.089	0.009	0.002	4.96
Dissolved As(V)	mg/L	0.53	0.11	0.042	2.32	0.132	0.059	0.11
Dissolved DMAs	mg/L	≤0.005	≤0.005	≤0.0001	≤0.005	≤0.0001	≤0.0001	≤0.005
Dissolved MMAs	mg/L	≤0.009	≤0.009	≤0.0002	≤0.009	≤0.0002	≤0.0002	≤0.009

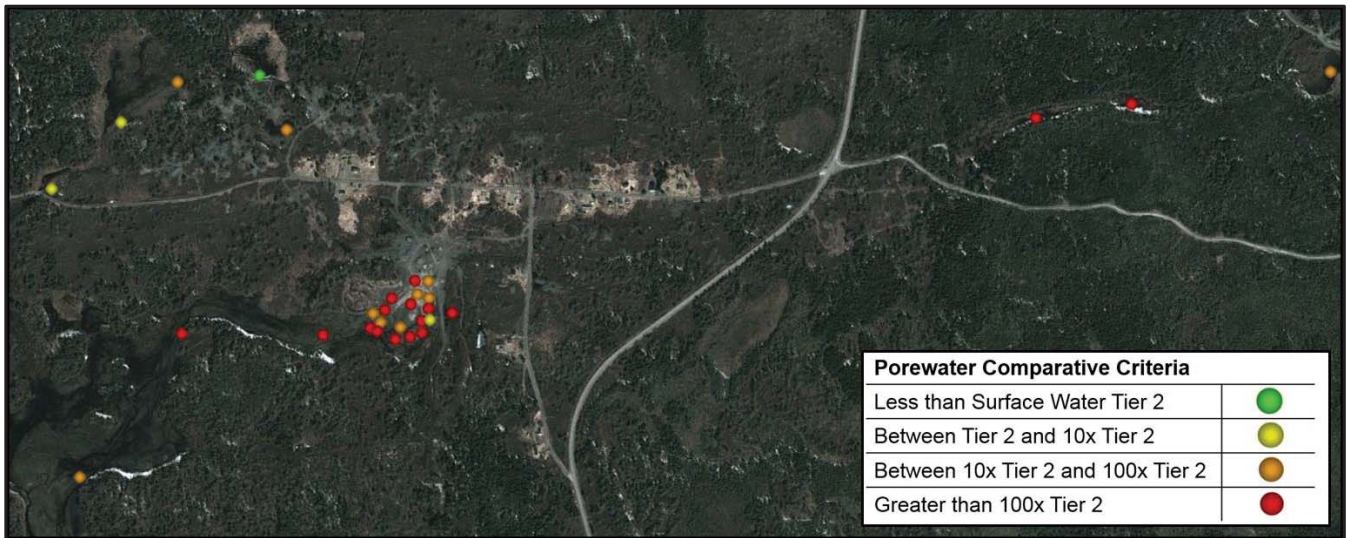


Figure 3-10a: Goldenville Tailings Areas – Maximum Porewater Arsenic Concentrations – Central Region

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).

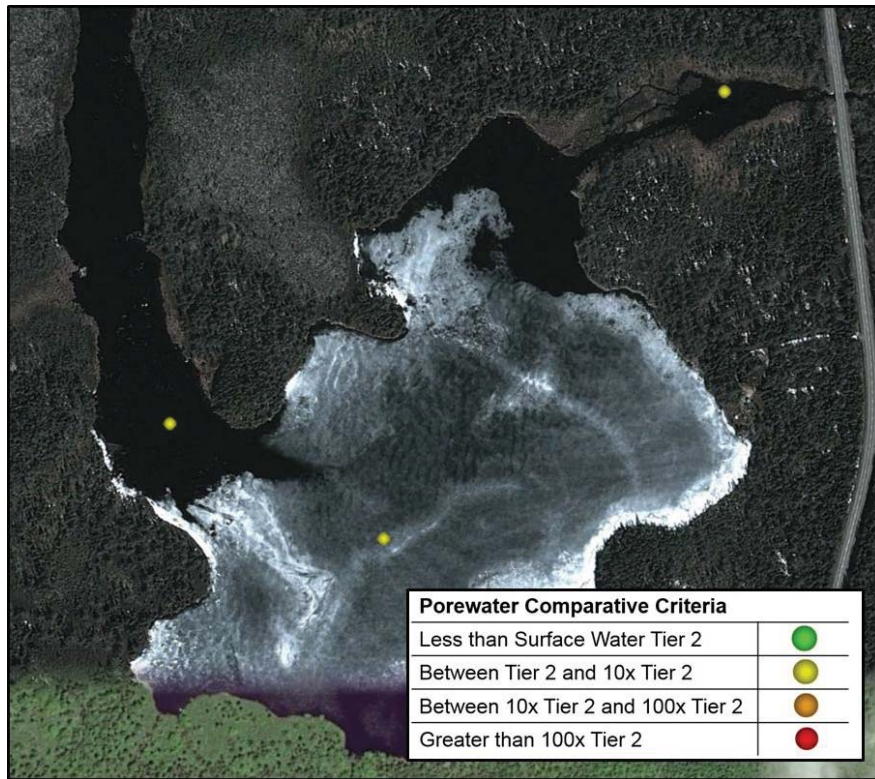


Figure 3-10b: Goldenville Tailings Areas – Maximum Porewater Arsenic Concentrations – Gegogan Lake

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).

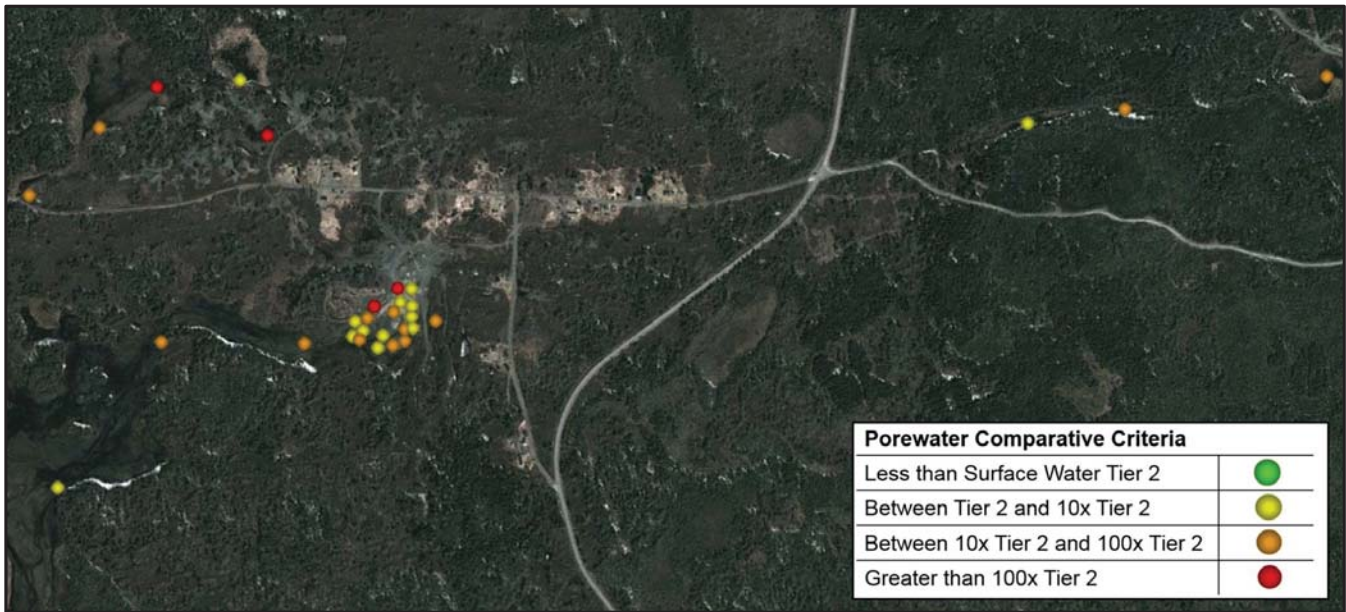


Figure 3-11a: Goldenville Tailings Areas – Maximum Porewater Mercury Concentrations – Central Region

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).

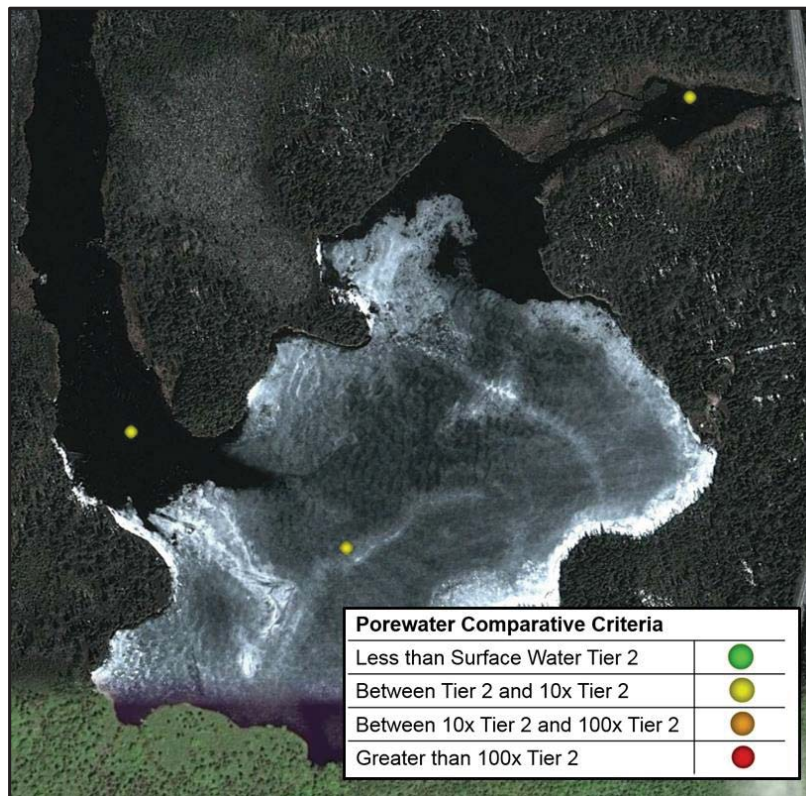


Figure 3-11b: Goldenville Tailings Areas – Maximum Porewater Mercury Concentrations – Gegogan Lake

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 3-12](#). 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.

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

Sample ID		Screened Depth Range (cm-bgs)	Dissolved Arsenic	Dissolved Mercury
			mg/L	
G-Pz1	Shallow	57 to 70	0.935	0.000032
	Deep	142 to 155	0.815	<0.00002
G-Pz2	Shallow	57 to 70	0.576	0.000113
	Deep	107 to 120	0.96	<0.00002
G-Pz3	Shallow	52 to 65	2.93	<0.00002
	Deep	107 to 120	0.548	0.000025
G-Pz4	Shallow	57 to 70	0.518	0.000784



Figure 3-12: Goldenville Tailings Areas – Mini Piezometer Locations

The dissolved arsenic concentrations in surface water, porewater, and subsurface piezometer samples at each station are summarized in [Figure 3-13](#) to [Figure 3-16](#). For reference, the water concentrations were also compared to the arsenic contents of the solids at each depth of all mini piezometer stations.

The results for G-Pz1, located at the east side of upper main tailings area, are presented in [Figure 3-13](#). At this station, the dissolved arsenic concentration in surface water was less than 1 mg/L, while the porewater concentrations ranged from about 4 mg/L in the near-surface to values on the order of 1 mg/L at a depth greater than 30 cm below ground surface. In comparison, the concentration of dissolved arsenic in the subsurface piezometer sample at the 2 m depth was on the order of 3 mg/L. The arsenic contents in the solids varied from a low of about 500 mg/kg to 2100 mg/kg. At this station, the dissolved arsenic concentrations in porewater were the highest at the surface and lowest at a depth of 30 cm below ground surface. The piezometer subsurface water sample exhibited concentrations of approximately 1 mg/L for dissolved arsenic, which was in good agreement with the concentration in the porewater at the same depth.

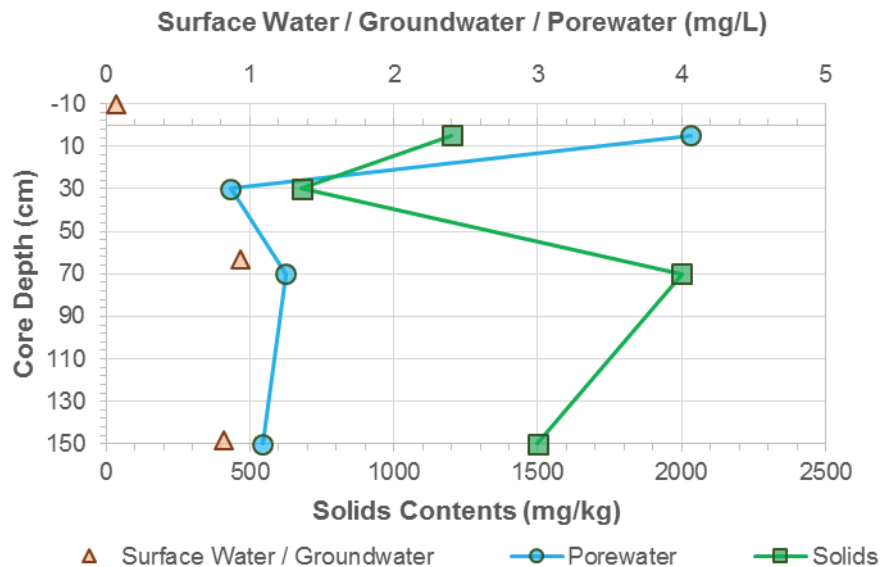


Figure 3-13: Goldenville Tailings Areas – G-Pz1 Arsenic Chemistry

The results from the core at piezometer station G-Pz2 are shown in [Figure 3-14](#). The concentration of dissolved arsenic in the surface water sample from this station was less than 0.09 mg/L, while the concentrations in porewaters ranged from about 17 mg/L in the shallow subsurface to about 3 mg/L in porewater at a depth of 30 cm. The arsenic contents in the solids varied from a low of about 1,000 mg/kg to a high of 18,000 mg/kg at a depth of 30 cm below ground surface, and decreased to about 7,000 mg/kg at a depth of 70 cm.

Conversely, the two piezometer samples exhibited dissolved arsenic concentrations of about 0.5 mg/L at the depth of 60 cm and 1 mg/L at the depth of 1.1 m below ground surface, respectively. There is a discrepancy between the concentrations in the porewater at 60 cm

depth and the piezometer sample at the similar depth. Additional sampling of the piezometers is warranted to evaluate the discrepancy between these results.

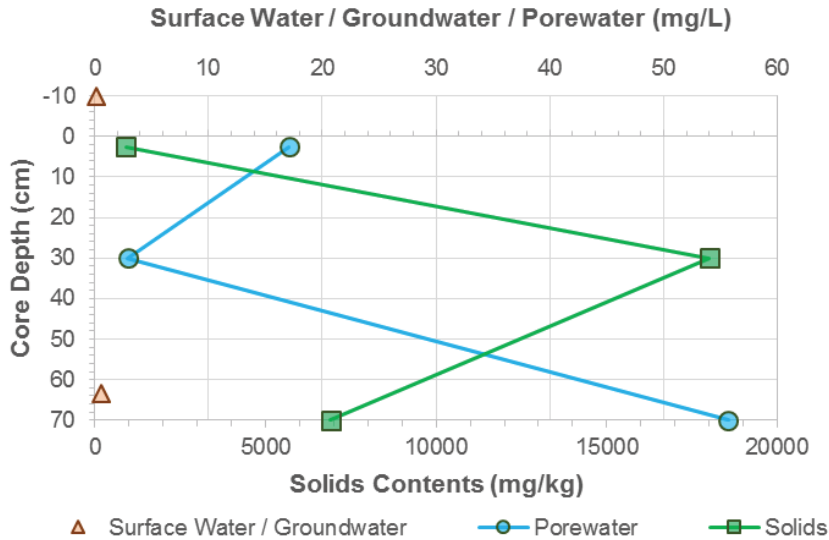


Figure 3-14: Goldenville Tailings Areas – G-Pz2 Arsenic Chemistry

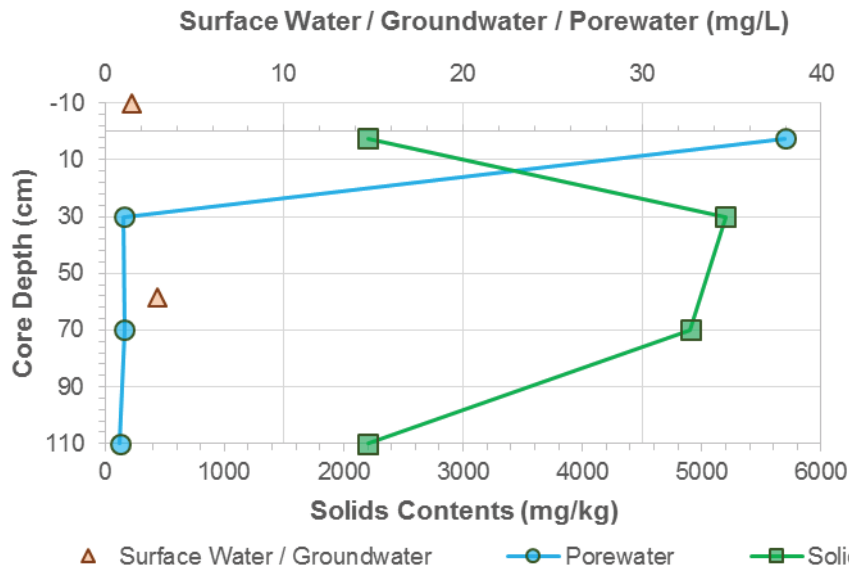


Figure 3-15: Goldenville Tailings Areas – G-Pz3 Arsenic Chemistry

The results from piezometer monitoring station G-Pz3 are presented in [Figure 3-15](#). The concentrations of dissolved arsenic in the surface water at this station was 1.5 mg/L, greater than that collected within the vicinity of other piezometers. This corresponds to the greater arsenic concentration of the porewater close to the surface compared to station G-Pz1 and G-Pz2. The arsenic contents in the solids varied from a low of about 2000 mg/kg at the surface and a depth of 1.1 m, to a high of over 5000 mg/kg at a depth of 30 and 70 cm below ground surface. The two piezometer samples exhibited dissolved arsenic concentrations of 2.9 mg/L at a depth of 60 cm and 0.54 mg/L at a depth of 1.1 m below ground surface,

respectively, which is in accordance with arsenic concentrations in the porewater from similar depth.

The arsenic results at piezometer station G-Pz4 are shown in **Figure 3-16**. Consistent with other sampling stations, the dissolved arsenic concentration water at the surface was less than 1 mg/L while porewater concentrations were greater, ranged from approximately 0.3 mg/L to 11 mg/L. Measured values in the porewater decreased from the surficial area to a depth of 15 cm below ground surface.

At this station, the concentration in the piezometer sample at a depth of 60 cm was about 0.5 mg/L. The maximum depth of available porewater concentration was 15 cm, where the arsenic concentration was about 0.3 mg/L. The arsenic contents in the solids ranged from about 3300 mg/kg close to the surface to 500 mg/kg at a depth of 30 cm below ground surface. At this station, additional piezometer and porewater sampling appears warranted to evaluate correlation between these two types of samples at the similar depth.

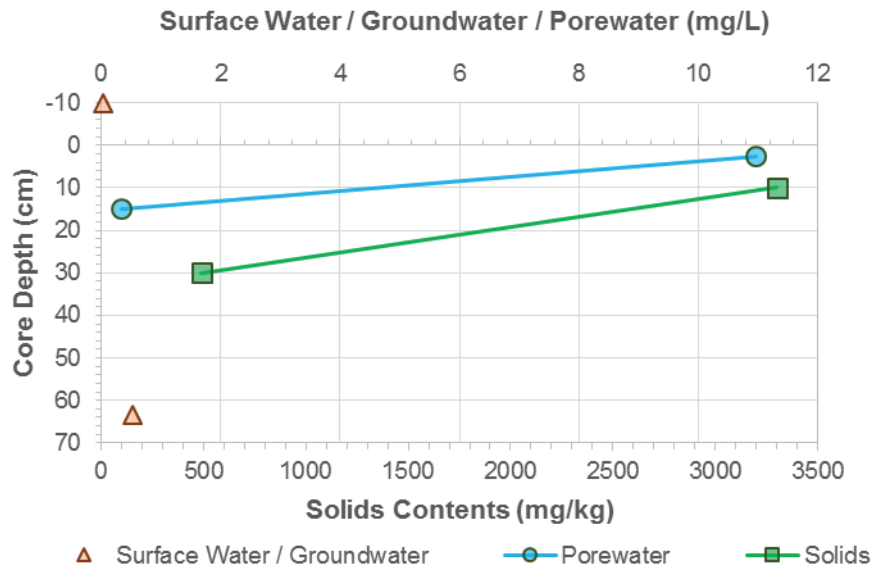


Figure 3-16: Goldenville Tailings Areas – G-Pz3 Arsenic Chemistry

These results above show that there are samples with solids arsenic contents that are consistent with those expected for tailings materials at all stations. The dissolved arsenic concentrations in the porewaters and the piezometer samples are consistently higher than those observed in the surface water. The higher concentrations in the porewaters from the shallow subsurface compared to those in the overlying water indicate that dissolved arsenic can be transported by diffusion, and the diffusive flux occurs from the higher concentration at the shallow subsurface towards the lower concentration in the overlying water. Therefore, 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.

In addition, 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. 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 all stations, the higher concentration of arsenic in porewater was near the water tailings interface followed by a lower concentration at depth. At these stations, the arsenic concentration gradient is downward, where 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.

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 the Main Site and Northeast Zone. (e.g. 'Main Site Core' and 'NE Zone' 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-Goldenville 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 ($\text{Fe}(\text{OH})_3$) 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.

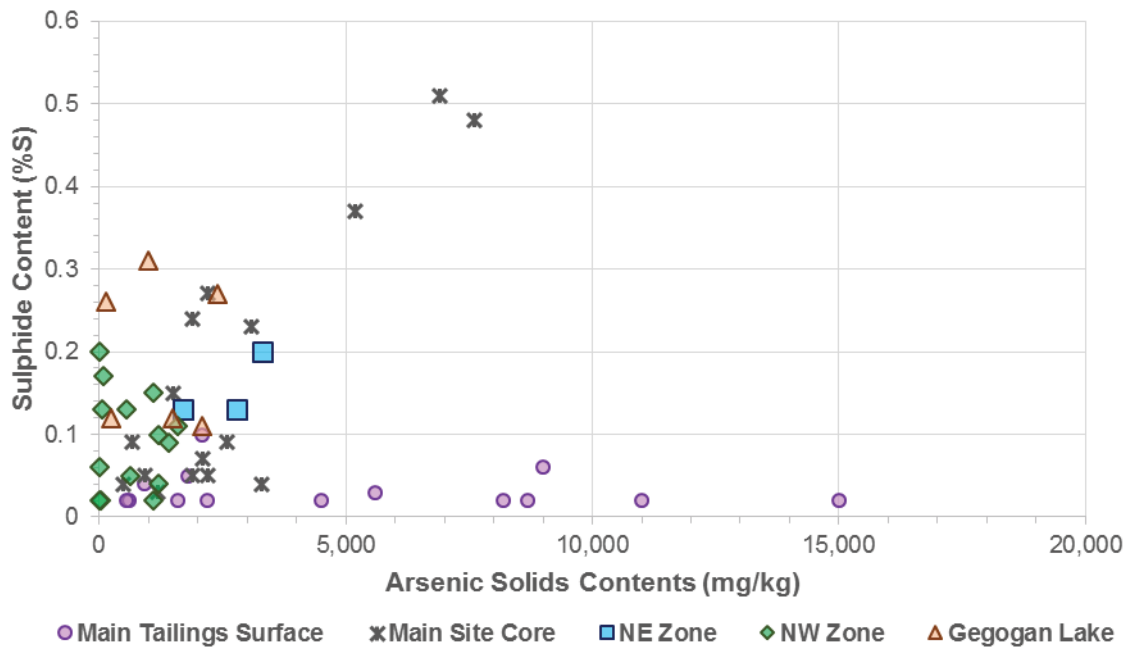


Figure 4-1: Goldenville Tailings Areas – Sulphide vs. Arsenic Contents in Tailings and Sediments (Sulphide Less than 0.6% and Arsenic Content Less than 20,000 mg/kg)

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 attenuated 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.

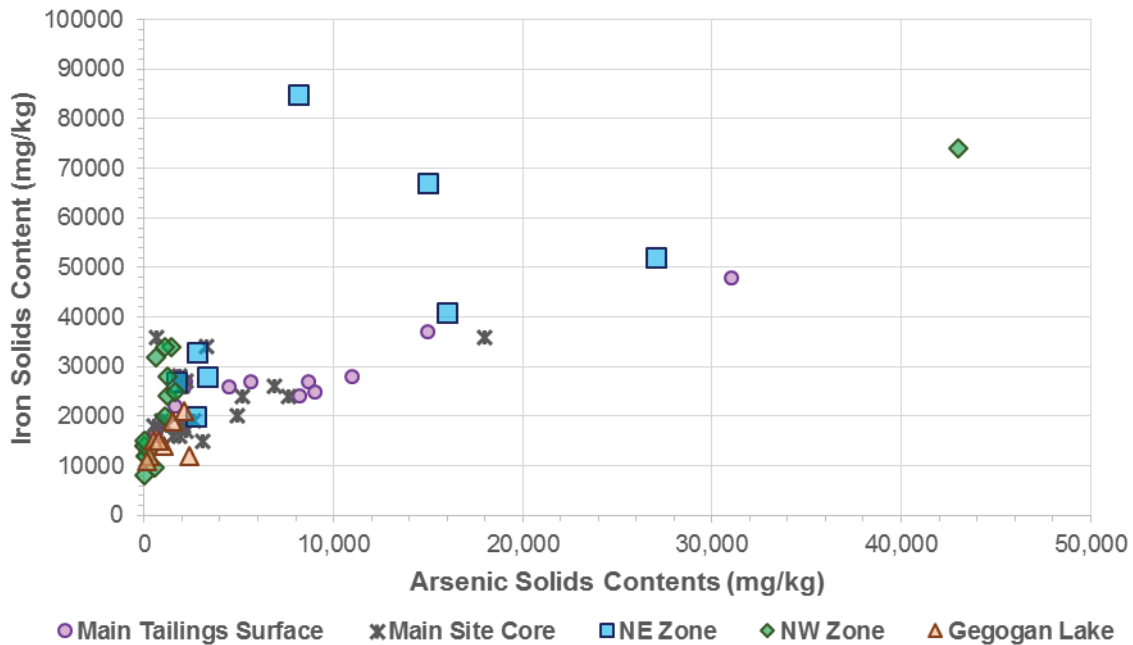


Figure 4-2: Goldenville Tailings Areas – Iron vs. Arsenic Contents in Tailings and Sediments (Iron Less than 100,000 mg/kg and Arsenic Content Less than 50,000 mg/kg)

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 to the 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 arsenic. The detectable concentrations of mercury in water were also observed close to the former crusher locations. Mercury concentrations in water are very limited, and so are the loadings of mercury from the tailings to the environment. 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 the reclamation at Goldenville 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 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**

Goldenville - Solids

Sample ID	G-2018-C2 (0-5cm)	G-2018-C2 (20-40cm)	G-2018-C2 (60-80cm)	G-2018-C3 (0-5cm)	G-2018-C3 (20-40cm)	G-2018-C3 (60-80cm)	G-2018-C3 (100-120cm)	G-2018-C5 (2.5-10cm)	G-2018-C5 (15-20cm)	
Latitude	45.12168302	45.12168302	45.12168302	45.12154103	45.12154103	45.12154103	45.12154103	45.12597959	45.12597959	
Longitude	-62.01805604	-62.01805604	-62.01805604	-62.01943503	-62.01943503	-62.01943503	-62.01943503	-61.99875285	-61.99875285	
Analysis	Units									
Moisture	%	34.3	29.8	25.1	35.1	30.4	19.2	45.2	59.4	42.1
Mercury	mg/kg	1	1	1	2	1	8	10	29	40
Silver	mg/kg	0.070	0.34	0.17	0.18	0.15	0.21	0.24	0.59	0.56
Arsenic	mg/kg	920	18000	6900	2200	5200	4900	2200	15000	16000
Aluminum	mg/kg	7100	7400	8400	9400	7600	5300	7800	8600	8800
Barium	mg/kg	30	28	35	36	38	23	36	66	52
Beryllium	mg/kg	0.18	0.20	0.24	0.21	0.29	0.16	0.23	0.42	0.41
Bismuth	mg/kg	0.33	1.4	0.62	0.62	0.59	0.85	0.83	1.6	1.5
Calcium	mg/kg	1400	2000	1700	1800	2500	2200	4200	3000	2400
Cadmium	mg/kg	0.15	0.25	0.28	0.12	0.21	0.22	0.19	0.85	0.58
Cobalt	mg/kg	5.1	43	77	5.7	11	10	6.7	44	35
Chromium	mg/kg	86	10	11	78	11	81	58	100	69
Copper	mg/kg	20	48	37	33	29	31	25	50	45
Iron	mg/kg	19000	36000	26000	27000	24000	20000	17000	67000	41000
Potassium	mg/kg	1900	1700	2600	2000	2200	1400	1400	1300	1600
Lithium	mg/kg	11	11	12	14	11	8.3	10	12	15
Magnesium	mg/kg	4400	4700	5300	6000	4600	3300	3600	4200	5100
Manganese	mg/kg	190	240	240	250	290	250	220	1200	510
Molybdenum	mg/kg	0.89	0.92	1.1	1.1	0.85	0.61	0.45	1.2	1.1
Nickel	mg/kg	19	59	93	20	27	24	17	79	65
Lead	mg/kg	21	69	32	36	29	47	48	100	99
Sulphur	mg/kg	760	12000	5400	770	3800	4100	3500	8600	11000
Antimony	mg/kg	1.2	24	7.5	2.6	7.6	8.7	2.5	15	14
Selenium	mg/kg	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	0.74	< 0.7
Tin	mg/kg	< 0.5	0.72	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	0.84
Strontium	mg/kg	17	22	20	20	24	20	36	29	24
Titanium	mg/kg	260	260	270	330	260	190	200	210	220
Thallium	mg/kg	0.069	0.097	0.092	0.088	0.086	0.065	0.060	0.17	0.17
Uranium	mg/kg	0.28	0.35	0.32	0.36	0.32	0.25	0.43	0.53	0.67
Vanadium	mg/kg	8.3	8.6	9.2	11	8.9	6.1	9.0	12	12
Yttrium	mg/kg	4.7	5.8	7.1	6.1	7.3	3.6	4.0	7.0	8.5
Zinc	mg/kg	47	61	69	51	50	50	46	140	88

Goldenville - Solids

Sample ID	G-2018-C2 (0-5cm)	G-2018-C2 (20-40cm)	G-2018-C2 (60-80cm)	G-2018-C3 (0-5cm)	G-2018-C3 (20-40cm)	G-2018-C3 (60-80cm)	G-2018-C3 (100-120cm)	G-2018-C5 (2.5-10cm)	G-2018-C5 (15-20cm)	
ABA										
Paste pH	--	5.06	--	--	--	--	--	--	--	
Fizz Rate	---	1	--	--	--	--	--	--	--	
Sample weight	g	2.02	--	--	--	--	--	--	--	
HCl Added	mL	20	--	--	--	--	--	--	--	
HCl	Normality	0.1	--	--	--	--	--	--	--	
NaOH	Normality	0.1	--	--	--	--	--	--	--	
NaOH to pH=8.3	mL	18.99	--	--	--	--	--	--	--	
Final pH	no unit	1.5	--	--	--	--	--	--	--	
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)	%S	0.08	1.46	0.642	0.086	0.458	--	0.44	1.07	1.33
Acid Leachable SO4-S	%S	0.03	0.44	0.13	0.04	0.09	--	0.17	0.29	0.35
Sulphide	%S	0.05	1.02	0.51	0.05	0.37	--	0.27	0.78	0.98
Carbon (total)	%C	0.885	0.63	0.314	1.32	0.409	--	5.14	3.96	2.93
Carbonate	%CO3	0.09	0.105	0.13	0.1	0.27	--	0.16	0.824	0.649

Goldenville - Solids

Sample ID	G-2018-C11 (0-7.5cm)	G-2018-C11 (15-20cm)	G-2018-C12 (2.5-10cm)	G-2018-C12 (10-20cm)	G-2018-C12 (20-40cm)	G-2018-C13 (2.5-10cm)	G-2018-C13 (15-20cm)	G-2018-C13 (20-40cm)	G-2018-C6 (28NOV) (2.5-10cm)	
Latitude	45.08256946	45.08256946	45.07847222	45.07847222	45.07847222	45.07952778	45.07952778	45.07952778	45.12626801	
Longitude	-61.99973647	-61.99973647	-62.00416667	-62.00416667	-62.00416667	-62.00694444	-62.00694444	-62.00694444	-61.99597299	
Analysis	Units									
Moisture	%	90.6	83.8	80.3	89.8	88.7	74.9	87.2	87.5	81.6
Mercury	mg/kg	2	2	2	1	1	2	0	0	11
Silver	mg/kg	0.22	0.17	0.16	0.21	0.24	0.18	0.19	0.16	0.35
Arsenic	mg/kg	2400	1000	1500	510	250	2100	770	150	8100
Aluminum	mg/kg	9300	10000	11000	8800	9400	13000	7500	7300	13000
Barium	mg/kg	57	74	72	43	49	73	33	30	110
Beryllium	mg/kg	0.38	0.47	0.45	0.32	0.36	0.48	0.23	0.23	0.66
Bismuth	mg/kg	0.60	0.47	0.34	0.17	0.17	0.73	0.14	< 0.09	1.0
Calcium	mg/kg	2100	2800	1700	2600	2700	1800	2800	2800	4000
Cadmium	mg/kg	0.77	0.48	0.26	0.21	0.25	0.46	0.21	0.24	1.1
Cobalt	mg/kg	14	11	7.5	5.1	3.7	14	9.0	4.5	35
Chromium	mg/kg	28	12	15	12	13	17	490	9.7	14
Copper	mg/kg	21	17	12	12	14	19	20	11	43
Iron	mg/kg	12000	14000	19000	15000	12000	21000	15000	11000	85000
Potassium	mg/kg	2200	2100	2700	1200	1400	2900	480	350	1200
Lithium	mg/kg	6.7	8.9	14	7.8	8.6	16	5.4	5.0	8.4
Magnesium	mg/kg	2600	3000	4800	2000	2300	5800	1100	1000	2800
Manganese	mg/kg	500	990	390	520	340	470	870	670	3000
Molybdenum	mg/kg	1.3	1.2	1.1	1.1	1.1	1.2	2.2	0.92	1.2
Nickel	mg/kg	14	17	16	13	13	21	23	9.2	55
Lead	mg/kg	82	39	21	12	12	52	12	9.1	85
Sulphur	mg/kg	3500	3100	1600	2300	2200	2100	3200	3100	2500
Antimony	mg/kg	1.6	1.3	< 0.8	< 0.8	< 0.8	1.8	< 0.8	< 0.8	6.1
Selenium	mg/kg	1.7	1.5	1.1	2.0	2.3	0.99	2.5	2.5	1.3
Tin	mg/kg	1.1	0.63	< 0.5	< 0.5	< 0.5	< 0.5	0.61	< 0.5	1.2
Strontium	mg/kg	22	29	19	25	27	20	26	27	35
Titanium	mg/kg	190	220	170	210	220	210	220	200	210
Thallium	mg/kg	0.18	0.12	0.11	0.055	0.061	0.15	0.035	0.026	0.21
Uranium	mg/kg	0.49	0.68	0.55	0.63	0.70	0.56	0.64	0.61	0.54
Vanadium	mg/kg	16	11	11	7.8	7.7	13	9.0	6.9	18
Yttrium	mg/kg	7.1	8.3	6.4	6.6	7.3	7.0	6.4	6.5	11
Zinc	mg/kg	53	52	61	31	32	67	11	11	210

Goldenville - Solids

Sample ID		G-2018-C11 (0-7.5cm)	G-2018-C11 (15-20cm)	G-2018-C12 (2.5-10cm)	G-2018-C12 (10-20cm)	G-2018-C12 (20-40cm)	G-2018-C13 (2.5-10cm)	G-2018-C13 (15-20cm)	G-2018-C13 (20-40cm)	G-2018-C6 (28NOV) (2.5-10cm)
ABA										
Paste pH		--	--	--	--	--	4.87	--	--	--
Fizz Rate	---	--	--	--	--	--	1	--	--	--
Sample weight	g	--	--	--	--	--	2	--	--	--
HCl Added	mL	--	--	--	--	--	20	--	--	--
HCl	Normality	--	--	--	--	--	0.1	--	--	--
NaOH	Normality	--	--	--	--	--	0.1	--	--	--
NaOH to pH=8.3	mL	--	--	--	--	--	21.99	--	--	--
Final pH	no unit	--	--	--	--	--	1.23	--	--	--
NP	t CaCO3/1000 t	--	--	--	--	--	-5	--	--	--
AP	t CaCO3/1000 t	--	--	--	--	--	3.44	--	--	--
Net NP	t CaCO3/1000 t	--	--	--	--	--	-8.44	--	--	--
NP/AP	ratio	--	--	--	--	--	-1.45	--	--	--
Sulphur (total)	%S	0.491	0.464	0.233	--	0.343	0.246	--	0.454	--
Acid Leachable SO4-S	%S	0.22	0.15	0.11	--	0.22	0.14	--	0.19	--
Sulphide	%S	0.27	0.31	0.12	--	0.12	0.11	--	0.26	--
Carbon (total)	%C	24.1	24.8	9.54	--	19.7	8.62	--	27.2	--
Carbonate	%CO3	<0.025	<0.025	<0.025	--	<0.025	0.09	--	<0.025	--

Goldenville - Solids

Sample ID	G-2018-C6 (28NOV) (10-20cm)	G-2018-C6 (28NOV) (20-30cm)	G-2018-C7 (2.5-10cm)	G-2018-C7 (15-20cm)	G-2018-C7 (20-30cm)	G-2018-C8 (0-5cm)	G-2018-C8 (15-20cm)	G-2018-C8 (40-50cm)	G-2018-C9 (0-7.5cm)	
Latitude	45.12626801	45.12626801	45.12685298	45.12685298	45.12685298	45.12671602	45.12671602	45.12671602	45.12589401	
Longitude	-61.99597299	-61.99597299	-62.02127502	-62.02127502	-62.02127502	-62.02365297	-62.02365297	-62.02365297	-62.02529398	
Analysis	Units									
Moisture	%	31.9	45.0	85.5	75.0	81.2	57.3	20.7	21.5	75.9
Mercury	mg/kg	14	39	1	1	1	2	4	3	4
Silver	mg/kg	0.76	0.67	0.29	0.35	0.95	0.16	0.20	0.19	0.25
Arsenic	mg/kg	27000	2700	53	22	22	640	1400	1100	1200
Aluminum	mg/kg	6900	11000	8900	11000	19000	11000	13000	12000	11000
Barium	mg/kg	32	69	59	59	69	40	49	40	40
Beryllium	mg/kg	0.24	0.41	0.45	0.48	1.4	0.24	0.30	0.24	0.29
Bismuth	mg/kg	2.1	1.8	0.23	0.15	0.21	0.81	1.0	0.77	1.1
Calcium	mg/kg	1500	2600	4800	4900	6300	3000	7400	11000	5100
Cadmium	mg/kg	0.46	0.54	0.51	0.18	0.46	0.36	0.12	0.15	0.41
Cobalt	mg/kg	49	7.1	6.9	6.7	5.7	9.1	20	16	8.5
Chromium	mg/kg	120	14	9.1	13	22	15	34	59	14
Copper	mg/kg	50	18	23	11	28	70	54	75	65
Iron	mg/kg	52000	20000	12000	14000	8000	32000	34000	34000	28000
Potassium	mg/kg	1100	3300	840	930	380	1700	2500	3100	1500
Lithium	mg/kg	10	17	6.1	9.5	8.5	21	28	24	19
Magnesium	mg/kg	3600	6100	1800	2900	1200	6200	9300	9500	5700
Manganese	mg/kg	370	250	320	300	250	420	660	840	520
Molybdenum	mg/kg	1.4	0.26	0.86	0.57	0.81	0.77	0.55	0.72	0.95
Nickel	mg/kg	74	18	14	15	11	32	40	41	31
Lead	mg/kg	110	99	37	18	30	55	63	44	77
Sulphur	mg/kg	18000	2000	3300	1900	3100	850	1400	2000	2200
Antimony	mg/kg	33	3.1	0.96	< 0.8	< 0.8	5.0	4.1	2.7	3.2
Selenium	mg/kg	< 0.7	< 0.7	1.4	1.5	3.6	< 0.7	< 0.7	< 0.7	< 0.7
Tin	mg/kg	0.96	< 0.5	1.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.51
Strontium	mg/kg	18	28	49	51	71	35	77	110	52
Titanium	mg/kg	210	190	170	270	270	260	160	320	220
Thallium	mg/kg	0.10	0.13	0.13	0.095	0.11	0.13	0.10	0.13	0.092
Uranium	mg/kg	0.36	0.46	1.4	1.6	3.9	0.31	0.41	0.35	0.42
Vanadium	mg/kg	9.4	11	12	9.6	7.4	12	12	12	12
Yttrium	mg/kg	4.3	4.2	6.0	5.8	15	4.3	4.7	4.4	5.2
Zinc	mg/kg	63	70	34	26	22	140	95	93	110

Goldenville - Solids

Sample ID	G-2018-C6 (28NOV) (10-20cm)	G-2018-C6 (28NOV) (20-30cm)	G-2018-C7 (2.5-10cm)	G-2018-C7 (15-20cm)	G-2018-C7 (20-30cm)	G-2018-C8 (0-5cm)	G-2018-C8 (15-20cm)	G-2018-C8 (40-50cm)	G-2018-C9 (0-7.5cm)	
ABA										
Paste pH		--	--	--	--	--	--	7.31	--	5.73
Fizz Rate	---	--	--	--	--	--	--	1	--	1
Sample weight	g	--	--	--	--	--	--	2	--	1.99
HCl Added	mL	--	--	--	--	--	--	20	--	20
HCl	Normality	--	--	--	--	--	--	0.1	--	0.1
NaOH	Normality	--	--	--	--	--	--	0.1	--	0.1
NaOH to pH=8.3	mL	--	--	--	--	--	--	10.23	--	19.79
Final pH	no unit	--	--	--	--	--	--	1.52	--	1.27
NP	t CaCO3/1000 t	--	--	--	--	--	--	24.4	--	0.5
AP	t CaCO3/1000 t	--	--	--	--	--	--	2.81	--	3.12
Net NP	t CaCO3/1000 t	--	--	--	--	--	--	21.6	--	-2.62
NP/AP	ratio	--	--	--	--	--	--	8.68	--	0.16
Sulphur (total)	%S	--	--	0.344	0.292	0.428	0.098	0.146	0.218	0.28
Acid Leachable SO4-S	%S	--	--	0.21	0.23	0.23	0.05	0.06	0.07	0.18
Sulphide	%S	--	--	0.13	0.06	0.2	0.05	0.09	0.15	0.1
Carbon (total)	%C	--	--	12.8	24.4	36.9	3.84	0.501	0.587	10.6
Carbonate	%CO3	--	--	0.44	0.115	0.19	<0.025	1.29	2.29	<0.025

Goldenville - Solids

Sample ID	G-2018-C9 (20-30cm)	G-2018-C9 (30-40cm)	G-2018-C10 (2.5-10cm)	G-2018-C10 (15-20cm)	G-2018-C10 (40-50cm)	G-2018-C14 (2.5-10cm)	G-2018-C14 (15-20cm)	G-2018-C14 (40-50cm)	G-2018-C15 (2.5-10cm)	
Latitude	45.12589401	45.12589401	45.12453203	45.12453203	45.12453203	45.12157079	45.12157079	45.12157079	45.11863	
Longitude	-62.02529398	-62.02529398	-62.02730698	-62.02730698	-62.02730698	-62.02352858	-62.02352858	-62.02352858	-62.02648999	
Analysis	Units									
Moisture	%	57.8	80.2	59.4	23.3	17.8	25.2	24.3	34.6	28.2
Mercury	mg/kg	11	2	20	0	0	1	1	44	2
Silver	mg/kg	0.20	0.47	0.27	0.019	0.042	0.052	0.052	0.37	0.12
Arsenic	mg/kg	1600	230	82	34	17	2600	2100	7600	1900
Aluminum	mg/kg	12000	10000	6500	9000	8000	6300	6500	6100	12000
Barium	mg/kg	76	50	34	30	35	33	31	33	56
Beryllium	mg/kg	0.49	0.42	0.31	0.19	0.21	0.17	0.17	0.18	0.33
Bismuth	mg/kg	0.79	0.30	0.35	0.15	0.16	0.30	0.28	1.2	0.41
Calcium	mg/kg	3800	8500	1600	650	1800	1300	1100	1300	1700
Cadmium	mg/kg	0.23	0.17	0.14	< 0.02	0.030	0.10	0.10	0.28	0.17
Cobalt	mg/kg	21	4.0	2.7	4.1	6.8	5.1	4.6	13	10
Chromium	mg/kg	26	9.3	7.6	78	64	80	84	94	57
Copper	mg/kg	34	17	19	4.8	15	13	11	31	26
Iron	mg/kg	25000	13000	12000	14000	15000	19000	18000	24000	28000
Potassium	mg/kg	3100	1000	680	860	1500	1700	1900	1500	2800
Lithium	mg/kg	21	4.9	3.5	13	13	9.3	9.3	8.4	18
Magnesium	mg/kg	6300	2200	1200	3200	4100	3700	3800	3400	7700
Manganese	mg/kg	440	830	170	150	210	160	160	180	290
Molybdenum	mg/kg	0.69	0.73	1.1	0.41	0.27	0.65	0.66	0.87	0.51
Nickel	mg/kg	31	9.5	6.7	13	17	14	14	25	25
Lead	mg/kg	48	23	920	21	6.1	18	18	76	25
Sulphur	mg/kg	1900	2300	890	210	38	1400	1000	5700	940
Antimony	mg/kg	1.9	< 0.8	< 0.8	< 0.8	< 0.8	3.2	3.0	8.3	2.6
Selenium	mg/kg	< 0.7	2.0	1.0	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Tin	mg/kg	< 0.5	< 0.5	1.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Strontium	mg/kg	45	100	19	8.6	19	17	14	16	20
Titanium	mg/kg	160	230	140	300	430	220	210	200	290
Thallium	mg/kg	0.16	0.078	0.14	0.070	0.062	0.058	0.065	0.072	0.12
Uranium	mg/kg	0.79	1.9	0.62	0.44	0.53	0.24	0.24	0.27	0.46
Vanadium	mg/kg	13	6.9	7.8	12	12	7.6	7.6	7.9	14
Yttrium	mg/kg	5.3	5.2	3.7	4.3	6.2	3.9	3.4	4.2	6.8
Zinc	mg/kg	76	20	13	23	31	35	34	66	66

Goldenville - Solids

Sample ID		G-2018-C9 (20-30cm)	G-2018-C9 (30-40cm)	G-2018-C10 (2.5-10cm)	G-2018-C10 (15-20cm)	G-2018-C10 (40-50cm)	G-2018-C14 (2.5-10cm)	G-2018-C14 (15-20cm)	G-2018-C14 (40-50cm)	G-2018-C15 (2.5-10cm)
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	0.232	--	0.538	0.024	0.005	0.151	0.11	0.666	0.089
Acid Leachable SO4-S	%S	0.12	--	0.37	<0.02	<0.02	0.06	0.04	0.19	0.04
Sulphide	%S	0.11	--	0.17	0.02	<0.02	0.09	0.07	0.48	0.05
Carbon (total)	%C	8	--	6.4	1.02	0.267	0.208	0.201	2.39	0.476
Carbonate	%CO3	0.14	--	1.05	0.035	<0.025	0.12	0.105	0.39	0.11

Goldenville - Solids

Sample ID	G-2018-C15 (15-20cm)	G-2018-C15 (20-30cm)	G-2018-C17 (0-5cm)	G-2018-C17 (10-20cm)	G-2018-C17 (40-50cm)	G-2018-C6 (29NOV) (0-7.5cm)	G-2018-C6 (29NOV) (10-15cm)	G-2018-C6 (29NOV) (20-30cm)	G-2018-C6 (29NOV) (40-50cm)	
Latitude	45.11863	45.11863	45.12692297	45.12692297	45.12692297	45.1257397	45.1257397	45.1257397	45.1257397	
Longitude	-62.02648999	-62.02648999	-61.99020197	-61.99020197	-61.99020197	-62.02049048	-62.02049048	-62.02049048	-62.02049048	
Analysis	Units									
Moisture	%	76.3	79.3	40.8	30.5	33.2	63.9	36.0	21.5	83.7
Mercury	mg/kg	1	1	3	5	8	29	29	14	10
Silver	mg/kg	0.16	0.22	0.19	0.19	0.23	0.65	0.63	0.78	0.76
Arsenic	mg/kg	1900	3100	2800	1700	3300	1200	1100	43000	550
Aluminum	mg/kg	8400	9500	16000	11000	13000	8900	11000	12000	13000
Barium	mg/kg	39	35	77	45	64	58	55	69	38
Beryllium	mg/kg	0.31	0.34	0.46	0.31	0.41	0.36	0.35	0.41	0.57
Bismuth	mg/kg	0.27	0.21	0.43	0.38	0.59	1.5	1.5	2.1	0.65
Calcium	mg/kg	8000	7300	3000	8000	9400	2400	1900	2800	4600
Cadmium	mg/kg	0.26	0.37	0.36	0.20	0.40	0.65	0.51	0.36	0.36
Cobalt	mg/kg	8.6	12	13	9.1	11	8.3	5.5	66	2.8
Chromium	mg/kg	79	9.0	21	23	18	12	14	17	11
Copper	mg/kg	15	14	43	29	31	25	16	39	19
Iron	mg/kg	16000	15000	33000	27000	28000	24000	20000	74000	9600
Potassium	mg/kg	1400	1200	3300	2600	3800	1900	2600	3900	1100
Lithium	mg/kg	6.8	5.4	25	20	20	14	18	18	6.2
Magnesium	mg/kg	3100	2500	9900	7500	8400	4900	6800	6700	2600
Manganese	mg/kg	490	510	460	640	670	320	250	470	180
Molybdenum	mg/kg	0.68	0.72	0.49	0.28	0.38	0.52	0.21	1.7	0.72
Nickel	mg/kg	19	31	29	22	26	23	16	87	10
Lead	mg/kg	18	16	36	23	43	99	86	96	40
Sulphur	mg/kg	3900	3400	2100	2300	2900	1100	770	26000	3000
Antimony	mg/kg	1.3	1.6	2.9	1.7	2.9	2.5	2.3	41	0.99
Selenium	mg/kg	1.3	2.0	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	2.5
Tin	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Strontium	mg/kg	64	61	31	58	66	28	23	34	40
Titanium	mg/kg	180	200	260	280	250	150	190	300	280
Thallium	mg/kg	0.066	0.066	0.15	0.12	0.12	0.12	0.12	0.14	0.045
Uranium	mg/kg	0.75	1.3	0.46	0.51	0.49	0.41	0.31	0.47	2.2
Vanadium	mg/kg	6.6	6.0	16	14	15	9.7	11	15	7.3
Yttrium	mg/kg	5.2	5.4	7.5	6.4	7.0	4.8	4.3	5.8	6.1
Zinc	mg/kg	40	59	92	59	75	89	76	64	33

Goldenville - Solids

Sample ID	G-2018-C15 (15-20cm)	G-2018-C15 (20-30cm)	G-2018-C17 (0-5cm)	G-2018-C17 (10-20cm)	G-2018-C17 (40-50cm)	G-2018-C6 (29NOV) (0-7.5cm)	G-2018-C6 (29NOV) (10-15cm)	G-2018-C6 (29NOV) (20-30cm)	G-2018-C6 (29NOV) (40-50cm)	
ABA										
Paste pH		--	--	--	7.45	--	--	--	--	--
Fizz Rate	---	--	--	--	3	--	--	--	--	--
Sample weight	g	--	--	--	1.99	--	--	--	--	--
HCl Added	mL	--	--	--	20	--	--	--	--	--
HCl	Normality	--	--	--	0.1	--	--	--	--	--
NaOH	Normality	--	--	--	0.1	--	--	--	--	--
NaOH to pH=8.3	mL	--	--	--	12.47	--	--	--	--	--
Final pH	no unit	--	--	--	1.38	--	--	--	--	--
NP	t CaCO3/1000 t	--	--	--	18.9	--	--	--	--	--
AP	t CaCO3/1000 t	--	--	--	4.06	--	--	--	--	--
Net NP	t CaCO3/1000 t	--	--	--	14.8	--	--	--	--	--
NP/AP	ratio	--	--	--	4.65	--	--	--	--	--
Sulphur (total)	%S	0.468	0.436	0.247	0.234	0.303	0.108	0.077	--	0.429
Acid Leachable SO4-S	%S	0.23	0.21	0.12	0.1	0.1	0.07	0.06	--	0.3
Sulphide	%S	0.24	0.23	0.13	0.13	0.2	0.04	0.02	--	0.13
Carbon (total)	%C	27.3	32.7	1.73	1.26	1.04	7.34	1.43	--	34.5
Carbonate	%CO3	0.075	0.09	0.2	0.924	1.14	0.155	0.135	--	0.165

Goldenville - Solids

Sample ID	G-2018-SFC-1 (0-20cm)	G-2018-SFC-2	G-2018-SFC-3	G-2018-SFC-4	G-2018-SFC-5	G-2018-SFC-6	G-2018-SFC-7	G-2018-SFC-8	G-2018-SFC-10	
Latitude	45.122642	45.12229599	45.122082	45.12185301	45.12158998	45.12150398	45.12145302	45.12169903	45.12217403	
Longitude	-62.01637697	-62.01636096	-62.01637404	-62.01633196	-62.01656498	-62.01690696	-62.01733704	-62.01718901	-62.016884	
Analysis	Units									
Moisture	%	17.0	20.8	20.5	12.4	24.3	25.2	23.4	21.5	21.4
Mercury	mg/kg	6	3	0	0	0	1	1	0	0
Silver	mg/kg	0.77	0.37	0.068	0.15	0.052	0.13	0.12	0.083	0.18
Arsenic	mg/kg	31000	15000	600	2200	550	1800	4500	920	1600
Aluminum	mg/kg	5100	8100	7000	8400	6600	11000	9000	7500	7200
Barium	mg/kg	34	48	35	45	28	57	39	32	30
Beryllium	mg/kg	0.12	0.19	0.18	0.22	0.17	0.33	0.25	0.19	0.21
Bismuth	mg/kg	2.6	1.4	0.28	0.61	0.24	0.51	0.47	0.33	0.66
Calcium	mg/kg	160	1100	1300	1100	1300	6500	5000	4800	1400
Cadmium	mg/kg	0.090	0.091	0.050	0.37	0.089	0.16	0.24	0.14	0.67
Cobalt	mg/kg	1.9	3.4	2.5	12	4.2	10	9.7	7.7	9.6
Chromium	mg/kg	8.8	12	10	12	100	47	62	65	66
Copper	mg/kg	8.6	7.3	14	32	20	34	35	25	45
Iron	mg/kg	48000	37000	17000	27000	16000	28000	26000	19000	22000
Potassium	mg/kg	1800	2500	2100	2600	1700	3400	2600	2100	2200
Lithium	mg/kg	6.5	11	11	12	10	18	14	12	11
Magnesium	mg/kg	2800	4800	4200	5000	4200	7000	6300	4900	4600
Manganese	mg/kg	110	210	190	490	190	710	500	400	500
Molybdenum	mg/kg	1.3	1.0	0.93	1.1	0.74	0.89	0.80	1.0	1.2
Nickel	mg/kg	9.0	9.9	9.0	24	15	28	29	23	41
Lead	mg/kg	170	93	16	46	14	28	23	19	39
Sulphur	mg/kg	1800	530	59	180	100	1000	240	610	110
Antimony	mg/kg	33	13	1.3	2.8	1.2	1.8	4.5	1.3	2.0
Selenium	mg/kg	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Tin	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Strontium	mg/kg	3.7	14	16	15	15	51	57	37	18
Titanium	mg/kg	200	230	250	270	250	260	310	270	270
Thallium	mg/kg	0.11	0.090	0.069	0.10	0.065	0.11	0.11	0.081	0.10
Uranium	mg/kg	0.19	0.33	0.26	0.33	0.26	0.60	0.42	0.29	0.33
Vanadium	mg/kg	6.5	10	8.1	9.3	7.7	12	10	8.7	8.2
Yttrium	mg/kg	1.7	4.0	3.8	5.2	4.3	7.1	8.2	5.1	6.5
Zinc	mg/kg	24	31	32	51	35	61	57	48	78

Goldenville - Solids

Sample ID	G-2018-SFC-1 (0-20cm)	G-2018-SFC-2	G-2018-SFC-3	G-2018-SFC-4	G-2018-SFC-5	G-2018-SFC-6	G-2018-SFC-7	G-2018-SFC-8	G-2018-SFC-10	
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	0.228	0.061	0.008	0.023	0.012	0.095	0.026	0.064	0.013
Acid Leachable SO4-S	%S	0.17	0.04	<0.02	0.02	<0.02	0.04	0.03	0.02	<0.02
Sulphide	%S	0.06	0.02	<0.02	<0.02	<0.02	0.05	<0.02	0.04	<0.02
Carbon (total)	%C	0.061	0.161	0.411	0.067	0.337	0.47	0.236	0.232	0.074
Carbonate	%CO3	0.08	0.135	0.05	0.055	0.05	0.57	0.355	0.495	0.07

Goldenville - Solids

Sample ID	G-2018-SFC-11	G-2018-SFC-12	G-2018-SFC-13	G-2018-SFC-14	G-2018-SFC-15	G-2018-SFC-16	G-2018-SFC-18	G-2018-C1 (0-10cm)	G-2018-C1 (20-40cm)	
Latitude	45.12237403	45.12265096	45.12229398	45.12205401	45.12179903	45.12161597	45.121982	45.12183096	45.12183096	
Longitude	-62.01669599	-62.01676497	-62.01743603	-62.01763703	-62.01776401	-62.01786401	-62.01798102	-62.016568	-62.016568	
Analysis	Units									
Moisture	%	11.9	16.6	22.5	21.4	19.6	34.1	17.6	26.6	20.1
Mercury	mg/kg	0	18	2	1	1	1	1	0	2
Silver	mg/kg	0.31	6.2	0.31	0.23	0.19	0.22	0.25	0.089	0.15
Arsenic	mg/kg	8700	170000	5600	9000	8200	2100	11000	1200	680
Aluminum	mg/kg	5500	370	7900	5700	6100	9600	6500	7000	14000
Barium	mg/kg	28	13	34	27	29	42	31	30	62
Beryllium	mg/kg	0.11	0.024	0.20	0.14	0.14	0.27	0.14	0.17	0.35
Bismuth	mg/kg	1.6	25	1.1	1.0	0.93	0.72	1.2	0.38	0.55
Calcium	mg/kg	810	38	1800	1300	1000	3400	890	2100	5900
Cadmium	mg/kg	< 0.02	0.16	0.21	0.10	0.077	0.23	0.12	0.096	0.17
Cobalt	mg/kg	1.4	3.0	13	5.3	4.4	9.4	4.9	5.1	20
Chromium	mg/kg	68	13	63	67	67	14	66	82	42
Copper	mg/kg	3.7	82	33	13	13	36	11	20	31
Iron	mg/kg	27000	160000	27000	25000	24000	26000	28000	18000	36000
Potassium	mg/kg	1700	320	2000	1700	1800	2300	1700	1900	3600
Lithium	mg/kg	8.0	< 2	11	8.4	8.7	15	9.0	11	20
Magnesium	mg/kg	3400	97	5000	3700	3800	6000	4000	4500	8600
Manganese	mg/kg	110	9.8	360	190	200	400	200	280	920
Molybdenum	mg/kg	1.0	2.2	0.61	0.87	1.5	1.1	1.6	0.91	2.2
Nickel	mg/kg	8.1	5.1	27	13	10	28	11	16	45
Lead	mg/kg	93	1400	63	47	41	47	48	21	29
Sulphur	mg/kg	1000	17000	410	840	290	1300	460	310	1500
Antimony	mg/kg	8.3	240	6.1	11	12	3.3	16	1.5	< 0.8
Selenium	mg/kg	< 0.7	3.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Tin	mg/kg	< 0.5	2.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Strontium	mg/kg	11	5.8	27	17	16	31	13	23	45
Titanium	mg/kg	210	120	250	220	210	310	230	250	320
Thallium	mg/kg	0.066	0.18	0.090	0.072	0.083	0.098	0.088	0.072	0.12
Uranium	mg/kg	0.20	0.064	0.34	0.24	0.26	0.45	0.29	0.27	0.48
Vanadium	mg/kg	7.8	1.4	9.2	6.9	7.4	12	8.0	8.0	15
Yttrium	mg/kg	2.4	0.32	5.4	3.5	3.6	6.5	3.8	4.3	7.0
Zinc	mg/kg	23	11	57	27	27	64	28	40	71

Goldenville - Solids

Sample ID	G-2018-SFC-11	G-2018-SFC-12	G-2018-SFC-13	G-2018-SFC-14	G-2018-SFC-15	G-2018-SFC-16	G-2018-SFC-18	G-2018-C1 (0-10cm)	G-2018-C1 (20-40cm)	
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	0.122	2.54	0.045	0.101	0.034	0.14	0.056	0.034	0.148
Acid Leachable SO4-S	%S	0.1	0.71	<0.02	0.04	0.03	0.04	0.04	<0.02	0.06
Sulphide	%S	0.02	1.83	0.03	0.06	<0.02	0.1	0.02	0.03	0.09
Carbon (total)	%C	0.059	0.238	0.163	0.091	0.185	1.27	0.115	0.325	0.375
Carbonate	%CO3	0.08	0.095	0.115	0.12	0.15	0.15	0.13	0.11	0.55

Goldenville - Solids

Sample ID	G-2018-C1 (60-80cm)	G-2018-C1 (140-160cm)	G-2018-C4 (0-5cm)	G-2018-C4 (10-20cm)	G-2018-WR1	G-2018-WR2	G-2018-WR3	G-2018-WR4	G-2018-WR5	
Latitude	45.12183096	45.12183096	45.121996	45.121996	45.12306101	45.12281399	45.12233002	45.12614898	45.12653296	
Longitude	-62.016568	-62.016568	-62.01568597	-62.01568597	-62.01652701	-62.01607003	-62.01598504	-62.02110202	-62.021558	
Analysis	Units									
Moisture	%	19.1	39.3	51.7	35.5	9.72	15.7	11.8	7.38	14.1
Mercury	mg/kg	11	5	0	4	---	---	---	---	---
Silver	mg/kg	0.26	0.098	0.11	0.15	0.17	0.44	0.086	0.066	0.095
Arsenic	mg/kg	2000	1500	3300	490	2500	12000	1600	4100	850
Aluminum	mg/kg	10000	8200	9200	10000	11000	8400	13000	14000	17000
Barium	mg/kg	59	31	40	43	68	49	69	73	82
Beryllium	mg/kg	0.31	0.23	0.25	0.28	0.34	0.19	0.40	0.42	0.53
Bismuth	mg/kg	0.79	0.39	0.34	0.41	0.61	1.5	0.34	0.39	0.53
Calcium	mg/kg	2300	2100	1400	1100	3300	1400	2900	5600	4400
Cadmium	mg/kg	0.28	0.14	0.13	0.11	0.20	0.095	0.11	0.057	0.068
Cobalt	mg/kg	16	22	7.4	5.5	15	8.1	13	14	21
Chromium	mg/kg	13	9.3	12	13	17	14	18	19	23
Copper	mg/kg	35	20	18	13	39	170	28	27	49
Iron	mg/kg	26000	16000	34000	18000	31000	37000	29000	34000	39000
Potassium	mg/kg	3200	1400	1300	1700	3400	1900	3400	4400	5000
Lithium	mg/kg	14	10	10	12	15	11	18	25	34
Magnesium	mg/kg	5600	3200	3000	4100	6600	4900	6800	7600	9700
Manganese	mg/kg	510	220	490	250	490	320	510	560	590
Molybdenum	mg/kg	1.4	0.73	0.96	0.82	0.67	0.77	0.52	0.52	2.2
Nickel	mg/kg	37	46	14	12	33	17	28	35	50
Lead	mg/kg	45	24	24	20	45	290	27	17	21
Sulphur	mg/kg	1900	1700	410	480	1200	1300	430	2100	430
Antimony	mg/kg	4.7	1.3	1.6	1.3	1.2	19	1.3	6.0	1.9
Selenium	mg/kg	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Tin	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	0.99	5.9	0.61	< 0.5	< 0.5
Strontium	mg/kg	24	19	15	14	32	15	25	61	49
Titanium	mg/kg	240	200	260	280	310	260	330	270	330
Thallium	mg/kg	0.11	0.052	0.077	0.095	0.12	0.083	0.12	0.15	0.18
Uranium	mg/kg	0.40	0.35	0.39	0.36	0.46	0.41	0.59	0.42	0.52
Vanadium	mg/kg	11	8.4	13	12	14	11	16	16	18
Yttrium	mg/kg	5.4	5.0	5.2	4.1	7.1	4.7	7.3	5.1	6.6
Zinc	mg/kg	87	66	31	32	81	56	55	61	82

Goldenville - Solids

Sample ID	G-2018-C1 (60-80cm)	G-2018-C1 (140-160cm)	G-2018-C4 (0-5cm)	G-2018-C4 (10-20cm)	G-2018-WR1	G-2018-WR2	G-2018-WR3	G-2018-WR4	G-2018-WR5	
ABA										
Paste pH		--	--	--	--	--	5.88	--	--	--
Fizz Rate	---	--	--	--	--	--	1	--	--	--
Sample weight	g	--	--	--	--	--	2.04	--	--	--
HCl Added	mL	--	--	--	--	--	20	--	--	--
HCl	Normality	--	--	--	--	--	0.1	--	--	--
NaOH	Normality	--	--	--	--	--	0.1	--	--	--
NaOH to pH=8.3	mL	--	--	--	--	--	19.86	--	--	--
Final pH	no unit	--	--	--	--	--	1.1	--	--	--
NP	t CaCO3/1000 t	--	--	--	--	--	0.3	--	--	--
AP	t CaCO3/1000 t	--	--	--	--	--	2.5	--	--	--
Net NP	t CaCO3/1000 t	--	--	--	--	--	-2.2	--	--	--
NP/AP	ratio	--	--	--	--	--	0.12	--	--	--
Sulphur (total)	%S	--	0.201	0.051	0.062	0.124	0.137	0.039	0.217	0.04
Acid Leachable SO4-S	%S	--	0.05	<0.02	0.02	0.05	0.06	<0.02	0.07	0.04
Sulphide	%S	--	0.15	0.04	0.04	0.07	0.08	0.02	0.15	<0.02
Carbon (total)	%C	--	4.4	3.76	2.36	0.174	0.44	0.303	0.307	0.46
Carbonate	%CO3	--	0.07	0.06	0.1	0.225	0.37	0.225	0.834	0.51

Goldenville - Solids

Sample ID		G-2018-WR6
Latitude		45.12505104
Longitude		-62.016007
Analysis	Units	
Moisture	%	9.51
Mercury	mg/kg	---
Silver	mg/kg	0.097
Arsenic	mg/kg	380
Aluminum	mg/kg	17000
Barium	mg/kg	80
Beryllium	mg/kg	0.49
Bismuth	mg/kg	0.47
Calcium	mg/kg	3000
Cadmium	mg/kg	0.11
Cobalt	mg/kg	15
Chromium	mg/kg	23
Copper	mg/kg	41
Iron	mg/kg	38000
Potassium	mg/kg	4000
Lithium	mg/kg	28
Magnesium	mg/kg	10000
Manganese	mg/kg	590
Molybdenum	mg/kg	0.22
Nickel	mg/kg	35
Lead	mg/kg	33
Sulphur	mg/kg	240
Antimony	mg/kg	< 0.8
Selenium	mg/kg	< 0.7
Tin	mg/kg	< 0.5
Strontium	mg/kg	33
Titanium	mg/kg	250
Thallium	mg/kg	0.14
Uranium	mg/kg	0.60
Vanadium	mg/kg	18
Yttrium	mg/kg	6.0
Zinc	mg/kg	80

Goldenville - Solids

Sample ID		G-2018-WR6
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	0.017
Acid Leachable SO4-S	%S	<0.02
Sulphide	%S	<0.02
Carbon (total)	%C	0.36
Carbonate	%CO3	0.255

Appendix B Surface Water/Standing Water Results

**Goldenville - Surface/Standing
Water - Total**

Sample ID	G-Pz4	G-Pz1	G-Pz2	G-Pz3	G-SW16	G-SW14	G-SW15	G-SW13	G-SW12	G-SW11	G-SW5	
Field Data												
Field pH	--	6.87	5.07	5.42	6.59	7.76	7.04	6.83	4.92	N/A	4.72	6.04
Field EC	uS/cm	34	50	59	176	30	47	45	35	N/A	36	73
Field Temp	Celsius	0.3	2	2.2	0.8	0.5	1.1	0.9	N/A	N/A	3.7	2.5
Latitude	--	45.121996	45.12183096	45.12168302	45.12154103	45.12174396	45.12157079	45.11863	45.07952778	45.07847222	45.08256946	45.12597959
Longitude	--	-62.01568597	-62.016568	-62.01805604	-62.01943503	-62.02204599	-62.02352858	-62.02648999	-62.00694444	-62.00416667	-61.99973647	-61.99875285
Lab Results												
Total Hardness (CaCO3)	mg/L	4.81	6.43	10.6	72.3	9.98	8.86	9.40	4.38	4.55	3.61	12.0
Total Mercury (Hg)	mg/L	<0.00002	<0.00002	<0.00002	0.000339	0.000031	0.000036	<0.00002	<0.00002	<0.00002	<0.00002	0.000045
Total Aluminum (Al)	mg/L	0.289	0.253	0.300	1.40	0.318	0.187	0.199	0.190	0.226	0.282	0.213
Total Antimony (Sb)	mg/L	0.000069	0.000136	0.000161	0.0016	0.000303	0.000527	0.000229	0.000055	0.000059	0.000033	0.000354
Total Arsenic (As)	mg/L	0.0270	0.0721	0.0999	18.4	0.262	0.358	0.138	0.0382	0.0364	0.0128	0.130
Total Barium (Ba)	mg/L	0.00251	0.00254	0.00353	0.0437	0.00259	0.00201	0.00194	0.00202	0.00226	0.00215	0.00680
Total Beryllium (Be)	mg/L	0.000012	0.000018	0.000014	<0.0005	0.000021	<0.00001	0.000012	<0.00001	0.000012	0.000011	0.000011
Total Bismuth (Bi)	mg/L	<0.00001	<0.00001	<0.00001	<0.0005	0.000017	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Boron (B)	mg/L	<0.01	<0.01	<0.01	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Cadmium (Cd)	mg/L	0.0000168	0.0000259	0.0000354	0.00030	0.0000257	0.0000230	0.0000179	0.0000141	0.0000158	0.0000155	0.0000167
Total Chromium (Cr)	mg/L	0.00034	0.00028	0.00033	<0.005	0.00038	0.00019	0.00018	0.00019	0.00021	0.00024	0.00026
Total Cobalt (Co)	mg/L	0.000428	0.000597	0.00144	0.00896	0.000908	0.000457	0.000716	0.000256	0.000314	0.000653	0.000227
Total Copper (Cu)	mg/L	0.00080	0.00101	0.00127	0.0125	0.00165	0.00273	0.00129	0.00035	0.00041	0.00035	0.00269
Total Iron (Fe)	mg/L	0.518	0.700	1.04	80.0	0.866	0.363	0.377	0.445	0.484	0.418	0.515
Total Lead (Pb)	mg/L	0.000591	0.000656	0.000775	0.0132	0.00153	0.000386	0.000368	0.000237	0.000278	0.000387	0.000353
Total Lithium (Li)	mg/L											
Total Manganese (Mn)	mg/L	0.0492	0.0595	0.105	2.01	0.0583	0.0309	0.0585	0.0584	0.0691	0.0636	0.0651
Total Molybdenum (Mo)	mg/L	<0.00005	<0.00005	0.000080	<0.0025	0.000061	0.000102	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Total Nickel (Ni)	mg/L	0.00091	0.00139	0.00324	0.0241	0.00206	0.00218	0.00166	0.00057	0.00069	0.00048	0.00223
Total Selenium (Se)	mg/L	0.000070	0.000069	0.000068	<0.002	0.000067	0.000056	0.000052	0.000069	0.000074	0.000080	0.000074
Total Silicon (Si)	mg/L	1.63	1.64	1.76	5.3	1.45	1.28	1.39	1.39	1.33	1.55	1.77
Total Silver (Ag)	mg/L	<0.00001	<0.00001	<0.00001	<0.0005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Strontium (Sr)	mg/L	0.00931	0.0129	0.0225	0.216	0.0199	0.0182	0.0192	0.00881	0.00923	0.00733	0.0246
Total Thallium (Tl)	mg/L	0.0000039	0.0000037	0.0000043	<0.0001	0.0000047	0.0000037	0.0000030	0.0000022	0.0000028	0.0000027	0.0000055
Total Tin (Sn)	mg/L	<0.0002	<0.0002	<0.0002	<0.01	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00032	<0.0002
Total Titanium (Ti)	mg/L	0.0063	0.0030	0.0031	<0.1	0.0075	<0.002	0.0024	<0.002	0.0023	0.0034	<0.002
Total Uranium (U)	mg/L	0.0000096	0.0000091	0.0000150	<0.00025	0.0000108	0.0000082	0.0000070	0.0000067	0.0000081	0.0000083	0.0000169
Total Vanadium (V)	mg/L	0.00032	0.00027	0.00025	<0.01	0.00038	<0.0002	<0.0002	<0.0002	<0.0002	0.00022	<0.0002
Total Zinc (Zn)	mg/L	0.0036	0.0045	0.0063	<0.05	0.0056	0.0051	0.0042	0.0020	0.0029	0.0022	0.0055
Total Zirconium (Zr)	mg/L	<0.0001	0.00016	<0.0001	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L	1.17	1.78	3.19	29	2.96	2.67	2.85	1.05	1.08	0.79	3.78
Total Magnesium (Mg)	mg/L	0.46	0.48	0.64	<13.0	0.63	0.53	0.55	0.43	0.45	0.40	0.62
Total Potassium (K)	mg/L	<0.25	<0.25	<0.25	<13.0	0.31	0.33	0.30	<0.25	<0.25	<0.25	0.51
Total Sodium (Na)	mg/L	5.88	5.97	6.32	<13.0	4.52	4.10	4.13	3.51	3.82	3.40	5.22
Total Phosphorus	mg/L	0.0117	0.0102	0.0122	0.28	0.0202	0.0091	0.0102	0.0101	0.0093	0.0084	0.0083
Total Sulphur	mg/L	<0.6	0.70	1.68	<30.0	1.17	1.26	1.20	<0.6	<0.6	<0.6	1.72

Goldenville - Surface/Standing

Water - Total

Sample ID	G-SW6 (NE-Nov28)	G-SW17	G-SW6 (NW-Nov29)	G-SW7	G-SW8	G-SW9	G-SW10
Field Data							
Field pH	--	7.02	6.9	6.51	6.09	6.99	7.18
Field EC	uS/cm	51	45	91	67	58	44
Field Temp	Celsius	2.1	2.9	5.2	2.5	0.3	0.4
Latitude	--	45.12626801	45.12692297	45.1257397	45.12685298	45.12671602	45.12589401
Longitude	--	-61.99597299	-61.99020197	-62.02049048	-62.02127502	-62.02365297	-62.02529398
Lab Results							
Total Hardness (CaCO3)	mg/L	12.6	7.39	30.6	5.97	16.2	7.53
Total Mercury (Hg)	mg/L	0.000028	0.00003		<0.00002	<0.00002	0.000049
Total Aluminum (Al)	mg/L	0.133	0.166	0.196	0.341	0.0358	0.287
Total Antimony (Sb)	mg/L	0.000173	0.000180	0.000272	0.000042	0.000249	0.000191
Total Arsenic (As)	mg/L	0.0882	0.124	0.0303	0.00180	0.0129	0.0883
Total Barium (Ba)	mg/L	0.00283	0.00220	0.00299	0.00254	0.000900	0.00219
Total Beryllium (Be)	mg/L	<0.00001	0.000011	0.000029	0.000017	<0.00001	0.000014
Total Bismuth (Bi)	mg/L	<0.00001	<0.00001	0.000018	<0.00001	<0.00001	0.000016
Total Boron (B)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Cadmium (Cd)	mg/L	<0.000005	0.0000139	0.0000050	0.0000158	<0.000005	0.0000136
Total Chromium (Cr)	mg/L	0.00017	0.00022	0.00024	0.00034	<0.0001	0.00031
Total Cobalt (Co)	mg/L	0.000086	0.000088	0.000883	0.000153	0.000035	0.000609
Total Copper (Cu)	mg/L	0.00119	0.00126	0.00573	0.00082	0.00157	0.00190
Total Iron (Fe)	mg/L	0.280	0.210	1.13	0.240	0.0788	2.78
Total Lead (Pb)	mg/L	0.000193	0.000121	0.00186	0.000405	0.000072	0.00191
Total Lithium (Li)	mg/L			0.00085			
Total Manganese (Mn)	mg/L	0.0258	0.0113	0.314	0.0205	0.00290	0.107
Total Molybdenum (Mo)	mg/L	<0.00005	<0.00005	0.000106	<0.00005	<0.00005	0.000072
Total Nickel (Ni)	mg/L	0.00085	0.00137	0.00233	0.00070	0.00076	0.00050
Total Selenium (Se)	mg/L	0.000062	0.000070	0.000083	0.000070	<0.00004	0.000086
Total Silicon (Si)	mg/L	1.74	1.28	1.75	1.31	1.02	1.37
Total Silver (Ag)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Strontium (Sr)	mg/L	0.0259	0.0156	0.0792	0.0117	0.0345	0.0326
Total Thallium (Tl)	mg/L	0.0000031	0.0000031	0.0000037	0.0000052	<0.000002	0.0000062
Total Tin (Sn)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Total Titanium (Ti)	mg/L	<0.002	<0.002	0.0021	0.0021	<0.002	0.0048
Total Uranium (U)	mg/L	0.0000104	0.0000072	0.0000890	0.0000131	0.0000078	0.0000247
Total Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00037
Total Zinc (Zn)	mg/L	0.0012	0.0019	0.0013	0.0016	<0.001	0.0029
Total Zirconium (Zr)	mg/L	<0.0001	<0.0001	0.00021	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L	4.05	2.21	8.36	1.49	4.23	3.92
Total Magnesium (Mg)	mg/L	0.60	0.46	2.37	0.54	1.37	1.32
Total Potassium (K)	mg/L	0.39	<0.25	0.63	<0.25	0.31	0.51
Total Sodium (Na)	mg/L	4.45	3.54	3.39	2.74	2.22	2.61
Total Phosphorus	mg/L	0.0066	0.0072		0.0065	<0.005	0.0342
Total Sulphur	mg/L	1.19	<0.6		<0.6	1.05	0.94

**Goldenville - Surface/Standing
Water - Dissolved**

Sample ID	G-SW16	G-SW14	G-SW15	G-SW13	G-SW12	G-SW11	G-SW5	G-SW6 (NE-Nov28)	G-SW17	
Field Data										
Field pH	--	7.76	7.04	6.83	4.92	N/A	4.72	6.04	7.02	6.9
Field EC	uS/cm	30	47	45	35	N/A	36	73	51	45
Field Temp	Celsius	0.5	1.1	0.9	N/A	N/A	3.7	2.5	2.1	2.9
Latitude	--	45.12174396	45.12157079	45.11863	45.07952778	45.07847222	45.08256946	45.12597959	45.12626801	45.12692297
Longitude	--	-62.02204599	-62.02352858	-62.02648999	-62.00694444	-62.00416667	-61.99973647	-61.99875285	-61.99597299	-61.99020197
Lab Results										
Dissolved Hardness (CaCO3)	mg/L	10.6	9.42	10.2	4.47	4.51	4.34	11.6	12.6	6.58
Dissolved Mercury (Hg)	mg/L	0.0000238	0.0000177	0.0000315	0.0000055	<0.000002	0.0000154	0.0000453	0.0000216	0.0000248
Dissolved Aluminum (Al)	mg/L	0.202	0.180	0.186	0.185	0.216	0.254	0.200	0.131	0.185
Dissolved Antimony (Sb)	mg/L	0.000213	0.000329	0.000224	0.000055	0.000051	0.000043	0.000336	0.000170	0.000156
Dissolved Arsenic (As)	mg/L	0.0906	0.225	0.124	0.0348	0.0331	0.0124	0.104	0.0837	0.103
Dissolved Barium (Ba)	mg/L	0.00357	0.00217	0.00344	0.00204	0.00228	0.00247	0.00566	0.00253	0.00253
Dissolved Beryllium (Be)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dissolved Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<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	0.0000292	0.0000208	0.0000283	0.0000122	0.0000150	0.0000258	0.0000156	<0.000005	0.0000155
Dissolved Chromium (Cr)	mg/L	0.00023	0.00023	0.00022	0.00020	0.00021	0.00030	0.00024	0.00021	0.00021
Dissolved Cobalt (Co)	mg/L	0.000580	0.000704	0.000541	0.000246	0.000286	0.000333	0.000151	0.0000733	0.000109
Dissolved Copper (Cu)	mg/L	0.00216	0.0117	0.00192	0.000340	0.000360	0.00164	0.00258	0.00129	0.00105
Dissolved Iron (Fe)	mg/L	0.301	0.356	0.279	0.395	0.427	0.318	0.299	0.224	0.204
Dissolved Lead (Pb)	mg/L	0.000342	0.000613	0.000277	0.000204	0.000260	0.000356	0.000217	0.000135	0.000117
Dissolved Lithium (Li)	mg/L	0.00054	0.00054	0.00054	<0.0005	<0.0005	<0.0005	0.00071	0.00059	<0.0005
Dissolved Manganese (Mn)	mg/L	0.0337	0.0509	0.0381	0.0572	0.0669	0.0225	0.0415	0.0205	0.0164
Dissolved Molybdenum (Mo)	mg/L	<0.00005	0.000084	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dissolved Nickel (Ni)	mg/L	0.00169	0.00185	0.00167	0.000609	0.000619	0.000588	0.00192	0.000809	0.00123
Dissolved Selenium (Se)	mg/L	0.000050	0.000047	0.000045	0.000060	0.000066	0.000064	0.000061	0.000047	0.000061
Dissolved Silicon (Si)	mg/L	1.36	1.33	1.33	1.39	1.33	1.61	1.81	1.83	1.27
Dissolved Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Dissolved Strontium (Sr)	mg/L	0.0156	0.0195	0.0156	0.00887	0.00922	0.00467	0.0257	0.0273	0.0141
Dissolved Thallium (Tl)	mg/L	0.0000025	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002	0.0000039	<0.000002	0.0000020
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00023	<0.0002
Dissolved Titanium (Ti)	mg/L	0.00197	0.00168	0.00144	0.00161	0.00137	0.00313	0.00136	0.00145	0.00107
Dissolved Uranium (U)	mg/L	0.0000065	0.0000059	0.0000062	0.0000051	0.0000062	0.0000071	0.0000115	0.0000071	0.0000067
Dissolved Vanadium (V)	mg/L	0.00021	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Zinc (Zn)	mg/L	0.00967	0.0140	0.00912	0.00211	0.00235	0.00872	0.00528	0.00146	0.00182
Dissolved Zirconium (Zr)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00010	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L	3.45	2.87	3.32	1.07	1.07	1.37	3.64	4.05	1.93
Dissolved Magnesium (Mg)	mg/L	0.476	0.548	0.471	0.436	0.448	0.223	0.601	0.607	0.431
Dissolved Potassium (K)	mg/L	0.307	0.343	0.314	0.178	0.152	0.141	0.504	0.388	0.160
Dissolved Sodium (Na)	mg/L	4.25	4.16	4.00	3.54	3.70	3.19	4.96	4.39	3.23
Dissolved Sulphur (S)	mg/L	1.22	1.45	1.12	<0.6	<0.6	<0.6	1.54	1.03	0.64

**Goldenville - Surface/Standing
Water - Dissolved**

Sample ID		G-SW6 (NW-Nov29)	G-SW7	G-SW8	G-SW9	G-SW10
Field Data						
Field pH	--	6.51	6.09	6.99	7.18	6.71
Field EC	uS/cm	91	67	58	44	31
Field Temp	Celsius	5.2	2.5	0.3	0.4	0.4
Latitude	--	45.1257397	45.12685298	45.12671602	45.12589401	45.12453203
Longitude	--	-62.02049048	-62.02127502	-62.02365297	-62.02529398	-62.02730698
Lab Results						
Dissolved Hardness (CaCO3)	mg/L	30.4	6.15	19.7	14.3	7.65
Dissolved Mercury (Hg)	mg/L		0.000082	0.000101	0.000081	0.0000298
Dissolved Aluminum (Al)	mg/L	0.192	0.345	0.0423	0.0830	0.230
Dissolved Antimony (Sb)	mg/L	0.000213	0.000044	0.000314	0.000151	0.000087
Dissolved Arsenic (As)	mg/L	0.0288	0.00181	0.0160	0.00719	0.0249
Dissolved Barium (Ba)	mg/L	0.00309	0.00230	0.00102	0.000747	0.00213
Dissolved Beryllium (Be)	mg/L	0.000034	0.000021	<0.00001	<0.00001	<0.00001
Dissolved Bismuth (Bi)	mg/L	0.000062	<0.000005	<0.000005	<0.000005	0.0000053
Dissolved Boron (B)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Cadmium (Cd)	mg/L	<0.000005	0.0000161	<0.000005	<0.000005	0.0000090
Dissolved Chromium (Cr)	mg/L	0.00021	0.00028	<0.0001	0.00012	0.00024
Dissolved Cobalt (Co)	mg/L	0.000828	0.000138	0.0000377	0.0000413	0.000300
Dissolved Copper (Cu)	mg/L	0.00197	0.000981	0.00197	0.000959	0.000829
Dissolved Iron (Fe)	mg/L	1.06	0.235	0.0773	0.124	0.397
Dissolved Lead (Pb)	mg/L	0.000852	0.000338	0.0000694	0.0000762	0.000305
Dissolved Lithium (Li)	mg/L	0.00093	0.00051	0.00073	<0.0005	0.00051
Dissolved Manganese (Mn)	mg/L	0.302	0.0204	0.00220	0.00311	0.0478
Dissolved Molybdenum (Mo)	mg/L	0.000097	<0.00005	<0.00005	<0.00005	<0.00005
Dissolved Nickel (Ni)	mg/L	0.00215	0.000652	0.000847	0.000963	0.000640
Dissolved Selenium (Se)	mg/L	0.000063	0.000069	<0.00004	<0.00004	0.000057
Dissolved Silicon (Si)	mg/L	1.82	1.43	1.33	1.28	1.26
Dissolved Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Dissolved Strontium (Sr)	mg/L	0.0788	0.0128	0.0454	0.0314	0.0170
Dissolved Thallium (Tl)	mg/L	0.0000021	0.0000040	<0.000002	<0.000002	<0.000002
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Titanium (Ti)	mg/L	0.00130	0.00220	<0.0005	0.00139	0.00288
Dissolved Uranium (U)	mg/L	0.0000794	0.0000101	0.0000062	0.0000051	0.0000081
Dissolved Vanadium (V)	mg/L	<0.0002	0.00021	<0.0002	<0.0002	<0.0002
Dissolved Zinc (Zn)	mg/L	0.00137	0.00233	0.00126	0.00154	0.00477
Dissolved Zirconium (Zr)	mg/L	0.00025	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L	8.30	1.55	5.12	3.73	1.90
Dissolved Magnesium (Mg)	mg/L	2.34	0.554	1.68	1.22	0.703
Dissolved Potassium (K)	mg/L	0.633	0.173	0.375	0.487	0.168
Dissolved Sodium (Na)	mg/L	3.33	2.81	2.68	2.50	2.74
Dissolved Sulphur (S)	mg/L	1.18	<0.6	1.08	0.73	<0.6

Goldenville - Piezometers

Sample ID	G-Pz4	G-Pz1	G-Pz1	G-Pz2	G-Pz2	G-Pz18-Historical	G-Pz3	G-Pz3	G-Pz19-Historical	
Piezometer Installation Information										
Screened Depth (from)	cm	57	142	57	107	57	--	107	52	--
Screened Depth (to)	cm	70	155	70	120	70	--	120	65	--
Stick-up Height	cm	--	61	41.4	92	50	109.8	96	49	83.2
Field Data										
Field pH	--	7.23	6.21	6.81	6.14	NA	7.02	6.59	6.64	6.35
Field EC	uS/cm	167	222	412	924	NA	87	711	554	149
Field Temp	Celsius	3.4	3.7	3.5	3.5	NA	5.1	3.2	4.5	4.9
Latitude	--	45.121996	45.12183096	45.12183096	45.12168302	45.12168302	45.12166198	45.12154103	45.12154103	45.12145503
Longitude	--	-62.01568597	-62.016568	-62.016568	-62.01805604	-62.01805604	-62.01809803	-62.01943503	-62.01943503	-62.01970903
Lab Results										
Dissolved Hardness (CaCO3)	mg/L	47.2	79.3	154	318	56.7	10.3	333	185	39.8
Dissolved Mercury (Hg)	mg/L	0.000784	<0.00002	0.000032	<0.00002	0.000113	0.0000270	0.000025	<0.00002	<0.00002
Dissolved Aluminum (Al)	mg/L	0.379	0.0184	0.0075	0.407	0.284	0.0802	0.00466	0.0325	0.0225
Dissolved Antimony (Sb)	mg/L	0.00202	0.000384	0.000761	0.00085	0.00237	0.00093	0.000758	0.00208	0.00035
Dissolved Arsenic (As)	mg/L	0.518	0.815	0.935	0.960	0.576	2.09	0.548	2.93	1.31
Dissolved Barium (Ba)	mg/L	0.00910	0.0258	0.0420	0.0321	0.0278	0.00534	0.0386	0.0228	0.0128
Dissolved Beryllium (Be)	mg/L	0.000025	<0.00001	<0.00002	0.000165	0.000078	<0.00005	<0.00001	0.00137	<0.00005
Dissolved Bismuth (Bi)	mg/L	0.000286	<0.000005	<0.00001	<0.000025	0.000121	<0.000025	<0.000005	0.000109	<0.000025
Dissolved Boron (B)	mg/L	0.250	0.074	0.142	0.087	0.250	<0.05	0.063	0.193	<0.05
Dissolved Cadmium (Cd)	mg/L	0.0000720	<0.000005	0.000014	<0.000025	0.0000357	<0.000025	0.0000131	0.00144	<0.000025
Dissolved Chromium (Cr)	mg/L	0.00337	0.00088	0.00063	0.00227	0.00302	<0.0005	0.00045	0.00283	0.00071
Dissolved Cobalt (Co)	mg/L	0.00751	0.00589	0.00116	0.482	0.0164	0.00400	0.00290	0.0127	0.00139
Dissolved Copper (Cu)	mg/L	0.00992	0.000372	0.00030	0.00246	0.00271	0.00356	0.000274	0.00210	0.00046
Dissolved Iron (Fe)	mg/L	4.62	10.4	1.56	61.3	4.54	4.57	6.27	39.8	18.3
Dissolved Lead (Pb)	mg/L	0.0130	0.0000563	0.000180	0.000458	0.0118	0.00175	0.000187	0.00165	0.000182
Dissolved Lithium (Li)	mg/L	0.00051	0.00315	0.0040	0.0310	0.00380	<0.0025	0.00091	0.0043	<0.0025
Dissolved Manganese (Mn)	mg/L	1.07	1.16	1.10	22.6	1.53	0.297	1.67	3.85	0.812
Dissolved Molybdenum (Mo)	mg/L	0.00469	0.00227	0.00296	0.00121	0.00302	0.00031	0.00250	0.00471	<0.00025
Dissolved Nickel (Ni)	mg/L	0.0999	0.0357	0.00738	0.420	0.0252	0.00524	0.0341	0.0838	0.00224
Dissolved Selenium (Se)	mg/L	0.000134	<0.00004	<0.00008	<0.0002	0.000066	<0.0002	<0.00004	0.00142	<0.0002
Dissolved Silicon (Si)	mg/L	3.58	4.75	4.55	11.6	2.41	1.28	10.6	6.52	3.33
Dissolved Silver (Ag)	mg/L	0.0000741	<0.000005	<0.00001	<0.000025	0.0000182	<0.000025	<0.000005	0.000034	<0.000025
Dissolved Strontium (Sr)	mg/L	0.0507	0.194	0.364	0.799	0.0820	0.0223	0.800	0.384	0.109
Dissolved Thallium (Tl)	mg/L	0.0000088	<0.000002	<0.000004	<0.00001	0.0000036	<0.00001	<0.000002	0.000125	<0.00001
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	<0.0004	<0.001	0.00039	<0.001	<0.0002	<0.001	<0.001
Dissolved Titanium (Ti)	mg/L	0.0351	<0.0005	<0.001	<0.0025	0.00755	<0.0025	<0.0005	<0.0025	<0.0025
Dissolved Uranium (U)	mg/L	0.000191	0.0000082	0.0000345	<0.00001	0.0000945	<0.00001	0.0000575	0.00139	<0.00001
Dissolved Vanadium (V)	mg/L	0.00077	<0.0002	<0.0004	<0.001	0.00090	<0.001	<0.0002	0.0011	<0.001
Dissolved Zinc (Zn)	mg/L	0.0517	0.0223	0.0332	0.110	0.0525	0.0168	0.0290	0.0257	0.0120
Dissolved Zirconium (Zr)	mg/L	0.00429	<0.0001	<0.0002	<0.0005	0.00056	<0.0005	<0.0001	<0.0005	<0.0005
Dissolved Calcium (Ca)	mg/L	16.7	27.5	57.1	93.7	19.1	3.20	118	63.8	14.2
Dissolved Magnesium (Mg)	mg/L	1.33	2.59	2.66	20.5	2.21	0.55	9.42	6.20	1.03
Dissolved Potassium (K)	mg/L	6.01	4.51	6.51	10.1	9.41	0.43	4.67	10.3	1.36
Dissolved Sodium (Na)	mg/L	5.14	3.69	3.65	5.86	4.56	4.28	7.61	6.20	3.09
Dissolved Sulphur (S)	mg/L	3.59	12.5	23.4	148	6.25	<3.0	49.1	7.5	<3.0

Appendix C **Porewater Results**

Goldenville - Porewater

Sample ID	G-2018-SFC-3	G-2018-SFC-8	G-2018-SFC-11	G-2018-SFC-1	G-2018-SFC-2	G-2018-SFC-6	G-2018-SFC-7	G-2018-SFC-4	
Sample Coordinates									
Latitude	45.122082	45.12169903	45.12237403	45.122642	45.12229599	45.12150398	45.12145302	45.12185301	
Longitude	-62.01637404	-62.01718901	-62.01669599	-62.01637697	-62.01636096	-62.01690696	-62.01733704	-62.01633196	
EcoMetrix Porewater Test Data									
Mass Sample (wet weight)	g-wet	301.00	299.57	299.52	255.11	257.24	299.04	297.48	300.61
Mass Water Added	g	302.77	303.91	298.43	260.26	255.11	300.08	302.44	304.70
Water-to-Solids Ratio	-	1.01	1.01	1.00	1.02	0.99	1.00	1.02	1.01
Lab pH	-	5.61	7.37	3.32	3.25	3.57	6.80	7.33	4.83
Lab Electrical Conductivity	µS/cm	23.74	282.80	223.30	245.00	139.60	316.60	121.00	31.25
Environmental Moisture Content	%	20.5%	21.5%	11.9%	17.0%	20.8%	25.2%	23.4%	12.4%
PW Volume	mL (g)	61.71	64.41	35.64	43.37	53.51	75.36	69.61	37.28
Total Water Mass	g	364.48	368.32	334.07	303.63	308.62	375.44	372.05	341.98
Total Water Volume	L	0.364	0.368	0.334	0.304	0.309	0.375	0.372	0.342
Sample Solids Mass (dry weight)	g	239.30	235.16	263.88	211.74	203.73	223.68	227.87	263.33
Lab-Measured Constituent Concentration (mg/L)									
Inorganics									
Acidity	mg/L	15		32	32	18			<5.0
Total Cyanide (CN)	mg/L								
WAD Cyanide (Free)	mg/L								
Alkalinity (Total as CaCO3)	mg/L		37				54	35	
Mercury									
Dissolved Mercury (Hg)	µg/L	0.02	0.01	<0.01	<0.01	0.01	0.09	0.02	<0.01
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	3.23	110	3.51	1.93	4.09	119	45	4.46

Goldenville - Porewater

Sample ID	G-2018-SFC-3	G-2018-SFC-8	G-2018-SFC-11	G-2018-SFC-1	G-2018-SFC-2	G-2018-SFC-6	G-2018-SFC-7	G-2018-SFC-4	
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L	0.355	0.0181	0.366	0.549	0.441	0.113	0.0194	0.0375
Dissolved Antimony (Sb)	mg/L	0.00478	0.00555	0.000729	0.00065	0.000781	0.00253	0.0132	0.000131
Dissolved Arsenic (As)	mg/L	2.11	0.134	0.223	0.152	0.0523	1.86	1.12	0.0144
Dissolved Barium (Ba)	mg/L	0.00567	0.0039	0.0199	0.0136	0.0147	0.00782	0.000494	0.026
Dissolved Beryllium (Be)	mg/L	<0.00005	<0.00001	0.000046	0.000029	0.000056	<0.00001	<0.00001	0.000035
Dissolved Bismuth (Bi)	mg/L	0.000453	<0.000005	0.0000246	<0.000005	<0.000005	0.0000069	0.0000102	<0.000005
Dissolved Boron (B)	mg/L	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Cadmium (Cd)	mg/L	0.00009	0.000017	0.0000887	0.0000615	0.0000801	<0.000005	0.0000084	0.000479
Dissolved Chromium (Cr)	mg/L	0.00162	<0.0001	0.00019	<0.0001	0.00011	0.00017	<0.0001	<0.0001
Dissolved Cobalt (Co)	mg/L	0.00208	0.000154	0.00282	0.00182	0.0067	0.00304	0.000176	0.00147
Dissolved Copper (Cu)	mg/L	0.0203	0.000687	0.0134	0.0179	0.0199	0.000882	0.00182	0.0457
Dissolved Iron (Fe)	mg/L	4.09	0.0213	0.621	0.323	0.125	0.122	0.194	0.0028
Dissolved Lead (Pb)	mg/L	0.0374	0.000195	0.00496	0.00336	0.000613	0.000399	0.000641	0.000165
Dissolved Lithium (Li)	mg/L	<0.0025	0.00386	0.00347	0.0021	0.00297	0.00194	0.00183	0.00114
Dissolved Manganese (Mn)	mg/L	0.0691	0.0146	0.143	0.0313	0.103	0.835	0.00715	0.262
Dissolved Molybdenum (Mo)	mg/L	0.00069	0.00411	<0.00005	<0.00005	<0.00005	0.00739	0.00653	<0.00005
Dissolved Nickel (Ni)	mg/L	0.00614	0.00413	0.00965	0.00611	0.0104	0.0102	0.00134	0.0435
Dissolved Selenium (Se)	mg/L	<0.0002	0.000069	0.000053	0.000098	<0.00004	<0.00004	0.000055	<0.00004
Dissolved Silicon (Si)	mg/L	1.08	0.895	1.32	2.01	2.16	1.63	0.394	0.376
Dissolved Silver (Ag)	mg/L	0.000052	<0.000005	<0.000005	0.0000074	<0.000005	0.0000062	0.000005	<0.000005
Dissolved Strontium (Sr)	mg/L	0.00655	0.242	0.00763	0.0044	0.00998	0.304	0.0907	0.0152
Dissolved Thallium (Tl)	mg/L	<0.00001	0.0000165	0.0000432	0.0000359	0.0000285	0.0000024	0.0000024	0.0000296
Dissolved Tin (Sn)	mg/L	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Titanium (Ti)	mg/L	0.0084	<0.0005	<0.0005	0.00055	<0.0005	0.00183	0.00053	<0.0005
Dissolved Uranium (U)	mg/L	0.000075	0.0000602	0.0000115	0.0000068	0.0000211	0.000322	0.0000187	0.0000032
Dissolved Vanadium (V)	mg/L	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Zinc (Zn)	mg/L	0.0132	0.00058	0.0428	0.0267	0.0151	0.00221	0.00146	0.119
Dissolved Zirconium (Zr)	mg/L	0.00068	<0.0001	<0.0001	<0.0001	<0.0001	0.00034	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L	1.03	41.3	0.828	0.286	0.606	42.6	16.9	1.27
Dissolved Magnesium (Mg)	mg/L	<0.25	1.68	0.35	0.296	0.626	3.17	0.658	0.313
Dissolved Potassium (K)	mg/L	1.94	4.82	1.28	0.952	1.85	7.92	2.63	1.02
Dissolved Sodium (Na)	mg/L	1.23	0.694	0.468	0.601	1.2	1.68	1.27	0.613
Dissolved Sulphur (S)	mg/L	<3.0	28.7	10	9.94	6.84	26.8	4.77	2.63
Dissolved Sulphate (SO4)	mg/L	<9.0	86.1	30	29.82	20.52	80.4	14.31	7.89

Goldenville - Porewater

Sample ID	G-2018-SFC-3	G-2018-SFC-8	G-2018-SFC-11	G-2018-SFC-1	G-2018-SFC-2	G-2018-SFC-6	G-2018-SFC-7	G-2018-SFC-4	
Porewater Concentration (mg/L_{pw})									
Inorganics									
Acidity	mg/Lpw	88.60	0.00	299.93	224.04	103.82	0.00	0.00	45.87
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 CaCO ₃)	mg/Lpw	0.00	211.59	0.00	0.00	0.00	269.03	187.07	0.00
Mercury									
Dissolved Mercury (Hg)	mg/Lpw	0.0001	0.0001	0.0001	0.0001	0.0001	0.0004	0.0001	0.0001
Calculated Parameters									
Dissolved Hardness (CaCO ₃)	mg/Lpw	19.08	629.04	32.90	13.51	23.59	592.86	240.51	40.92
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/Lpw	2.0969	0.1035	3.4304	3.8436	2.5436	0.5630	0.1037	0.3440
Dissolved Antimony (Sb)	mg/Lpw	0.0282	0.0317	0.0068	0.0046	0.0045	0.0126	0.0706	0.0012
Dissolved Arsenic (As)	mg/Lpw	12.4632	0.7663	2.0901	1.0642	0.3017	9.2666	5.9861	0.1321
Dissolved Barium (Ba)	mg/Lpw	0.0335	0.0223	0.1865	0.0952	0.0848	0.0390	0.0026	0.2385
Dissolved Beryllium (Be)	mg/Lpw	0.0003	0.0001	0.0004	0.0002	0.0003	0.0000	0.0001	0.0003
Dissolved Bismuth (Bi)	mg/Lpw	0.0027	0.0000	0.0002	0.0000	0.0000	0.0000	0.0001	0.0000
Dissolved Boron (B)	mg/Lpw	0.2953	0.0572	0.0937	0.0700	0.0577	0.0498	0.0534	0.0917
Dissolved Cadmium (Cd)	mg/Lpw	0.0005	0.0001	0.0008	0.0004	0.0005	0.0000	0.0000	0.0044
Dissolved Chromium (Cr)	mg/Lpw	0.0096	0.0006	0.0018	0.0007	0.0006	0.0008	0.0005	0.0009
Dissolved Cobalt (Co)	mg/Lpw	0.0123	0.0009	0.0264	0.0127	0.0386	0.0151	0.0009	0.0135
Dissolved Copper (Cu)	mg/Lpw	0.1199	0.0039	0.1256	0.1253	0.1148	0.0044	0.0097	0.4193
Dissolved Iron (Fe)	mg/Lpw	24.1585	0.1218	5.8205	2.2614	0.7210	0.6078	1.0369	0.0257
Dissolved Lead (Pb)	mg/Lpw	0.2209	0.0011	0.0465	0.0235	0.0035	0.0020	0.0034	0.0015
Dissolved Lithium (Li)	mg/Lpw	0.0148	0.0221	0.0325	0.0147	0.0171	0.0097	0.0098	0.0105
Dissolved Manganese (Mn)	mg/Lpw	0.4082	0.0835	1.3403	0.2191	0.5941	4.1600	0.0382	2.4037
Dissolved Molybdenum (Mo)	mg/Lpw	0.0041	0.0235	0.0005	0.0004	0.0003	0.0368	0.0349	0.0005
Dissolved Nickel (Ni)	mg/Lpw	0.0363	0.0236	0.0904	0.0428	0.0600	0.0508	0.0072	0.3991
Dissolved Selenium (Se)	mg/Lpw	0.0012	0.0004	0.0005	0.0007	0.0002	0.0002	0.0003	0.0004
Dissolved Silicon (Si)	mg/Lpw	6.3793	5.1181	12.3721	14.0722	12.4586	8.1207	2.1058	3.4495
Dissolved Silver (Ag)	mg/Lpw	0.0003	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
Dissolved Strontium (Sr)	mg/Lpw	0.0387	1.3839	0.0715	0.0308	0.0576	1.5145	0.4848	0.1394
Dissolved Thallium (Tl)	mg/Lpw	0.0001	0.0001	0.0004	0.0003	0.0002	0.0000	0.0000	0.0003
Dissolved Tin (Sn)	mg/Lpw	0.0059	0.0011	0.0019	0.0014	0.0012	0.0010	0.0011	0.0018
Dissolved Titanium (Ti)	mg/Lpw	0.0496	0.0029	0.0047	0.0039	0.0029	0.0091	0.0028	0.0046
Dissolved Uranium (U)	mg/Lpw	0.0004	0.0003	0.0001	0.0000	0.0001	0.0016	0.0001	0.0000
Dissolved Vanadium (V)	mg/Lpw	0.0059	0.0011	0.0019	0.0014	0.0012	0.0010	0.0011	0.0018
Dissolved Zinc (Zn)	mg/Lpw	0.0780	0.0033	0.4012	0.1869	0.0871	0.0110	0.0078	1.0917
Dissolved Zirconium (Zr)	mg/Lpw	0.0040	0.0006	0.0009	0.0007	0.0006	0.0017	0.0005	0.0009
Dissolved Calcium (Ca)	mg/Lpw	6.08	236.18	7.76	2.00	3.50	212.24	90.33	11.65
Dissolved Magnesium (Mg)	mg/Lpw	1.48	9.61	3.28	2.07	3.61	15.79	3.52	2.87
Dissolved Potassium (K)	mg/Lpw	11.46	27.56	12.00	6.67	10.67	39.46	14.06	9.36
Dissolved Sodium (Na)	mg/Lpw	7.27	3.97	4.39	4.21	6.92	8.37	6.79	5.62
Dissolved Sulphur (S)	mg/Lpw	17.72	164.12	93.73	69.59	39.45	133.52	25.49	24.13
Dissolved Sulphate (SO ₄)	mg/Lpw	53.16	492.37	281.18	208.77	118.36	400.56	76.48	72.38

Goldenville - Porewater

Sample ID	G-2018-SFC-5	G-2018-SFC-10	G-2018-SFC-12	G-2018-SFC-13	G-2018-SFC-14	G-2018-SFC-15	G-2018-SFC-16	G-2018-SFC-18	
Sample Coordinates									
Latitude	45.12158998	45.12217403	45.12265096	45.12229398	45.12205401	45.12179903	45.12161597	45.121982	
Longitude	-62.01656498	-62.016884	-62.01676497	-62.01743603	-62.01763703	-62.01776401	-62.01786401	-62.01798102	
EcoMetrix Porewater Test Data									
Mass Sample (wet weight)	g-wet	299.62	294.34	294.39	295.34	199.13	300.48	297.74	300.39
Mass Water Added	g	304.92	298.10	298.52	301.05	200.33	299.32	299.30	302.25
Water-to-Solids Ratio	-	1.02	1.01	1.01	1.02	1.01	1.00	1.01	1.01
Lab pH	-	5.98	6.31	2.43	5.02	6.24	4.26	6.75	3.65
Lab Electrical Conductivity	µS/cm	32.01	24.50	1683.00	74.17	108.80	79.69	134.70	143.90
Environmental Moisture Content	%	24.3%	21.4%	16.6%	22.5%	21.4%	19.6%	34.1%	17.6%
PW Volume	mL (g)	72.81	62.99	48.87	66.45	42.61	58.89	101.53	52.87
Total Water Mass	g	377.73	361.09	347.39	367.50	242.94	358.21	400.83	355.12
Total Water Volume	L	0.378	0.361	0.347	0.368	0.243	0.358	0.401	0.355
Sample Solids Mass (dry weight)	g	226.81	231.35	245.52	228.89	156.52	241.59	196.21	247.52
Lab-Measured Constituent Concentration									
Inorganics									
Acidity	mg/L	<5.0	<5.0	240	5	<5.0	7.8		24
Total Cyanide (CN)	mg/L								
WAD Cyanide (Free)	mg/L								
Alkalinity (Total as CaCO3)	mg/L						36		
Mercury									
Dissolved Mercury (Hg)	µg/L	0.06	0.18	6.4	0.63	0.2	<0.01	0.18	<0.01
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	6.05	5.78	13.2	19.6	32.3	13.5	40.7	5.88

Goldenville - Porewater

Sample ID	G-2018-SFC-5	G-2018-SFC-10	G-2018-SFC-12	G-2018-SFC-13	G-2018-SFC-14	G-2018-SFC-15	G-2018-SFC-16	G-2018-SFC-18	
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L	0.0768	0.118	2.34	0.28	0.124	0.0558	0.0805	1.21
Dissolved Antimony (Sb)	mg/L	0.00306	0.00215	0.0156	0.00603	0.011	0.00221	0.00591	0.00116
Dissolved Arsenic (As)	mg/L	1.98	0.662	4.74	2.39	1.7	0.184	0.978	0.151
Dissolved Barium (Ba)	mg/L	0.00328	0.00163	0.0246	0.00389	0.00145	0.00161	0.0119	0.00848
Dissolved Beryllium (Be)	mg/L	<0.00001	0.000018	0.000116	<0.00002	<0.00001	0.000026	<0.00001	0.000067
Dissolved Bismuth (Bi)	mg/L	0.00011	0.000163	<0.000025	0.000134	0.0000694	<0.000005	0.000133	<0.000005
Dissolved Boron (B)	mg/L	<0.01	<0.01	<0.05	<0.02	<0.01	<0.01	<0.01	<0.01
Dissolved Cadmium (Cd)	mg/L	0.000118	0.000245	0.000169	0.000107	0.0000283	0.0000292	0.000037	0.0000922
Dissolved Chromium (Cr)	mg/L	0.00036	0.00044	0.00617	0.00031	0.00033	<0.0001	0.0003	<0.0001
Dissolved Cobalt (Co)	mg/L	0.00248	0.00145	0.0228	0.0052	0.000624	0.006	0.00115	0.0805
Dissolved Copper (Cu)	mg/L	0.0132	0.00933	0.0993	0.0102	0.00201	0.0184	0.0034	0.0411
Dissolved Iron (Fe)	mg/L	0.84	1.24	4.79	1.76	1.19	0.0081	0.655	0.065
Dissolved Lead (Pb)	mg/L	0.00667	0.0119	1.38	0.0138	0.00444	0.0000862	0.0115	0.000727
Dissolved Lithium (Li)	mg/L	0.00074	0.00123	0.0036	0.0021	0.00117	0.00276	0.00054	0.00295
Dissolved Manganese (Mn)	mg/L	0.2	0.0882	0.235	0.175	0.0221	0.211	0.366	1.28
Dissolved Molybdenum (Mo)	mg/L	0.000503	0.000811	0.00026	0.00025	0.00116	<0.00005	0.00129	<0.00005
Dissolved Nickel (Ni)	mg/L	0.00822	0.0139	0.0551	0.0517	0.0039	0.0432	0.00369	0.0438
Dissolved Selenium (Se)	mg/L	0.000052	<0.00004	0.00065	<0.00008	0.000069	0.00004	<0.00004	0.000051
Dissolved Silicon (Si)	mg/L	0.822	0.944	3.41	1.09	2.09	0.866	0.989	2.55
Dissolved Silver (Ag)	mg/L	0.000022	0.0000335	0.00166	0.000057	0.0000398	<0.000005	0.0000253	<0.000005
Dissolved Strontium (Sr)	mg/L	0.0145	0.016	0.0385	0.0637	0.0487	0.0369	0.11	0.0147
Dissolved Thallium (Tl)	mg/L	0.0000235	0.0000169	0.000081	0.0000157	0.0000073	0.0000059	0.0000075	0.0000177
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	<0.001	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Titanium (Ti)	mg/L	0.00193	0.0024	0.0082	0.005	0.00347	<0.0005	0.00262	<0.0005
Dissolved Uranium (U)	mg/L	0.0000226	0.0000239	0.000222	0.0000286	0.000011	0.000002	0.0000193	0.0000312
Dissolved Vanadium (V)	mg/L	0.00034	<0.0002	0.0013	<0.0004	0.00031	<0.0002	0.00039	<0.0002
Dissolved Zinc (Zn)	mg/L	0.00808	0.0314	0.115	0.043	0.00433	0.0507	0.00337	0.0852
Dissolved Zirconium (Zr)	mg/L	0.00032	0.00015	<0.0005	<0.0002	0.00019	<0.0001	0.00032	<0.0001
Dissolved Calcium (Ca)	mg/L	2	1.84	3.26	6.04	10.5	3.91	14.6	1.06
Dissolved Magnesium (Mg)	mg/L	0.255	0.288	1.22	1.1	1.49	0.919	1	0.783
Dissolved Potassium (K)	mg/L	2.3	1.73	1.08	2.85	3.34	1.91	6.77	1.7
Dissolved Sodium (Na)	mg/L	1.66	0.934	0.38	0.98	1.5	1.31	2.7	1.02
Dissolved Sulphur (S)	mg/L	1.39	1.08	69.1	6.6	10.6	6.61	6.19	8.9
Dissolved Sulphate (SO4)	mg/L	4.17	3.24	207.3	19.8	31.8	19.83	18.57	26.7

Goldenville - Porewater

Sample ID	G-2018-SFC-5	G-2018-SFC-10	G-2018-SFC-12	G-2018-SFC-13	G-2018-SFC-14	G-2018-SFC-15	G-2018-SFC-16	G-2018-SFC-18	
Porewater Concentration (mg/L_{pw})									
Inorganics									
Acidity	mg/Lpw	25.94	28.66	1706.07	27.65	28.51	47.44	0.00	161.21
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	142.12	0.00
Mercury									
Dissolved Mercury (Hg)	mg/Lpw	0.0003	0.0010	0.0455	0.0035	0.0011	0.0001	0.0007	0.0001
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/Lpw	31.39	33.13	93.83	108.40	184.14	82.11	160.68	39.50
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/Lpw	0.3984	0.6764	16.6341	1.5485	0.7069	0.3394	0.3178	8.1276
Dissolved Antimony (Sb)	mg/Lpw	0.0159	0.0123	0.1109	0.0333	0.0627	0.0134	0.0233	0.0078
Dissolved Arsenic (As)	mg/Lpw	10.2723	3.7950	33.6948	13.2176	9.6918	1.1192	3.8611	1.0143
Dissolved Barium (Ba)	mg/Lpw	0.0170	0.0093	0.1749	0.0215	0.0083	0.0098	0.0470	0.0570
Dissolved Beryllium (Be)	mg/Lpw	0.0001	0.0001	0.0008	0.0001	0.0001	0.0002	0.0000	0.0005
Dissolved Bismuth (Bi)	mg/Lpw	0.0006	0.0009	0.0002	0.0007	0.0004	0.0000	0.0005	0.0000
Dissolved Boron (B)	mg/Lpw	0.0519	0.0573	0.3554	0.1106	0.0570	0.0608	0.0395	0.0672
Dissolved Cadmium (Cd)	mg/Lpw	0.0006	0.0014	0.0012	0.0006	0.0002	0.0002	0.0001	0.0006
Dissolved Chromium (Cr)	mg/Lpw	0.0019	0.0025	0.0439	0.0017	0.0019	0.0006	0.0012	0.0007
Dissolved Cobalt (Co)	mg/Lpw	0.0129	0.0083	0.1621	0.0288	0.0036	0.0365	0.0045	0.5407
Dissolved Copper (Cu)	mg/Lpw	0.0685	0.0535	0.7059	0.0564	0.0115	0.1119	0.0134	0.2761
Dissolved Iron (Fe)	mg/Lpw	4.3579	7.1084	34.0502	9.7335	6.7843	0.0493	2.5859	0.4366
Dissolved Lead (Pb)	mg/Lpw	0.0346	0.0682	9.8099	0.0763	0.0253	0.0005	0.0454	0.0005
Dissolved Lithium (Li)	mg/Lpw	0.0038	0.0071	0.0256	0.0116	0.0067	0.0168	0.0021	0.0198
Dissolved Manganese (Mn)	mg/Lpw	1.0376	0.5056	1.6705	0.9678	0.1260	1.2834	1.4449	8.5978
Dissolved Molybdenum (Mo)	mg/Lpw	0.0026	0.0046	0.0018	0.0014	0.0066	0.0003	0.0051	0.0003
Dissolved Nickel (Ni)	mg/Lpw	0.0426	0.0797	0.3917	0.2859	0.0222	0.2628	0.0146	0.2942
Dissolved Selenium (Se)	mg/Lpw	0.0003	0.0002	0.0046	0.0004	0.0004	0.0002	0.0002	0.0003
Dissolved Silicon (Si)	mg/Lpw	4.2646	5.4116	24.2404	6.0281	11.9152	5.2673	3.9045	17.1283
Dissolved Silver (Ag)	mg/Lpw	0.0001	0.0002	0.0118	0.0003	0.0002	0.0000	0.0001	0.0000
Dissolved Strontium (Sr)	mg/Lpw	0.0752	0.0917	0.2737	0.3523	0.2776	0.2244	0.4343	0.0987
Dissolved Thallium (Tl)	mg/Lpw	0.0001	0.0001	0.0006	0.0001	0.0000	0.0000	0.0000	0.0001
Dissolved Tin (Sn)	mg/Lpw	0.0010	0.0011	0.0071	0.0022	0.0011	0.0012	0.0008	0.0013
Dissolved Titanium (Ti)	mg/Lpw	0.0100	0.0138	0.0583	0.0277	0.0198	0.0030	0.0103	0.0034
Dissolved Uranium (U)	mg/Lpw	0.0001	0.0001	0.0016	0.0002	0.0001	0.0000	0.0001	0.0002
Dissolved Vanadium (V)	mg/Lpw	0.0018	0.0011	0.0092	0.0022	0.0018	0.0012	0.0015	0.0013
Dissolved Zinc (Zn)	mg/Lpw	0.0419	0.1800	0.8175	0.2378	0.0247	0.3084	0.0133	0.5723
Dissolved Zirconium (Zr)	mg/Lpw	0.0017	0.0009	0.0036	0.0011	0.0011	0.0006	0.0013	0.0007
Dissolved Calcium (Ca)	mg/Lpw	10.38	10.55	23.17	33.40	59.86	23.78	57.64	7.12
Dissolved Magnesium (Mg)	mg/Lpw	1.32	1.65	8.67	6.08	8.49	5.59	3.95	5.26
Dissolved Potassium (K)	mg/Lpw	11.93	9.92	7.68	15.76	19.04	11.62	26.73	11.42
Dissolved Sodium (Na)	mg/Lpw	8.61	5.35	2.70	5.42	8.55	7.97	10.66	6.85
Dissolved Sulphur (S)	mg/Lpw	7.21	6.19	491.20	36.50	60.43	40.20	24.44	59.78
Dissolved Sulphate (SO4)	mg/Lpw	21.63	18.57	1473.61	109.50	181.29	120.61	73.31	179.34

Goldenville - Porewater

Sample ID	G-2018-C1 (0-10cm)	G-2018-C1 (20-40cm)	G-2018-C1 (60-80cm)	G-2018-C1 (140-160cm)	G-2018-C2 (0-5cm)	G-2018-C2 (20-40cm)	G-2018-C2 (60-80cm)	G-2018-C3 (0-5cm)	
Sample Coordinates									
Latitude	45.12183096	45.12183096	45.12183096	45.12183096	45.12168302	45.12168302	45.12168302	45.12154103	
Longitude	-62.016568	-62.016568	-62.016568	-62.016568	-62.01805604	-62.01805604	-62.01805604	-62.01943503	
EcoMetrix Porewater Test Data									
Mass Sample (wet weight)	g-wet	298.35	299.61	300.91	300.76	234.40	299.09	300.86	300.05
Mass Water Added	g	298.67	303.51	303.36	304.79	238.41	299.57	299.70	307.91
Water-to-Solids Ratio	-	1.00	1.01	1.01	1.01	1.02	1.00	1.00	1.03
Lab pH	-	7.08	7.40	6.56	5.43	6.26	5.48	5.20	5.60
Lab Electrical Conductivity	µS/cm	188.30	336.60	372.70	305.40	98.08	375.30	504.90	67.68
Environmental Moisture Content	%	26.6%	20.1%	19.1%	39.3%	34.3%	29.8%	25.1%	35.1%
PW Volume	mL (g)	79.36	60.22	57.47	118.20	80.40	89.13	75.52	105.32
Total Water Mass	g	378.03	363.73	360.83	422.99	318.81	388.70	375.22	413.23
Total Water Volume	L	0.378	0.364	0.361	0.423	0.319	0.389	0.375	0.413
Sample Solids Mass (dry weight)	g	218.99	239.39	243.44	182.56	154.00	209.96	225.34	194.73
Lab-Measured Constituent Concentration									
Inorganics									
Acidity	mg/L				15	13	43	50	41
Total Cyanide (CN)	mg/L						<0.005	<0.005	
WAD Cyanide (Free)	mg/L						<0.001	<0.001	
Alkalinity (Total as CaCO3)	mg/L	43	28	14					
Mercury									
Dissolved Mercury (Hg)	µg/L	0.06	0.21	0.1	0.01	0.06	0.05	<0.01	0.25
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	67.4	128	147	101	16.5	110	160	8.05

Goldenville - Porewater

Sample ID	G-2018-C1 (0-10cm)	G-2018-C1 (20-40cm)	G-2018-C1 (60-80cm)	G-2018-C1 (140-160cm)	G-2018-C2 (0-5cm)	G-2018-C2 (20-40cm)	G-2018-C2 (60-80cm)	G-2018-C3 (0-5cm)	
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L	0.03	0.0814	0.0702	0.0724	0.0539	0.0674	0.408	0.195
Dissolved Antimony (Sb)	mg/L	0.00208	0.00238	0.0206	0.00114	0.00239	0.00566	0.00303	0.00346
Dissolved Arsenic (As)	mg/L	0.853	0.143	0.199	0.304	4.31	0.668	11.2	9.68
Dissolved Barium (Ba)	mg/L	0.00306	0.013	0.0151	0.0438	0.00985	0.0357	0.0203	0.00747
Dissolved Beryllium (Be)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.0001	0.000035	0.00029	<0.0001
Dissolved Bismuth (Bi)	mg/L	0.0000121	0.0000122	0.0000221	<0.000005	<0.00005	0.0000467	<0.0001	0.00034
Dissolved Boron (B)	mg/L	<0.01	<0.01	<0.01	0.011	<0.1	<0.01	<0.2	<0.1
Dissolved Cadmium (Cd)	mg/L	0.000006	0.0000094	0.0000053	<0.000005	<0.00005	0.0000236	<0.0001	0.000076
Dissolved Chromium (Cr)	mg/L	<0.0001	<0.0001	<0.0001	0.00034	0.0013	0.00053	<0.002	0.004
Dissolved Cobalt (Co)	mg/L	0.000786	0.00121	0.00825	0.0329	0.006	0.0907	3.14	0.0126
Dissolved Copper (Cu)	mg/L	0.00126	0.000366	0.000593	0.000195	0.00914	0.00309	0.0034	0.0275
Dissolved Iron (Fe)	mg/L	0.0938	0.075	0.318	5.4	2.53	17.5	12.9	4.37
Dissolved Lead (Pb)	mg/L	0.000767	0.000866	0.00202	0.000197	0.00412	0.00414	0.00127	0.0184
Dissolved Lithium (Li)	mg/L	0.0012	0.00158	0.00399	0.0012	<0.005	0.0133	0.023	<0.005
Dissolved Manganese (Mn)	mg/L	0.137	0.194	0.687	1.56	0.696	6.19	11.4	0.829
Dissolved Molybdenum (Mo)	mg/L	0.00305	0.00264	0.00145	0.000079	0.00089	0.000188	<0.001	0.00213
Dissolved Nickel (Ni)	mg/L	0.00297	0.0497	0.0275	0.0312	0.0157	0.0808	3.47	0.0215
Dissolved Selenium (Se)	mg/L	0.000048	<0.00004	<0.00004	<0.00004	<0.0004	<0.00004	<0.0008	<0.0004
Dissolved Silicon (Si)	mg/L	1.48	0.852	0.866	1.37	1.32	1.38	3.7	2.28
Dissolved Silver (Ag)	mg/L	0.0000094	<0.000005	0.0000068	<0.000005	<0.00005	0.0000054	<0.0001	<0.00005
Dissolved Strontium (Sr)	mg/L	0.162	0.344	0.382	0.263	0.0406	0.261	0.4	0.018
Dissolved Thallium (Tl)	mg/L	0.0000049	<0.000002	<0.000002	<0.000002	<0.00002	<0.000002	<0.00004	<0.00002
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.002	<0.0002	<0.004	<0.002
Dissolved Titanium (Ti)	mg/L	0.00054	0.00099	0.00101	0.0005	<0.005	0.00071	<0.01	<0.005
Dissolved Uranium (U)	mg/L	0.0000291	0.000276	0.000016	<0.000002	<0.00002	0.0000056	<0.00004	0.000056
Dissolved Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.002	0.00024	<0.004	<0.002
Dissolved Zinc (Zn)	mg/L	0.00278	0.0043	0.00363	0.0235	0.0268	0.0417	0.753	0.0343
Dissolved Zirconium (Zr)	mg/L	0.00013	<0.0001	0.00017	<0.0001	<0.001	<0.0001	<0.002	<0.001
Dissolved Calcium (Ca)	mg/L	25.1	48.2	55.7	33.6	5.2	36.4	45.5	2.25
Dissolved Magnesium (Mg)	mg/L	1.13	1.82	1.88	4.21	0.84	4.71	11.4	0.59
Dissolved Potassium (K)	mg/L	3.76	6.01	4.41	1.81	7.24	2.75	4.5	5.5
Dissolved Sodium (Na)	mg/L	1.52	1.08	0.691	2.99	5.62	3.31	2.2	3.99
Dissolved Sulphur (S)	mg/L	11.9	37.6	45.9	39.3	<6.0	53.4	72	<6.0
Dissolved Sulphate (SO4)	mg/L	35.7	112.8	137.7	117.9	<18.0	160.2	216	<18.0

Goldenville - Porewater

Sample ID	G-2018-C1 (0-10cm)	G-2018-C1 (20-40cm)	G-2018-C1 (60-80cm)	G-2018-C1 (140-160cm)	G-2018-C2 (0-5cm)	G-2018-C2 (20-40cm)	G-2018-C2 (60-80cm)	G-2018-C3 (0-5cm)	
Porewater Concentration (mg/L_{pw})									
Inorganics									
Acidity	mg/L _{pw}	0.00	0.00	0.00	53.68	51.55	187.53	248.44	160.87
Total Cyanide (CN)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0218	0.0248	0.0000
WAD Cyanide (Free)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0044	0.0050	0.0000
Alkalinity (Total as CaCO ₃)	mg/L _{pw}	204.83	169.12	87.90	0.00	0.00	0.00	0.00	0.00
Mercury									
Dissolved Mercury (Hg)	mg/L _{pw}	0.0003	0.0013	0.0006	0.0000	0.0002	0.0002	0.0000	0.0010
Calculated Parameters									
Dissolved Hardness (CaCO ₃)	mg/L _{pw}	321.06	773.11	922.90	361.44	65.43	479.72	794.99	31.59
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L _{pw}	0.1429	0.4916	0.4407	0.2591	0.2137	0.2939	2.0272	0.7651
Dissolved Antimony (Sb)	mg/L _{pw}	0.0099	0.0144	0.1293	0.0041	0.0095	0.0247	0.0151	0.0136
Dissolved Arsenic (As)	mg/L _{pw}	4.0632	0.8637	1.2494	1.0879	17.0906	2.9132	55.6495	37.9808
Dissolved Barium (Ba)	mg/L _{pw}	0.0146	0.0785	0.0948	0.1567	0.0391	0.1557	0.1009	0.0293
Dissolved Beryllium (Be)	mg/L _{pw}	0.0000	0.0001	0.0001	0.0000	0.0004	0.0002	0.0014	0.0004
Dissolved Bismuth (Bi)	mg/L _{pw}	0.0001	0.0001	0.0001	0.0000	0.0002	0.0002	0.0005	0.0013
Dissolved Boron (B)	mg/L _{pw}	0.0476	0.0604	0.0628	0.0394	0.3965	0.0436	0.9937	0.3924
Dissolved Cadmium (Cd)	mg/L _{pw}	0.0000	0.0001	0.0000	0.0000	0.0002	0.0001	0.0005	0.0003
Dissolved Chromium (Cr)	mg/L _{pw}	0.0005	0.0006	0.0006	0.0012	0.0052	0.0023	0.0099	0.0157
Dissolved Cobalt (Co)	mg/L _{pw}	0.0037	0.0073	0.0518	0.1177	0.0238	0.3956	15.6017	0.0494
Dissolved Copper (Cu)	mg/L _{pw}	0.0060	0.0022	0.0037	0.0007	0.0362	0.0135	0.0169	0.1079
Dissolved Iron (Fe)	mg/L _{pw}	0.4468	0.4530	1.9965	19.3246	10.0323	76.3191	64.0963	17.1463
Dissolved Lead (Pb)	mg/L _{pw}	0.0037	0.0052	0.0127	0.0007	0.0163	0.0181	0.0063	0.0722
Dissolved Lithium (Li)	mg/L _{pw}	0.0057	0.0095	0.0251	0.0043	0.0198	0.0580	0.1143	0.0196
Dissolved Manganese (Mn)	mg/L _{pw}	0.6526	1.1717	4.3131	5.5827	2.7599	26.9951	56.6432	3.2527
Dissolved Molybdenum (Mo)	mg/L _{pw}	0.0145	0.0159	0.0091	0.0003	0.0035	0.0008	0.0050	0.0084
Dissolved Nickel (Ni)	mg/L _{pw}	0.0141	0.3002	0.1727	0.1117	0.0623	0.3524	17.2414	0.0844
Dissolved Selenium (Se)	mg/L _{pw}	0.0002	0.0002	0.0003	0.0001	0.0016	0.0002	0.0040	0.0016
Dissolved Silicon (Si)	mg/L _{pw}	7.0499	5.1460	5.4369	4.9027	5.2342	6.0183	18.3842	8.9459
Dissolved Silver (Ag)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0005	0.0002
Dissolved Strontium (Sr)	mg/L _{pw}	0.7717	2.0777	2.3983	0.9412	0.1610	1.1382	1.9875	0.0706
Dissolved Thallium (Tl)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0002	0.0001
Dissolved Tin (Sn)	mg/L _{pw}	0.0010	0.0012	0.0013	0.0007	0.0079	0.0009	0.0199	0.0078
Dissolved Titanium (Ti)	mg/L _{pw}	0.0026	0.0060	0.0063	0.0018	0.0198	0.0031	0.0497	0.0196
Dissolved Uranium (U)	mg/L _{pw}	0.0001	0.0017	0.0001	0.0000	0.0001	0.0000	0.0002	0.0002
Dissolved Vanadium (V)	mg/L _{pw}	0.0010	0.0012	0.0013	0.0007	0.0079	0.0010	0.0199	0.0078
Dissolved Zinc (Zn)	mg/L _{pw}	0.0132	0.0260	0.0228	0.0841	0.1063	0.1819	3.7414	0.1346
Dissolved Zirconium (Zr)	mg/L _{pw}	0.0006	0.0006	0.0011	0.0004	0.0040	0.0004	0.0099	0.0039
Dissolved Calcium (Ca)	mg/L _{pw}	119.56	291.12	349.70	120.24	20.62	158.74	226.08	8.83
Dissolved Magnesium (Mg)	mg/L _{pw}	5.38	10.99	11.80	15.07	3.33	20.54	56.64	2.31
Dissolved Potassium (K)	mg/L _{pw}	17.91	36.30	27.69	6.48	28.71	11.99	22.36	21.58
Dissolved Sodium (Na)	mg/L _{pw}	7.24	6.52	4.34	10.70	22.29	14.44	10.93	15.66
Dissolved Sulphur (S)	mg/L _{pw}	56.68	227.10	288.17	140.64	23.79	232.88	357.75	23.54
Dissolved Sulphate (SO ₄)	mg/L _{pw}	170.05	681.30	864.51	421.92	71.38	698.65	1073.24	70.63

Goldenville - Porewater

Sample ID	G-2018-C3 (20-40cm)	G-2018-C3 (60-80cm)	G-2018-C3 (100-120cm)	G-2018-C4 (0-5cm)	G-2018-C4 (10-20cm)	G-2018-C5 (2.5-10cm)	G-2018-C5 (15-20cm)	G-2018-C6 (28NOV) (2.5-10cm)	
Sample Coordinates									
Latitude	44.71530204	44.71530204	44.71530204	45.121996	45.121996	45.12597959	45.12597959	45.12626801	
Longitude	-63.52343	-63.52343	-63.52343	-62.01568597	-62.01568597	-61.99875285	-61.99875285	-61.99597299	
EcoMetrix Porewater Test Data									
Mass Sample (wet weight)	g-wet	303.15	304.17	236.48	299.93	302.85	301.96	198.72	304.30
Mass Water Added	g	300.46	303.77	235.04	299.38	302.71	299.91	203.64	300.77
Water-to-Solids Ratio	-	0.99	1.00	0.99	1.00	1.00	0.99	1.02	0.99
Lab pH	-	6.65	6.26	5.94	5.97	5.50	6.02	5.27	5.51
Lab Electrical Conductivity	µS/cm	195.70	633.70	937.00	77.98	45.45	481.20	516.00	133.70
Environmental Moisture Content	%	30.4%	19.2%	45.2%	51.7%	35.5%	59.4%	42.1%	81.6%
PW Volume	mL (g)	92.16	58.40	106.89	155.06	107.51	179.36	83.66	248.31
Total Water Mass	g	392.62	362.17	341.93	454.44	410.22	479.27	287.30	549.08
Total Water Volume	L	0.393	0.362	0.342	0.454	0.410	0.479	0.287	0.549
Sample Solids Mass (dry weight)	g	210.99	245.77	129.59	144.87	195.34	122.60	115.06	55.99
Lab-Measured Constituent Concentration									
Inorganics									
Acidity	mg/L		16	14	26	<5.0	41	33	21
Total Cyanide (CN)	mg/L								
WAD Cyanide (Free)	mg/L								
Alkalinity (Total as CaCO3)	mg/L	20							
Mercury									
Dissolved Mercury (Hg)	µg/L	0.05	0.08	0.07	0.01	0.15	0.02	0.04	0.07
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	72.9	265	430	19.6	9.26	142	164	23.7

Goldenville - Porewater

Sample ID		G-2018-C3 (20-40cm)	G-2018-C3 (60-80cm)	G-2018-C3 (100-120cm)	G-2018-C4 (0-5cm)	G-2018-C4 (10-20cm)	G-2018-C5 (2.5-10cm)	G-2018-C5 (15-20cm)	G-2018-C6 (28NOV) (2.5-10cm)
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L	0.0357	0.00868	0.0212	0.0676	0.0864	0.0285	0.0377	0.17
Dissolved Antimony (Sb)	mg/L	0.0115	0.00721	0.00431	0.00064	0.0025	0.00071	0.00146	0.00116
Dissolved Arsenic (As)	mg/L	0.245	0.174	0.261	3.74	0.0881	1.89	0.336	1.13
Dissolved Barium (Ba)	mg/L	0.0205	0.0309	0.0493	0.00937	0.00631	0.103	0.0714	0.0441
Dissolved Beryllium (Be)	mg/L	<0.00001	<0.00001	<0.00001	<0.00005	0.000012	<0.0001	<0.0001	0.000015
Dissolved Bismuth (Bi)	mg/L	0.0000816	0.0000135	0.0000058	<0.000025	0.000064	<0.00005	<0.00005	0.0000471
Dissolved Boron (B)	mg/L	<0.01	<0.01	0.023	<0.05	<0.01	<0.1	<0.1	0.029
Dissolved Cadmium (Cd)	mg/L	0.0000313	0.0000103	0.0000287	0.000029	0.0000537	<0.00005	0.000091	0.0000261
Dissolved Chromium (Cr)	mg/L	0.00054	0.00023	0.00093	0.00186	0.00072	0.0025	<0.001	0.0025
Dissolved Cobalt (Co)	mg/L	0.00269	0.0101	0.00216	0.00688	0.000725	0.0519	0.143	0.0136
Dissolved Copper (Cu)	mg/L	0.00418	0.00143	0.00588	0.00551	0.00102	0.00674	0.00289	0.011
Dissolved Iron (Fe)	mg/L	0.453	1.89	0.696	1.7	0.107	18.6	8.62	6.3
Dissolved Lead (Pb)	mg/L	0.00576	0.0013	0.000617	0.00122	0.002	0.000274	0.00227	0.00434
Dissolved Lithium (Li)	mg/L	<0.0005	0.00114	<0.0005	<0.0025	<0.0005	<0.005	<0.005	0.0008
Dissolved Manganese (Mn)	mg/L	0.726	5.03	2.08	2.41	0.408	15	19.3	4.6
Dissolved Molybdenum (Mo)	mg/L	0.000411	0.000362	0.0003	<0.00025	<0.00005	<0.0005	<0.0005	0.000059
Dissolved Nickel (Ni)	mg/L	0.00718	0.0175	0.00304	0.00608	0.00178	0.051	0.172	0.0136
Dissolved Selenium (Se)	mg/L	<0.00004	<0.00004	<0.00004	<0.0002	0.000049	<0.0004	<0.0004	0.000067
Dissolved Silicon (Si)	mg/L	0.721	0.679	2.31	1.19	0.643	4.04	4.04	3.47
Dissolved Silver (Ag)	mg/L	0.000007	<0.000005	<0.000005	<0.000025	0.0000122	<0.00005	<0.00005	0.0000066
Dissolved Strontium (Sr)	mg/L	0.175	0.64	1.09	0.0441	0.0198	0.326	0.368	0.0601
Dissolved Thallium (Tl)	mg/L	0.0000056	<0.000002	<0.000002	<0.00001	0.0000062	<0.00002	<0.00002	0.000008
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0002
Dissolved Titanium (Ti)	mg/L	0.00115	<0.0005	0.00119	<0.0025	0.00593	<0.005	<0.005	0.00191
Dissolved Uranium (U)	mg/L	0.0000092	0.0000025	0.0000055	<0.00001	0.0000149	<0.00002	<0.00002	0.0000117
Dissolved Vanadium (V)	mg/L	<0.0002	<0.0002	0.00034	<0.001	0.00037	<0.002	<0.002	0.00033
Dissolved Zinc (Zn)	mg/L	0.00715	0.0121	0.0123	0.0131	0.0029	0.0517	0.187	0.0403
Dissolved Zirconium (Zr)	mg/L	0.00013	<0.0001	0.00012	<0.0005	0.00012	<0.001	<0.001	<0.0001
Dissolved Calcium (Ca)	mg/L	27.4	98.6	153	5.69	2.8	49.1	57.4	7.89
Dissolved Magnesium (Mg)	mg/L	1.08	4.48	11.7	1.3	0.552	4.79	5.11	0.984
Dissolved Potassium (K)	mg/L	2.26	3.68	5.74	1.03	0.324	1.48	2.5	0.446
Dissolved Sodium (Na)	mg/L	2.09	1.75	5.35	3.92	2.98	6.73	5.42	6.2
Dissolved Sulphur (S)	mg/L	19.3	95.3	152	<3.0	4.27	65.6	72.3	13.8
Dissolved Sulphate (SO4)	mg/L	57.9	285.9	456	<9.0	12.81	196.8	216.9	41.4

Goldenville - Porewater

Sample ID	G-2018-C3 (20-40cm)	G-2018-C3 (60-80cm)	G-2018-C3 (100-120cm)	G-2018-C4 (0-5cm)	G-2018-C4 (10-20cm)	G-2018-C5 (2.5-10cm)	G-2018-C5 (15-20cm)	G-2018-C6 (28NOV) (2.5-10cm)	
Porewater Concentration (mg/L_{pw})									
Inorganics									
Acidity	mg/L _{pw}	0.00	99.22	44.78	76.20	19.08	109.55	113.33	46.44
Total Cyanide (CN)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WAD Cyanide (Free)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Alkalinity (Total as CaCO ₃)	mg/L _{pw}	85.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mercury									
Dissolved Mercury (Hg)	mg/L _{pw}	0.0002	0.0005	0.0002	0.0000	0.0006	0.0001	0.0001	0.0002
Calculated Parameters									
Dissolved Hardness (CaCO ₃)	mg/L _{pw}	310.57	1643.39	1375.53	57.44	35.33	379.43	563.19	52.41
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L _{pw}	0.1521	0.0538	0.0678	0.1981	0.3297	0.0762	0.1295	0.3759
Dissolved Antimony (Sb)	mg/L _{pw}	0.0490	0.0447	0.0138	0.0019	0.0095	0.0019	0.0050	0.0026
Dissolved Arsenic (As)	mg/L _{pw}	1.0438	1.0791	0.8349	10.9608	0.3362	5.0502	1.1539	2.4987
Dissolved Barium (Ba)	mg/L _{pw}	0.0873	0.1916	0.1577	0.0275	0.0241	0.2752	0.2452	0.0975
Dissolved Beryllium (Be)	mg/L _{pw}	0.0000	0.0001	0.0000	0.0001	0.0000	0.0003	0.0003	0.0000
Dissolved Bismuth (Bi)	mg/L _{pw}	0.0003	0.0001	0.0000	0.0001	0.0002	0.0001	0.0002	0.0001
Dissolved Boron (B)	mg/L _{pw}	0.0426	0.0620	0.0736	0.1465	0.0382	0.2672	0.3434	0.0641
Dissolved Cadmium (Cd)	mg/L _{pw}	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0003	0.0001
Dissolved Chromium (Cr)	mg/L _{pw}	0.0023	0.0014	0.0030	0.0055	0.0027	0.0067	0.0034	0.0055
Dissolved Cobalt (Co)	mg/L _{pw}	0.0115	0.0626	0.0069	0.0202	0.0028	0.1387	0.4911	0.0301
Dissolved Copper (Cu)	mg/L _{pw}	0.0178	0.0089	0.0188	0.0161	0.0039	0.0180	0.0099	0.0243
Dissolved Iron (Fe)	mg/L _{pw}	1.9299	11.7208	2.2264	4.9822	0.4083	49.7005	29.6020	13.9310
Dissolved Lead (Pb)	mg/L _{pw}	0.0245	0.0081	0.0020	0.0036	0.0076	0.0007	0.0078	0.0096
Dissolved Lithium (Li)	mg/L _{pw}	0.0021	0.0071	0.0016	0.0073	0.0019	0.0134	0.0172	0.0018
Dissolved Manganese (Mn)	mg/L _{pw}	3.0930	31.1935	6.6537	7.0630	1.5568	40.0811	66.2782	10.1719
Dissolved Molybdenum (Mo)	mg/L _{pw}	0.0018	0.0022	0.0010	0.0007	0.0002	0.0013	0.0017	0.0001
Dissolved Nickel (Ni)	mg/L _{pw}	0.0306	0.1085	0.0097	0.0178	0.0068	0.1363	0.5907	0.0301
Dissolved Selenium (Se)	mg/L _{pw}	0.0002	0.0002	0.0001	0.0006	0.0002	0.0011	0.0014	0.0001
Dissolved Silicon (Si)	mg/L _{pw}	3.0717	4.2108	7.3895	3.4875	2.4534	10.7952	13.8738	7.6731
Dissolved Silver (Ag)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0002	0.0000
Dissolved Strontium (Sr)	mg/L _{pw}	0.7455	3.9689	3.4868	0.1292	0.0755	0.8711	1.2638	0.1329
Dissolved Thallium (Tl)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000
Dissolved Tin (Sn)	mg/L _{pw}	0.0009	0.0012	0.0006	0.0029	0.0008	0.0053	0.0069	0.0004
Dissolved Titanium (Ti)	mg/L _{pw}	0.0049	0.0031	0.0038	0.0073	0.0226	0.0134	0.0172	0.0042
Dissolved Uranium (U)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0000
Dissolved Vanadium (V)	mg/L _{pw}	0.0009	0.0012	0.0011	0.0029	0.0014	0.0053	0.0069	0.0007
Dissolved Zinc (Zn)	mg/L _{pw}	0.0305	0.0750	0.0393	0.0384	0.0111	0.1381	0.6422	0.0891
Dissolved Zirconium (Zr)	mg/L _{pw}	0.0006	0.0006	0.0004	0.0015	0.0005	0.0027	0.0034	0.0002
Dissolved Calcium (Ca)	mg/L _{pw}	116.73	611.47	489.43	16.68	10.68	131.20	197.12	17.45
Dissolved Magnesium (Mg)	mg/L _{pw}	4.60	27.78	37.43	3.81	2.11	12.80	17.55	2.18
Dissolved Potassium (K)	mg/L _{pw}	9.63	22.82	18.36	3.02	1.24	3.95	8.59	0.99
Dissolved Sodium (Na)	mg/L _{pw}	8.90	10.85	17.11	11.49	11.37	17.98	18.61	13.71
Dissolved Sulphur (S)	mg/L _{pw}	82.22	591.00	486.24	8.79	16.29	175.29	248.29	30.52
Dissolved Sulphate (SO ₄)	mg/L _{pw}	246.67	1773.00	1458.71	26.38	48.88	525.86	744.86	91.55

Goldenville - Porewater

Sample ID	G-2018-C6 (28NOV) (10-20cm)	G-2018-C6 (28NOV) (20-30cm)	G-2018-C6 (29NOV) (0-7.5cm)	G-2018-C6 (29NOV) (10-15cm)	G-2018-C6 (29NOV) (20-30cm)	G-2018-C6 (29NOV) (40-50cm)	G-2018-C7 (2.5-10cm)	G-2018-C7 (15-20cm)	
Sample Coordinates									
Latitude	45.12626801	45.12626801	45.1257397	45.1257397	45.1257397	45.1257397	45.12685298	45.12685298	
Longitude	-61.99597299	-61.99597299	-62.02049048	-62.02049048	-62.02049048	-62.02049048	-62.02127502	-62.02127502	
EcoMetrix Porewater Test Data									
Mass Sample (wet weight)	g-wet	298.11	300.09	295.86	297.53	299.24	266.60	299.44	299.11
Mass Water Added	g	298.86	300.40	301.97	298.12	302.00	272.10	300.39	300.13
Water-to-Solids Ratio	-	1.00	1.00	1.02	1.00	1.01	1.02	1.00	1.00
Lab pH	-	5.14	5.25	5.73	4.66	5.22	5.20	5.55	5.50
Lab Electrical Conductivity	µS/cm	304.20	483.80	46.66	156.10	177.00	7891.00	44.16	43.96
Environmental Moisture Content	%	31.9%	45.0%	63.9%	36.0%	21.5%	83.7%	85.5%	75.0%
PW Volume	mL (g)	95.10	135.04	189.05	107.11	64.34	223.14	256.02	224.33
Total Water Mass	g	393.96	435.44	491.02	405.23	366.34	495.24	556.41	524.46
Total Water Volume	L	0.394	0.435	0.491	0.405	0.366	0.495	0.556	0.524
Sample Solids Mass (dry weight)	g	203.01	165.05	106.81	190.42	234.90	43.46	43.42	74.78
Lab-Measured Constituent Concentration									
Inorganics									
Acidity	mg/L	38	39	<5.0	5.6	<5.0	<5.0	17.2	<10.0
Total Cyanide (CN)	mg/L								
WAD Cyanide (Free)	mg/L								
Alkalinity (Total as CaCO3)	mg/L								
Mercury									
Dissolved Mercury (Hg)	µg/L	0.12	0.16	0.48	0.16	0.7	0.23	0.02	0.02
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	72.8	161	8.26	47.3	57.9	19.2	10.3	10.5

Goldenville - Porewater

Sample ID	G-2018-C6 (28NOV) (10-20cm)	G-2018-C6 (28NOV) (20-30cm)	G-2018-C6 (29NOV) (0-7.5cm)	G-2018-C6 (29NOV) (10-15cm)	G-2018-C6 (29NOV) (20-30cm)	G-2018-C6 (29NOV) (40-50cm)	G-2018-C7 (2.5-10cm)	G-2018-C7 (15-20cm)	
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L	0.028	0.0329	0.148	0.0655	0.128	0.19	0.377	0.384
Dissolved Antimony (Sb)	mg/L	0.00667	0.0227	0.00205	0.00366	0.00319	0.00128	0.000592	0.00047
Dissolved Arsenic (As)	mg/L	0.623	1.42	0.836	0.162	0.204	0.219	0.0106	0.00805
Dissolved Barium (Ba)	mg/L	0.0639	0.0299	0.00673	0.0521	0.0163	0.00685	0.00554	0.00597
Dissolved Beryllium (Be)	mg/L	0.000027	0.000047	0.000028	0.000067	<0.00001	<0.00001	0.000017	0.000015
Dissolved Bismuth (Bi)	mg/L	0.0000269	0.0000094	0.000249	0.0000109	0.0000554	0.0000136	0.0000177	0.0000158
Dissolved Boron (B)	mg/L	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Cadmium (Cd)	mg/L	0.0000706	0.0000575	0.0000838	0.000628	0.0000435	0.0000116	0.0000316	0.000035
Dissolved Chromium (Cr)	mg/L	0.00052	0.00048	0.00079	0.00038	0.00086	0.00113	0.00476	0.00306
Dissolved Cobalt (Co)	mg/L	0.0462	0.0567	0.00279	0.0155	0.00227	0.000469	0.000503	0.000307
Dissolved Copper (Cu)	mg/L	0.00384	0.00203	0.00296	0.00281	0.000692	0.000581	0.0245	0.0168
Dissolved Iron (Fe)	mg/L	15.7	15	0.654	0.0684	0.125	0.0908	0.274	0.267
Dissolved Lead (Pb)	mg/L	0.00374	0.00496	0.0134	0.0523	0.00251	0.000607	0.00119	0.00152
Dissolved Lithium (Li)	mg/L	0.00274	0.00318	0.00216	0.012	0.00428	0.0024	0.00053	0.00057
Dissolved Manganese (Mn)	mg/L	9.26	8.4	0.266	1.21	0.589	0.123	0.11	0.076
Dissolved Molybdenum (Mo)	mg/L	<0.00005	0.000227	0.000113	<0.00005	0.000088	0.000123	0.000161	0.000147
Dissolved Nickel (Ni)	mg/L	0.0368	0.0522	0.00623	0.0168	0.00328	0.00308	0.00537	0.00385
Dissolved Selenium (Se)	mg/L	<0.00004	<0.00004	0.000062	<0.00004	<0.00004	0.000042	0.000097	0.000087
Dissolved Silicon (Si)	mg/L	3.01	1.4	1.91	2.02	3.96	4.14	4.28	2.89
Dissolved Silver (Ag)	mg/L	<0.000005	<0.000005	0.0000306	<0.000005	0.0000114	0.00001	0.0000168	0.0000431
Dissolved Strontium (Sr)	mg/L	0.181	0.295	0.0203	0.114	0.124	0.0374	0.0234	0.0276
Dissolved Thallium (Tl)	mg/L	0.0000199	<0.000002	0.0000138	0.0000553	0.0000208	0.0000117	0.0000073	0.0000053
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Titanium (Ti)	mg/L	0.00081	<0.0005	0.00379	<0.0005	0.00832	0.00732	0.0284	0.0272
Dissolved Uranium (U)	mg/L	0.0000037	0.0000036	0.0000336	0.0000069	0.0000165	0.0000318	0.0000671	0.0000916
Dissolved Vanadium (V)	mg/L	0.00028	0.00035	0.0004	<0.0002	0.00038	0.00061	0.00163	0.00089
Dissolved Zinc (Zn)	mg/L	0.0399	0.0366	0.0126	0.0856	0.0116	0.00788	0.027	0.0217
Dissolved Zirconium (Zr)	mg/L	<0.0001	<0.0001	0.00041	<0.0001	0.00035	0.00014	0.00031	0.00022
Dissolved Calcium (Ca)	mg/L	24.1	42.6	2.31	11.8	15.4	4.97	3.07	3.11
Dissolved Magnesium (Mg)	mg/L	3.05	13.3	0.604	4.34	4.72	1.64	0.641	0.668
Dissolved Potassium (K)	mg/L	0.851	1.17	1.97	1.86	0.894	0.624	0.166	0.1
Dissolved Sodium (Na)	mg/L	4.6	3.01	4.85	2.96	4.36	4.69	8.66	6.65
Dissolved Sulphur (S)	mg/L	40.3	69.1	1.17	18.3	21.7	8.17	6.28	5.64
Dissolved Sulphate (SO4)	mg/L	120.9	207.3	3.51	54.9	65.1	24.51	18.84	16.92

Goldenville - Porewater

Sample ID	G-2018-C6 (28NOV) (10-20cm)	G-2018-C6 (28NOV) (20-30cm)	G-2018-C6 (29NOV) (0-7.5cm)	G-2018-C6 (29NOV) (10-15cm)	G-2018-C6 (29NOV) (20-30cm)	G-2018-C6 (29NOV) (40-50cm)	G-2018-C7 (2.5-10cm)	G-2018-C7 (15-20cm)	
Porewater Concentration (mg/L_{pw})									
Inorganics									
Acidity	mg/L _{pw}	157.42	125.76	12.99	21.19	28.47	11.10	37.38	23.38
Total Cyanide (CN)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WAD Cyanide (Free)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Alkalinity (Total as CaCO ₃)	mg/L _{pw}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mercury									
Dissolved Mercury (Hg)	mg/L _{pw}	0.0005	0.0005	0.0012	0.0006	0.0040	0.0005	0.0000	0.0000
Calculated Parameters									
Dissolved Hardness (CaCO ₃)	mg/L _{pw}	301.59	519.15	21.45	178.95	329.69	42.61	22.39	24.55
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L _{pw}	0.1160	0.1061	0.3844	0.2478	0.7288	0.4217	0.8193	0.8977
Dissolved Antimony (Sb)	mg/L _{pw}	0.0276	0.0732	0.0053	0.0138	0.0182	0.0028	0.0013	0.0011
Dissolved Arsenic (As)	mg/L _{pw}	2.5809	4.5788	2.1713	0.6129	1.1616	0.4860	0.0230	0.0188
Dissolved Barium (Ba)	mg/L _{pw}	0.2647	0.0964	0.0175	0.1971	0.0928	0.0152	0.0120	0.0140
Dissolved Beryllium (Be)	mg/L _{pw}	0.0001	0.0002	0.0001	0.0003	0.0001	0.0000	0.0000	0.0000
Dissolved Bismuth (Bi)	mg/L _{pw}	0.0001	0.0000	0.0006	0.0000	0.0003	0.0000	0.0000	0.0000
Dissolved Boron (B)	mg/L _{pw}	0.0456	0.0322	0.0260	0.0378	0.0569	0.0222	0.0217	0.0234
Dissolved Cadmium (Cd)	mg/L _{pw}	0.0003	0.0002	0.0002	0.0024	0.0002	0.0000	0.0001	0.0001
Dissolved Chromium (Cr)	mg/L _{pw}	0.0022	0.0015	0.0021	0.0014	0.0049	0.0025	0.0103	0.0072
Dissolved Cobalt (Co)	mg/L _{pw}	0.1914	0.1828	0.0072	0.0586	0.0129	0.0010	0.0011	0.0007
Dissolved Copper (Cu)	mg/L _{pw}	0.0159	0.0065	0.0077	0.0106	0.0039	0.0013	0.0532	0.0393
Dissolved Iron (Fe)	mg/L _{pw}	65.0401	48.3678	1.6986	0.2588	0.7118	0.2015	0.5955	0.6242
Dissolved Lead (Pb)	mg/L _{pw}	0.0155	0.0160	0.0348	0.1979	0.0143	0.0013	0.0026	0.0036
Dissolved Lithium (Li)	mg/L _{pw}	0.0114	0.0103	0.0056	0.0454	0.0244	0.0053	0.0012	0.0013
Dissolved Manganese (Mn)	mg/L _{pw}	38.3612	27.0859	0.6909	4.5778	3.3538	0.2730	0.2391	0.1777
Dissolved Molybdenum (Mo)	mg/L _{pw}	0.0002	0.0007	0.0003	0.0002	0.0005	0.0003	0.0003	0.0003
Dissolved Nickel (Ni)	mg/L _{pw}	0.1525	0.1683	0.0162	0.0636	0.0187	0.0068	0.0117	0.0090
Dissolved Selenium (Se)	mg/L _{pw}	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002
Dissolved Silicon (Si)	mg/L _{pw}	12.4695	4.5143	4.9608	7.6422	22.5485	9.1883	9.3017	6.7565
Dissolved Silver (Ag)	mg/L _{pw}	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000	0.0000	0.0001
Dissolved Strontium (Sr)	mg/L _{pw}	0.7498	0.9512	0.0527	0.4313	0.7061	0.0830	0.0509	0.0645
Dissolved Thallium (Tl)	mg/L _{pw}	0.0001	0.0000	0.0000	0.0002	0.0001	0.0000	0.0000	0.0000
Dissolved Tin (Sn)	mg/L _{pw}	0.0008	0.0006	0.0005	0.0008	0.0011	0.0004	0.0004	0.0005
Dissolved Titanium (Ti)	mg/L _{pw}	0.0034	0.0016	0.0098	0.0019	0.0474	0.0162	0.0617	0.0636
Dissolved Uranium (U)	mg/L _{pw}	0.0000	0.0000	0.0001	0.0000	0.0001	0.0001	0.0001	0.0002
Dissolved Vanadium (V)	mg/L _{pw}	0.0012	0.0011	0.0010	0.0008	0.0022	0.0014	0.0035	0.0021
Dissolved Zinc (Zn)	mg/L _{pw}	0.1653	0.1180	0.0327	0.3238	0.0661	0.0175	0.0587	0.0507
Dissolved Zirconium (Zr)	mg/L _{pw}	0.0004	0.0003	0.0011	0.0004	0.0020	0.0003	0.0007	0.0005
Dissolved Calcium (Ca)	mg/L _{pw}	99.84	137.36	6.00	44.64	87.69	11.03	6.67	7.27
Dissolved Magnesium (Mg)	mg/L _{pw}	12.64	42.89	1.57	16.42	26.88	3.64	1.39	1.56
Dissolved Potassium (K)	mg/L _{pw}	3.53	3.77	5.12	7.04	5.09	1.38	0.36	0.23
Dissolved Sodium (Na)	mg/L _{pw}	19.06	9.71	12.60	11.20	24.83	10.41	18.82	15.55
Dissolved Sulphur (S)	mg/L _{pw}	166.95	222.81	3.04	69.23	123.56	18.13	13.65	13.19
Dissolved Sulphate (SO ₄)	mg/L _{pw}	500.85	668.44	9.12	207.70	370.68	54.40	40.94	39.56

Goldenville - Porewater

Sample ID	G-2018-C7 (20-30cm)	G-2018-C8 (0-5cm)	G-2018-C8 (15-20cm)	G-2018-C8 (40-50cm)	G-2018-C9 (0-7.5cm)	G-2018-C9 (20-30cm)	G-2018-C9 (30-40cm)	G-2018-C10 (2.5-10cm)	
Sample Coordinates									
Latitude	45.12685298	45.12671602	45.12671602	45.12671602	45.12589401	45.12589401	45.12589401	45.12453203	
Longitude	-62.02127502	-62.02365297	-62.02365297	-62.02365297	-62.02529398	-62.02529398	-62.02529398	-62.02730698	
EcoMetrix Porewater Test Data									
Mass Sample (wet weight)	g-wet	299.38	293.50	263.67	301.05	301.40	301.89	299.67	302.10
Mass Water Added	g	299.76	302.16	265.80	305.29	301.46	305.25	301.84	304.89
Water-to-Solids Ratio	-	1.00	1.03	1.01	1.01	1.00	1.01	1.01	1.01
Lab pH	-	5.47	6.56	6.26	6.39	6.05	5.93	5.94	5.47
Lab Electrical Conductivity	µS/cm	55.37	311.20	374.50	312.30	73.83	167.50	83.96	36.46
Environmental Moisture Content	%	81.2%	57.3%	20.7%	21.5%	75.9%	57.8%	80.2%	59.4%
PW Volume	mL (g)	243.10	168.18	54.58	64.73	228.76	174.49	240.34	179.45
Total Water Mass	g	542.86	470.34	320.38	370.02	530.22	479.74	542.18	484.34
Total Water Volume	L	0.543	0.470	0.320	0.370	0.530	0.480	0.542	0.484
Sample Solids Mass (dry weight)	g	56.28	125.32	209.09	236.32	72.64	127.40	59.33	122.65
Lab-Measured Constituent Concentration									
Inorganics									
Acidity	mg/L	<10.0		<5.0	<5.0	27	<10.0	<10.0	<10.0
Total Cyanide (CN)	mg/L								
WAD Cyanide (Free)	mg/L								
Alkalinity (Total as CaCO3)	mg/L		132						
Mercury									
Dissolved Mercury (Hg)	µg/L	0.01	0.02	1.32	0.69	0.15	0.59	0.24	0.29
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	14.4	116	145	114	21.4	52.7	19.3	2.8

Goldenville - Porewater

Sample ID	G-2018-C7 (20-30cm)	G-2018-C8 (0-5cm)	G-2018-C8 (15-20cm)	G-2018-C8 (40-50cm)	G-2018-C9 (0-7.5cm)	G-2018-C9 (20-30cm)	G-2018-C9 (30-40cm)	G-2018-C10 (2.5-10cm)	
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L	0.318	0.0225	0.161	0.145	0.0663	0.0756	0.257	0.259
Dissolved Antimony (Sb)	mg/L	0.000572	0.00229	0.0195	0.0121	0.00351	0.00426	0.00118	0.000329
Dissolved Arsenic (As)	mg/L	0.00983	0.264	0.431	0.2	0.115	0.0832	0.0192	0.0128
Dissolved Barium (Ba)	mg/L	0.00874	0.0229	0.0147	0.0239	0.00456	0.0187	0.00574	0.00258
Dissolved Beryllium (Be)	mg/L	0.000022	<0.00001	0.000034	0.000028	0.000017	0.000014	<0.00001	0.000018
Dissolved Bismuth (Bi)	mg/L	0.0000109	0.0000401	0.0000889	0.0000738	0.0000755	0.0000372	0.000012	0.0000266
Dissolved Boron (B)	mg/L	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	0.016	<0.01
Dissolved Cadmium (Cd)	mg/L	0.000018	0.0000097	0.0000226	0.0000074	0.0000225	0.0000216	0.0000067	0.0000154
Dissolved Chromium (Cr)	mg/L	0.00201	0.00085	0.00016	0.00013	0.00346	0.00024	0.00106	0.00088
Dissolved Cobalt (Co)	mg/L	0.000443	0.00647	0.0258	0.0243	0.000597	0.00204	0.00021	0.000231
Dissolved Copper (Cu)	mg/L	0.00558	0.00475	0.00148	0.000906	0.0107	0.00114	0.000657	0.00366
Dissolved Iron (Fe)	mg/L	0.131	0.341	0.27	0.252	0.535	0.661	0.154	0.429
Dissolved Lead (Pb)	mg/L	0.000695	0.00139	0.00574	0.00409	0.00348	0.00243	0.000547	0.019
Dissolved Lithium (Li)	mg/L	0.00057	0.00149	0.00499	0.00304	0.00118	0.0013	<0.0005	<0.0005
Dissolved Manganese (Mn)	mg/L	0.117	3.43	3.56	3.88	0.202	0.738	0.269	0.0377
Dissolved Molybdenum (Mo)	mg/L	0.000149	0.00056	0.000218	0.000746	0.000101	0.000195	0.000181	0.000175
Dissolved Nickel (Ni)	mg/L	0.00377	0.00923	0.0953	0.0776	0.00595	0.00361	0.00226	0.00209
Dissolved Selenium (Se)	mg/L	0.000106	0.000096	0.000058	<0.00004	0.000046	<0.00004	0.000071	0.000163
Dissolved Silicon (Si)	mg/L	2.91	2.17	0.635	0.852	1.85	1.37	2.3	1.78
Dissolved Silver (Ag)	mg/L	0.0000321	0.0000099	0.0000117	0.0000144	0.0000146	0.0000084	0.0000206	0.0000143
Dissolved Strontium (Sr)	mg/L	0.0398	0.31	0.316	0.251	0.0522	0.14	0.0581	0.00627
Dissolved Thallium (Tl)	mg/L	0.0000058	0.0000112	0.0000322	0.0000088	0.00001	0.0000094	0.0000055	0.0000098
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Titanium (Ti)	mg/L	0.023	0.00098	0.00204	0.00233	0.00175	0.0015	0.0343	0.0334
Dissolved Uranium (U)	mg/L	0.0000596	0.0000723	0.0000467	0.0000651	0.000017	0.0000248	0.0000438	0.0000408
Dissolved Vanadium (V)	mg/L	0.00085	<0.0002	0.00028	0.00026	0.00028	<0.0002	0.00068	0.00135
Dissolved Zinc (Zn)	mg/L	0.0125	0.0157	0.0129	0.00698	0.0219	0.00837	0.00502	0.00883
Dissolved Zirconium (Zr)	mg/L	0.00044	<0.0001	0.00047	0.00108	0.00016	0.00068	0.00033	0.0005
Dissolved Calcium (Ca)	mg/L	4.28	30.1	36.6	30	5.69	12.9	5.03	0.839
Dissolved Magnesium (Mg)	mg/L	0.902	10.1	13	9.51	1.74	4.94	1.63	0.172
Dissolved Potassium (K)	mg/L	0.097	10.6	4.59	4.76	0.808	2.27	1.63	0.539
Dissolved Sodium (Na)	mg/L	5.79	5.85	1.09	0.936	5.04	3.5	5.06	3.85
Dissolved Sulphur (S)	mg/L	5.7	1.34	48.9	37.4	7.46	18.2	7.81	2.38
Dissolved Sulphate (SO4)	mg/L	17.1	4.02	146.7	112.2	22.38	54.6	23.43	7.14

Goldenville - Porewater

Sample ID	G-2018-C7 (20-30cm)	G-2018-C8 (0-5cm)	G-2018-C8 (15-20cm)	G-2018-C8 (40-50cm)	G-2018-C9 (0-7.5cm)	G-2018-C9 (20-30cm)	G-2018-C9 (30-40cm)	G-2018-C10 (2.5-10cm)	
Porewater Concentration (mg/L_{pw})									
Inorganics									
Acidity	mg/Lpw	22.33	0.00	29.35	28.58	62.58	27.49	22.56	26.99
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	369.16	0.00	0.00	0.00	0.00	0.00	0.00
Mercury									
Dissolved Mercury (Hg)	mg/Lpw	0.0000	0.0001	0.0077	0.0039	0.0003	0.0016	0.0005	0.0008
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/Lpw	32.16	324.42	851.14	651.70	49.60	144.89	43.54	7.56
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/Lpw	0.7101	0.0629	0.9451	0.8289	0.1537	0.2079	0.5798	0.6991
Dissolved Antimony (Sb)	mg/Lpw	0.0013	0.0064	0.1145	0.0692	0.0081	0.0117	0.0027	0.0009
Dissolved Arsenic (As)	mg/Lpw	0.0220	0.7383	2.5299	1.1433	0.2665	0.2287	0.0433	0.0345
Dissolved Barium (Ba)	mg/Lpw	0.0195	0.0640	0.0863	0.1366	0.0106	0.0514	0.0129	0.0070
Dissolved Beryllium (Be)	mg/Lpw	0.0000	0.0000	0.0002	0.0002	0.0000	0.0000	0.0000	0.0000
Dissolved Bismuth (Bi)	mg/Lpw	0.0000	0.0001	0.0005	0.0004	0.0002	0.0001	0.0000	0.0001
Dissolved Boron (B)	mg/Lpw	0.0223	0.0280	0.0587	0.0572	0.0255	0.0275	0.0361	0.0270
Dissolved Cadmium (Cd)	mg/Lpw	0.0000	0.0000	0.0001	0.0000	0.0001	0.0001	0.0000	0.0000
Dissolved Chromium (Cr)	mg/Lpw	0.0045	0.0024	0.0009	0.0007	0.0080	0.0007	0.0024	0.0024
Dissolved Cobalt (Co)	mg/Lpw	0.0010	0.0181	0.1514	0.1389	0.0014	0.0056	0.0005	0.0006
Dissolved Copper (Cu)	mg/Lpw	0.0125	0.0133	0.0087	0.0052	0.0248	0.0031	0.0015	0.0099
Dissolved Iron (Fe)	mg/Lpw	0.2925	0.9537	1.5849	1.4406	1.2400	1.8173	0.3474	1.1579
Dissolved Lead (Pb)	mg/Lpw	0.0016	0.0039	0.0337	0.0234	0.0081	0.0067	0.0012	0.0513
Dissolved Lithium (Li)	mg/Lpw	0.0013	0.0042	0.0293	0.0174	0.0027	0.0036	0.0011	0.0013
Dissolved Manganese (Mn)	mg/Lpw	0.2613	9.5927	20.8970	22.1807	0.4682	2.0290	0.6068	0.1018
Dissolved Molybdenum (Mo)	mg/Lpw	0.0003	0.0016	0.0013	0.0043	0.0002	0.0005	0.0004	0.0005
Dissolved Nickel (Ni)	mg/Lpw	0.0084	0.0258	0.5594	0.4436	0.0138	0.0099	0.0051	0.0056
Dissolved Selenium (Se)	mg/Lpw	0.0002	0.0003	0.0003	0.0002	0.0001	0.0001	0.0002	0.0004
Dissolved Silicon (Si)	mg/Lpw	6.4983	6.0688	3.7274	4.8706	4.2879	3.7666	5.1886	4.8043
Dissolved Silver (Ag)	mg/Lpw	0.0001	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
Dissolved Strontium (Sr)	mg/Lpw	0.0889	0.8670	1.8549	1.4349	0.1210	0.3849	0.1311	0.0169
Dissolved Thallium (Tl)	mg/Lpw	0.0000	0.0000	0.0002	0.0001	0.0000	0.0000	0.0000	0.0000
Dissolved Tin (Sn)	mg/Lpw	0.0004	0.0006	0.0012	0.0011	0.0005	0.0005	0.0005	0.0005
Dissolved Titanium (Ti)	mg/Lpw	0.0514	0.0027	0.0120	0.0133	0.0041	0.0041	0.0774	0.0901
Dissolved Uranium (U)	mg/Lpw	0.0001	0.0002	0.0003	0.0004	0.0000	0.0001	0.0001	0.0001
Dissolved Vanadium (V)	mg/Lpw	0.0019	0.0006	0.0016	0.0015	0.0006	0.0005	0.0015	0.0036
Dissolved Zinc (Zn)	mg/Lpw	0.0279	0.0439	0.0757	0.0399	0.0508	0.0230	0.0113	0.0238
Dissolved Zirconium (Zr)	mg/Lpw	0.0010	0.0003	0.0028	0.0062	0.0004	0.0019	0.0007	0.0013
Dissolved Calcium (Ca)	mg/Lpw	9.56	84.18	214.84	171.50	13.19	35.47	11.35	2.26
Dissolved Magnesium (Mg)	mg/Lpw	2.01	28.25	76.31	54.37	4.03	13.58	3.68	0.46
Dissolved Potassium (K)	mg/Lpw	0.22	29.64	26.94	27.21	1.87	6.24	3.68	1.45
Dissolved Sodium (Na)	mg/Lpw	12.93	16.36	6.40	5.35	11.68	9.62	11.41	10.39
Dissolved Sulphur (S)	mg/Lpw	12.73	3.75	287.04	213.80	17.29	50.04	17.62	6.42
Dissolved Sulphate (SO4)	mg/Lpw	38.19	11.24	861.12	641.41	51.87	150.12	52.86	19.27

Goldenville - Porewater

Sample ID	G-2018-C10 (15-20cm)	G-2018-C10 (40-50cm)	G-2018-C11 (0-7.5cm)	G-2018-C11 (15-20cm)	G-2018-C12 (2.5-10cm)	G-2018-C12 (10-20cm)	G-2018-C12 (20-40cm)	G-2018-C13 (2.5-10cm)	
Sample Coordinates									
Latitude	45.12453203	45.12453203	45.08256946	45.08256946	45.07847222	45.07847222	45.07847222	45.07952778	
Longitude	-62.02730698	-62.02730698	-61.99973647	-61.99973647	-62.00416667	-62.00416667	-62.00416667	-62.00694444	
EcoMetrix Porewater Test Data									
Mass Sample (wet weight)	g-wet	301.71	143.47	295.76	115.80	297.37	300.53	301.92	302.78
Mass Water Added	g	306.15	216.38	298.79	172.85	297.20	300.72	300.05	303.48
Water-to-Solids Ratio	-	1.01	1.51	1.01	1.49	1.00	1.00	0.99	1.00
Lab pH	-	5.67	6.58	5.04	5.00	5.18	5.53	5.59	5.04
Lab Electrical Conductivity	µS/cm	13.42	19.35	64.55	64.03	88.23	74.45	62.71	94.82
Environmental Moisture Content	%	23.3%	17.8%	90.6%	83.8%	80.3%	89.8%	88.7%	74.9%
PW Volume	mL (g)	70.30	25.54	267.96	97.04	238.79	269.88	267.80	226.78
Total Water Mass	g	376.45	241.92	566.75	269.89	535.99	570.60	567.85	530.26
Total Water Volume	L	0.376	0.242	0.567	0.270	0.536	0.571	0.568	0.530
Sample Solids Mass (dry weight)	g	231.41	117.93	27.80	18.76	58.58	30.65	34.12	76.00
Lab-Measured Constituent Concentration									
Inorganics									
Acidity	mg/L	<5.0		12	11	7.6	<5.6	19	6.2
Total Cyanide (CN)	mg/L					<0.005		<0.005	
WAD Cyanide (Free)	mg/L					<0.001		<0.001	
Alkalinity (Total as CaCO3)	mg/L		2.9						
Mercury									
Dissolved Mercury (Hg)	µg/L	0.01	<0.01	0.01	0.03	0.02	0.05	<0.01	0.06
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	2.43	3.87	9.33	9.77	22.8	13.4	7.31	19.6

Goldenville - Porewater

Sample ID	G-2018-C10 (15-20cm)	G-2018-C10 (40-50cm)	G-2018-C11 (0-7.5cm)	G-2018-C11 (15-20cm)	G-2018-C12 (2.5-10cm)	G-2018-C12 (10-20cm)	G-2018-C12 (20-40cm)	G-2018-C13 (2.5-10cm)
Constituents by ICPMS								
Dissolved Aluminum (Al)	mg/L	0.857	0.452	0.164	0.117	0.0814	0.196	0.219
Dissolved Antimony (Sb)	mg/L	0.000102	0.00014	0.000757	0.00124	0.00121	0.00135	0.00133
Dissolved Arsenic (As)	mg/L	0.0133	0.0178	0.0899	0.0504	0.0439	0.044	0.123
Dissolved Barium (Ba)	mg/L	0.00317	0.00356	0.00607	0.00837	0.0105	0.00677	0.0177
Dissolved Beryllium (Be)	mg/L	0.000037	0.000031	0.000014	0.000015	0.000016	<0.00001	0.000027
Dissolved Bismuth (Bi)	mg/L	0.0000156	0.0000321	0.0000132	0.000009	0.000006	<0.000005	0.0000289
Dissolved Boron (B)	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	0.013	<0.01
Dissolved Cadmium (Cd)	mg/L	0.000052	0.000062	0.0000431	0.0000423	0.0000256	0.0000161	0.000092
Dissolved Chromium (Cr)	mg/L	0.00095	0.00065	0.00378	0.00252	0.0023	0.0002	0.00352
Dissolved Cobalt (Co)	mg/L	0.000216	0.00061	0.00234	0.00181	0.000785	0.00036	0.00149
Dissolved Copper (Cu)	mg/L	0.00118	0.00525	0.0242	0.0119	0.0108	0.00161	0.0163
Dissolved Iron (Fe)	mg/L	0.134	0.271	0.148	0.0885	0.0687	0.145	0.164
Dissolved Lead (Pb)	mg/L	0.00427	0.00117	0.00122	0.001	0.000513	0.000313	0.00562
Dissolved Lithium (Li)	mg/L	<0.0005	0.0006	0.00051	0.00057	0.00053	<0.0005	<0.0005
Dissolved Manganese (Mn)	mg/L	0.052	0.0053	0.429	0.785	0.382	0.351	1.22
Dissolved Molybdenum (Mo)	mg/L	<0.00005	0.000103	0.000142	0.00011	0.00011	0.000265	0.000507
Dissolved Nickel (Ni)	mg/L	0.00113	0.00152	0.0046	0.00447	0.00324	0.000683	0.00332
Dissolved Selenium (Se)	mg/L	0.000055	<0.00004	0.000061	0.000045	<0.00004	0.000103	0.000163
Dissolved Silicon (Si)	mg/L	1.13	1.07	3.05	4.36	3.99	4.66	4.68
Dissolved Silver (Ag)	mg/L	<0.000005	0.0000086	0.0000051	<0.000005	<0.000005	0.0000078	0.0000063
Dissolved Strontium (Sr)	mg/L	0.00639	0.0142	0.0187	0.021	0.0517	0.0248	0.0462
Dissolved Thallium (Tl)	mg/L	<0.000002	<0.000002	0.0000026	<0.000002	<0.000002	0.0000079	0.000004
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Titanium (Ti)	mg/L	0.015	0.00988	0.00361	0.00278	0.00224	0.00909	0.00602
Dissolved Uranium (U)	mg/L	0.000173	0.0000855	0.0000111	0.0000106	0.0000084	0.0000203	0.0000136
Dissolved Vanadium (V)	mg/L	0.00126	0.00468	0.00179	0.00069	0.00028	0.00087	0.00171
Dissolved Zinc (Zn)	mg/L	0.00311	0.00323	0.0335	0.021	0.0193	0.00537	0.0193
Dissolved Zirconium (Zr)	mg/L	0.00021	0.00019	0.00024	0.00012	0.00013	0.00011	0.00011
Dissolved Calcium (Ca)	mg/L	0.709	1.12	2.48	2.75	6.44	4.02	2.05
Dissolved Magnesium (Mg)	mg/L	0.16	0.257	0.759	0.705	1.63	0.821	0.534
Dissolved Potassium (K)	mg/L	0.075	0.298	1.17	0.854	0.271	0.319	0.258
Dissolved Sodium (Na)	mg/L	1.8	2.02	9.97	7.06	6.74	3.35	7.21
Dissolved Sulphur (S)	mg/L	<0.6	<0.6	6.12	6.67	9.85	6.21	7.03
Dissolved Sulphate (SO4)	mg/L	<1.8	<1.8	18.36	20.01	29.55	18.63	21.09

Goldenville - Porewater

Sample ID	G-2018-C10 (15-20cm)	G-2018-C10 (40-50cm)	G-2018-C11 (0-7.5cm)	G-2018-C11 (15-20cm)	G-2018-C12 (2.5-10cm)	G-2018-C12 (10-20cm)	G-2018-C12 (20-40cm)	G-2018-C13 (2.5-10cm)	
Porewater Concentration (mg/L_{pw})									
Inorganics									
Acidity	mg/L _{pw}	26.78	0.00	25.38	30.59	17.06	11.84	40.29	14.50
Total Cyanide (CN)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0112	0.0000	0.0106	0.0000
WAD Cyanide (Free)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0021	0.0000
Alkalinity (Total as CaCO ₃)	mg/L _{pw}	0.00	27.47	0.00	0.00	0.00	0.00	0.00	0.00
Mercury									
Dissolved Mercury (Hg)	mg/L _{pw}	0.0001	0.0001	0.0000	0.0001	0.0000	0.0001	0.0000	0.0001
Calculated Parameters									
Dissolved Hardness (CaCO ₃)	mg/L _{pw}	13.01	36.66	19.73	27.17	51.18	28.33	15.50	45.83
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L _{pw}	4.5892	4.2818	0.3469	0.3254	0.1827	0.4144	0.2544	0.5121
Dissolved Antimony (Sb)	mg/L _{pw}	0.0005	0.0013	0.0016	0.0034	0.0027	0.0029	0.0028	0.0035
Dissolved Arsenic (As)	mg/L _{pw}	0.0712	0.1686	0.1901	0.1402	0.0985	0.0930	0.1043	0.2876
Dissolved Barium (Ba)	mg/L _{pw}	0.0170	0.0337	0.0128	0.0233	0.0236	0.0143	0.0065	0.0414
Dissolved Beryllium (Be)	mg/L _{pw}	0.0002	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Dissolved Bismuth (Bi)	mg/L _{pw}	0.0001	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Dissolved Boron (B)	mg/L _{pw}	0.0536	0.0947	0.0212	0.0278	0.0224	0.0275	0.0233	0.0234
Dissolved Cadmium (Cd)	mg/L _{pw}	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.0002
Dissolved Chromium (Cr)	mg/L _{pw}	0.0051	0.0062	0.0080	0.0070	0.0052	0.0004	0.0075	0.0091
Dissolved Cobalt (Co)	mg/L _{pw}	0.0012	0.0058	0.0049	0.0050	0.0018	0.0008	0.0003	0.0097
Dissolved Copper (Cu)	mg/L _{pw}	0.0063	0.0497	0.0512	0.0331	0.0242	0.0034	0.0346	0.0379
Dissolved Iron (Fe)	mg/L _{pw}	0.7176	2.5672	0.3130	0.2461	0.1542	0.3066	0.1894	0.3835
Dissolved Lead (Pb)	mg/L _{pw}	0.0229	0.0111	0.0026	0.0028	0.0012	0.0007	0.0012	0.0038
Dissolved Lithium (Li)	mg/L _{pw}	0.0027	0.0057	0.0011	0.0016	0.0012	0.0011	0.0011	0.0012
Dissolved Manganese (Mn)	mg/L _{pw}	0.2785	0.0502	0.9074	2.1833	0.8574	0.7421	0.2396	2.8526
Dissolved Molybdenum (Mo)	mg/L _{pw}	0.0003	0.0010	0.0003	0.0003	0.0002	0.0006	0.0011	0.0004
Dissolved Nickel (Ni)	mg/L _{pw}	0.0061	0.0144	0.0097	0.0124	0.0073	0.0014	0.0070	0.0146
Dissolved Selenium (Se)	mg/L _{pw}	0.0003	0.0004	0.0001	0.0001	0.0001	0.0002	0.0003	0.0001
Dissolved Silicon (Si)	mg/L _{pw}	6.0512	10.1361	6.4509	12.1261	8.9560	9.8526	10.7505	10.9428
Dissolved Silver (Ag)	mg/L _{pw}	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Dissolved Strontium (Sr)	mg/L _{pw}	0.0342	0.1345	0.0396	0.0584	0.1160	0.0524	0.0310	0.1080
Dissolved Thallium (Tl)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Dissolved Tin (Sn)	mg/L _{pw}	0.0011	0.0019	0.0004	0.0006	0.0004	0.0004	0.0004	0.0005
Dissolved Titanium (Ti)	mg/L _{pw}	0.0803	0.0936	0.0076	0.0077	0.0050	0.0192	0.0128	0.0134
Dissolved Uranium (U)	mg/L _{pw}	0.0009	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Dissolved Vanadium (V)	mg/L _{pw}	0.0067	0.0443	0.0038	0.0019	0.0006	0.0018	0.0036	0.0018
Dissolved Zinc (Zn)	mg/L _{pw}	0.0167	0.0306	0.0709	0.0584	0.0433	0.0114	0.0409	0.0561
Dissolved Zirconium (Zr)	mg/L _{pw}	0.0011	0.0018	0.0005	0.0003	0.0003	0.0002	0.0002	0.0008
Dissolved Calcium (Ca)	mg/L _{pw}	3.80	10.61	5.25	7.65	14.46	8.50	4.35	13.77
Dissolved Magnesium (Mg)	mg/L _{pw}	0.86	2.43	1.61	1.96	3.66	1.74	1.13	2.76
Dissolved Potassium (K)	mg/L _{pw}	0.40	2.82	2.47	2.38	0.61	0.67	0.55	2.88
Dissolved Sodium (Na)	mg/L _{pw}	9.64	19.14	21.09	19.64	15.13	7.08	15.29	21.53
Dissolved Sulphur (S)	mg/L _{pw}	3.21	5.68	12.94	18.55	22.11	13.13	14.91	25.25
Dissolved Sulphate (SO ₄)	mg/L _{pw}	9.64	17.05	38.83	55.65	66.33	39.39	44.72	75.76

Goldenville - Porewater

Sample ID	G-2018-C13 (15-20cm)	G-2018-C13 (20-40cm)	G-2018-C14 (2.5-10cm)	G-2018-C14 (15-20cm)	G-2018-C14 (40-50cm)	G-2018-C15 (2.5-10cm)	G-2018-C15 (15-20cm)	G-2018-C15 (20-30cm)	
Sample Coordinates									
Latitude	45.07952778	45.07952778	45.12157079	45.12157079	45.12157079	45.11863	45.11863	45.11863	
Longitude	-62.00694444	-62.00694444	-62.02352858	-62.02352858	-62.02352858	-62.02648999	-62.02648999	-62.02648999	
EcoMetrix Porewater Test Data									
Mass Sample (wet weight)	g-wet	218.77	200.29	295.61	300.48	300.51	301.86	265.13	171.90
Mass Water Added	g	221.98	203.66	304.57	300.18	303.84	304.96	266.23	202.99
Water-to-Solids Ratio	-	1.01	1.02	1.03	1.00	1.01	1.01	1.00	1.18
Lab pH	-	5.27	5.35	5.04	5.33	4.93	4.02	4.89	5.35
Lab Electrical Conductivity	µS/cm	52.47	50.49	276.80	176.20	238.20	406.30	725.20	160.80
Environmental Moisture Content	%	87.2%	87.5%	25.2%	24.3%	34.6%	28.2%	76.3%	79.3%
PW Volume	mL (g)	190.77	175.25	74.49	73.02	103.98	85.12	202.29	136.32
Total Water Mass	g	412.75	378.91	379.06	373.20	407.82	390.08	468.52	339.31
Total Water Volume	L	0.413	0.379	0.379	0.373	0.408	0.390	0.469	0.339
Sample Solids Mass (dry weight)	g	28.00	25.04	221.12	227.46	196.53	216.74	62.84	35.58
Lab-Measured Constituent Concentration									
Inorganics									
Acidity	mg/L	11	12	<5.0	7.8	46	18	5.8	<5.0
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	0.02	0.05	0.07	<0.01	<0.01	0.02
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	9.6	8.6	98.9	53.6	46.1	118	306	41.7

Goldenville - Porewater

Sample ID	G-2018-C13 (15-20cm)	G-2018-C13 (20-40cm)	G-2018-C14 (2.5-10cm)	G-2018-C14 (15-20cm)	G-2018-C14 (40-50cm)	G-2018-C15 (2.5-10cm)	G-2018-C15 (15-20cm)	G-2018-C15 (20-30cm)	
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L	0.0878	0.0832	0.0376	0.068	0.052	0.503	0.0587	0.109
Dissolved Antimony (Sb)	mg/L	0.000169	0.000118	0.00388	0.00222	0.00343	0.00135	0.00143	0.00407
Dissolved Arsenic (As)	mg/L	0.0184	0.0155	0.353	1.09	1.78	0.0291	0.202	0.755
Dissolved Barium (Ba)	mg/L	0.0048	0.00382	0.0291	0.0229	0.0637	0.028	0.0467	0.0082
Dissolved Beryllium (Be)	mg/L	<0.00001	<0.00001	0.000015	0.000013	0.000065	0.00106	<0.00001	<0.00001
Dissolved Bismuth (Bi)	mg/L	<0.000005	0.0000116	0.0000262	0.0000557	<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	0.047	0.019
Dissolved Cadmium (Cd)	mg/L	0.0000108	0.0000092	0.000201	0.000113	0.000176	0.0045	0.000631	0.000208
Dissolved Chromium (Cr)	mg/L	0.00272	0.00269	<0.0001	0.00013	0.00106	0.0001	0.00032	0.00061
Dissolved Cobalt (Co)	mg/L	0.00063	0.000326	0.0202	0.0168	0.0545	0.547	0.0147	0.00505
Dissolved Copper (Cu)	mg/L	0.00874	0.0132	0.00114	0.0011	0.000429	0.0332	0.000167	0.000487
Dissolved Iron (Fe)	mg/L	0.077	0.0651	0.615	3.27	19.9	1.86	0.0206	0.102
Dissolved Lead (Pb)	mg/L	0.000568	0.000403	0.00208	0.00454	0.00318	0.00149	0.000148	0.000265
Dissolved Lithium (Li)	mg/L	<0.0005	<0.0005	0.00416	0.00217	0.00412	0.0161	0.00411	0.00124
Dissolved Manganese (Mn)	mg/L	0.716	0.45	0.796	1.32	2.56	8.02	4.98	0.809
Dissolved Molybdenum (Mo)	mg/L	0.000171	0.000197	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.000243
Dissolved Nickel (Ni)	mg/L	0.00374	0.00309	0.0245	0.0139	0.0327	0.69	0.00748	0.0054
Dissolved Selenium (Se)	mg/L	0.000058	0.000061	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004
Dissolved Silicon (Si)	mg/L	5.84	6.15	1.25	1.24	4.83	4.53	2.75	2.6
Dissolved Silver (Ag)	mg/L	0.000006	0.0000063	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.0000074
Dissolved Strontium (Sr)	mg/L	0.0227	0.0197	0.306	0.15	0.152	0.454	0.806	0.101
Dissolved Thallium (Tl)	mg/L	<0.000002	<0.000002	0.0000173	0.0000157	0.0000068	0.000158	0.0000642	0.0000226
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	0.00024	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Titanium (Ti)	mg/L	0.00264	0.00309	0.00081	0.0016	<0.0005	<0.0005	<0.0005	0.0039
Dissolved Uranium (U)	mg/L	0.0000077	0.0000089	0.0000028	0.0000073	0.000002	0.0000479	0.0000026	0.0000162
Dissolved Vanadium (V)	mg/L	0.00079	0.00099	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00043
Dissolved Zinc (Zn)	mg/L	0.0182	0.0165	0.049	0.0284	0.0782	0.981	0.0367	0.0162
Dissolved Zirconium (Zr)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00013
Dissolved Calcium (Ca)	mg/L	2.91	2.56	34.5	18.5	14.9	39.2	109	13.7
Dissolved Magnesium (Mg)	mg/L	0.567	0.536	3.12	1.76	2.15	4.84	8.48	1.79
Dissolved Potassium (K)	mg/L	0.28	0.259	1.98	1.58	1.16	3.98	1.5	0.853
Dissolved Sodium (Na)	mg/L	5.59	6.46	3.54	3.57	3.15	3.72	6.78	6.02
Dissolved Sulphur (S)	mg/L	5.19	5.82	32.9	21.1	27.8	49.9	112	17.2
Dissolved Sulphate (SO4)	mg/L	15.57	17.46	98.7	63.3	83.4	149.7	336	51.6

Goldenville - Porewater

Sample ID	G-2018-C13 (15-20cm)	G-2018-C13 (20-40cm)	G-2018-C14 (2.5-10cm)	G-2018-C14 (15-20cm)	G-2018-C14 (40-50cm)	G-2018-C15 (2.5-10cm)	G-2018-C15 (15-20cm)	G-2018-C15 (20-30cm)	
Porewater Concentration (mg/L_{pw})									
Inorganics									
Acidity	mg/L _{pw}	23.80	25.95	25.44	39.87	180.42	82.49	13.43	12.45
Total Cyanide (CN)	mg/L _{pw}	0.0000	0.0000	0.0254	0.0000	0.0196	0.0000	0.0000	0.0000
WAD Cyanide (Free)	mg/L _{pw}	0.0000	0.0000	0.0051	0.0000	0.0039	0.0000	0.0000	0.0000
Alkalinity (Total as CaCO ₃)	mg/L _{pw}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mercury									
Dissolved Mercury (Hg)	mg/L _{pw}	0.0000	0.0000	0.0001	0.0003	0.0003	0.0000	0.0000	0.0000
Calculated Parameters									
Dissolved Hardness (CaCO ₃)	mg/L _{pw}	20.77	18.59	503.26	273.96	180.81	540.74	708.71	103.80
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/L _{pw}	0.1900	0.1799	0.1913	0.3476	0.2040	2.3050	0.1360	0.2713
Dissolved Antimony (Sb)	mg/L _{pw}	0.0004	0.0003	0.0197	0.0113	0.0135	0.0062	0.0033	0.0101
Dissolved Arsenic (As)	mg/L _{pw}	0.0398	0.0335	1.7963	5.5711	6.9815	0.1334	0.4678	1.8793
Dissolved Barium (Ba)	mg/L _{pw}	0.0104	0.0083	0.1481	0.1170	0.2498	0.1283	0.1082	0.0204
Dissolved Beryllium (Be)	mg/L _{pw}	0.0000	0.0000	0.0001	0.0001	0.0003	0.0049	0.0000	0.0000
Dissolved Bismuth (Bi)	mg/L _{pw}	0.0000	0.0000	0.0001	0.0003	0.0000	0.0000	0.0000	0.0000
Dissolved Boron (B)	mg/L _{pw}	0.0216	0.0216	0.0509	0.0511	0.0392	0.0458	0.1089	0.0473
Dissolved Cadmium (Cd)	mg/L _{pw}	0.0000	0.0000	0.0010	0.0006	0.0007	0.0206	0.0001	0.0001
Dissolved Chromium (Cr)	mg/L _{pw}	0.0059	0.0058	0.0005	0.0007	0.0042	0.0005	0.0007	0.0015
Dissolved Cobalt (Co)	mg/L _{pw}	0.0014	0.0007	0.1028	0.0859	0.2138	2.5066	0.0340	0.0126
Dissolved Copper (Cu)	mg/L _{pw}	0.0189	0.0285	0.0058	0.0056	0.0017	0.1521	0.0004	0.0012
Dissolved Iron (Fe)	mg/L _{pw}	0.1666	0.1408	3.1294	16.7134	78.0518	8.5235	0.0477	0.2539
Dissolved Lead (Pb)	mg/L _{pw}	0.0012	0.0009	0.0106	0.0232	0.0125	0.0068	0.0003	0.0007
Dissolved Lithium (Li)	mg/L _{pw}	0.0011	0.0011	0.0212	0.0111	0.0162	0.0738	0.0095	0.0031
Dissolved Manganese (Mn)	mg/L _{pw}	1.5491	0.9729	4.0505	6.7467	10.0408	36.7518	11.5339	2.0137
Dissolved Molybdenum (Mo)	mg/L _{pw}	0.0004	0.0004	0.0003	0.0003	0.0002	0.0002	0.0001	0.0006
Dissolved Nickel (Ni)	mg/L _{pw}	0.0081	0.0067	0.1247	0.0710	0.1283	3.1619	0.0173	0.0134
Dissolved Selenium (Se)	mg/L _{pw}	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001
Dissolved Silicon (Si)	mg/L _{pw}	12.6355	13.2968	6.3607	6.3378	18.9442	20.7588	6.3691	6.4717
Dissolved Silver (Ag)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Dissolved Strontium (Sr)	mg/L _{pw}	0.0491	0.0426	1.5571	0.7667	0.5962	2.0805	1.8667	0.2514
Dissolved Thallium (Tl)	mg/L _{pw}	0.0000	0.0000	0.0001	0.0001	0.0000	0.0007	0.0001	0.0001
Dissolved Tin (Sn)	mg/L _{pw}	0.0004	0.0004	0.0012	0.0010	0.0008	0.0009	0.0005	0.0005
Dissolved Titanium (Ti)	mg/L _{pw}	0.0057	0.0067	0.0041	0.0082	0.0020	0.0023	0.0012	0.0097
Dissolved Uranium (U)	mg/L _{pw}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000
Dissolved Vanadium (V)	mg/L _{pw}	0.0017	0.0021	0.0010	0.0010	0.0008	0.0009	0.0005	0.0011
Dissolved Zinc (Zn)	mg/L _{pw}	0.0394	0.0357	0.2493	0.1452	0.3067	4.4954	0.0850	0.0403
Dissolved Zirconium (Zr)	mg/L _{pw}	0.0002	0.0002	0.0005	0.0005	0.0004	0.0005	0.0002	0.0003
Dissolved Calcium (Ca)	mg/L _{pw}	6.30	5.53	175.55	94.56	58.44	179.63	252.45	34.10
Dissolved Magnesium (Mg)	mg/L _{pw}	1.23	1.16	15.88	9.00	8.43	22.18	19.64	4.46
Dissolved Potassium (K)	mg/L _{pw}	0.61	0.56	10.08	8.08	4.55	18.24	3.47	2.12
Dissolved Sodium (Na)	mg/L _{pw}	12.09	13.97	18.01	18.25	12.35	17.05	15.70	14.98
Dissolved Sulphur (S)	mg/L _{pw}	11.23	12.58	167.41	107.84	109.04	228.67	259.40	42.81
Dissolved Sulphate (SO ₄)	mg/L _{pw}	33.69	37.75	502.24	323.53	327.11	686.00	778.19	128.44

Goldenville - Porewater

Sample ID	G-2018-C17 (0-5cm)	G-2018-C17 (10-20cm)	G-2018-C17 (40-50cm)	G-2018-WR1	G-2018-WR2	G-2018-WR3	G-2018-WR4	G-2018-WR5	G-2018-WR6	
Sample Coordinates										
Latitude	45.12692297	45.12692297	45.12692297	45.12306101	45.12281399	45.12233002	45.12614898	45.12653296	45.12505104	
Longitude	-61.99020197	-61.99020197	-61.99020197	-62.01652701	-62.01607003	-62.01598504	-62.02110202	-62.021558	-62.016007	
EcoMetrix Porewater Test Data										
Mass Sample (wet weight)	g-wet	292.94	294.32	299.93	301.31	302.12	302.29	304.80	301.19	304.51
Mass Water Added	g	296.70	292.93	304.74	299.21	299.55	301.39	299.92	300.10	295.43
Water-to-Solids Ratio	-	1.01	1.00	1.02	0.99	0.99	1.00	0.98	1.00	0.97
Lab pH	-	5.62	6.95	7.08	6.62	5.93	6.63	7.67	7.47	6.87
Lab Electrical Conductivity	µS/cm	543.40	581.50	522.10	40.12	28.88	36.26	52.78	53.99	21.09
Environmental Moisture Content	%	40.8%	30.5%	33.2%	9.7%	15.7%	11.8%	7.4%	14.1%	9.5%
PW Volume	mL (g)	119.52	89.77	99.58	29.29	47.43	35.67	22.49	42.47	28.96
Total Water Mass	g	416.22	382.70	404.32	328.50	346.98	337.06	322.41	342.57	324.39
Total Water Volume	L	0.416	0.383	0.404	0.328	0.347	0.337	0.322	0.343	0.324
Sample Solids Mass (dry weight)	g	173.42	204.55	200.35	272.02	254.69	266.62	282.31	258.72	275.55
Lab-Measured Constituent Concentration										
Inorganics										
Acidity	mg/L	<5.0				<5.0				
Total Cyanide (CN)	mg/L									
WAD Cyanide (Free)	mg/L									
Alkalinity (Total as CaCO3)	mg/L		27	33	4.9		3.9	13	16	2.9
Mercury										
Dissolved Mercury (Hg)	µg/L	0.02	0.06	0.43	1.73	0.26	<0.01	0.07	0.07	<0.01
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	218	248	221	12	7.98	10.4	18.9	18.2	6.17

Goldenville - Porewater

Sample ID		G-2018-C17 (0-5cm)	G-2018-C17 (10-20cm)	G-2018-C17 (40-50cm)	G-2018-WR1	G-2018-WR2	G-2018-WR3	G-2018-WR4	G-2018-WR5	G-2018-WR6
Constituents by ICPMS										
Dissolved Aluminum (Al)	mg/L	0.0168	0.0115	0.0899	0.379	0.139	0.152	0.188	0.0875	0.0326
Dissolved Antimony (Sb)	mg/L	0.00567	0.00421	0.0115	0.000745	0.00565	0.000425	0.000688	0.000771	0.000145
Dissolved Arsenic (As)	mg/L	0.18	0.225	0.627	0.626	0.725	0.401	0.248	0.149	0.0777
Dissolved Barium (Ba)	mg/L	0.026	0.0267	0.0209	0.0112	0.0034	0.00197	0.00171	0.000893	0.000811
Dissolved Beryllium (Be)	mg/L	0.000018	<0.00001	0.00001	0.000022	<0.00001	<0.00001	0.000015	<0.00001	<0.00001
Dissolved Bismuth (Bi)	mg/L	<0.000005	<0.000005	0.0000199	0.0000666	0.0000476	0.0000197	0.000019	0.0000115	0.0000059
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	0.000276	<0.000005	0.000011	0.0000272	0.0000185	0.0000078	<0.000005	<0.000005	0.0000055
Dissolved Chromium (Cr)	mg/L	<0.0001	<0.0001	0.00017	0.00055	0.00027	0.00034	0.00042	0.00014	<0.0001
Dissolved Cobalt (Co)	mg/L	0.0281	0.00301	0.00202	0.00204	0.0013	0.00051	0.00155	0.000757	0.00051
Dissolved Copper (Cu)	mg/L	0.000467	0.000168	0.000476	0.00662	0.00338	0.00154	0.00278	0.0023	0.00227
Dissolved Iron (Fe)	mg/L	0.595	0.0806	0.139	1.31	0.644	0.374	0.597	0.154	0.101
Dissolved Lead (Pb)	mg/L	0.000695	0.000338	0.0016	0.00714	0.012	0.0018	0.0019	0.000836	0.000961
Dissolved Lithium (Li)	mg/L	0.00203	0.0007	0.00052	0.00113	<0.0005	<0.0005	0.00177	0.00172	<0.0005
Dissolved Manganese (Mn)	mg/L	4.68	2.07	0.901	0.0352	0.0783	0.0178	0.0223	0.00684	0.0093
Dissolved Molybdenum (Mo)	mg/L	<0.00005	0.000547	0.000941	0.000077	0.000144	0.000055	<0.00005	0.000267	<0.00005
Dissolved Nickel (Ni)	mg/L	0.037	0.0149	0.0085	0.00652	0.00151	0.00182	0.00241	0.00172	0.00102
Dissolved Selenium (Se)	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	0.00007	<0.00004	<0.00004	<0.00004	0.000051
Dissolved Silicon (Si)	mg/L	1.16	0.545	1.11	0.656	0.616	0.204	0.345	0.285	0.22
Dissolved Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	0.000031	0.0000321	0.0000131	0.0000077	0.0000107	0.0000273
Dissolved Strontium (Sr)	mg/L	0.459	0.525	0.431	0.033	0.0195	0.0201	0.0494	0.0411	0.0137
Dissolved Thallium (Tl)	mg/L	0.0000519	<0.000002	<0.000002	0.0000128	0.0000106	0.0000043	0.0000049	0.0000026	<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	<0.0005	0.00187	0.0127	0.00629	0.00461	0.00871	0.00184	0.00069
Dissolved Uranium (U)	mg/L	0.0000034	0.000266	0.000296	0.0000319	0.0000204	0.0000149	0.0000124	0.0000094	0.0000103
Dissolved Vanadium (V)	mg/L	<0.0002	<0.0002	0.00033	0.00042	0.00027	0.00026	0.00025	<0.0002	<0.0002
Dissolved Zinc (Zn)	mg/L	0.0307	0.00164	0.00356	0.0121	0.00422	0.00267	0.00375	0.00203	0.00136
Dissolved Zirconium (Zr)	mg/L	<0.0001	<0.0001	0.00061	0.00012	0.00032	<0.0001	<0.0001	0.00026	0.00016
Dissolved Calcium (Ca)	mg/L	72	93.6	83.8	4.04	2.77	3.61	5.07	4.94	1.77
Dissolved Magnesium (Mg)	mg/L	9.25	3.6	2.8	0.469	0.261	0.344	1.51	1.42	0.421
Dissolved Potassium (K)	mg/L	1.91	2.16	2.66	1.35	0.703	0.72	1.46	2.32	0.597
Dissolved Sodium (Na)	mg/L	3.73	2.06	2.17	1.13	0.728	1.38	0.664	0.795	0.745
Dissolved Sulphur (S)	mg/L	80.1	83.8	67.7	2.77	2.28	2.02	2.21	1.53	0.92
Dissolved Sulphate (SO4)	mg/L	240.3	251.4	203.1	8.31	6.84	6.06	6.63	4.59	2.76

Goldenville - Porewater

Sample ID	G-2018-C17 (0-5cm)	G-2018-C17 (10-20cm)	G-2018-C17 (40-50cm)	G-2018-WR1	G-2018-WR2	G-2018-WR3	G-2018-WR4	G-2018-WR5	G-2018-WR6
Porewater Concentration (mg/L_{pw})									
Inorganics									
Acidity	mg/Lpw	17.41	0.00	0.00	0.00	36.58	0.00	0.00	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	115.11	133.99	54.96	0.00	36.85	186.33	129.06
Mercury									
Dissolved Mercury (Hg)	mg/Lpw	0.0001	0.0003	0.0017	0.0194	0.0019	0.0001	0.0010	0.0006
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/Lpw	759.17	1057.27	897.34	134.60	58.38	98.27	270.90	146.81
Constituents by ICPMS									
Dissolved Aluminum (Al)	mg/Lpw	0.0585	0.0490	0.3650	4.2510	1.0168	1.4363	2.6946	0.7058
Dissolved Antimony (Sb)	mg/Lpw	0.0197	0.0179	0.0467	0.0084	0.0413	0.0040	0.0099	0.0062
Dissolved Arsenic (As)	mg/Lpw	0.6268	0.9592	2.5458	7.0214	5.3036	3.7892	3.5546	1.2019
Dissolved Barium (Ba)	mg/Lpw	0.0905	0.1138	0.0849	0.1256	0.0249	0.0186	0.0245	0.0072
Dissolved Beryllium (Be)	mg/Lpw	0.0001	0.0000	0.0000	0.0002	0.0001	0.0001	0.0002	0.0001
Dissolved Bismuth (Bi)	mg/Lpw	0.0000	0.0000	0.0001	0.0007	0.0003	0.0002	0.0003	0.0001
Dissolved Boron (B)	mg/Lpw	0.0348	0.0426	0.0406	0.1122	0.0732	0.0945	0.1433	0.0807
Dissolved Cadmium (Cd)	mg/Lpw	0.0010	0.0000	0.0000	0.0003	0.0001	0.0001	0.0001	0.0000
Dissolved Chromium (Cr)	mg/Lpw	0.0003	0.0004	0.0007	0.0062	0.0020	0.0032	0.0060	0.0011
Dissolved Cobalt (Co)	mg/Lpw	0.0979	0.0128	0.0082	0.0229	0.0095	0.0048	0.0222	0.0061
Dissolved Copper (Cu)	mg/Lpw	0.0016	0.0007	0.0019	0.0743	0.0247	0.0146	0.0398	0.0186
Dissolved Iron (Fe)	mg/Lpw	2.0721	0.3436	0.5644	14.6934	4.7110	3.5341	8.5569	1.2422
Dissolved Lead (Pb)	mg/Lpw	0.0024	0.0014	0.0065	0.0801	0.0878	0.0170	0.0272	0.0067
Dissolved Lithium (Li)	mg/Lpw	0.0071	0.0030	0.0021	0.0127	0.0037	0.0047	0.0254	0.0139
Dissolved Manganese (Mn)	mg/Lpw	16.2978	8.8248	3.6584	0.3948	0.5728	0.1682	0.3196	0.0552
Dissolved Molybdenum (Mo)	mg/Lpw	0.0002	0.0023	0.0038	0.0009	0.0011	0.0005	0.0007	0.0022
Dissolved Nickel (Ni)	mg/Lpw	0.1289	0.0635	0.0345	0.0731	0.0110	0.0172	0.0345	0.0139
Dissolved Selenium (Se)	mg/Lpw	0.0001	0.0002	0.0002	0.0004	0.0005	0.0004	0.0006	0.0003
Dissolved Silicon (Si)	mg/Lpw	4.0396	2.3234	4.5070	7.3579	4.5062	1.9277	4.9450	2.2990
Dissolved Silver (Ag)	mg/Lpw	0.0000	0.0000	0.0000	0.0003	0.0002	0.0001	0.0001	0.0001
Dissolved Strontium (Sr)	mg/Lpw	1.5984	2.2382	1.7500	0.3701	0.1426	0.1899	0.7081	0.3315
Dissolved Thallium (Tl)	mg/Lpw	0.0002	0.0000	0.0000	0.0001	0.0001	0.0000	0.0001	0.0000
Dissolved Tin (Sn)	mg/Lpw	0.0007	0.0009	0.0008	0.0022	0.0015	0.0019	0.0029	0.0016
Dissolved Titanium (Ti)	mg/Lpw	0.0017	0.0021	0.0076	0.1424	0.0460	0.0436	0.1248	0.0148
Dissolved Uranium (U)	mg/Lpw	0.0000	0.0011	0.0012	0.0004	0.0001	0.0001	0.0002	0.0001
Dissolved Vanadium (V)	mg/Lpw	0.0007	0.0009	0.0013	0.0047	0.0020	0.0025	0.0036	0.0016
Dissolved Zinc (Zn)	mg/Lpw	0.1069	0.0070	0.0145	0.1357	0.0309	0.0252	0.0537	0.0164
Dissolved Zirconium (Zr)	mg/Lpw	0.0003	0.0004	0.0025	0.0013	0.0023	0.0009	0.0014	0.0021
Dissolved Calcium (Ca)	mg/Lpw	250.74	399.04	340.26	45.31	20.26	34.11	72.67	39.85
Dissolved Magnesium (Mg)	mg/Lpw	32.21	15.35	11.37	5.26	1.91	3.25	21.64	11.45
Dissolved Potassium (K)	mg/Lpw	6.65	9.21	10.80	15.14	5.14	6.80	20.93	18.71
Dissolved Sodium (Na)	mg/Lpw	12.99	8.78	8.81	12.67	5.33	13.04	9.52	6.41
Dissolved Sulphur (S)	mg/Lpw	278.94	357.26	274.89	31.07	16.68	19.09	31.68	12.34
Dissolved Sulphate (SO4)	mg/Lpw	836.83	1071.77	824.66	93.21	50.04	57.26	95.03	37.03

Goldenville - Porewater - Arsenic Species

Analyte	Units	G-2018-C3 (0-5cm)	G-2018-C6 (28NOV) (2.5-10cm)	G-2018-C9 (0-7.5cm)	G-2018-SFC-3	G-2018-SFC-8	G-2018-SFC-11	G-2018-C4 (0-5cm)
Dissolved As(III)	mg/L	11600	1080	61.4	88.6	8.56	1.57	4960
Dissolved As(V)	mg/L	525	110	41.8	2320	132	59.1	113
Dissolved DMAs	mg/L	≤5.0	≤5.0	≤0.125	≤5.0	≤0.125	≤0.125	≤5.0
Dissolved MMAs	mg/L	≤9.0	≤9.0	≤0.225	≤9.0	≤0.225	≤0.225	≤9.0

Appendix D **Laboratory Certificates of Analysis**



SGS Canada Inc.
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Ecometrix

Attn : Daniel Skruch

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Canada, L5N 2L8
Phone: 905-794-2325, Fax:905-794-2338

ABA - Modified Sobek

13-February-2019

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



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LR Report : CA15296-JAN19

Analysis	10: M-2018-SFC-T7	11: M-2018-SFC-T2	12: M-2018-SFC-T9	13: M-2018-SFC-T1 4	14: M-2018-SFC-T2 8AHP	15: M-2018-SFC-T1 2	16: M-2018-SFC-T1 3	17: M-2018-SFC-T1 5	18: M-2018-SW12-C ORE (2.5-10)	19: M-2018-SW12-C ORE (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-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
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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LR Report : CA15296-JAN19

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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LR Report : CA15296-JAN19

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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LR Report : CA15296-JAN19

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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LR Report : CA15296-JAN19

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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LR Report : CA15296-JAN19

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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ABA - Modified Sobek

LR Report : CA15296-JAN19

*NP (Neutralization Potential)

$$= \frac{50 \times (N \text{ of HCL} \times \text{Total HCL added} - N \text{ NaOH} \times \text{NaOH added})}{\text{Weight of Sample}}$$

- *AP (Acid Potential) = % Sulphide Sulphur x 31.25
- *Net NP (Net Neutralization Potential) = NP-AP
- NP/AP Ratio = NP/AP
- *Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
- Samples with a % Sulphide value of <0.02 will be calculated using a 0.02 value.

Chris Sullivan

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





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11-February-2019

Ecometrix

Attn : Daniel Skruch

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

Date Rec. : 22 January 2019
LR Report: CA15297-JAN19
Reference: 18-2525

Copy: #1

CERTIFICATE OF ANALYSIS Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time Completed	3: Analysis Date Completed	4: Analysis Date Completed	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 [ug/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 [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	2100	690	1800	1300	1400	1600	12000	2500
Aluminum [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	14000	13000	12000	8800	9000	16000	14000	16000
Barium [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	81	52	44	38	43	82	75	83
Beryllium [ug/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 [ug/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 [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	3500	1500	2300	2800	3300	1800	2500	3100
Cadmium [ug/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 [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	32	6.8	13	8.6	9.0	12	25	21
Chromium [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	33	40	32	54	42	35	18	19
Copper [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	130	97	78	100	120	79	120	75
Iron [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	38000	29000	29000	21000	22000	37000	48000	38000
Potassium [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	2600	4700	4500	3500	3100	6400	4500	6400
Lithium [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	19	20	19	14	14	24	21	25
Magnesium [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	7300	8100	8000	5900	5900	9500	8600	9900
Manganese [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	1200	260	260	280	320	390	1300	590
Molybdenum [ug/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 [ug/g]	08-Feb-19	14:39	11-Feb-19	08:51	70	28	36	22	23	35	59	52
Lead [ug/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 Completed	3: Analysis Date Completed	4: Analysis Date Completed	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-T9M	14: M-2018-SFC-T14M	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 [µg/g]	6.0	6.4	3.8	4.1	6.1	4.7	0.30	0.13	35	30	4.5	7.2
Silver [µg/g]	0.29	0.23	0.95	0.29	0.29	0.23	0.27	0.20	0.55	0.48	0.26	0.19
Arsenic [µg/g]	6600	4200	54000	10000	12000	6400	140	64	130	360	14000	7900
Aluminum [µg/g]	15000	14000	6800	13000	14000	15000	26000	25000	9000	9100	15000	14000
Barium [µg/g]	58	79	33	100	89	74	160	67	66	49	76	63
Beryllium [µg/g]	0.59	0.46	0.12	0.44	0.42	0.41	1.4	1.1	0.42	0.46	0.33	0.40
Bismuth [µg/g]	1.7	1.6	6.7	2.0	2.0	1.4	0.63	0.22	2.9	2.0	1.9	1.4
Calcium [µg/g]	2200	2300	350	3300	4900	3000	2800	3200	7200	5400	5600	5700
Cadmium [µg/g]	0.93	0.29	0.085	0.73	0.34	0.33	2.1	1.2	0.83	0.62	0.38	0.20
Cobalt [µg/g]	25	20	1.7	30	30	25	37	13	4.2	3.0	25	19
Chromium [µg/g]	17	20	12	48	24	23	31	35	36	4.1	27	21
Copper [µg/g]	120	70	43	97	82	78	60	23	110	92	88	60
Iron [µg/g]	41000	35000	79000	43000	45000	41000	53000	39000	9900	4400	51000	39000
Potassium [µg/g]	4100	4600	3600	3900	5400	5700	2200	640	380	340	4900	5600
Lithium [µg/g]	21	23	7.4	20	23	24	23	6.9	< 2	< 2	22	23
Magnesium [µg/g]	7600	8400	3700	8300	9900	9600	4000	1400	1100	930	10000	11000
Manganese [µg/g]	700	490	90	2300	830	620	2400	1200	210	180	1200	500
Molybdenum [µg/g]	0.85	0.18	1.2	0.66	0.31	0.22	3.0	3.9	0.40	0.48	0.24	0.25
Nickel [µg/g]	47	39	9.7	63	54	47	82	29	17	12	53	42
Lead [µg/g]	82	90	360	100	100	78	120	20	170	130	88	62

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LR Report : CA15297-JAN19

Analysis	13: M-2018-SFC-T9M-2018-SFC-T14M-2018-SFC-T28 AHP	14: M-2018-SFC-T12	15: M-2018-SFC-12	16: M-2018-SFC-13	17: M-2018-SFC-15	18: M-2018-SW12- CORE (2.5-10)	19: M-2018-SW12- CORE (30-40)	20: M-2018-C13 (2.5-10)	21: M-2018-C13 (20-30)	22: M-2018-C5 (2.5-10)	23: M-2018-C5 (30-50)	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-T25M-2018-SFC-T26M-2018-SFC-T27M-2018-SFC-T32M-2018-SFC-T17M-2018-SFC-T20M-2018-SFC-T23M-2018-SFC-T30M-2018-SFC-T35M-2018-C19 (0-5)	26:	27:	28:	29:	30:	31:	32:	33:	34: M-2018-C19 (20-30)	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 [µg/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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LR Report : CA15297-JAN19

Analysis	25: M-2018-SFC-T25M-2018-SFC-T26M-2018-SFC-T27M-2018-SFC-T32M-2018-SFC-T17M-2018-SFC-T20M-2018-SFC-T23M-2018-SFC-T30M-2018-SFC-T35M-2018-C19 (0-5)	26:	27:	28:	29:	30:	31:	32:	33:	34:	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-C11M-2018-C2 (0-5) (30-40)	39:	40: M-2018-C2 (10-20)	41: M-2018-C2 (40-60)	42: M-2018-C2M-2018-C3 (0-5) (80-100)	43:	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 [µg/g]	0.22	0.52	27	1.2	2.1	2.1	4.4	9.0	17	7.8	4.0	0.20
Silver [µg/g]	0.11	0.12	0.38	0.14	0.11	0.19	0.27	0.22	0.44	0.32	0.36	0.013
Arsenic [µg/g]	120	210	5400	8900	4200	8200	5400	2200	5000	2500	11000	500
Aluminum [µg/g]	6700	6900	12000	12000	13000	12000	23000	12000	13000	12000	14000	16000
Barium [µg/g]	56	57	57	49	64	110	440	50	76	65	470	35
Beryllium [µg/g]	0.37	0.41	0.33	0.34	0.35	0.41	1.7	0.33	0.42	0.46	0.75	0.26
Bismuth [µg/g]	< 0.09	0.15	2.0	1.4	1.1	1.1	1.2	1.2	1.6	0.94	2.0	0.35
Calcium [µg/g]	7300	7600	1900	1500	3400	4000	6700	3000	4100	5600	2800	900
Cadmium [µg/g]	0.53	0.62	0.33	0.27	0.21	0.89	4.0	0.27	0.58	0.52	2.7	0.032
Cobalt [µg/g]	10	4.0	11	13	14	37	120	13	15	11	88	3.7
Chromium [µg/g]	4.2	4.9	14	14	15	14	18	57	13	12	56	18
Copper [µg/g]	15	21	95	97	73	120	93	73	93	63	130	9.9
Iron [µg/g]	5300	6100	30000	38000	34000	55000	77000	28000	31000	25000	58000	28000
Potassium [µg/g]	230	630	3300	4100	5100	3200	2100	3900	3400	2700	2800	1300
Lithium [µg/g]	< 2	< 2	20	21	22	17	15	21	20	14	18	17
Magnesium [µg/g]	1000	1200	6600	7600	8500	6900	4000	7600	6700	5300	6500	3800
Manganese [µg/g]	420	290	480	240	520	2900	35000	350	450	620	21000	330
Molybdenum [µg/g]	0.71	0.76	0.47	0.36	0.32	0.79	7.3	0.42	0.51	0.75	2.0	0.52
Nickel [µg/g]	16	13	27	37	35	63	130	30	32	24	120	13
Lead [µg/g]	22	26	80	57	40	58	110	43	74	42	120	8.6

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LR Report : CA15297-JAN19

Analysis	37: M-2018-C11 (10-20)	38: M-2018-C11M-2018-C2 (30-40)	39: M-2018-C2 (0-5)	40: M-2018-C2 (10-20)	41: M-2018-C2 (40-60)	42: M-2018-C2M-2018-C3 (80-100)	43: M-2018-C3 (0-5)	44: M-2018-C3 (40-80)	45: M-2018-C3 (140-160)	46: M-2018-C3 (160-180)	47: M-2018-C4 (0-10)	48: M-2018-C4 (40-60)
Sulphur [µg/g]	5400	4800	4200	5400	3200	710	2000	2500	5100	4100	4300	530
Antimony [µg/g]	< 0.8	< 0.8	10	17	7.8	12	3.1	3.9	8.1	3.9	15	< 0.8
Selenium [µg/g]	2.1	2.3	0.72	< 0.7	< 0.7	0.89	4.3	< 0.7	1.4	2.1	1.6	< 0.7
Tin [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5	< 0.5	< 0.5	< 0.5	0.79	< 0.5
Strontium [µg/g]	39	36	11	10	14	24	34	11	19	21	21	5.8
Titanium [µg/g]	73	91	410	530	610	490	310	550	370	360	500	460
Thallium [µg/g]	< 0.02	< 0.02	0.20	0.26	0.28	0.32	0.44	0.23	0.17	0.13	0.60	0.11
Uranium [µg/g]	0.70	1.3	0.48	0.35	0.48	0.37	1.5	0.55	0.93	1.1	0.67	0.33
Vanadium [µg/g]	5.8	4.9	15	15	17	27	140	16	15	13	37	21
Yttrium [µg/g]	13	16	4.0	4.0	4.0	5.0	15	4.3	5.9	8.3	6.5	1.8
Zinc [µg/g]	25	19	140	160	130	230	370	110	190	100	430	31

Analysis	49: M-2018-C4 (60-100)	50: M-2018-C18 (0-2.5)	51: M-2018-C18 (2.5-10)	52: M-2018-C18 (10-20)	53: M-2018-C18 (20-30)	54: M-2018-SFC SOIL C.MOORE	55: M-2018-SW9-C ORE (0-7.5)	56: M-2018-SW9-C ORE (15-20)	57: M-2018-SW9-C ORE (20-40)	58: M-2018-SW10- CORE (0-5)	59: M-2018-SW10- CORE (15-20)	60: M-2018-SW10- CORE (30-40)
Moisture [%]	44.0	89.5	54.6	69.8	79.1	24.6	88.2	66.9	60.0	84.0	89.5	91.0
Mercury [µg/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	39	13	60	25	28
Iron [µg/g]	33000	32000	34000	31000	15000	29000	21000	15000	20000	39000	17000	18000
Potassium [µg/g]	7000	1400	2700	2500	770	2700	850	1100	1800	2700	1000	1100
Lithium [µg/g]	24	13	25	22	10	18	16	19	25	22	9.2	9.9
Magnesium [µg/g]	8800	4600	9800	7500	2500	5000	2200	3000	3700	5900	2300	2900
Manganese [µg/g]	500	670	610	580	670	440	1300	340	410	5900	1600	1500
Molybdenum [µg/g]	0.31	1.1	0.56	0.84	1.4	0.60	1.6	0.90	1.2	2.4	2.1	2.5
Nickel [µg/g]	35	36	40	32	23	21	16	14	16	63	17	22
Lead [µg/g]	35	78	77	60	43	120	69	10	8.8	98	31	24



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LR Report : CA15297-JAN19

Analysis	49: M-2018-C4 (60-100)	50: M-2018-C18 (0-2.5)	51: M-2018-C18 (2.5-10)	52: M-2018-C18 (10-20)	53: M-2018-C18 (20-30)	54: M-2018-SFC SOIL C.MOORE	55: M-2018-SW9-C ORE (0-7.5)	56: M-2018-SW9-C ORE (15-20)	57: M-2018-SW9-C ORE (20-40)	58: M-2018-SW10- CORE (0-5)	59: M-2018-SW10- CORE (15-20)	60: M-2018-SW10- CORE (30-40)
Sulphur [µg/g]	4200	4500	1800	5200	5900	250	1200	680	500	1300	3400	2600
Antimony [µg/g]	4.7	< 0.8	< 0.8	< 0.8	1.7	4.1	< 0.8	< 0.8	< 0.8	1.8	< 0.8	< 0.8
Selenium [µg/g]	< 0.7	1.1	< 0.7	1.2	3.9	< 0.7	1.8	0.81	0.77	1.3	2.5	3.5
Tin [µg/g]	< 0.5	1.0	0.83	0.98	0.78	1.9	2.3	0.68	0.79	2.7	< 0.5	< 0.5
Strontium [µg/g]	18	25	15	16	23	11	9.2	7.6	8.9	23	21	19
Titanium [µg/g]	650	290	500	350	290	370	470	420	530	370	260	280
Thallium [µg/g]	0.31	0.24	0.17	0.18	0.25	0.16	0.17	0.29	0.37	0.28	0.14	0.17
Uranium [µg/g]	0.58	0.71	0.64	0.84	1.7	0.58	3.5	2.5	3.7	2.6	1.2	1.5
Vanadium [µg/g]	20	120	48	28	16	17	61	15	16	77	18	16
Yttrium [µg/g]	4.3	10	7.7	7.9	7.1	3.6	9.8	7.0	9.5	24	22	30
Zinc [µg/g]	99	280	140	100	71	63	50	97	110	300	110	120

Analysis	61: M-2018-C17 (2.5-10)	62: M-2018-C17 (15-20)	63: M-2018-C17 (30-40)	64: G-2018-C2 (0-5)	65: G-2018-C2 (20-40)	66: G-2018-C2 (60-80)	67: G-2018-C3 (0-5)	68: G-2018-C3 (20-40)	69: G-2018-C3 (60-80)	70: G-2018-C3 (100-120)	71: G-2018-C5 (2.5-10)	72: G-2018-C5 (15-20)
Moisture [%]	25.2	21.3	21.4	34.3	29.8	25.1	35.1	30.4	19.2	45.2	59.4	42.1
Mercury [µg/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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LR Report : CA15297-JAN19

Analysis	61: M-2018-C17 (2.5-10)	62: M-2018-C17 (15-20)	63: M-2018-C17 (30-40)	64: G-2018-C2 (0-5)	65: G-2018-C2 (20-40)	66: G-2018-C2 (60-80)	67: G-2018-C3 (0-5)	68: G-2018-C3 (20-40)	69: G-2018-C3 (60-80)	70: G-2018-C3 (100-120)	71: G-2018-C5 (2.5-10)	72: G-2018-C5 (15-20)
Sulphur [µg/g]	900	1100	3000	760	12000	5400	770	3800	4100	3500	8600	11000
Antimony [µg/g]	10	6.7	7.3	1.2	24	7.5	2.6	7.6	8.7	2.5	15	14
Selenium [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	0.74	< 0.7
Tin [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	0.72	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	0.84
Strontium [µg/g]	11	12	11	17	22	20	20	24	20	36	29	24
Titanium [µg/g]	260	220	200	260	260	270	330	260	190	200	210	220
Thallium [µg/g]	0.16	0.12	0.14	0.069	0.097	0.092	0.088	0.086	0.065	0.060	0.17	0.17
Uranium [µg/g]	0.35	0.31	0.33	0.28	0.35	0.32	0.36	0.32	0.25	0.43	0.53	0.67
Vanadium [µg/g]	10	9.7	8.9	8.3	8.6	9.2	11	8.9	6.1	9.0	12	12
Yttrium [µg/g]	1.9	2.4	2.2	4.7	5.8	7.1	6.1	7.3	3.6	4.0	7.0	8.5
Zinc [µg/g]	46	61	70	47	61	69	51	50	50	46	140	88

Analysis	73: G-2018-C11 (0-7.5)	74: G-2018-C11 (15-20)	75: G-2018-C12 (2.5-10)	76: G-2018-C12 (10-20)	77: G-2018-C12 (20-40)	78: G-2018-C13 (2.5-10)	79: G-2018-C13 (15-20)	80: G-2018-C13 (20-40)	81: G-2018-C6 (28NOV) (2.5-10)	82: G-2018-C6 (28NOV) (10-20)	83: G-2018-C6 (28NOV) (20-30)	84: G-2018-C7 (2.5-10)
Moisture [%]	90.6	83.8	80.3	89.8	88.7	74.9	87.2	87.5	81.6	31.9	45.0	85.5
Mercury [µg/g]	2.1	1.9	2.2	0.72	0.63	2.3	0.44	0.21	11	14	39	1.3
Silver [µg/g]	0.22	0.17	0.16	0.21	0.24	0.18	0.19	0.16	0.35	0.76	0.67	0.29
Arsenic [µg/g]	2400	1000	1500	510	250	2100	770	150	8100	27000	2700	53
Aluminum [µg/g]	9300	10000	11000	8800	9400	13000	7500	7300	13000	6900	11000	8900
Barium [µg/g]	57	74	72	43	49	73	33	30	110	32	69	59
Beryllium [µg/g]	0.38	0.47	0.45	0.32	0.36	0.48	0.23	0.23	0.66	0.24	0.41	0.45
Bismuth [µg/g]	0.60	0.47	0.34	0.17	0.17	0.73	0.14	< 0.09	1.0	2.1	1.8	0.23
Calcium [µg/g]	2100	2800	1700	2600	2700	1800	2800	2800	4000	1500	2600	4800
Cadmium [µg/g]	0.77	0.48	0.26	0.21	0.25	0.46	0.21	0.24	1.1	0.46	0.54	0.51
Cobalt [µg/g]	14	11	7.5	5.1	3.7	14	9.0	4.5	35	49	7.1	6.9
Chromium [µg/g]	28	12	15	12	13	17	490	9.7	14	120	14	9.1
Copper [µg/g]	21	17	12	12	14	19	20	11	43	50	18	23
Iron [µg/g]	12000	14000	19000	15000	12000	21000	15000	11000	85000	52000	20000	12000
Potassium [µg/g]	2200	2100	2700	1200	1400	2900	480	350	1200	1100	3300	840
Lithium [µg/g]	6.7	8.9	14	7.8	8.6	16	5.4	5.0	8.4	10	17	6.1
Magnesium [µg/g]	2600	3000	4800	2000	2300	5800	1100	1000	2800	3600	6100	1800
Manganese [µg/g]	500	990	390	520	340	470	870	670	3000	370	250	320
Molybdenum [µg/g]	1.3	1.2	1.1	1.1	1.1	1.2	2.2	0.92	1.2	1.4	0.26	0.86
Nickel [µg/g]	14	17	16	13	13	21	23	9.2	55	74	18	14
Lead [µg/g]	82	39	21	12	12	52	12	9.1	85	110	99	37

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LR Report : CA15297-JAN19

Analysis	73: G-2018-C11 (0-7.5)	74: G-2018-C11 (15-20)	75: G-2018-C12 (2.5-10)	76: G-2018-C12 (10-20)	77: G-2018-C12 (20-40)	78: G-2018-C13 (2.5-10)	79: G-2018-C13 (15-20)	80: G-2018-C13 (20-40)	81: G-2018-C6 (28NOV) (2.5-10)	82: G-2018-C6 (28NOV) (10-20)	83: G-2018-C6 (28NOV) (20-30)	84: G-2018-C7 (2.5-10)
Sulphur [µg/g]	3500	3100	1600	2300	2200	2100	3200	3100	2500	18000	2000	3300
Antimony [µg/g]	1.6	1.3	< 0.8	< 0.8	< 0.8	1.8	< 0.8	< 0.8	6.1	33	3.1	0.96
Selenium [µg/g]	1.7	1.5	1.1	2.0	2.3	0.99	2.5	2.5	1.3	< 0.7	< 0.7	1.4
Tin [µg/g]	1.1	0.63	< 0.5	< 0.5	< 0.5	< 0.5	0.61	< 0.5	1.2	0.96	< 0.5	1.1
Strontium [µg/g]	22	29	19	25	27	20	26	27	35	18	28	49
Titanium [µg/g]	190	220	170	210	220	210	220	200	210	210	190	170
Thallium [µg/g]	0.18	0.12	0.11	0.055	0.061	0.15	0.035	0.026	0.21	0.10	0.13	0.13
Uranium [µg/g]	0.49	0.68	0.55	0.63	0.70	0.56	0.64	0.61	0.54	0.36	0.46	1.4
Vanadium [µg/g]	16	11	11	7.8	7.7	13	9.0	6.9	18	9.4	11	12
Yttrium [µg/g]	7.1	8.3	6.4	6.6	7.3	7.0	6.4	6.5	11	4.3	4.2	6.0
Zinc [µg/g]	53	52	61	31	32	67	11	11	210	63	70	34

Analysis	85: G-2018-C7 (15-20)	86: G-2018-C7 (20-30)	87: G-2018-C8 (0-5)	88: G-2018-C8 (15-20)	89: G-2018-C8 (40-50)	90: G-2018-C9 (0-7.5)	91: G-2018-C9 (20-30)	92: G-2018-C9 (30-40)	93: G-2018-C10 (2.5-10)	94: G-2018-C10 (15-20)	95: G-2018-C10 (40-50)	96: G-2018-C14 (2.5-10)
Moisture [%]	75.0	81.2	57.3	20.7	21.5	75.9	57.8	80.2	59.4	23.3	17.8	25.2
Mercury [µg/g]	0.57	0.60	2.1	4.1	3.4	4.0	11	1.5	20	0.25	0.06	1.1
Silver [µg/g]	0.35	0.95	0.16	0.20	0.19	0.25	0.20	0.47	0.27	0.019	0.042	0.052
Arsenic [µg/g]	22	22	640	1400	1100	1200	1600	230	82	34	17	2600
Aluminum [µg/g]	11000	19000	11000	13000	12000	11000	12000	10000	6500	9000	8000	6300
Barium [µg/g]	59	69	40	49	40	40	76	50	34	30	35	33
Beryllium [µg/g]	0.48	1.4	0.24	0.30	0.24	0.29	0.49	0.42	0.31	0.19	0.21	0.17
Bismuth [µg/g]	0.15	0.21	0.81	1.0	0.77	1.1	0.79	0.30	0.35	0.15	0.16	0.30
Calcium [µg/g]	4900	6300	3000	7400	11000	5100	3800	8500	1600	650	1800	1300
Cadmium [µg/g]	0.18	0.46	0.36	0.12	0.15	0.41	0.23	0.17	0.14	< 0.02	0.030	0.10
Cobalt [µg/g]	6.7	5.7	9.1	20	16	8.5	21	4.0	2.7	4.1	6.8	5.1
Chromium [µg/g]	13	22	15	34	59	14	26	9.3	7.6	78	64	80
Copper [µg/g]	11	28	70	54	75	65	34	17	19	4.8	15	13
Iron [µg/g]	14000	8000	32000	34000	34000	28000	25000	13000	12000	14000	15000	19000
Potassium [µg/g]	930	380	1700	2500	3100	1500	3100	1000	680	860	1500	1700
Lithium [µg/g]	9.5	8.5	21	28	24	19	21	4.9	3.5	13	13	9.3
Magnesium [µg/g]	2900	1200	6200	9300	9500	5700	6300	2200	1200	3200	4100	3700
Manganese [µg/g]	300	250	420	660	840	520	440	830	170	150	210	160
Molybdenum [µg/g]	0.57	0.81	0.77	0.55	0.72	0.95	0.69	0.73	1.1	0.41	0.27	0.65
Nickel [µg/g]	15	11	32	40	41	31	31	9.5	6.7	13	17	14
Lead [µg/g]	18	30	55	63	44	77	48	23	920	21	6.1	18

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LR Report : CA15297-JAN19

Analysis	85: G-2018-C7 (15-20)	86: G-2018-C7G-2018-C8 (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-C15G-2018-C17 (20-30)	102: G-2018-C17 (0-5)	103: G-2018-C17 (10-20)	104: G-2018-C17 (40-50) (29NOV)	105: G-2018-C6 (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 [µg/g]	0.66	44	1.6	1.1	0.69	3.0	4.6	7.7	1.1	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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Test method information available upon request. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.



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LR Report : CA15297-JAN19

Analysis	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) (29NOV)	105: G-2018-C6 (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 [µg/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 [µg/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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LR Report : CA15297-JAN19

Analysis	121: G-2018-SFC-7	122: G-2018-SFC-8	123: G-2018-SFC-10	124: G-2018-SFC-11	125: G-2018-SFC-12	126: G-2018-SFC-13	127: G-2018-SFC-14	128: G-2018-SFC-15	129: G-2018-SFC-16	130: G-2018-SFC-18	131: G-2018-C1 (0-10)	132: G-2018-C1 (20-40)
Sulphur [µg/g]	240	610	110	1000	17000	410	840	290	1300	460	310	1500
Antimony [µg/g]	4.5	1.3	2.0	8.3	240	6.1	11	12	3.3	16	1.5	< 0.8
Selenium [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	3.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Tin [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	2.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Strontium [µg/g]	57	37	18	11	5.8	27	17	16	31	13	23	45
Titanium [µg/g]	310	270	270	210	120	250	220	210	310	230	250	320
Thallium [µg/g]	0.11	0.081	0.10	0.066	0.18	0.090	0.072	0.083	0.098	0.088	0.072	0.12
Uranium [µg/g]	0.42	0.29	0.33	0.20	0.064	0.34	0.24	0.26	0.45	0.29	0.27	0.48
Vanadium [µg/g]	10	8.7	8.2	7.8	1.4	9.2	6.9	7.4	12	8.0	8.0	15
Yttrium [µg/g]	8.2	5.1	6.5	2.4	0.32	5.4	3.5	3.6	6.5	3.8	4.3	7.0
Zinc [µg/g]	57	48	78	23	11	57	27	27	64	28	40	71

Analysis	133: G-2018-C1 (60-80)	134: G-2018-C1G-2018-C4 (140-160)	135: G-2018-C4 (0-5)	136: G-2018-C4 (10-20)
Moisture [%]	19.1	39.3	51.7	35.5
Mercury [ug/g]	11	4.9	0.37	3.6
Silver [µg/g]	0.26	0.098	0.11	0.15
Arsenic [µg/g]	2000	1500	3300	490
Aluminum [µg/g]	10000	8200	9200	10000
Barium [µg/g]	59	31	40	43
Beryllium [µg/g]	0.31	0.23	0.25	0.28
Bismuth [µg/g]	0.79	0.39	0.34	0.41
Calcium [µg/g]	2300	2100	1400	1100
Cadmium [µg/g]	0.28	0.14	0.13	0.11
Cobalt [µg/g]	16	22	7.4	5.5
Chromium [µg/g]	13	9.3	12	13
Copper [µg/g]	35	20	18	13
Iron [µg/g]	26000	16000	34000	18000
Potassium [µg/g]	3200	1400	1300	1700
Lithium [µg/g]	14	10	10	12
Magnesium [µg/g]	5600	3200	3000	4100
Manganese [µg/g]	510	220	490	250
Molybdenum [µg/g]	1.4	0.73	0.96	0.82
Nickel [µg/g]	37	46	14	12
Lead [µg/g]	45	24	24	20



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LR Report : CA15297-JAN19

Analysis	133: G-2018-C1 (60-80)	134: G-2018-C1G-2018-C4 (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

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LR Report : CA15297-JAN19

Quality Control Report

Parameter	Reporting Limit	Unit	Method Blank	Inorganic Analysis				LCS / Spike Blank			Matrix Spike / Reference Material		
				Duplicate			Acceptance Criteria	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
				Result 1	Result 2	RPD			Low	High		Low	High
								%					
<i>Mercury by CVAAS - QCBatchID: EMS0044-FEB19</i>													
Mercury	0.05	ug/g	<0.05			8	20	105	80	120	NV	70	130
<i>Metals in Soil - Aqua-regia/ICP-MS - QCBatchID: EMS0044-FEB19</i>													
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
<i>Metals in Soil - ICP-OES - QCBatchID: ESG0025-FEB19</i>													
Sulphur	3	µg/g	<3			5	20	91	80	120	NV	70	130

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 CaCO ₃) (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

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

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

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		UZ2888	UZ2890	UZ2891		
Sampling Date		2018/11/29	2018/11/29	2018/11/29		
COC Number		B8X4697-M058-01-01	B8X4697-M058-02-01	B8X4697-M058-02-01		
	UNITS	G-2018-SW14	G-2018-SW15	G-2018-SW16	RDL	QC Batch
Total Metals by ICPMS						
Total Aluminum (Al)	mg/L	0.187	0.199	0.318	0.0030	9274584
Total Antimony (Sb)	mg/L	0.000527	0.000229	0.000303	0.000020	9274584
Total Arsenic (As)	mg/L	0.358	0.138	0.262	0.000020	9274584
Total Barium (Ba)	mg/L	0.00201	0.00194	0.00259	0.000050	9274584
Total Beryllium (Be)	mg/L	<0.000010	0.000012	0.000021	0.000010	9274584
Total Bismuth (Bi)	mg/L	<0.000010	<0.000010	0.000017	0.000010	9274584
Total Boron (B)	mg/L	<0.010	<0.010	<0.010	0.010	9274584
Total Cadmium (Cd)	mg/L	0.0000230	0.0000179	0.0000257	0.0000050	9274584
Total Chromium (Cr)	mg/L	0.00019	0.00018	0.00038	0.00010	9274584
Total Cobalt (Co)	mg/L	0.000457	0.000716	0.000908	0.000010	9274584
Total Copper (Cu)	mg/L	0.00273	0.00129	0.00165	0.00010	9274584
Total Iron (Fe)	mg/L	0.363	0.377	0.866	0.0050	9274584
Total Lead (Pb)	mg/L	0.000386	0.000368	0.00153	0.000020	9274584
Total Manganese (Mn)	mg/L	0.0309	0.0585	0.0583	0.00010	9274584
Total Molybdenum (Mo)	mg/L	0.000102	<0.000050	0.000061	0.000050	9274584
Total Nickel (Ni)	mg/L	0.00218	0.00166	0.00206	0.00010	9274584
Total Phosphorus (P)	mg/L	0.0091	0.0102	0.0202	0.0050	9274584
Total Selenium (Se)	mg/L	0.000056	0.000052	0.000067	0.000040	9274584
Total Silicon (Si)	mg/L	1.28	1.39	1.45	0.050	9274584
Total Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	0.000010	9274584
Total Strontium (Sr)	mg/L	0.0182	0.0192	0.0199	0.000050	9274584
Total Thallium (Tl)	mg/L	0.0000037	0.0000030	0.0000047	0.0000020	9274584
Total Tin (Sn)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	9274584
Total Titanium (Ti)	mg/L	<0.0020	0.0024	0.0075	0.0020	9274584
Total Uranium (U)	mg/L	0.0000082	0.0000070	0.0000108	0.0000050	9274584
Total Vanadium (V)	mg/L	<0.00020	<0.00020	0.00038	0.00020	9274584
Total Zinc (Zn)	mg/L	0.0051	0.0042	0.0056	0.0010	9274584
Total Zirconium (Zr)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	9274584
Total Sulphur (S)	mg/L	1.26	1.20	1.17	0.60	9274584
RDL = Reportable Detection Limit						

Maxxam 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						

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
Report Date: 2018/12/28

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

LOW LEVEL TOTAL METALS WITH CV HG (WATER)

Maxxam ID		UZ2879	UZ2880	UZ2881	UZ2882		
Sampling Date		2018/11/28	2018/11/28	2018/11/29	2018/11/29		
COC Number		B8X4697-M058-01-01	B8X4697-M058-01-01	B8X4697-M058-01-01	B8X4697-M058-01-01		
	UNITS	G-2018-C5 SW	G-2018-C6 SW	G-2018-C7 SW	G-2018-C8 SW	RDL	QC Batch

Calculated Parameters							
Total Hardness (CaCO3)	mg/L	12.0	12.6	5.97	16.2	0.50	9272190
Elements							
Total Mercury (Hg)	mg/L	0.000045 (1)	0.000028 (1)	<0.000020 (1)	<0.000020 (1)	0.000020	9274769
Total Metals by ICPMS							
Total Calcium (Ca)	mg/L	3.78	4.05	1.49	4.23	0.25	9272347
Total Magnesium (Mg)	mg/L	0.62	0.60	0.54	1.37	0.25	9272347
Total Potassium (K)	mg/L	0.51	0.39	<0.25	0.31	0.25	9272347
Total Sodium (Na)	mg/L	5.22	4.45	2.74	2.22	0.25	9272347
RDL = Reportable Detection Limit							
(1) Detection limits raised due to insufficient sample volume.							

Maxxam ID		UZ2883	UZ2884	UZ2885	UZ2886		
Sampling Date		2018/11/29	2018/11/29	2018/11/28	2018/11/28		
COC Number		B8X4697-M058-01-01	B8X4697-M058-01-01	B8X4697-M058-01-01	B8X4697-M058-01-01		
	UNITS	G-2018-C9 SW	G-2018-C10 SW	G-2018-C11 SW	G-2018-C12 SW	RDL	QC Batch

Calculated Parameters							
Total Hardness (CaCO3)	mg/L	15.2	7.53	3.61	4.55	0.50	9272190
Elements							
Total Mercury (Hg)	mg/L	0.000049 (1)	<0.000020 (1)	<0.000020 (1)	<0.000020 (1)	0.000020	9274769
Total Metals by ICPMS							
Total Calcium (Ca)	mg/L	3.92	1.86	0.79	1.08	0.25	9272347
Total Magnesium (Mg)	mg/L	1.32	0.70	0.40	0.45	0.25	9272347
Total Potassium (K)	mg/L	0.51	<0.25	<0.25	<0.25	0.25	9272347
Total Sodium (Na)	mg/L	2.61	2.77	3.40	3.82	0.25	9272347
RDL = Reportable Detection Limit							
(1) Detection limits raised due to insufficient sample volume.							

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		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.

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.						

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

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

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

TEST SUMMARY

Maxxam ID: UZ2884
Sample ID: G-2018-C10 SW
Matrix: Water

Collected: 2018/11/29
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness Total (calculated as CaCO3)	CALC	9272190	N/A	2018/12/27	Report Automation Engine
Mercury (Total) by CVAF	CV/AF	9274769	2018/12/22	2018/12/22	Edwin Lamigo
Elements by ICPMS Digested LL (total)	ICP/CRCM	9273673	2018/12/21	2018/12/24	Valentina Balada
Na, K, Ca, Mg, S by CRC ICPMS (total)	CALC	9272347	N/A	2018/12/27	Automated Statchk

Maxxam ID: UZ2885
Sample ID: G-2018-C11 SW
Matrix: Water

Collected: 2018/11/28
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness Total (calculated as CaCO3)	CALC	9272190	N/A	2018/12/27	Report Automation Engine
Mercury (Total) by CVAF	CV/AF	9274769	2018/12/22	2018/12/22	Edwin Lamigo
Elements by ICPMS Digested LL (total)	ICP/CRCM	9274584	2018/12/21	2018/12/24	Andrew An
Na, K, Ca, Mg, S by CRC ICPMS (total)	CALC	9272347	N/A	2018/12/27	Automated Statchk

Maxxam ID: UZ2886
Sample ID: G-2018-C12 SW
Matrix: Water

Collected: 2018/11/28
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness Total (calculated as CaCO3)	CALC	9272190	N/A	2018/12/27	Report Automation Engine
Mercury (Total) by CVAF	CV/AF	9274769	2018/12/22	2018/12/22	Edwin Lamigo
Elements by ICPMS Digested LL (total)	ICP/CRCM	9274584	2018/12/21	2018/12/24	Andrew An
Na, K, Ca, Mg, S by CRC ICPMS (total)	CALC	9272347	N/A	2018/12/27	Automated Statchk

Maxxam ID: UZ2887
Sample ID: G-2018-C13 SW
Matrix: Water

Collected: 2018/11/28
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness Total (calculated as CaCO3)	CALC	9272190	N/A	2018/12/27	Report Automation Engine
Mercury (Total) by CVAF	CV/AF	9274769	2018/12/22	2018/12/22	Edwin Lamigo
Elements by ICPMS Digested LL (total)	ICP/CRCM	9274584	2018/12/21	2018/12/24	Andrew An
Na, K, Ca, Mg, S by CRC ICPMS (total)	CALC	9272347	N/A	2018/12/27	Automated Statchk

Maxxam ID: UZ2888
Sample ID: G-2018-SW14
Matrix: Water

Collected: 2018/11/29
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness Total (calculated as CaCO3)	CALC	9272190	N/A	2018/12/27	Report Automation Engine
Mercury (Total) by CVAF	CV/AF	9274769	2018/12/22	2018/12/22	Edwin Lamigo
Elements by ICPMS Digested LL (total)	ICP/CRCM	9274584	2018/12/21	2018/12/24	Andrew An
Na, K, Ca, Mg, S by CRC ICPMS (total)	CALC	9272347	N/A	2018/12/27	Report Automation Engine

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

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

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

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

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

GENERAL COMMENTS

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

Package 1	5.7°C
Package 2	3.0°C

Report to include results for Mercury by CVAf for all samples as per client request.

Effective October 1, 2013, the BC MOE SAMPLE PRESERVATION & HOLDING TIME REQUIREMENTS states that Mercury in water requires a glass or PTFE container with Hydrochloric Acid (HCl) preservation. Sample container and preservation received was not in compliance. Maxxam added HCl to stabilize Mercury for all samples prior to analysis.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample UZ2895 [G-2018-P3 SW] Elements by ICPMS Digested LL (total): Detection limits raised due to dilution to bring analyte within the calibrated range.

Results relate only to the items tested.



Success Through Sciences

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

QUALITY ASSURANCE REPORT

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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	<0.000020	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



Success Through Sciences

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

QUALITY ASSURANCE REPORT(CONT'D)

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QUALITY ASSURANCE REPORT(CONT'D)

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>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)</p> <p>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).</p> <p>(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.</p> <p>(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.</p> <p>(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.</p>										

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.

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

Attention: KYLE REINHART

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B8X4700-M058-01-01, B8X4700-M058-02-01, B8X4700-M058-03-01

Report Date: 2018/12/28
Report #: R2669159
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B0550

Received: 2018/12/18, 09:35

Sample Matrix: Water
Samples Received: 26

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hardness (calculated as CaCO3)	26	N/A	2018/12/24	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	14	N/A	2018/12/21	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Dissolved) by CVAf	12	N/A	2018/12/22	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	26	N/A	2018/12/24	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved)	25	N/A	2018/12/22	BBY7SOP-00002	EPA 6020b R2 m
Elements by ICPMS Low Level (dissolved)	1	N/A	2018/12/24	BBY7SOP-00002	EPA 6020b R2 m
Filter and HNO3 Preserve for Metals	26	N/A	2018/12/19	BBY7 WI-00004	BCMOE Reqs 08/14

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

Attention: KYLE REINHART

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B8X4700-M058-01-01, B8X4700-M058-02-01, B8X4700-M058-03-01

Report Date: 2018/12/28
Report #: R2669159
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B0550

Received: 2018/12/18, 09:35

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Jennifer Villocero, Project Manager

Email: JVillocero@maxxam.ca

Phone# (604)638-5020

=====
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

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

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

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

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		UZ2938	UZ2939	
Sampling Date		2018/11/27	2018/11/29	
COC Number		B8X4700-M058-03-01	B8X4700-M058-03-01	
	UNITS	G-2018-P4 SW	G-2018-P4B	QC Batch
Calculated Parameters				
Filter and HNO3 Preservation	N/A	FIELD	FIELD	ONSITE

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

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

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		UZ2914	UZ2915	UZ2916		
Sampling Date		2018/11/28	2018/11/28	2018/11/29		
COC Number		B8X4700-M058-01-01	B8X4700-M058-01-01	B8X4700-M058-01-01		
	UNITS	G-2018-C5 SW	G-2018-C6 SW	G-2018-C7 SW	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	mg/L	0.0000453	0.0000216	0.0000082	0.0000020	9272572
RDL = Reportable Detection Limit						

Maxxam ID		UZ2917	UZ2918	UZ2919		
Sampling Date		2018/11/29	2018/11/29	2018/11/29		
COC Number		B8X4700-M058-01-01	B8X4700-M058-01-01	B8X4700-M058-01-01		
	UNITS	G-2018-C8 SW	G-2018-C9 SW	G-2018-C10 SW	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	mg/L	0.0000101	0.0000081	0.0000298	0.0000020	9272572
RDL = Reportable Detection Limit						

Maxxam ID		UZ2920	UZ2921	UZ2922		
Sampling Date		2018/11/28	2018/11/28	2018/11/28		
COC Number		B8X4700-M058-01-01	B8X4700-M058-01-01	B8X4700-M058-01-01		
	UNITS	G-2018-C11 SW	G-2018-C12 SW	G-2018-C13 SW	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	mg/L	0.0000154	<0.0000020	0.0000055	0.0000020	9272572
RDL = Reportable Detection Limit						

Maxxam ID		UZ2923	UZ2924	UZ2925		
Sampling Date		2018/11/29	2018/11/29	2018/11/29		
COC Number		B8X4700-M058-01-01	B8X4700-M058-02-01	B8X4700-M058-02-01		
	UNITS	G-2018-SW14	G-2018-SW15	G-2018-SW16	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	mg/L	0.0000177	0.0000315	0.0000238	0.0000020	9272572
RDL = Reportable Detection Limit						

Maxxam ID		UZ2926	UZ2927			UZ2928		
Sampling Date		2018/11/30	2018/11/30			2018/11/30		
COC Number		B8X4700-M058-02-01	B8X4700-M058-02-01			B8X4700-M058-02-01		
	UNITS	G-2018-SW17	G-2018-P18	RDL	QC Batch	G-2018-P19	RDL	QC Batch

Elements								
Dissolved Mercury (Hg)	mg/L	0.0000248	0.0000270	0.0000020	9272572	<0.000020 (1)	0.000020	9274771
RDL = Reportable Detection Limit								

(1) Detection limits raised due to insufficient sample volume.

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

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

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		UZ2929	UZ2930	UZ2931	UZ2932		
Sampling Date		2018/11/27	2018/11/29	2018/11/29	2018/11/27		
COC Number		B8X4700-M058-02-01	B8X4700-M058-02-01	B8X4700-M058-02-01	B8X4700-M058-02-01		
	UNITS	G-2018-P1 SW	G-2018-P1 A	G-2018-P1 B	G-2018-P2 SW	RDL	QC Batch

Elements							
Dissolved Mercury (Hg)	mg/L	<0.000020 (1)	<0.000020 (1)	0.000032 (1)	<0.000020 (1)	0.000020	9274771
RDL = Reportable Detection Limit							
(1) Detection limits raised due to insufficient sample volume.							

Maxxam ID		UZ2933	UZ2934	UZ2935	UZ2936		
Sampling Date		2018/11/29	2018/11/29	2018/11/27	2018/11/29		
COC Number		B8X4700-M058-02-01	B8X4700-M058-03-01	B8X4700-M058-03-01	B8X4700-M058-03-01		
	UNITS	G-2018-P2A	G-2018-P2B	G-2018-P3 SW	G-2018-P3A	RDL	QC Batch

Elements							
Dissolved Mercury (Hg)	mg/L	<0.000020 (1)	0.000113 (1)	0.000114 (1)	0.000025 (1)	0.000020	9274771
RDL = Reportable Detection Limit							
(1) Detection limits raised due to insufficient sample volume.							

Maxxam ID		UZ2937	UZ2938	UZ2939		
Sampling Date		2018/11/29	2018/11/27	2018/11/29		
COC Number		B8X4700-M058-03-01	B8X4700-M058-03-01	B8X4700-M058-03-01		
	UNITS	G-2018-P3B	G-2018-P4 SW	G-2018-P4B	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	mg/L	<0.000020 (1)	<0.000020 (1)	0.000784 (1)	0.000020	9274771
RDL = Reportable Detection Limit						
(1) Detection limits raised due to insufficient sample volume.						

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		UZ2914	UZ2915	UZ2916		
Sampling Date		2018/11/28	2018/11/28	2018/11/29		
COC Number		B8X4700-M058-01-01	B8X4700-M058-01-01	B8X4700-M058-01-01		
	UNITS	G-2018-C5 SW	G-2018-C6 SW	G-2018-C7 SW	RDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	11.6	12.6	6.15	0.50	9270527
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	mg/L	0.200	0.131	0.345	0.00050	9272326
Dissolved Antimony (Sb)	mg/L	0.000336	0.000170	0.000044	0.000020	9272326
Dissolved Arsenic (As)	mg/L	0.104	0.0837	0.00181	0.000020	9272326
Dissolved Barium (Ba)	mg/L	0.00566	0.00253	0.00230	0.000020	9272326
Dissolved Beryllium (Be)	mg/L	<0.000010	<0.000010	0.000021	0.000010	9272326
Dissolved Bismuth (Bi)	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000050	9272326
Dissolved Boron (B)	mg/L	<0.010	<0.010	<0.010	0.010	9272326
Dissolved Cadmium (Cd)	mg/L	0.0000156	<0.0000050	0.0000161	0.0000050	9272326
Dissolved Chromium (Cr)	mg/L	0.00024	0.00021	0.00028	0.00010	9272326
Dissolved Cobalt (Co)	mg/L	0.000151	0.0000733	0.000138	0.0000050	9272326
Dissolved Copper (Cu)	mg/L	0.00258	0.00129	0.000981	0.000050	9272326
Dissolved Iron (Fe)	mg/L	0.299	0.224	0.235	0.0010	9272326
Dissolved Lead (Pb)	mg/L	0.000217	0.000135	0.000338	0.0000050	9272326
Dissolved Lithium (Li)	mg/L	0.00071	0.00059	0.00051	0.00050	9272326
Dissolved Manganese (Mn)	mg/L	0.0415	0.0205	0.0204	0.000050	9272326
Dissolved Molybdenum (Mo)	mg/L	<0.000050	<0.000050	<0.000050	0.000050	9272326
Dissolved Nickel (Ni)	mg/L	0.00192	0.000809	0.000652	0.000020	9272326
Dissolved Selenium (Se)	mg/L	0.000061	0.000047	0.000069	0.000040	9272326
Dissolved Silicon (Si)	mg/L	1.81	1.83	1.43	0.050	9272326
Dissolved Silver (Ag)	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000050	9272326
Dissolved Strontium (Sr)	mg/L	0.0257	0.0273	0.0128	0.000050	9272326
Dissolved Thallium (Tl)	mg/L	0.0000039	<0.0000020	0.0000040	0.0000020	9272326
Dissolved Tin (Sn)	mg/L	<0.00020	0.00023	<0.00020	0.00020	9272326
Dissolved Titanium (Ti)	mg/L	0.00136	0.00145	0.00220	0.00050	9272326
Dissolved Uranium (U)	mg/L	0.0000115	0.0000071	0.0000101	0.0000020	9272326
Dissolved Vanadium (V)	mg/L	<0.00020	<0.00020	0.00021	0.00020	9272326
Dissolved Zinc (Zn)	mg/L	0.00528	0.00146	0.00233	0.00010	9272326
Dissolved Zirconium (Zr)	mg/L	0.00010	<0.00010	<0.00010	0.00010	9272326
Dissolved Calcium (Ca)	mg/L	3.64	4.05	1.55	0.050	9270528
RDL = Reportable Detection Limit						

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		UZ2914	UZ2915	UZ2916		
Sampling Date		2018/11/28	2018/11/28	2018/11/29		
COC Number		B8X4700-M058-01-01	B8X4700-M058-01-01	B8X4700-M058-01-01		
	UNITS	G-2018-C5 SW	G-2018-C6 SW	G-2018-C7 SW	RDL	QC Batch
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						

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		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						

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		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						

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		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						

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		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						

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
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						

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						

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					

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					

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	0.0000050	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	0.0000050	9272335	1.10	0.00010	9272335
Dissolved Molybdenum (Mo)	mg/L	0.00225	0.0000050	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	0.0000050	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						

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						

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		UZ2934		UZ2935		
Sampling Date		2018/11/29		2018/11/27		
COC Number		B8X4700-M058-03-01		B8X4700-M058-03-01		
	UNITS	G-2018-P2B	RDL	G-2018-P3 SW	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	2.21	0.050	2.00	0.25	9270528
Dissolved Potassium (K)	mg/L	9.41	0.050	1.84	0.25	9270528
Dissolved Sodium (Na)	mg/L	4.56	0.050	2.73	0.25	9270528
Dissolved Sulphur (S)	mg/L	6.25	0.60	9.4	3.0	9272335
RDL = Reportable Detection Limit						

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
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						

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					

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
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					

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

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

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

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

TEST SUMMARY

Maxxam ID: UZ2922
Sample ID: G-2018-C13 SW
Matrix: Water

Collected: 2018/11/28
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9272326	N/A	2018/12/22	Andrew An
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

Maxxam ID: UZ2923
Sample ID: G-2018-SW14
Matrix: Water

Collected: 2018/11/29
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9270527	N/A	2018/12/24	Report Automation Engine
Mercury (Dissolved) by CVAF	CV/AF	9272572	N/A	2018/12/21	Edwin Lamigo
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9272326	N/A	2018/12/22	Andrew An
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

Maxxam ID: UZ2924
Sample ID: G-2018-SW15
Matrix: Water

Collected: 2018/11/29
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9270527	N/A	2018/12/24	Report Automation Engine
Mercury (Dissolved) by CVAF	CV/AF	9272572	N/A	2018/12/21	Edwin Lamigo
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9272326	N/A	2018/12/22	Andrew An
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

Maxxam ID: UZ2925
Sample ID: G-2018-SW16
Matrix: Water

Collected: 2018/11/29
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9270527	N/A	2018/12/24	Report Automation Engine
Mercury (Dissolved) by CVAF	CV/AF	9272572	N/A	2018/12/21	Edwin Lamigo
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9272326	N/A	2018/12/22	Andrew An
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

Maxxam ID: UZ2926
Sample ID: G-2018-SW17
Matrix: Water

Collected: 2018/11/30
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9270527	N/A	2018/12/24	Report Automation Engine
Mercury (Dissolved) by CVAF	CV/AF	9272572	N/A	2018/12/21	Edwin Lamigo
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Automated Statchk

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

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

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

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

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

TEST SUMMARY

Maxxam ID: UZ2938
Sample ID: G-2018-P4 SW
Matrix: Water

Collected: 2018/11/27
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (Dissolved) by CVAf	CV/AF	9274771	N/A	2018/12/22	Edwin Lamigo
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9272335	N/A	2018/12/22	Andrew An
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

Maxxam ID: UZ2939
Sample ID: G-2018-P4B
Matrix: Water

Collected: 2018/11/29
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9270527	N/A	2018/12/24	Automated Statchk
Mercury (Dissolved) by CVAf	CV/AF	9274771	N/A	2018/12/22	Edwin Lamigo
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9272335	N/A	2018/12/22	Andrew An
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

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

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

GENERAL COMMENTS

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

Package 1	5.7°C
Package 2	3.0°C

Report to include results for Mercury by CVAf as per client request.

Effective October 1, 2013, the BC MOE SAMPLE PRESERVATION & HOLDING TIME REQUIREMENTS states that Mercury in water requires a glass or PTFE container with Hydrochloric Acid (HCl) preservation. Sample container and preservation received was not in compliance. Maxxam added HCl to stabilize Mercury to all samples prior to analysis.

LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments

Sample UZ2927 [G-2018-P18] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
 Sample UZ2928 [G-2018-P19] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
 Sample UZ2931 [G-2018-P1 B] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
 Sample UZ2933 [G-2018-P2A] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
 Sample UZ2935 [G-2018-P3 SW] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
 Sample UZ2937 [G-2018-P3B] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Results relate only to the items tested.



Success Through Science®

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

QUALITY ASSURANCE REPORT

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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

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.

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	Date		Laboratory Method	Analytical Method
	Quantity	Extracted			Analyzed
Hardness (calculated as CaCO3)	24	N/A	2018/12/24 BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	10	N/A	2018/12/21 BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Dissolved) by CVAf	15	N/A	2018/12/22 BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	24	N/A	2018/12/24 BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved)	19	N/A	2018/12/21 BBY7SOP-00002	EPA 6020b R2 m
Elements by ICPMS Low Level (dissolved)	4	N/A	2018/12/22 BBY7SOP-00002	EPA 6020b R2 m
Elements by ICPMS Low Level (dissolved)	1	N/A	2018/12/24 BBY7SOP-00002	EPA 6020b R2 m
Filter and HNO3 Preserve for Metals	25	N/A	2018/12/19 BBY7 WI-00004	BCMOE Reqs 08/14

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

Your Project #: MB8X4703
Site Location: 18-2525 MONTAGUE

Attention: KYLE REINHART

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B8X4703-M058-01-01, B8X4703-M058-02-01, B8X4703-M058-03-01

Report Date: 2018/12/28
Report #: R2669158
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B0538
Received: 2018/12/18, 09:35

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

=====
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 #: 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

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

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

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		UZ2853	UZ2854	UZ2855	UZ2856		
Sampling Date		2018/11/25	2018/11/24	2018/11/25	2018/11/25		
COC Number		B8X4703-M058-01-01	B8X4703-M058-01-01	B8X4703-M058-01-01	B8X4703-M058-01-01		
	UNITS	M-2018-P1A	M-2018-P1B	M-2018-P1SW	M-2018-P2A	RDL	QC Batch

Elements							
Dissolved Mercury (Hg)	mg/L	0.000029 (1)	<0.000020 (1)	0.000079 (1)	0.000238 (1)	0.000020	9272533
RDL = Reportable Detection Limit (1) Detection limits raised due to insufficient sample volume.							

Maxxam ID		UZ2857	UZ2858	UZ2859	UZ2860		
Sampling Date		2018/11/25	2018/11/25	2018/11/25	2018/11/25		
COC Number		B8X4703-M058-01-01	B8X4703-M058-01-01	B8X4703-M058-01-01	B8X4703-M058-01-01		
	UNITS	M-2018-P2B	M-2018-SW2	M-2018-P3A	M-2018-P3B	RDL	QC Batch

Elements							
Dissolved Mercury (Hg)	mg/L	<0.000020 (1)	<0.000020 (1)	<0.000020 (1)	<0.000020 (1)	0.000020	9272533
RDL = Reportable Detection Limit (1) Detection limits raised due to insufficient sample volume.							

Maxxam ID		UZ2861	UZ2862	UZ2863	UZ2864		
Sampling Date		2018/11/25	2018/11/25	2018/11/25	2018/11/25		
COC Number		B8X4703-M058-01-01	B8X4703-M058-01-01	B8X4703-M058-02-01	B8X4703-M058-02-01		
	UNITS	M-2018-SW3	M-2018-P4A	M-2018-P4B	M-2018-SW4	RDL	QC Batch

Elements							
Dissolved Mercury (Hg)	mg/L	<0.000020 (1)	0.000048 (1)	0.000030 (1)	<0.000020 (1)	0.000020	9272533
RDL = Reportable Detection Limit (1) Detection limits raised due to insufficient sample volume.							

Maxxam ID		UZ2865	UZ2866	UZ2867	UZ2868		
Sampling Date		2018/11/25	2018/11/26	2018/11/26	2018/11/30		
COC Number		B8X4703-M058-02-01	B8X4703-M058-02-01	B8X4703-M058-02-01	B8X4703-M058-02-01		
	UNITS	M-2018-C5 SW	M-2018-SW9	M-2018-SW10	M-2018-SW11	RDL	QC Batch

Elements							
Dissolved Mercury (Hg)	mg/L	<0.000020 (1)	<0.000020 (1)	<0.000020 (1)	<0.000020 (1)	0.000020	9272533
RDL = Reportable Detection Limit (1) Detection limits raised due to insufficient sample volume.							

Maxxam ID		UZ2869	UZ2870	UZ2871		
Sampling Date		2018/11/26	2018/12/01	2018/12/01		
COC Number		B8X4703-M058-02-01	B8X4703-M058-02-01	B8X4703-M058-02-01		
	UNITS	M-2018-SW12	M-2018-C13 SW	M-2018-SW14	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	mg/L	<0.000020 (1)	0.000111 (1)	0.000030 (1)	0.000020	9272533
RDL = Reportable Detection Limit (1) Detection limits raised due to insufficient sample volume.						

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

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		UZ2872			UZ2874	UZ2875		
Sampling Date		2018/12/01			2018/12/01	2018/12/01		
COC Number		B8X4703-M058-02-01			B8X4703-M058-03-01	B8X4703-M058-03-01		
	UNITS	M-2018-SW15	RDL	QC Batch	M-2018-SW16	M-2018-C17 SW	RDL	QC Batch

Elements								
Dissolved Mercury (Hg)	mg/L	0.000023 (1)	0.000020	9274771	0.0000258	0.0000040	0.0000020	9272572

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

Maxxam ID		UZ2876	UZ2877	UZ2878		
Sampling Date		2018/12/01	2018/12/01	2018/11/25		
COC Number		B8X4703-M058-03-01	B8X4703-M058-03-01	B8X4703-M058-03-01		
	UNITS	M-2018-C18 SW	M-2018-C19 SW	M-2018-MBSW	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	mg/L	0.0000031	0.0000090	<0.0000020	0.0000020	9272572

RDL = Reportable Detection Limit

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						

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							

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							

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							

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
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						

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						

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						

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						

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
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							

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							

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

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		UZ2874			UZ2875	UZ2876		
Sampling Date		2018/12/01			2018/12/01	2018/12/01		
COC Number		B8X4703-M058-03-01			B8X4703-M058-03-01	B8X4703-M058-03-01		
	UNITS	M-2018-SW16 Lab-Dup	RDL	QC Batch	M-2018-C17 SW	M-2018-C18 SW	RDL	QC Batch

Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L				25.5	22.0	0.50	9270527
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	mg/L	0.0402	0.0025	9272326	0.0548	0.0552	0.00050	9272326
Dissolved Antimony (Sb)	mg/L	0.0151	0.00010	9272326	0.000097	0.000089	0.000020	9272326
Dissolved Arsenic (As)	mg/L	2.90	0.00010	9272326	0.0240	0.00966	0.000020	9272326
Dissolved Barium (Ba)	mg/L	0.00206	0.00010	9272326	0.00947	0.0248	0.000020	9272326
Dissolved Beryllium (Be)	mg/L	<0.000050	0.000050	9272326	<0.000010	<0.000010	0.000010	9272326
Dissolved Bismuth (Bi)	mg/L	<0.000025	0.000025	9272326	<0.000050	<0.000050	0.000050	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	0.000050	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	0.000050	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	0.000050	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	<0.000050	<0.000050	0.000050	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

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								

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					

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					

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: 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

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: 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

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

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

TEST SUMMARY

Maxxam ID: UZ2865
Sample ID: M-2018-C5 SW
Matrix: Water

Collected: 2018/11/25
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

Maxxam ID: UZ2866
Sample ID: M-2018-SW9
Matrix: Water

Collected: 2018/11/26
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9270527	N/A	2018/12/24	Report Automation Engine
Mercury (Dissolved) by CVAF	CV/AF	9272533	N/A	2018/12/22	Edwin Lamigo
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9272319	N/A	2018/12/21	Andrew An
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

Maxxam ID: UZ2867
Sample ID: M-2018-SW10
Matrix: Water

Collected: 2018/11/26
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9270527	N/A	2018/12/24	Report Automation Engine
Mercury (Dissolved) by CVAF	CV/AF	9272533	N/A	2018/12/22	Edwin Lamigo
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9272319	N/A	2018/12/21	Andrew An
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

Maxxam ID: UZ2868
Sample ID: M-2018-SW11
Matrix: Water

Collected: 2018/11/30
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9270527	N/A	2018/12/24	Report Automation Engine
Mercury (Dissolved) by CVAF	CV/AF	9272533	N/A	2018/12/22	Edwin Lamigo
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9272319	N/A	2018/12/21	Andrew An
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

Maxxam ID: UZ2869
Sample ID: M-2018-SW12
Matrix: Water

Collected: 2018/11/26
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9270527	N/A	2018/12/24	Report Automation Engine
Mercury (Dissolved) by CVAF	CV/AF	9272533	N/A	2018/12/22	Edwin Lamigo
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9270528	N/A	2018/12/24	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9272319	N/A	2018/12/21	Andrew An
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2018/12/19	Marilou H. Truant

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

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

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

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

GENERAL COMMENTS

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

Package 1	5.7°C
Package 2	3.0°C

Report to include results for Mercury by CVAf on all samples as per client request.

Effective October 1, 2013, the BC MOE SAMPLE PRESERVATION & HOLDING TIME REQUIREMENTS states that Mercury in water requires a glass or PTFE container with Hydrochloric Acid (HCl) preservation. Sample container and preservation received was not in compliance. Maxxam added HCl to stabilize Mercury for all samples prior to analysis.

Lab ID UZ2854, Client ID: M-2008-P1B (IOA346): Low level dissolved Metals analysis could not be completed due to a spiking error in the lab. There was not additional volume to complete the test.

LOW LEVEL DISSOLVED METALS IN WATER (WATER) Comments

- Sample UZ2853 [M-2018-P1A] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
- Sample UZ2856 [M-2018-P2A] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
- Sample UZ2857 [M-2018-P2B] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.
- Sample UZ2874 [M-2018-SW16] Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Results relate only to the items tested.



Success Through Sciences

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

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB8X4703
Site Location: 18-2525 MONTAGUE
Sampler Initials: DS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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	<0.000010	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



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

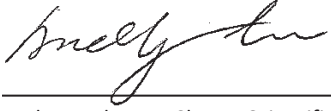
QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9274771	Dissolved Mercury (Hg)	2018/12/22	96	80 - 120	97	80 - 120	<0.0000020	mg/L	NC	20
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>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)</p> <p>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).</p>										

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.

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	Date		Laboratory Method	Analytical Method
	Quantity Extracted	Analyzed		
Hardness Total (calculated as CaCO ₃) (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).

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							

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							

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				

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

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

LOW LEVEL TOTAL METALS WITH CV HG (WATER)

Maxxam ID		UZ3773		
Sampling Date		2018/12/01		
COC Number		B8X4745-M058-02-01		
	UNITS	M-2018-SW16	RDL	QC Batch
Total Zirconium (Zr)	mg/L	<0.00050	0.00050	9276527
Total Calcium (Ca)	mg/L	78.2	0.25	9274099
Total Magnesium (Mg)	mg/L	36.9	0.25	9274099
Total Potassium (K)	mg/L	4.93	0.25	9274099
Total Sodium (Na)	mg/L	10.9	0.25	9274099
Total Sulphur (S)	mg/L	79.1	3.0	9276527
RDL = Reportable Detection Limit				

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

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

LL TOTAL METALS (DIGESTED) WITH CV HG

Maxxam ID		UZ3739		UZ3741	UZ3742		
Sampling Date		2018/11/24		2018/11/25	2018/11/25		
COC Number		B8X4745-M058-01-01		B8X4745-M058-01-01	B8X4745-M058-01-01		
	UNITS	M-2018-P1SW	RDL	M-2018-SW3	M-2018-SW4	RDL	QC Batch
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	25.6	0.50	25.5	23.1	0.50	9274526
Elements							
Total Mercury (Hg)	mg/L	0.000487 (1)	0.000020	0.000024	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.							

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

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

LL TOTAL METALS (DIGESTED) WITH CV HG

Maxxam ID		UZ3739		UZ3741	UZ3742		
Sampling Date		2018/11/24		2018/11/25	2018/11/25		
COC Number		B8X4745-M058-01-01		B8X4745-M058-01-01	B8X4745-M058-01-01		
	UNITS	M-2018-P1SW	RDL	M-2018-SW3	M-2018-SW4	RDL	QC Batch
Total Calcium (Ca)	mg/L	6.33	0.25	7.92	6.98	0.25	9274099
Total Magnesium (Mg)	mg/L	2.39	0.25	1.40	1.39	0.25	9274099
Total Potassium (K)	mg/L	1.60	0.25	1.01	1.08	0.25	9274099
Total Sodium (Na)	mg/L	6.09	0.25	35.0	32.0	0.25	9274099
Total Sulphur (S)	mg/L	2.94	0.60	3.12	3.42	0.60	9276498
RDL = Reportable Detection Limit							

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

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

LL TOTAL METALS (DIGESTED) WITH CV HG

Maxxam ID		UZ3743	UZ3744	UZ3746		
Sampling Date		2018/11/25	2018/11/26	2018/11/30		
COC Number		B8X4745-M058-01-01	B8X4745-M058-01-01	B8X4745-M058-01-01		
	UNITS	M-2018-C5 SW	M-2018-SW9	M-2018-SW11	RDL	QC Batch
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						

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

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

LL TOTAL METALS (DIGESTED) WITH CV HG

Maxxam ID		UZ3743	UZ3744	UZ3746		
Sampling Date		2018/11/25	2018/11/26	2018/11/30		
COC Number		B8X4745-M058-01-01	B8X4745-M058-01-01	B8X4745-M058-01-01		
	UNITS	M-2018-C5 SW	M-2018-SW9	M-2018-SW11	RDL	QC Batch
Total Calcium (Ca)	mg/L	8.50	0.95	6.45	0.25	9274099
Total Magnesium (Mg)	mg/L	2.07	0.42	1.33	0.25	9274099
Total Potassium (K)	mg/L	1.14	0.27	0.71	0.25	9274099
Total Sodium (Na)	mg/L	26.2	4.01	19.6	0.25	9274099
Total Sulphur (S)	mg/L	4.72	0.76	5.36	0.60	9276498
RDL = Reportable Detection Limit						

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
Calculated Parameters						
Total Hardness (CaCO3)	mg/L	26.6	0.50	9.21	0.50	9274526
Elements						
Total Mercury (Hg)	mg/L	<0.000020	0.000020	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	<0.000050	0.000050	0.0000711	0.000050	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	<0.000020	0.000020	0.0000063	0.000020	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						

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
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.							

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							

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					

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
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					

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

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

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

TEST SUMMARY

Maxxam ID: UZ3744
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

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

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

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

TEST SUMMARY

Maxxam ID: UZ3776
Sample ID: M-2018-C19 SW
Matrix: Water

Collected: 2018/12/01
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness Total (calculated as CaCO3)	CALC	9274526	N/A	2018/12/28	Report Automation Engine
Mercury (Total) by CVAf	CV/AF	9277254	2018/12/27	2018/12/27	Chamila Jayasinghe
Elements by ICPMS Digested LL (total)	ICP/CRCM	9276498	2018/12/24	2018/12/27	Valentina Balada
Na, K, Ca, Mg, S by CRC ICPMS (total)	CALC	9274099	N/A	2018/12/28	Rob Reinert

Maxxam ID: UZ3777
Sample ID: M-2018-MBSW
Matrix: Water

Collected: 2018/11/25
Shipped:
Received: 2018/12/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness Total (calculated as CaCO3)	CALC	9274526	N/A	2018/12/28	Report Automation Engine
Mercury (Total) by CVAf	CV/AF	9277254	2018/12/27	2018/12/27	Chamila Jayasinghe
Elements by ICPMS Digested LL (total)	ICP/CRCM	9276498	2018/12/24	2018/12/27	Valentina Balada
Na, K, Ca, Mg, S by CRC ICPMS (total)	CALC	9274099	N/A	2018/12/28	Rob Reinert

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

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

GENERAL COMMENTS

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

Package 1	5.7°C
Package 2	3.0°C

Report to include results for Mercury by CVAf for all samples as per client request.

Effective October 1, 2013, the BC MOE SAMPLE PRESERVATION & HOLDING TIME REQUIREMENTS states that Mercury in water requires a glass or PTFE container with Hydrochloric Acid (HCl) preservation. Sample container and preservation received was not in compliance. Maxxam added HCl to stabilize Mercury for all samples prior to analysis.

Version 2: Total Sulphur has been included on this report for all samples.

LOW LEVEL TOTAL METALS WITH CV HG (WATER) Comments

Sample UZ3772 [M-2018-SW15] Elements by ICPMS Low Level (total): RDL raised due to concentration over linear range, sample dilution required.

Sample UZ3773 [M-2018-SW16] Elements by ICPMS Low Level (total): RDL raised due to concentration over linear range, sample dilution required.

LL TOTAL METALS (DIGESTED) WITH CV HG Comments

Sample UZ3775 [M-2018-C18 SW] Elements by ICPMS Digested LL (total): RDL raised due to concentration over linear range, sample dilution required.

Results relate only to the items tested.



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

QUALITY ASSURANCE REPORT

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



Success Through Sciences

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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.

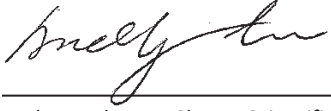
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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

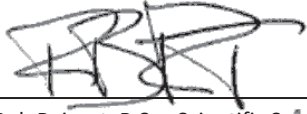
MAXXAM ANALYTICS
Client Project #: MB8X4745
Site Location: 18-2525
Sampler Initials: DS

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 Spécialist

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.

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	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Hardness Total (calculated as CaCO ₃) (1)	1	N/A	2018/12/27	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	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 HNO ₃ 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).

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				

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	Juvahne Cris Roy

Maxxam Job #: B8B1007
Report Date: 2018/12/28

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

GENERAL COMMENTS

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

Package 1	5.7°C
Package 2	3.0°C

Results relate only to the items tested.

Maxxam Job #: B8B1007
Report Date: 2018/12/28

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



Maxxam Job #: B8B1007
Report Date: 2018/12/28

QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: MB8X6166
Site Location: 18-2525 GOLDENVILLE EXTRA

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



Maxxam Job #: B8B1007
 Report Date: 2018/12/28

QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
 Client Project #: MB8X6166
 Site Location: 18-2525 GOLDENVILLE EXTRA

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>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)</p> <p>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).</p> <p>(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.</p> <p>(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.</p> <p>(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.</p>										

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.

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	Date		Laboratory Method	Analytical Method
	Quantity	Extracted			Analyzed
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
CANADA L5N 2L8

Your C.O.C. #: b929300-m058-01-01, b929300-m058-02-01

Report Date: 2019/02/12
Report #: R2685060
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B909556
Received: 2019/02/06, 11:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020
=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		VE9309	VE9310	VE9311	VE9312	
Sampling Date		2019/02/01	2019/02/01	2019/02/01	2019/02/01	
COC Number		b929300-m058-01-01	b929300-m058-01-01	b929300-m058-01-01	b929300-m058-01-01	
	UNITS	M-2018-C5 (30-50)	M-2018-SFC-T25	M-2018-SFC-T26	M-2018-SFC-T27	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VE9313	VE9314	VE9315	VE9316	
Sampling Date		2019/02/01	2019/02/01	2019/02/01	2019/02/01	
COC Number		b929300-m058-01-01	b929300-m058-01-01	b929300-m058-01-01	b929300-m058-01-01	
	UNITS	M-2018-SFC-T32	M-2018-SFC-T17	M-2018-SFC-T20	M-2018-SFC-T30	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VE9317	VE9318	VE9319	VE9320	
Sampling Date		2019/02/01	2019/02/01	2019/02/01	2019/02/01	
COC Number		b929300-m058-01-01	b929300-m058-01-01	b929300-m058-02-01	b929300-m058-02-01	
	UNITS	M-2018-C19 (0-5)	M-2018-C19 (20-30)	M-2018-C11 (10-20)	M-2018-C11 (30-40)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VE9321	VE9322	VE9323	VE9324	
Sampling Date		2019/02/01	2019/02/01	2019/02/01	2019/02/01	
COC Number		b929300-m058-02-01	b929300-m058-02-01	b929300-m058-02-01	b929300-m058-02-01	
	UNITS	M-2018-C2 (0-5)	M-2018-C2 (10-20)	M-2018-C2 (40-60)	M-2018-C2 (80-100)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VE9325	VE9326	VE9327	VE9328	
Sampling Date		2019/02/01	2019/02/01	2019/02/01	2019/02/01	
COC Number		b929300-m058-02-01	b929300-m058-02-01	b929300-m058-02-01	b929300-m058-02-01	
	UNITS	M-2018-C3 (0-5)	M-2018-C3 (40-80)	M-2018-C3 (140-160)	M-2018-C3 (160-180)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

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							

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							

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	0.0000050	9317235	0.184	0.0000050	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	0.0000050	9317235	0.508	0.0000050	9317235
Dissolved Molybdenum (Mo)	mg/L	<0.0000050	0.0000050	9317235	<0.0000050	0.0000050	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	0.0000050	9317235	0.0124	0.0000050	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
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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

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
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

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		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								

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		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

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		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
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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	0.0000050	0.00337	0.000010	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	0.0000050	0.316	0.00010	0.515	0.00025	9317235
Dissolved Molybdenum (Mo)	mg/L	<0.000050	0.0000050	<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	0.0000050	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

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		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

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		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
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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

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		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

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		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						

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		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				

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
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				

Maxxam Job #: B909556
Report Date: 2019/02/12

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

Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

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

Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
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

Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VE9323
Sample ID: M-2018-C2 (40-60)
Matrix: Water

Collected: 2019/02/01
Shipped:
Received: 2019/02/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9316212	N/A	2019/02/09	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9316618	N/A	2019/02/09	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9317235	N/A	2019/02/08	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/07	Aldean Alicando

Maxxam ID: VE9324
Sample ID: M-2018-C2 (80-100)
Matrix: Water

Collected: 2019/02/01
Shipped:
Received: 2019/02/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9316212	N/A	2019/02/09	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9316618	N/A	2019/02/09	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9317235	N/A	2019/02/08	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/07	Aldean Alicando

Maxxam ID: VE9325
Sample ID: M-2018-C3 (0-5)
Matrix: Water

Collected: 2019/02/01
Shipped:
Received: 2019/02/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9316212	N/A	2019/02/09	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9316618	N/A	2019/02/09	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9317235	N/A	2019/02/08	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/07	Aldean Alicando

Maxxam ID: VE9326
Sample ID: M-2018-C3 (40-80)
Matrix: Water

Collected: 2019/02/01
Shipped:
Received: 2019/02/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9316212	N/A	2019/02/09	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9316618	N/A	2019/02/09	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9317235	N/A	2019/02/08	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/07	Aldean Alicando

Maxxam ID: VE9327
Sample ID: M-2018-C3 (140-160)
Matrix: Water

Collected: 2019/02/01
Shipped:
Received: 2019/02/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9316212	N/A	2019/02/09	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9316618	N/A	2019/02/09	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9317235	N/A	2019/02/08	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/07	Aldean Alicando

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 CaCO ₃)	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 HNO ₃ Preserve for Metals	ICP	ONSITE	N/A	2019/02/07	Aldean Alicando

Maxxam Job #: B909556
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

GENERAL COMMENTS

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

Package 1	2.0°C
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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.



Success Through Sciences

Maxxam Job #: B909556
Report Date: 2019/02/12

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB929300
Site Location: 18-2525
Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>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)</p> <p>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).</p>										

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.

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	Date	Laboratory Method	Reference
		Extracted	Analyzed		
Acidity (CaCO3) in water (1, 2)	14	N/A	2019/02/06		SM 22 2310
Alkalinity	1	N/A	2019/02/04	CAM SOP-00448	SM 23 2320 B m
Dissolved Mercury (low level)	15	2019/02/04	2019/02/04	CAM SOP-00453	EPA 7470 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Bedford

(2) Non-accredited test method



Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

Attention: Daniel Skruch

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

Report Date: 2019/02/08
Report #: R5587438
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B927885
Received: 2019/01/31, 17:47

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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						

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						

GENERAL COMMENTS

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

Package 1	14.7°C
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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

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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).

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anastassia Hamanov, Scientific Specialist



Brad Newman, Scientific Service Specialist



Gina Thompson, Inorganics General Chemistry Supervisor

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



6740 Campbell Road, Mississauga, Ontario L5N 2L8
 Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
 CAM FCD-01151/2

31-Jan-19 17:47
 Kyle Reinhart
 B927885

ORD Page 1 of 2

Invoice Information		Report Information (if differs from invoice)		FCN ENV-685		ORD		Turnaround Time (TAT) Required		
Company Name: EcoMetrix Inc		Company Name:		Quotation #:		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS		
Contact Name: Daniel Skrucz		Contact Name:		P.O. #/ A/P #:		Rush TAT (Surcharges will be applied)		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days		
Address: 6800 Campbell Road		Address:		Project #:		Site Location: NS Lands		Date Required:		
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338		Phone: Fax:		Site #:		Sampled By: ALC+FL+CL		Rush Confirmation #:		
Email: dskrucz@ecometrix.ca		Email:		Analysis Requested		LABORATORY USE ONLY		CUSTODY SEAL		
Regulation 153 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agr/ Other <input type="checkbox"/> Table FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MSA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PQOQ Region <input type="checkbox"/> Other (Specify) <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested FIELD FILTERED (see latest Ontario Method (OP MS) include Sulphur) (ENTERED) (Stability) (ENTERED) Analyte (ENTERED) Disinfectant Cycle Time (min) (ENTERED) Disinfectant Residual (ENTERED)		Present Intact 15/15/14 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 (0.00005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); **Mercury 0.000002 mg/L *PLEASE CONTACT IF SAMPLE VOLUME CONCERNS*		
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM Include Criteria on Certificate of Analysis: Y / N										
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	FIELD FILTERED	ANALYTES	ANALYTES	ANALYTES	ANALYTES	ANALYTES	ANALYTES
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	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-T2BAHP	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				
RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #				
Anianda Ciosek	31/01/2019	17:46	[Signature]	31/01/2019	17:47					



6740 Campobello Road, Mississauga, Ontario L5N 2L8
 A Bureau Veritas Group Company Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
 CAM FCD-01591/2

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 #:		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most Analyses								
Contact Name: Daniel Skrush		Contact Name:		P.O. #/ A/FER:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS								
Address: 6800 Carapobello Road		Address:		Project #: 18-2525		Rush TAT (Surcharges will be applied)								
Phone: 905-794-2325 (ext. 229) Fax: 905-794-2338		Phone: Fax:		Site Location: NS Lands		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days								
Email: dskrush@ecometrix.ca		Email:		Site #:		Date Required:								
Sampled By: ALC+FL+CL		Sampled By:		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 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res./Park <input type="checkbox"/> Med./Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind./Comm <input type="checkbox"/> Coastal <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQD <input type="checkbox"/> Region <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 508 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested <input type="checkbox"/> Sulphur (0.6 mg/L) <input type="checkbox"/> Arsenic (0.00002 mg/L) <input type="checkbox"/> Copper (0.00005 mg/L) <input type="checkbox"/> Lead (0.00005 mg/L) <input type="checkbox"/> Nickel (0.00002 mg/L) <input type="checkbox"/> Zinc (0.0001 mg/L) <input type="checkbox"/> Mercury (0.00002 mg/L)		LABORATORY USE ONLY CUSTODY SEAL Y / N Present Intact COOLER TEMPERATURES COOLING MEDIA PRESENT: Y / N COMMENTS		HOLD-DO NOT ANALYZE						
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM														
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD/REMO	One used (Discard Method: CF/MIA, include Sulphur) (SELECT to Analyze)	Analysis (SELECT)	Sulphur (SELECT)	Arsenic (SELECT)	Copper (SELECT)	Lead (SELECT)	Nickel (SELECT)	Zinc (SELECT)	Mercury (SELECT)
1 M-2018-SFC-13	31/01/2019	12:00	Water	3	X	X	X	X	X					
2 M-2018-SFC-15	31/01/2019	12:00	Water	3	X	X	X	X	X					
3 M-2018-SW12-CORE (2.5-10)	31/01/2019	12:00	Water	3	X	X	X	X	X					
4 M-2018-SW12-CORE (30-40)	31/01/2019	12:00	Water	3	X	X	X	X	X					
5 M-2018-C13 (20-30)	31/01/2019	12:00	Water	3	X	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											
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)		TIME: (HH:MM)		MAXXAM JOB #						
Amanda Cloze		31/01/2019	17:46	See page 1										

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.

Your Project #: MB927885
Site#: NS LANDS
Site Location: 18-2525

Attention: KYLE REINHART

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B927885-M058-01-01, B927885-M058-02-01

Report Date: 2019/02/06
Report #: R2683186
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B908276
Received: 2019/02/02, 14:56

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020
=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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

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

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		VE3858	VE3859	VE3860	VE3861	
Sampling Date		2019/01/31 12:00	2019/01/31 12:00	2019/01/31 12:00	2019/01/31 12:00	
COC Number		B927885-M058-01-01	B927885-M058-01-01	B927885-M058-01-01	B927885-M058-01-01	
	UNITS	M-2018-C1 (10-20)	M-2018-C1 (40-60)	M-2018-C1 (140-160)	M-2018-C1 (180-200)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VE3862	VE3863	VE3864	VE3865	
Sampling Date		2019/01/31 12:00	2019/01/31 12:00	2019/01/31 12:00	2019/01/31 12:00	
COC Number		B927885-M058-01-01	B927885-M058-01-01	B927885-M058-01-01	B927885-M058-01-01	
	UNITS	M-2018-SFC-T3	M-2018-SFC-T7	M-2018-SFC-T2	M-2018-SFC-T14	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VE3866	VE3867	VE3868	VE3869	
Sampling Date		2019/01/31 12:00	2019/01/31 12:00	2019/01/31 12:00	2019/01/31 12:00	
COC Number		B927885-M058-01-01	B927885-M058-01-01	B927885-M058-02-01	B927885-M058-02-01	
	UNITS	M-2018-SFC-T28AHP	M-2018-SFC-12	M-2018-SFC-13	M-2018-SFC-15	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VE3870	VE3871	VE3872	
Sampling Date		2019/01/31 12:00	2019/01/31 12:00	2019/01/31 12:00	
COC Number		B927885-M058-02-01	B927885-M058-02-01	B927885-M058-02-01	
	UNITS	M-2018-SW12-CORE (2.5-10)	M-2018-SW12-CORE (30-40)	M-2018-C13- (20-30)	QC Batch

Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	ONSITE

Maxxam 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						

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						

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	0.0000050	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	0.0000050	2.42	6.46	0.00010	9312781
Dissolved Molybdenum (Mo)	mg/L	0.000200	0.0000050	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	0.0000050	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 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							

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							

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							

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
Calculated Parameters							
Dissolved Hardness (CaCO ₃)	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							

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
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							

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							

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

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

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

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
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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.



Success Through Sciences

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

QUALITY ASSURANCE REPORT

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QUALITY ASSURANCE REPORT(CONT'D)

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>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)</p> <p>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).</p>										

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 Spécialist

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.

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	Date	Laboratory Method	Reference
		Extracted	Analyzed		
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

=====
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.

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										

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 CaCO ₃)	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						

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									

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									

GENERAL COMMENTS

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

Package 1	15.0°C
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Results relate only to the items tested.



Maxxam Job #: B929300
 Report Date: 2019/02/13

QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
 Client Project #: 18-2525
 Site Location: NS LANDS
 Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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).

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.



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 #: _____		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses						
Contact Name: Daniel Skruch		Contact Name: _____		P.O. #/ AFE#: _____		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS						
Address: 6800 Campobello Road		Address: _____		Project #: 18-2525		Rush TAT (Surcharges will be applied)						
Phone: 905-794-2325 (ext. 229) Fax: 905-794-2338		Phone: _____ Fax: _____		Site Location: NS Lands		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days						
Email: dskruch@ecometrix.ca		Email: _____		Site #: _____		Date Required: _____						
Sampled By: ALC+FL+CL		Sampled By: _____		Rush Confirmation #: _____		LABORATORY USE ONLY						
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY												
Regulation 153 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agr/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO <input type="checkbox"/> Region _____ <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested # OF CONTAINERS SUBMITTED FIELD FILTERED Low Level Dissolved Metals (TCP+MS, include Sulphur) FILTERED; to Burnaby* Alkalinity FILTERED Acidity FILTERED Dissolved Cyanide (Free/Total) WAD FILTERED Dissolved Mercury** FILTERED		CUSTODY SEAL: Y / N COOLER TEMPERATURES Present: Intact N N 15/15/15 COOLING MEDIA PRESENT: Y / (N)						
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM												
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED	Low Level Dissolved Metals (TCP+MS, include Sulphur) FILTERED; to Burnaby*	Alkalinity FILTERED	Acidity FILTERED	Dissolved Cyanide (Free/Total) WAD FILTERED	Dissolved Mercury** FILTERED	COMMENTS	
1 M-2018-C5 (30-50)	01/02/2019		Water	3	X	X	X	X	X	X	*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	
2 M-2018-SFC-T25	02/02/2019		Water	3		X	X		X			
3 M-2018-SFC-T26	03/02/2019		Water	3		X	X		X			
4 M-2018-SFC-T27	04/02/2019		Water	3		X	X		X			
5 M-2018-SFC-T32	05/02/2019		Water	3		X	X		X			
6 M-2018-SFC-T17	06/02/2019		Water	3		X	X		X			
7 M-2018-SFC-T20	07/02/2019		Water	3		X	X		X			
8 M-2018-SFC-T30	08/02/2019		Water	3		X	X		X			
9 M-2018-C19 (0-5)	09/02/2019		Water	3		X	X		X			
10 M-2018-C19 (20-30)	10/02/2019		Water	3		X	X		X			
RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)		TIME: (HH:MM)							
Fel Luo	01/02/2019	19:40	Kyle Reinhart		2019/02/01	19:40						



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CHAIN OF CUSTODY RECORD

Page **1** of **1**

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required					
Company Name: EcoMetrix Inc		Company Name:		Quotation #:		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses					
Contact Name: Daniel Skruch		Contact Name:		P.O. #/ AF#: _____		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS					
Address: 6800 Campobello Road		Address:		Project #: 18-2525		Rush TAT (Surcharges will be applied)					
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338		Phone: _____ Fax: _____		Site Location: NS Lands		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days					
Email: dskruch@ecometrix.ca		Email: _____		Site #: _____		Date Required: _____					
Sampled By: ALC+FL+CL						Rush Confirmation #: _____					
MCE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY											
Regulation 153 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO Region <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested # OF CONTAINERS SUBMITTED FIELD FILLED Low Level Dissolved Metals (CP/MS, include Sulphur) (ELISEED) to Burnaby* Alkalinity (ELISEED) Acidity (ELISEED) Dissolved Cyanide (Free Total/AsAD) (ELISEED) Dissolved Mercury** (ELISEED)		LABORATORY USE ONLY CUSTODY SEAL: Y / N Present Intact COOLING MEDIA PRESENT: Y / N					
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM											
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILLED	Low Level Dissolved Metals (CP/MS, include Sulphur) (ELISEED) to Burnaby*	Alkalinity (ELISEED)	Acidity (ELISEED)	Dissolved Cyanide (Free Total/AsAD) (ELISEED)	Dissolved Mercury** (ELISEED)	COMMENTS
1 M-2018-C11 (10-20)	01/02/2019		Water	4	X	X	X	X	X	X	*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*
2 M-2018-C11 (30-40)	01/02/2019		Water	3	X	X	X	X	X		
3 M-2018-C2 (0-5)	01/02/2019		Water	3	X	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	X		
8 M-2018-C3 (40-80)	01/02/2019		Water	3	X	X	X	X	X		
9 M-2018-C3 (140-160)	01/02/2019		Water	3	X	X	X	X	X		
10 M-2018-C3 (160-180)	01/02/2019		Water	3	X	X	X	X	X		
RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)		TIME: (HH:MM)		MAXXAM JOB #				
Fei Luo	01/02/2019	19:40	See pg 1								

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	Date	Laboratory Method	Reference
		Extracted	Analyzed		
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

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: N/A

Attention: Daniel Skruch

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

Report Date: 2019/02/13
Report #: R5592502
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B930148
Received: 2019/02/04, 14:15

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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									

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				

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									

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					

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 Job #: B930148
 Report Date: 2019/02/13

QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
 Client Project #: 18-2525
 Site Location: NS LANDS
 Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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).

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
 A Wiggins Telex Company 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: Ecotrix Inc		Company Name: _____		Quotation #: _____		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses			
Contact Name: Daniel Struch		Contact Name: _____		P.O. #/ A/F/R: _____		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS			
Address: 6800 Campobello Road		Address: _____		Project #: 18-2525		Rush TAT (Surcharges will be applied)			
Phone: 905-794-2325 (ext. 229) Fax: 905-794-2338		Phone: _____ Fax: _____		Site Location: NS Lands		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days			
Email: dskruch@ecotrix.ca		Email: _____		Site #: _____		Date Required: _____			
Sampled By: AJC+FL+CL		Sampled By: _____		Rush Confirmation #: _____					
MDE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY									
Regulation 153 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MSA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWGO <input type="checkbox"/> Region <input type="checkbox"/> Other (Specify) _____ REG 558 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested # OF CONTAINERS SUBMITTED # OF CONTAINERS OPENED (DO NOT INCLUDE Sulphur/ELIMED, or Purged*) Mercury/ELIMED Aqueous/ELIMED Dissolved Copper/Free Ion/NOI/ELIMED Dissolved Mercury**/ELIMED		LABORATORY USE ONLY CUSTODY SEAL Y / N Present <input checked="" type="checkbox"/> Intact <input checked="" type="checkbox"/> COOLER TEMPERATURES 15/15/16 COOLING MEDIA PRESENT: Y / N		W.D.D. DO NOT ANALYZE 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* 04-Feb-19 14:15 Kyle Reinhart B930148 GID ENV-983	
SAMPLES MUST BE KEPT COOL (<10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM									
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	# OF CONTAINERS OPENED (DO NOT INCLUDE Sulphur/ELIMED, or Purged*)	Mercury/ELIMED	Aqueous/ELIMED	Dissolved Copper/Free Ion/NOI/ELIMED	Dissolved Mercury**/ELIMED
1 M-2018-C4 (40-60)	04/02/2019	12:00	Water	3	X	X	X	X	X
2 M-2018-C4 (60-100)	04/02/2019	12:00	Water	3	X	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	X
6 M-2018-SFC SOIL C.MOORE	04/02/2019	12:00	Water	3	X	X	X	X	X
7 M-2018-SW9-CORE (0-7.5)	04/02/2019	12:00	Water	3	X	X	X	X	X
8 M-2018-SW9-CORE (15-20)	04/02/2019	12:00	Water	3	X	X	X	X	X
9 M-2018-SW9-CORE (20-40)	04/02/2019	12:00	Water	3	X	X	X	X	X
10 M-2018-SW10-CORE (0-5)	04/02/2019	12:00	Water	3	X	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)		
Amranda Chong	04/02/2019	2:15 PM	Kyle Reinhart		04/02/2019		14:15		

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	Date		Laboratory Method	Analytical Method
	Quantity	Extracted			Analyzed
Hardness (calculated as CaCO3)	14	N/A	2019/02/11 BBY WI-00033	Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	14	N/A	2019/02/11 BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved)	14	N/A	2019/02/10 BBY7SOP-00002	EPA 6020b R2 m
Filter and HNO3 Preserve for Metals	14	N/A	2019/02/07 BBY7 WI-00004	BCMOE Reqs 08/14

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your Project #: MB930148
Site#: NS LANDS
Site Location: 18-2525

Attention: KYLE REINHART

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b930148-m058-01-01, b930148-m058-02-01

Report Date: 2019/02/12
Report #: R2685059
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B909554
Received: 2019/02/06, 11:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		VE9289	VE9290	VE9291	VE9292	
Sampling Date		2019/02/04 12:00	2019/02/04 12:00	2019/02/04 12:00	2019/02/04 12:00	
COC Number		b930148-m058-01-01	b930148-m058-01-01	b930148-m058-01-01	b930148-m058-01-01	
	UNITS	M-2018-C4 (40-60)	M-2018-C4 (60-100)	M-2018-C18 (2.5-10)	M-2018-C18 (10-20)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VE9293	VE9294	VE9295	VE9296	
Sampling Date		2019/02/04 12:00	2019/02/04 12:00	2019/02/04 12:00	2019/02/04 12:00	
COC Number		b930148-m058-01-01	b930148-m058-01-01	b930148-m058-01-01	b930148-m058-01-01	
	UNITS	M-2018-C18 (20-30)	M-2018-SFC SOIL C.MOORE	M-2018-SW9-CORE (0-7.5)	M-2018-SW9-CORE- (15-20)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VE9297	VE9298	VE9299	VE9300	
Sampling Date		2019/02/04 12:00	2019/02/04 12:00	2019/02/04 12:00	2019/02/04 12:00	
COC Number		b930148-m058-01-01	b930148-m058-01-01	b930148-m058-02-01	b930148-m058-02-01	
	UNITS	M-2018-SW9-CORE- (20-40)	M-2018-SW10-CORE (0-5)	M-2018-SW10-CORE (15-20)	M-2018-SW10-CORE (30-40)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VE9301	VE9302	
Sampling Date		2019/02/04 12:00	2019/02/04 12:00	
COC Number		b930148-m058-02-01	b930148-m058-02-01	
	UNITS	M-2018-C17 (15-20)	M-2018-C17 (30-40)	QC Batch

Calculated Parameters				
Filter and HNO3 Preservation	N/A	FIELD	FIELD	ONSITE

Maxxam 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	0.0000050	0.0119	0.00025	0.00140	0.0000050	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	0.0000050	8.96	0.00025	4.41	0.0000050	9317234
Dissolved Molybdenum (Mo)	mg/L	0.000071	0.0000050	0.00118	0.00025	<0.0000050	0.0000050	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	0.0000050	0.205	0.00025	0.136	0.0000050	9317234
Dissolved Thallium (Tl)	mg/L	0.0000519	0.0000020	0.0000050	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								

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	0.0000050	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	0.0000050	0.209	0.00025	9317234
Dissolved Molybdenum (Mo)	mg/L	<0.0000050	<0.0000050	0.0000050	<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	0.0000050	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
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VE9292	VE9293		VE9294		
Sampling Date		2019/02/04 12:00	2019/02/04 12:00		2019/02/04 12:00		
COC Number		b930148-m058-01-01	b930148-m058-01-01		b930148-m058-01-01		
	UNITS	M-2018-C18 (10-20)	M-2018-C18 (20-30)	RDL	M-2018-SFC SOIL C.MOORE	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	60.7	64.3	0.050	1.03	0.25	9316618
Dissolved Magnesium (Mg)	mg/L	13.4	17.1	0.050	0.29	0.25	9316618
Dissolved Potassium (K)	mg/L	2.54	1.60	0.050	0.37	0.25	9316618
Dissolved Sodium (Na)	mg/L	56.5	66.7	0.050	5.86	0.25	9316618
Dissolved Sulphur (S)	mg/L	93.1	103	0.60	<3.0	3.0	9317234
RDL = Reportable Detection Limit							

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							

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							

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 (CaCO ₃)	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						

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						

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

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	0.00020	0.0120	0.00020	9317234
Dissolved Arsenic (As)	mg/L	0.0141	0.0152	0.00020	7.54	0.00020	9317234
Dissolved Barium (Ba)	mg/L	0.0616	0.0460	0.00020	0.00583	0.00020	9317234
Dissolved Beryllium (Be)	mg/L	0.000039	0.000019	0.00010	<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

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				

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

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

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

Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

GENERAL COMMENTS

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

Package 1	2.0°C
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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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



Maxxam Job #: B909554
 Report Date: 2019/02/12

QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
 Client Project #: MB930148
 Site Location: 18-2525
 Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>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)</p> <p>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).</p>										

Maxxam Job #: B909554
Report Date: 2019/02/12

MAXXAM ANALYTICS
Client Project #: MB930148
Site Location: 18-2525
Sampler Initials: ALC

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Andy Lu, Ph.D., P.Chem., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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		Laboratory Method	Reference
		Extracted	Analyzed		
Acidity (CaCO3) in water (1, 2)	13	N/A	2019/02/14		SM 22 2310
Alkalinity	4	N/A	2019/02/08	CAM SOP-00448	SM 23 2320 B m
Free (WAD) Cyanide	1	N/A	2019/02/08	CAM SOP-00457	OMOE E3015 m
Total Cyanide	1	2019/02/07	2019/02/08	CAM SOP-00457	OMOE E3015 5 m
Dissolved Mercury (low level)	16	2019/02/07	2019/02/08	CAM SOP-00453	EPA 7470 m
Dissolved Mercury (low level)	1	2019/02/07	2019/02/13	CAM SOP-00453	EPA 7470 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Maxxam Bedford
- (2) Non-accredited test method



Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: na

Attention: Daniel Skruch

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

Report Date: 2019/02/15
Report #: R5596036
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B932246
Received: 2019/02/05, 17:46

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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							

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								

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							

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						

GENERAL COMMENTS

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

Package 1	16.0°C
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Results relate only to the items tested.



Maxxam Job #: B932246
 Report Date: 2019/02/15

QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
 Client Project #: 18-2525
 Site Location: NS LANDS
 Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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).

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.



6740 Campobello Road, Mississauga, Ontario L5N 2L8
 A Bureau Veritas Group Company 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 #:				<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses		
Contact Name: Daniel Skruch		Contact Name:				P.O. #/ AFER:				PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS		
Address: 6800 Campobello Road		Address:				Project #: 18-2525				Rush TAT (Surcharges will be applied)		
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338		Phone: Fax:				Site Location: NS Lands				<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days		
Email: dskruch@ecometrix.ca		Email:				Site #:				Date Required:		
						Sampled By: ALC+FL+CL				Rush Confirmation #:		
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY												
Regulation 153		Other Regulations				Analysis Requested				LABORATORY USE ONLY		
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		<input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO Region <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED)				# OF CONTAINERS SUBMITTED FIELD FILTERED Low Level Dissolved Metals (Pb, As, include Sulphur) FILTERED; to Burnaby* Alkalinity FILTERED Acidity FILTERED Dissolved Cyanide (Free/Total) FILTERED Dissolved Mercury** FILTERED				CUSTODY SEAL Y / N Present Intact COOLER TEMPERATURES 16.1/16.1/16		
Include Criteria on Certificate of Analysis: Y / N												
SAMPLES MUST BE KEPT COOL (<10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM												
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	FIELD FILTERED	Low Level Dissolved Metals (Pb, As, include Sulphur) FILTERED; to Burnaby*	Alkalinity FILTERED	Acidity FILTERED	Dissolved Cyanide (Free/Total) 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	X			
2 M-2018-SFC-T9	05/02/2019	12:00	Water	3	X	X	X	X	X			
3 M-2018-C13 (2.5-10)	05/02/2019	12:00	Water	3	X	X	X	X	X			
4 M-2018-C5 (2.5-10)	05/02/2019	12:00	Water	3	X	X	X	X	X			
5 M-2018-SFC-T23	05/02/2019	12:00	Water	3	X	X	X	X	X			
6 M-2018-SFC-T35	05/02/2019	12:00	Water	3	X	X	X	X	X			
7 M-2018-C4 (0-10)	05/02/2019	12:00	Water	3	X	X	X	X	X			
8 M-2018-C18 (0-2.5)	05/02/2019	12:00	Water	3	X	X	X	X	X			
9 G-2018-C3 (0-5)	05/02/2019	12:00	Water	3	X	X	X	X	X			
10 G-2018-C6 (28NOV) (2.5-10)	05/02/2019	12:00	Water	3	X	X	X	X	X			
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)						TIME: (HH:MM)		
Amanda Ciosek		05/02/2019	17:46	FRANCINE CHONG				2019/02/05		17:46		

*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

05-Feb-19 17:46
 Kyle Reinhart
 B932246
 MAF ENV-879

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.

Your Project #: MB932246
Site#: NS-LANDS
Site Location: 18-2525

Attention: KYLE REINHART

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: B932246-M058-01-01, B932246-M058-02-01

Report Date: 2019/02/14
Report #: R2686126
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B909907
Received: 2019/02/08, 09:25

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020
=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		VF1253	VF1254	VF1255	VF1256	
Sampling Date		2019/02/05 12:00	2019/02/05 12:00	2019/02/05 12:00	2019/02/05 12:00	
COC Number		B932246-M058-01-01	B932246-M058-01-01	B932246-M058-01-01	B932246-M058-01-01	
	UNITS	M-2018-C1 (0-5)	M-2018-SFC-T9	M-2018-C13 (2.5-10)	M-2018-C5 (2.5-10)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF1257	VF1258	VF1259	VF1260	
Sampling Date		2019/02/05 12:00	2019/02/05 12:00	2019/02/05 12:00	2019/02/05 12:00	
COC Number		B932246-M058-01-01	B932246-M058-01-01	B932246-M058-01-01	B932246-M058-01-01	
	UNITS	M-2018-SFC-T23	M-2018-SFC-T35	M-2018-C4 (0-10)	M-2018-C18 (0-2.5)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF1261	VF1262	VF1263	VF1264	
Sampling Date		2019/02/05 12:00	2019/02/05 12:00	2019/02/05 12:00	2019/02/05 12:00	
COC Number		B932246-M058-01-01	B932246-M058-01-01	B932246-M058-02-01	B932246-M058-02-01	
	UNITS	G-2018-C3 (0-5)	G-2018-C6 (28NOV) (2.5-10)	G-2018-C9 (0-7.5)	G-2018-SFC-3	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF1265	VF1266	VF1267	VF1268	
Sampling Date		2019/02/05 12:00	2019/02/05 12:00	2019/02/05 12:00	2019/02/05 12:00	
COC Number		B932246-M058-02-01	B932246-M058-02-01	B932246-M058-02-01	B932246-M058-02-01	
	UNITS	G-2018-SFC-8	G-2018-SFC-11	G-2018-C4 (0-5)	M-2018-C11 (2.5-10)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

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							

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

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF1253		VF1254	VF1255		
Sampling Date		2019/02/05 12:00		2019/02/05 12:00	2019/02/05 12:00		
COC Number		B932246-M058-01-01		B932246-M058-01-01	B932246-M058-01-01		
	UNITS	M-2018-C1 (0-5)	RDL	M-2018-SFC-T9	M-2018-C13 (2.5-10)	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	13.3	0.25	25.0	5.56	0.050	9318082
Dissolved Magnesium (Mg)	mg/L	4.62	0.25	5.86	1.73	0.050	9318082
Dissolved Potassium (K)	mg/L	5.25	0.25	3.07	0.278	0.050	9318082
Dissolved Sodium (Na)	mg/L	7.53	0.25	24.5	8.00	0.050	9318082
Dissolved Sulphur (S)	mg/L	<3.0	3.0	42.7	7.84	0.60	9318900
RDL = Reportable Detection Limit							

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
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	0.0000050	9318900	0.00319	0.0000050	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	0.0000050	9318900	0.651	0.0000050	9318900
Dissolved Molybdenum (Mo)	mg/L	0.000054	0.0000050	9318900	0.000131	0.0000050	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	0.0000050	9318900	0.112	0.0000050	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							
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		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

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

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF1257		VF1258		VF1259		
Sampling Date		2019/02/05 12:00		2019/02/05 12:00		2019/02/05 12:00		
COC Number		B932246-M058-01-01		B932246-M058-01-01		B932246-M058-01-01		
	UNITS	M-2018-SFC-T23	RDL	M-2018-SFC-T35	RDL	M-2018-C4 (0-10)	RDL	QC Batch
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								

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	0.0000050	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	0.0000050	0.829	0.00050	9318900
Dissolved Molybdenum (Mo)	mg/L	<0.0000050	0.0000050	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	0.0000050	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						

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							

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							

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						

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

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

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

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

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

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VF1262
Sample ID: G-2018-C6 (28NOV) (2.5-10)
Matrix: Water

Collected: 2019/02/05
Shipped:
Received: 2019/02/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9317722	N/A	2019/02/13	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318082	N/A	2019/02/13	Andy Lu
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318900	N/A	2019/02/13	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/08	Aldean Alicando

Maxxam ID: VF1263
Sample ID: G-2018-C9 (0-7.5)
Matrix: Water

Collected: 2019/02/05
Shipped:
Received: 2019/02/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9317722	N/A	2019/02/13	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318082	N/A	2019/02/13	Andy Lu
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318900	N/A	2019/02/13	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/08	Aldean Alicando

Maxxam ID: VF1264
Sample ID: G-2018-SFC-3
Matrix: Water

Collected: 2019/02/05
Shipped:
Received: 2019/02/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9317722	N/A	2019/02/13	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318082	N/A	2019/02/13	Andy Lu
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318900	N/A	2019/02/13	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/08	Aldean Alicando

Maxxam ID: VF1265
Sample ID: G-2018-SFC-8
Matrix: Water

Collected: 2019/02/05
Shipped:
Received: 2019/02/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9317722	N/A	2019/02/13	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318082	N/A	2019/02/13	Andy Lu
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318900	N/A	2019/02/13	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/08	Aldean Alicando

Maxxam ID: VF1266
Sample ID: G-2018-SFC-11
Matrix: Water

Collected: 2019/02/05
Shipped:
Received: 2019/02/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9317722	N/A	2019/02/13	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318082	N/A	2019/02/13	Andy Lu
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318900	N/A	2019/02/13	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/08	Aldean Alicando

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

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

MAXXAM ANALYTICS
Client Project #: MB932246
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
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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.



Success Through Sciences

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

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB932246
Site Location: 18-2525
Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
 Client Project #: MB932246
 Site Location: 18-2525
 Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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)

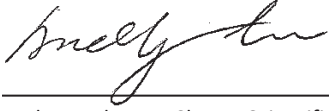
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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.

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		Laboratory Method	Reference
		Extracted	Analyzed		
Acidity (CaCO3) in water (1, 2)	15	N/A	2019/02/15		SM 22 2310
Alkalinity	1	N/A	2019/02/11	CAM SOP-00448	SM 23 2320 B m
Free (WAD) Cyanide	4	N/A	2019/02/11	CAM SOP-00457	OMOE E3015 m
Total Cyanide	4	2019/02/11	2019/02/11	CAM SOP-00457	OMOE E3015 5 m
Dissolved Mercury (low level)	16	2019/02/12	2019/02/13	CAM SOP-00453	EPA 7470 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Maxxam Bedford
- (2) Non-accredited test method

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

Attention: Daniel Skruch

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

Report Date: 2019/02/19
Report #: R5599522
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B934454
Received: 2019/02/07, 15:18

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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							

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				

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

GENERAL COMMENTS

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

Package 1	15.3°C
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Results relate only to the items tested.



Maxxam Job #: B934454
 Report Date: 2019/02/19

QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
 Client Project #: 18-2525
 Site Location: NS LANDS
 Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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).

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.



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 #:		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses							
Contact Name: Daniel Skruch		Contact Name:		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS							
Address: 6800 Campobello Road		Address:		Project #: 18-2525		Rush TAT (Surcharges will be applied)							
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338		Phone: Fax:		Site Location: NS Lands		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days							
Email: dskruch@ecomatrix.ca		Email:		Site #:		Date Required:							
Sampled By: ALC+FL+CL						Rush Confirmation #:							
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY													
Regulation 153 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO Region _____ <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested # OF CONTAINERS SUBMITTED FIELD FILTERED Low Level Dissolved Metals (ICP-AES, include Sulphur) FILTERED: to summary* Alkalinity FILTERED Acidity FILTERED Dissolved Cyanide (Free/Total) WAD FILTERED Dissolved Mercury **FILTERED				LABORATORY USE ONLY CUSTODY SEAL Y / (N) <input checked="" type="checkbox"/> Present Intact COOLER TEMPERATURES 15/15/16 COOLING MEDIA PRESENT: Y / (N) <input checked="" type="checkbox"/> COMMENTS					
Include Criteria on Certificate of Analysis: Y / N													
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM													
SAMPLE IDENTIFICATION		DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED	Low Level Dissolved Metals (ICP-AES, include Sulphur) FILTERED: to summary*	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	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	X			
5	G-2018-C3 (60-80)	07/02/2019	12:00	Water	3	X	X	X	X	X			
6	G-2018-C3 (100-120)	07/02/2019	12:00	Water	3	X	X	X	X	X			
7	G-2018-C5 (2.5-10)	07/02/2019	12:00	Water	3	X	X	X	X	X			
8	G-2018-C5 (15-20)	07/02/2019	12:00	Water	3	X	X	X	X	X			
9	G-2018-C11 (0-7.5)	07/02/2019	12:00	Water	3	X	X	X	X	X			
10	G-2018-C11 (15-20)	07/02/2019	12:00	Water	3	X	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)					
Fei Luo		07/02/2019	15:20	<i>[Signature]</i>		2019/02/07		15:18					

*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



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 #: _____				<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses			
Contact Name: Daniel Skruch		Contact Name: _____				P.O. #/ AFE#: _____				PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS			
Address: 6800 Campobello Road		Address: _____				Project #: 18-2525				Rush TAT (Surcharges will be applied)			
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338		Phone: _____ Fax: _____				Site Location: NS Lands				<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days			
Email: dskruch@ecometrix.ca		Email: _____				Site #: _____				Date Required: _____			
						Sampled By: ALC+FL+CL				Rush Confirmation #: _____			
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY													
Regulation 153 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO Region <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested # OF CONTAINERS SUBMITTED FIELD FILTERED Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED: to Burnaby* Alkalinity FILTERED Acidity FILTERED Dissolved Cyanide (Free/Total) FILTERED Dissolved Mercury** FILTERED								LABORATORY USE ONLY CUSTODY SEAL Y / N Present: Intact COOLING MEDIA PRESENT: Y / N COMMENTS	
Include Criteria on Certificate of Analysis: Y / N SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM													
SAMPLE IDENTIFICATION		DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED	Low Level Dissolved Metals (ICP-MS, include Sulphur) FILTERED: to Burnaby*	Alkalinity FILTERED	Acidity FILTERED	Dissolved Cyanide (Free/Total) FILTERED	Dissolved Mercury** FILTERED	HOLD-DO NOT ANALYZE	COMMENTS
1	G-2018-C12 (2.5-10)	07/02/2019	12:00	Water	4	X	X	X	X	X	X		*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*
2	G-2018-C12 (10-20)	07/02/2019	12:00	Water	3	X	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	X			
5	G-2018-C13 (15-20)	07/02/2019	12:00	Water	3	X	X	X	X	X			
6	G-2018-C13 (20-40)	07/02/2019	12:00	Water	3	X	X	X	X	X			
7													
8													
9													
10													
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									

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	Date		Laboratory Method	Analytical Method
	Quantity Extracted	Date Analyzed		
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
=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		VF1560	VF1561	VF1562	VF1563	
Sampling Date		2019/02/07 12:00	2019/02/07 12:00	2019/02/07 12:00	2019/02/07 12:00	
COC Number		B934454-M058-01-01	B934454-M058-01-01	B934454-M058-01-01	B934454-M058-01-01	
	UNITS	G-2018-C2 (0-5)	G-2018-C2 (20-40)	G-2018-C2 (60-80)	G-2018-C3 (20-40)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF1564	VF1565	VF1566	VF1567	
Sampling Date		2019/02/07 12:00	2019/02/07 12:00	2019/02/07 12:00	2019/02/07 12:00	
COC Number		B934454-M058-01-01	B934454-M058-01-01	B934454-M058-01-01	B934454-M058-01-01	
	UNITS	G-2018-C3 (60-80)	G-2018-C3 (100-120)	G-2018-C5 (2.5-10)	G-2018-C5 (15-20)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF1568	VF1569	VF1570	VF1571	
Sampling Date		2019/02/07 12:00	2019/02/07 12:00	2019/02/07 12:00	2019/02/07 12:00	
COC Number		B934454-M058-01-01	B934454-M058-01-01	B934454-M058-02-01	B934454-M058-02-01	
	UNITS	G-2018-C11 (0-7.5)	G-2018-C11 (15-20)	G-2018-C12 (2.5-10)	G-2018-C12 (10-20)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF1572	VF1573	VF1574	VF1575	
Sampling Date		2019/02/07 12:00	2019/02/07 12:00	2019/02/07 12:00	2019/02/07 12:00	
COC Number		B934454-M058-02-01	B934454-M058-02-01	B934454-M058-02-01	B934454-M058-02-01	
	UNITS	G-2018-C12 (20-40)	G-2018-C13 (2.5-10)	G-2018-C13 (10-20)	G-2018-C13 (20-40)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

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
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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

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								

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

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF1563	VF1564	VF1565		
Sampling Date		2019/02/07 12:00	2019/02/07 12:00	2019/02/07 12:00		
COC Number		B934454-M058-01-01	B934454-M058-01-01	B934454-M058-01-01		
	UNITS	G-2018-C3 (20-40)	G-2018-C3 (60-80)	G-2018-C3 (100-120)	RDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	72.9	265	430	0.50	9318669
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	mg/L	0.0357	0.00868	0.0212	0.00050	9318901
Dissolved Antimony (Sb)	mg/L	0.0115	0.00721	0.00431	0.00020	9318901
Dissolved Arsenic (As)	mg/L	0.245	0.174	0.261	0.00020	9318901
Dissolved Barium (Ba)	mg/L	0.0205	0.0309	0.0493	0.00020	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	0.0000050	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	0.0000050	9318901
Dissolved Molybdenum (Mo)	mg/L	0.000411	0.000362	0.000300	0.0000050	9318901
Dissolved Nickel (Ni)	mg/L	0.00718	0.0175	0.00304	0.0000020	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	0.0000050	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						

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

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF1563	VF1564	VF1565		
Sampling Date		2019/02/07 12:00	2019/02/07 12:00	2019/02/07 12:00		
COC Number		B934454-M058-01-01	B934454-M058-01-01	B934454-M058-01-01		
	UNITS	G-2018-C3 (20-40)	G-2018-C3 (60-80)	G-2018-C3 (100-120)	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	1.08	4.48	11.7	0.050	9318765
Dissolved Potassium (K)	mg/L	2.26	3.68	5.74	0.050	9318765
Dissolved Sodium (Na)	mg/L	2.09	1.75	5.35	0.050	9318765
Dissolved Sulphur (S)	mg/L	19.3	95.3	152	0.60	9318901
RDL = Reportable Detection Limit						

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

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF1566	VF1567		VF1568		
Sampling Date		2019/02/07 12:00	2019/02/07 12:00		2019/02/07 12:00		
COC Number		B934454-M058-01-01	B934454-M058-01-01		B934454-M058-01-01		
	UNITS	G-2018-C5 (2.5-10)	G-2018-C5 (15-20)	RDL	G-2018-C11 (0-7.5)	RDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	142	164	0.50	9.33	0.50	9318669
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	mg/L	0.0285	0.0377	0.0050	0.164	0.00050	9318901
Dissolved Antimony (Sb)	mg/L	0.00071	0.00146	0.00020	0.000757	0.000020	9318901
Dissolved Arsenic (As)	mg/L	1.89	0.336	0.00020	0.0899	0.000020	9318901
Dissolved Barium (Ba)	mg/L	0.103	0.0714	0.00020	0.00607	0.000020	9318901
Dissolved Beryllium (Be)	mg/L	<0.00010	<0.00010	0.00010	0.000014	0.000010	9318901
Dissolved Bismuth (Bi)	mg/L	<0.000050	<0.000050	0.000050	0.0000132	0.0000050	9318901
Dissolved Boron (B)	mg/L	<0.10	<0.10	0.10	<0.010	0.010	9318901
Dissolved Cadmium (Cd)	mg/L	<0.000050	0.000091	0.000050	0.0000431	0.0000050	9318901
Dissolved Chromium (Cr)	mg/L	0.0025	<0.0010	0.0010	0.00378	0.00010	9318901
Dissolved Cobalt (Co)	mg/L	0.0519	0.143	0.000050	0.00234	0.0000050	9318901
Dissolved Copper (Cu)	mg/L	0.00674	0.00289	0.00050	0.0242	0.000050	9318901
Dissolved Iron (Fe)	mg/L	18.6	8.62	0.010	0.148	0.0010	9318901
Dissolved Lead (Pb)	mg/L	0.000274	0.00227	0.000050	0.00122	0.0000050	9318901
Dissolved Lithium (Li)	mg/L	<0.0050	<0.0050	0.0050	0.00051	0.00050	9318901
Dissolved Manganese (Mn)	mg/L	15.0	19.3	0.00050	0.429	0.000050	9318901
Dissolved Molybdenum (Mo)	mg/L	<0.00050	<0.00050	0.00050	0.000142	0.000050	9318901
Dissolved Nickel (Ni)	mg/L	0.0510	0.172	0.00020	0.00460	0.000020	9318901
Dissolved Selenium (Se)	mg/L	<0.00040	<0.00040	0.00040	0.000061	0.000040	9318901
Dissolved Silicon (Si)	mg/L	4.04	4.04	0.50	3.05	0.050	9318901
Dissolved Silver (Ag)	mg/L	<0.000050	<0.000050	0.000050	0.0000051	0.0000050	9318901
Dissolved Strontium (Sr)	mg/L	0.326	0.368	0.00050	0.0187	0.000050	9318901
Dissolved Thallium (Tl)	mg/L	<0.000020	<0.000020	0.000020	0.0000026	0.0000020	9318901
Dissolved Tin (Sn)	mg/L	<0.0020	<0.0020	0.0020	<0.00020	0.00020	9318901
Dissolved Titanium (Ti)	mg/L	<0.0050	<0.0050	0.0050	0.00361	0.00050	9318901
Dissolved Uranium (U)	mg/L	<0.000020	<0.000020	0.000020	0.0000111	0.0000020	9318901
Dissolved Vanadium (V)	mg/L	<0.0020	<0.0020	0.0020	0.00179	0.00020	9318901
Dissolved Zinc (Zn)	mg/L	0.0517	0.187	0.0010	0.0335	0.00010	9318901
Dissolved Zirconium (Zr)	mg/L	<0.0010	<0.0010	0.0010	0.00024	0.00010	9318901
Dissolved Calcium (Ca)	mg/L	49.1	57.4	0.50	2.48	0.050	9318765
RDL = Reportable Detection Limit							

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

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF1566	VF1567		VF1568		
Sampling Date		2019/02/07 12:00	2019/02/07 12:00		2019/02/07 12:00		
COC Number		B934454-M058-01-01	B934454-M058-01-01		B934454-M058-01-01		
	UNITS	G-2018-C5 (2.5-10)	G-2018-C5 (15-20)	RDL	G-2018-C11 (0-7.5)	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	4.79	5.11	0.50	0.759	0.050	9318765
Dissolved Potassium (K)	mg/L	1.48	2.50	0.50	1.17	0.050	9318765
Dissolved Sodium (Na)	mg/L	6.73	5.42	0.50	9.97	0.050	9318765
Dissolved Sulphur (S)	mg/L	65.6	72.3	6.0	6.12	0.60	9318901
RDL = Reportable Detection Limit							

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		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	0.00020	9318901
Dissolved Arsenic (As)	mg/L	0.0504	0.0439	0.0440	0.00020	9318901
Dissolved Barium (Ba)	mg/L	0.00837	0.0105	0.00677	0.00020	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						

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		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						

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		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						

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		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						

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				

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

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VF1560
Sample ID: G-2018-C2 (0-5)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1561
Sample ID: G-2018-C2 (20-40)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1562
Sample ID: G-2018-C2 (60-80)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1563
Sample ID: G-2018-C3 (20-40)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1564
Sample ID: G-2018-C3 (60-80)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

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

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VF1565
Sample ID: G-2018-C3 (100-120)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1566
Sample ID: G-2018-C5 (2.5-10)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1567
Sample ID: G-2018-C5 (15-20)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1568
Sample ID: G-2018-C11 (0-7.5)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1569
Sample ID: G-2018-C11 (15-20)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

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

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VF1570
Sample ID: G-2018-C12 (2.5-10)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1571
Sample ID: G-2018-C12 (10-20)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1572
Sample ID: G-2018-C12 (20-40)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1573
Sample ID: G-2018-C13 (2.5-10)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

Maxxam ID: VF1574
Sample ID: G-2018-C13 (10-20)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9318669	N/A	2019/02/13	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9318765	N/A	2019/02/13	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9318901	N/A	2019/02/12	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

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

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

TEST SUMMARY

Maxxam ID: VF1575
Sample ID: G-2018-C13 (20-40)
Matrix: Water

Collected: 2019/02/07
Shipped:
Received: 2019/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO ₃)	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 HNO ₃ Preserve for Metals	ICP	ONSITE	N/A	2019/02/09	Aldean Alicando

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

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

GENERAL COMMENTS

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

Package 1	3.3°C
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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.



Success Through Sciences

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

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB934454
Site Location: 18-2525
Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
 Client Project #: MB934454
 Site Location: 18-2525
 Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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 Spécialist

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.

Your Project #: 18-2525
 Site Location: NS LANDS
 Your C.O.C. #: n/a

Attention: Daniel Skruch

EcoMetrix Incorporated
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 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	Date	Laboratory Method	Reference
		Extracted	Analyzed		
Acidity (CaCO3) in water (1, 2)	15	N/A	2019/02/19		SM 22 2310
Alkalinity	2	N/A	2019/02/13	CAM SOP-00448	SM 23 2320 B m
Free (WAD) Cyanide	2	N/A	2019/02/14	CAM SOP-00457	OMOE E3015 m
Total Cyanide	2	2019/02/14	2019/02/14	CAM SOP-00457	OMOE E3015 5 m
Dissolved Mercury (low level)	17	2019/02/14	2019/02/14	CAM SOP-00453	EPA 7470 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Maxxam Bedford
- (2) Non-accredited test method



Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

Attention: Daniel Skruch

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

Report Date: 2019/02/21
Report #: R5601788
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B936155
Received: 2019/02/08, 17:54

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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							

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

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								

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					

GENERAL COMMENTS

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

Package 1	16.3°C
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Results relate only to the items tested.



Maxxam Job #: B936155
 Report Date: 2019/02/21

QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
 Client Project #: 18-2525
 Site Location: NS LANDS
 Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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).

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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CHAIN OF CUSTODY RECORD

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)						
Company Name: EcoMetrix Inc	Company Name:	Quotation #:	Turnaround Time (TAT) Required <input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses							
Contact Name: Daniel Skruch	Contact Name:	P.O. #/ AFER:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS							
Address: 6800 Campobello Road	Address:	Project #: 18-2525	Rush TAT (Surcharges will be applied) <input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days							
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338	Phone: Fax:	Site Location: NS Lands	Date Required:							
Email: dskruch@ecometrix.ca	Email:	Sampled By: ALC+FL+CL	Rush Confirmation #:							
MODE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY										
Regulation 153 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agr/ Other <input type="checkbox"/> Table 4 FOR RJC (PLEASE CIRCLE) <input type="checkbox"/> Y / <input type="checkbox"/> N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWOD <input type="checkbox"/> Region <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested (Columns for various analyses)						
Include Criteria on Certificate of Analysis: <input type="checkbox"/> Y / <input type="checkbox"/> N SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM		# OF CONTAINERS SUBMITTED (Columns for container counts)		LABORATORY USE ONLY CUSTODY SEAL Present <input checked="" type="checkbox"/> Y / <input type="checkbox"/> N Intact COOLING MEDIA PRESENT: <input type="checkbox"/> Y / <input checked="" type="checkbox"/> N COMMENTS: 7/11/2016						
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	FIELD RETURNED	Lead Level (Distilled Water) (PPM) (N/A)	Sulphur (L/100L) (N/A)	Asbestos (L/100L)	Acidity (L/100L)	Distilled Condensate (Free/Total) (L/100L)	Distilled Residue (N/A)
1 G-2018-C6 (28NOV) (10-20)	08/02/2019	12:00	Water	3	X	X	X	X		
3 G-2018-C6 (28NOV) (20-30)	08/02/2019	12:00	Water	3	X	X	X	X		
5 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 Cloak	08/02/2019	17:53	<i>Cynthia O's, Cynthia A's</i>			19/02/2018	17:54			

08-Feb-19 17:54
 Kyle Reinhart

 B936155
 URE ENV-729

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 #:		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses				
Contact Name: Dangel Skruch		Contact Name:		P.O. #/ A/E/R:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS				
Address: 6800 Campobello Road		Address:		Project #: 18-2525		Rush TAT (Surcharges will be applied)				
Phone: 905-794-2325 (ext 229) Fax: 905-794-2338		Phone: Fax:		Site Location: NS Lands		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days				
Email: dskruch@ecometrix.ca		Email:		Site #:		Date Required:				
Email: dskruch@ecometrix.ca		Email:		Sampled By: ALC+FL+CL		Date Required:				
MIDE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY										
Regulation 353 <input type="checkbox"/> Table 1 <input type="checkbox"/> Rev/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO <input type="checkbox"/> Region <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested (Some Level: Disturbed Areas) (COP, AAS, include Sulphur) (LISTED, to be listed) Availability ELI/ED Safety ELI/ED Disturbed Closures (Fire/ Fuel/W/MS) ELI/ED Disturbed Mercury** ELI/ED		LABORATORY USE ONLY CUSTOMER SEAL Y / (N) Present Intact COOLER TEMPERATURES 17/16/16 COOLING MEDIA PRESENT: Y (N)				
Include Criteria on Certificate of Analysis: Y / N										
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM										
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	FIELD RETRIEVED	FIELD ELI/ED	SAFETY ELI/ED	DISTURBED CLOSURES (FIRE/FUEL/W/MS) ELI/ED	DISTURBED MERCURY** ELI/ED	COOLING MEDIA PRESENT: Y (N)	COMMENTS
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		
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		
7 G-2018-C15 (2.5-10)	08/02/2019	12:00	Water	3	X	X	X	X		
8										
9										
10										
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 Cross		08/02/2019	17:53	Cynthia Oja, Cynthia Pezz		19/02/08	17:54			

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:

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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.

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

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

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							

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							

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						

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						

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	0.0000050	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	0.0000050	9324444
Dissolved Molybdenum (Mo)	mg/L	0.000149	0.000560	0.000218	0.0000050	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	0.0000050	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						

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						

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						

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		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						

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		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
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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

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
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	<0.0000050	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				

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
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

Maxxam Job #: B911268
Report Date: 2019/02/19

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

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

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

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
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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.



Maxxam Job #: B911268
Report Date: 2019/02/19

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB936155
Site Location: 18-2525
Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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	<0.000010	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	<0.0000050	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	<0.0000050	mg/L	0.58	20
9324444	Dissolved Molybdenum (Mo)	2019/02/17	101	80 - 120	102	80 - 120	<0.0000050	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	<0.0000050	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



Maxxam Job #: B911268
 Report Date: 2019/02/19

QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
 Client Project #: MB936155
 Site Location: 18-2525
 Sampler Initials: ALC

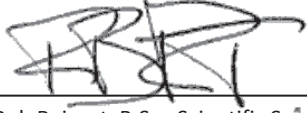
QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9324444	Dissolved Zirconium (Zr)	2019/02/17	105	80 - 120	107	80 - 120	<0.00010	mg/L	NC	20
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>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)</p> <p>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).</p> <p>(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.</p>										

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 Spécialist

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.

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	Date	Laboratory Method	Reference
		Extracted	Analyzed		
Acidity (CaCO3) in water (1, 2)	12	N/A	2019/02/19		SM 22 2310
Alkalinity	2	N/A	2019/02/13	CAM SOP-00448	SM 23 2320 B m
Alkalinity	7	N/A	2019/02/14	CAM SOP-00448	SM 23 2320 B m
Dissolved Mercury (low level)	21	2019/02/14	2019/02/14	CAM SOP-00453	EPA 7470 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Bedford

(2) Non-accredited test method

Your Project #: 18-2525
Site Location: NS LANDS
Your C.O.C. #: n/a

Attention: Daniel Skruch

EcoMetrix Incorporated
6800 Campobello Rd
Mississauga, ON
CANADA L5N 2L8

Report Date: 2019/02/22
Report #: R5603118
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B937168
Received: 2019/02/11, 16:55

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Kyle Reinhart, Project Manager - Environmental Customer Service
Email: kreinhart@maxxam.ca
Phone# (905) 817-5700

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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									

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									

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
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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
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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
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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
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RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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									

GENERAL COMMENTS

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

Package 1	16.3°C
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Results relate only to the items tested.



Maxxam Job #: B937168
 Report Date: 2019/02/22

QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
 Client Project #: 18-2525
 Site Location: NS LANDS
 Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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).

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.



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 #:		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses																								
Contact Name: Daniel Skruch		Contact Name:		P.O. #/ A/FER:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS																								
Address: 6800 Campobello Road		Address:		Project #: 18-2525		Rush TAT (Surcharges will be applied)																								
Phone: 905-794-2325 (ext. 229) Fax: 905-794-2338		Phone: Fax:		Site Location: NS Lands		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days																								
Email: dskruch@ecometrix.ca		Email:		Site #:		Date Required:																								
Sampled By: ALC+FLC/L		Sampled By:		Rush Confirmation #:		LABORATORY USE ONLY																								
<p>FOR REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY</p>																														
Regulation 153 <input type="checkbox"/> Table 1 <input type="checkbox"/> Rgs/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO <input type="checkbox"/> Region <input type="checkbox"/> Other (Specify): <input type="checkbox"/> REC 558 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested (Indicate with 'X' in appropriate boxes) Lead <input type="checkbox"/> Cadmium <input type="checkbox"/> Mercury <input type="checkbox"/> Copper <input type="checkbox"/> Nickel <input type="checkbox"/> Zinc <input type="checkbox"/> Manganese <input type="checkbox"/> Iron <input type="checkbox"/> Chloride <input type="checkbox"/> Sulfate <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Ammonia <input type="checkbox"/> Phosphate <input type="checkbox"/> Fluoride <input type="checkbox"/> Total Hardness <input type="checkbox"/> Total Dissolved Solids <input type="checkbox"/> Total Suspended Solids <input type="checkbox"/> Total Solids <input type="checkbox"/> Total Organic Carbon <input type="checkbox"/> Total Organic Nitrogen <input type="checkbox"/> Total Organic Phosphorus <input type="checkbox"/> Total Organic Halogen <input type="checkbox"/> Total Organic Chlorine <input type="checkbox"/> Total Organic Sulfur <input type="checkbox"/> Total Organic Nitrogen <input type="checkbox"/> Total Organic Phosphorus <input type="checkbox"/> Total Organic Halogen <input type="checkbox"/> Total Organic Chlorine <input type="checkbox"/> Total Organic Sulfur		CUSTODY SEAL Y / (N) <input checked="" type="checkbox"/> Present Intact COOLING MEDIA PRESENT: Y / (N) <input checked="" type="checkbox"/> COMMENTS: 17/16/19																								
<p>SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM</p>																														
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	FOR CONTAINERS SUBMITTED	LEAD	CADMIUM	MERCURY	COPPER	NICKEL	ZINC	MANAGANESE	IRON	CHLORIDE	SULFATE	NITRATE	NITRITE	AMMONIA	PHOSPHATE	FLUORIDE	TOTAL HARDNESS	TOTAL DISSOLVED SOLIDS	TOTAL SUSPENDED SOLIDS	TOTAL SOLIDS	TOTAL ORGANIC CARBON	TOTAL ORGANIC NITROGEN	TOTAL ORGANIC PHOSPHORUS	TOTAL ORGANIC HALOGEN	TOTAL ORGANIC CHLORINE	TOTAL ORGANIC SULFUR	
1 G-2018-C15 (15-20)	11/02/2019	12:00	Water	3	X	X	X	X	X	X																				
2 G-2018-C15 (20-30)	11/02/2019	12:00	Water	3	X	X	X	X	X	X																				
3 G-2018-C17 (0-5)	11/02/2019	12:00	Water	3	X	X	X	X	X	X																				
4 G-2018-C17 (10-20)	11/02/2019	12:00	Water	3	X	X	X	X	X	X																				
5 G-2018-C17 (40-50)	11/02/2019	12:00	Water	3	X	X	X	X	X	X																				
6 G-2018-C6 (29NOV) (0-7.5)	11/02/2019	12:00	Water	3	X	X	X	X	X	X																				
7 G-2018-C6 (29NOV) (10-15)	11/02/2019	12:00	Water	3	X	X	X	X	X	X																				
8 G-2018-C6 (29NOV) (20-30)	11/02/2019	12:00	Water	3	X	X	X	X	X	X																				
9 G-2018-C6 (29NOV) (40-50)	11/02/2019	12:00	Water	3	X	X	X	X	X	X																				
10 G-2018-WR1	11/02/2019	12:00	Water	3	X	X	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)																							
Fel Luo		11/02/2019	16:55	<i>[Signature]</i>		2019/02/11	16:55																							

*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

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



6740 Campobello Road, Mississauga, Ontario L5N 2J8
 Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
 A Boreau Veritas Group Company 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 #:		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses							
Contact Name: Daniel Skruch		Contact Name:		P.O. #/ APER:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS							
Address: 6800 Campobello Road		Address:		Project #: 18-2525		Rush TAT (Surcharges will be applied)							
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338		Phone: Fax:		Site Location: NS Lands		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days							
Email: dskruch@ecometrix.ca		Email:		Site #:		Date Required:							
Sampled by: ALC+FL+CL		Sampled by:		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 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Pack <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Hd/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table 4 FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWOQ <input type="checkbox"/> Region <input type="checkbox"/> Other (Specify) <input type="checkbox"/> REG 559 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested <input type="checkbox"/> PFC CONTAMINANTS SUBMITTED <input type="checkbox"/> HELD FILTERED <input type="checkbox"/> USE OF CHLORINATED METHYL (CEP MS), Volatiles <input type="checkbox"/> Sulphur (ELIMINATED, to be analysed) <input type="checkbox"/> Manganese (ELIMINATED) <input type="checkbox"/> Magnesium (ELIMINATED) <input type="checkbox"/> Dissolved Oxide (Free/Total/NO3)(ELIMINATED) <input type="checkbox"/> Dissolved Manganese (ELIMINATED)				LABORATORY USE ONLY CUSTODY SEAL Y / N Present <input type="checkbox"/> Intact <input type="checkbox"/>					
Include Criteria on Certificate of Analysis: Y / N													
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM													
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	PFC CONTAMINANTS SUBMITTED	HELD FILTERED	USE OF CHLORINATED METHYL (CEP MS), Volatiles	Sulphur (ELIMINATED, to be analysed)	Manganese (ELIMINATED)	Magnesium (ELIMINATED)	Dissolved Oxide (Free/Total/NO3)(ELIMINATED)	Dissolved Manganese (ELIMINATED)	COOLING MEDIA PRESENT: Y / N	COMMENTS
1 G-2018-WR2	11/02/2019	12:00	Water	3	X	X	X	X	X	X	X		*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*
2 G-2018-WR3	11/02/2019	12:00	Water	3	X	X	X	X	X	X	X		
3 G-2018-WR4	11/02/2019	12:00	Water	3	X	X	X	X	X	X	X		
4 G-2018-WR5	11/02/2019	12:00	Water	3	X	X	X	X	X	X	X		
5 G-2018-WR6	11/02/2019	12:00	Water	3	X	X	X	X	X	X	X		
6 G-2018-SFC-1 (0-20)	11/02/2019	12:00	Water	3	X	X	X	X	X	X	X		
7 G-2018-SFC-2	11/02/2019	12:00	Water	3	X	X	X	X	X	X	X		
8 G-2018-SFC-6	11/02/2019	12:00	Water	3	X	X	X	X	X	X	X		
9 G-2018-SFC-7	11/02/2019	12:00	Water	3	X	X	X	X	X	X	X		
10 G-2018-SFC-4	11/02/2019	12:00	Water	3	X	X	X	X	X	X	X		
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)				TIME: (HH:MM)	MAXXAM JOB #				
Fai Luo		11/02/2019	16:55	See page 1									

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required																			
Company Name: EcoMetric Inc	Company Name:	Contact Name: Daniel Struch	Contact Name:	Quotation #:	<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS																			
Address: 5800 Campbell Road	Address:	Phone: 905-794-2325 (ext: 228) Fax: 905-794-2338	Phone: Fax:	Project #:	Rush TAT (Surcharges will be applied)																				
Email: dstruch@ecometric.ca	Email:			Site Location: NO LANDS	<input type="checkbox"/> 1 Day	<input type="checkbox"/> 2 Days	<input type="checkbox"/> 3-4 Days																		
MICE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY				Site #:	Date Required:																				
Regulation 153 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agr/ Other <input type="checkbox"/> Table <input type="checkbox"/> Other (Specify) _____ FOR RSC (PLEASE CIRCLE) Y / N				Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> IPWGO <input type="checkbox"/> Region _____ <input type="checkbox"/> Other (Specify) _____ REG 558 (MIN. 3 DAY TAT REQUIRED)		Analysis Requested <table border="1"> <tr> <td>Lead</td> <td>Cadmium</td> <td>Chromium</td> <td>Copper</td> <td>Iron</td> <td>Nickel</td> <td>Sulphur</td> <td>Turbidity</td> <td>Zinc</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		Lead	Cadmium	Chromium	Copper	Iron	Nickel	Sulphur	Turbidity	Zinc									
Lead	Cadmium	Chromium	Copper	Iron	Nickel	Sulphur	Turbidity	Zinc																	
Include Criteria on Certificate of Analysis: Y / N				LABORATORY USE ONLY CUSTODY SEAL: Y / N Present: <input type="checkbox"/> Intact: <input type="checkbox"/>		COOLING MEDIA PRESENT: Y / N																			
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM				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*																			
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	U1	U2	U3	U4	U5																	
1 G-2018-SFC-5	11/01/2019	12:00	Water	X	X	X	X	X																	
RELINQUISHED BY: (Signature/Print) Fel Luo				RECEIVED BY: (Signature/Print) SEE PAGE 1		MAXXAM JOB #																			
DATE: (YYYY/MM/DD) 11/01/2019				TIME: (HH:MM) 16:55		TIME: (HH:MM)																			

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.

Your Project #: MB937168
Site#: NS LANDS
Site Location: 18-2525

Attention: KYLE REINHART

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b937168-m058-01-01, b973168-m058-02-01, b937168-
m058-03-01

Report Date: 2019/02/21
Report #: R2687946
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B911260
Received: 2019/02/14, 08:50

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020
=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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

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

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		VF7342	VF7343	VF7344	VF7345	
Sampling Date		2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00	
COC Number		b937168-m058-01-01	b937168-m058-01-01	b937168-m058-01-01	b937168-m058-01-01	
	UNITS	G-2018-C15 (15-20)	G-2018-C15 (20-30)	G-2018-C17 (0-5)	G-2018-C17 (10-20)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF7346	VF7347	VF7348	VF7349	
Sampling Date		2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00	
COC Number		b937168-m058-01-01	b937168-m058-01-01	b937168-m058-01-01	b937168-m058-01-01	
	UNITS	G-2018-C17 (40-50)	G-2018-C6 (29NOV) (0-7.5)	G-2018-C6 (29NOV) (10-15)	G-2018-C6 (29NOV) (20-30)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF7350	VF7351	VF7355	VF7356	
Sampling Date		2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00	
COC Number		b937168-m058-01-01	b937168-m058-01-01	b973168-m058-02-01	b973168-m058-02-01	
	UNITS	G-2018-C6 (29NOV) (40-50)	G-2018-WR1	G-2018-WR2	G-2018-WR3	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF7357	VF7358	VF7359	VF7360	
Sampling Date		2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00	
COC Number		b973168-m058-02-01	b973168-m058-02-01	b973168-m058-02-01	b973168-m058-02-01	
	UNITS	G-2018-WR4	G-2018-WR5	G-2018-WR6	G-2018-SFC-1 (0-20)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

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

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

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		VF7361	VF7362	VF7363	VF7364	
Sampling Date		2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00	
COC Number		b973168-m058-02-01	b973168-m058-02-01	b973168-m058-02-01	b973168-m058-02-01	
	UNITS	G-2018-SFC-2	G-2018-SFC-6	G-2018-SFC-7	G-2018-SFC-4	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF7365	
Sampling Date		2019/02/11 12:00	
COC Number		b937168-m058-03-01	
	UNITS	G-2018-SFC-5	QC Batch

Calculated Parameters			
Filter and HNO3 Preservation	N/A	FIELD	ONSITE

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF7342	VF7343	VF7344		
Sampling Date		2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00		
COC Number		b937168-m058-01-01	b937168-m058-01-01	b937168-m058-01-01		
	UNITS	G-2018-C15 (15-20)	G-2018-C15 (20-30)	G-2018-C17 (0-5)	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	306	41.7	218	0.50	9323406
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	mg/L	0.0587	0.109	0.0168	0.00050	9324441
Dissolved Antimony (Sb)	mg/L	0.00143	0.00407	0.00567	0.000020	9324441
Dissolved Arsenic (As)	mg/L	0.202	0.755	0.180	0.000020	9324441
Dissolved Barium (Ba)	mg/L	0.0467	0.00820	0.0260	0.000020	9324441
Dissolved Beryllium (Be)	mg/L	<0.000010	<0.000010	0.000018	0.000010	9324441
Dissolved Bismuth (Bi)	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000050	9324441
Dissolved Boron (B)	mg/L	0.047	0.019	<0.010	0.010	9324441
Dissolved Cadmium (Cd)	mg/L	0.0000631	0.0000208	0.000276	0.0000050	9324441
Dissolved Chromium (Cr)	mg/L	0.00032	0.00061	<0.00010	0.00010	9324441
Dissolved Cobalt (Co)	mg/L	0.0147	0.00505	0.0281	0.0000050	9324441
Dissolved Copper (Cu)	mg/L	0.000167	0.000487	0.000467	0.000050	9324441
Dissolved Iron (Fe)	mg/L	0.0206	0.102	0.595	0.0010	9324441
Dissolved Lead (Pb)	mg/L	0.000148	0.000265	0.000695	0.0000050	9324441
Dissolved Lithium (Li)	mg/L	0.00411	0.00124	0.00203	0.00050	9324441
Dissolved Manganese (Mn)	mg/L	4.98	0.809	4.68	0.000050	9324441
Dissolved Molybdenum (Mo)	mg/L	<0.000050	0.000243	<0.000050	0.000050	9324441
Dissolved Nickel (Ni)	mg/L	0.00748	0.00540	0.0370	0.000020	9324441
Dissolved Selenium (Se)	mg/L	<0.000040	<0.000040	<0.000040	0.000040	9324441
Dissolved Silicon (Si)	mg/L	2.75	2.60	1.16	0.050	9324441
Dissolved Silver (Ag)	mg/L	<0.0000050	0.0000074	<0.0000050	0.0000050	9324441
Dissolved Strontium (Sr)	mg/L	0.806	0.101	0.459	0.000050	9324441
Dissolved Thallium (Tl)	mg/L	0.0000642	0.0000226	0.0000519	0.0000020	9324441
Dissolved Tin (Sn)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	9324441
Dissolved Titanium (Ti)	mg/L	<0.00050	0.00390	<0.00050	0.00050	9324441
Dissolved Uranium (U)	mg/L	0.0000026	0.0000162	0.0000034	0.0000020	9324441
Dissolved Vanadium (V)	mg/L	<0.00020	0.00043	<0.00020	0.00020	9324441
Dissolved Zinc (Zn)	mg/L	0.0367	0.0162	0.0307	0.00010	9324441
Dissolved Zirconium (Zr)	mg/L	<0.00010	0.00013	<0.00010	0.00010	9324441
RDL = Reportable Detection Limit						

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF7342	VF7343	VF7344		
Sampling Date		2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00		
COC Number		b937168-m058-01-01	b937168-m058-01-01	b937168-m058-01-01		
	UNITS	G-2018-C15 (15-20)	G-2018-C15 (20-30)	G-2018-C17 (0-5)	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	109	13.7	72.0	0.050	9323408
Dissolved Magnesium (Mg)	mg/L	8.48	1.79	9.25	0.050	9323408
Dissolved Potassium (K)	mg/L	1.50	0.853	1.91	0.050	9323408
Dissolved Sodium (Na)	mg/L	6.78	6.02	3.73	0.050	9323408
Dissolved Sulphur (S)	mg/L	112	17.2	80.1	0.60	9324441
RDL = Reportable Detection Limit						

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF7344			VF7345	VF7346		
Sampling Date		2019/02/11 12:00			2019/02/11 12:00	2019/02/11 12:00		
COC Number		b937168-m058-01-01			b937168-m058-01-01	b937168-m058-01-01		
	UNITS	G-2018-C17 (0-5) Lab-Dup	RDL	QC Batch	G-2018-C17 (10-20)	G-2018-C17 (40-50)	RDL	QC Batch

Calculated Parameters

Dissolved Hardness (CaCO3)	mg/L				248	221	0.50	9323406
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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	0.0000050	9324441	0.000168	0.000476	0.0000050	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	0.0000050	9324441	2.07	0.901	0.0000050	9324441
Dissolved Molybdenum (Mo)	mg/L	<0.0000050	0.0000050	9324441	0.000547	0.000941	0.0000050	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	0.0000050	9324441	0.525	0.431	0.0000050	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

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF7344			VF7345	VF7346		
Sampling Date		2019/02/11 12:00			2019/02/11 12:00	2019/02/11 12:00		
COC Number		b937168-m058-01-01			b937168-m058-01-01	b937168-m058-01-01		
	UNITS	G-2018-C17 (0-5) Lab-Dup	RDL	QC Batch	G-2018-C17 (10-20)	G-2018-C17 (40-50)	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L				93.6	83.8	0.050	9323408
Dissolved Magnesium (Mg)	mg/L				3.60	2.80	0.050	9323408
Dissolved Potassium (K)	mg/L				2.16	2.66	0.050	9323408
Dissolved Sodium (Na)	mg/L				2.06	2.17	0.050	9323408
Dissolved Sulphur (S)	mg/L	79.8	0.60	9324441	83.8	67.7	0.60	9324441
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate								

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF7347	VF7348	VF7349		
Sampling Date		2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00		
COC Number		b937168-m058-01-01	b937168-m058-01-01	b937168-m058-01-01		
	UNITS	G-2018-C6 (29NOV) (0-7.5)	G-2018-C6 (29NOV) (10-15)	G-2018-C6 (29NOV) (20-30)	RDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	8.26	47.3	57.9	0.50	9323406
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	mg/L	0.148	0.0655	0.128	0.00050	9324441
Dissolved Antimony (Sb)	mg/L	0.00205	0.00366	0.00319	0.00020	9324441
Dissolved Arsenic (As)	mg/L	0.836	0.162	0.204	0.00020	9324441
Dissolved Barium (Ba)	mg/L	0.00673	0.0521	0.0163	0.00020	9324441
Dissolved Beryllium (Be)	mg/L	0.000028	0.000067	<0.000010	0.00010	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	0.00020	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						

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF7347	VF7348	VF7349		
Sampling Date		2019/02/11 12:00	2019/02/11 12:00	2019/02/11 12:00		
COC Number		b937168-m058-01-01	b937168-m058-01-01	b937168-m058-01-01		
	UNITS	G-2018-C6 (29NOV) (0-7.5)	G-2018-C6 (29NOV) (10-15)	G-2018-C6 (29NOV) (20-30)	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	2.31	11.8	15.4	0.050	9323408
Dissolved Magnesium (Mg)	mg/L	0.604	4.34	4.72	0.050	9323408
Dissolved Potassium (K)	mg/L	1.97	1.86	0.894	0.050	9323408
Dissolved Sodium (Na)	mg/L	4.85	2.96	4.36	0.050	9323408
Dissolved Sulphur (S)	mg/L	1.17	18.3	21.7	0.60	9324441
RDL = Reportable Detection Limit						

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

Calculated Parameters

Dissolved Hardness (CaCO3)	mg/L	19.2	12.0	7.98	0.50	9323406
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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

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						

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						

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						

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

Calculated Parameters

Dissolved Hardness (CaCO3)	mg/L	6.17	1.93	4.09	0.50	9323406
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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

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						

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						

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

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

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

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

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

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

TEST SUMMARY

Maxxam ID: VF7364
Sample ID: G-2018-SFC-4
Matrix: Water

Collected: 2019/02/11
Shipped:
Received: 2019/02/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9323406	N/A	2019/02/21	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9323408	N/A	2019/02/21	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9324441	N/A	2019/02/20	Valentina Balada
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/15	Aldean Alicando

Maxxam ID: VF7365
Sample ID: G-2018-SFC-5
Matrix: Water

Collected: 2019/02/11
Shipped:
Received: 2019/02/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9323406	N/A	2019/02/20	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9323408	N/A	2019/02/20	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9324434	N/A	2019/02/20	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/15	Aldean Alicando

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
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Results relate only to the items tested.



Success Through Sciences

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

QUALITY ASSURANCE REPORT

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QUALITY ASSURANCE REPORT(CONT'D)

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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	<0.000010	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	<0.0000050	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	<0.000050	mg/L	7.9	20
9324441	Dissolved Manganese (Mn)	2019/02/20	NC	80 - 120	100	80 - 120	<0.0000050	mg/L	0.64	20
9324441	Dissolved Molybdenum (Mo)	2019/02/20	105	80 - 120	99	80 - 120	<0.0000050	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	<0.0000050	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	<0.000020	mg/L	NC	20
9324441	Dissolved Titanium (Ti)	2019/02/20	101	80 - 120	98	80 - 120	<0.000050	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	<0.000020	mg/L	NC	20
9324441	Dissolved Zinc (Zn)	2019/02/20	98	80 - 120	102	80 - 120	<0.000010	mg/L	0.085	20



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

QUALITY ASSURANCE REPORT(CONT'D)

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


QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>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)</p> <p>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).</p>										

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 Spécialist

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.

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	Date	Laboratory Method	Reference
		Extracted	Analyzed		
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

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.

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									

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				

GENERAL COMMENTS

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

Package 1	15.0°C
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Results relate only to the items tested.



Maxxam Job #: B937829
 Report Date: 2019/02/21

QUALITY ASSURANCE REPORT

EcoMetrix Incorporated
 Client Project #: 18-2525
 Site Location: NS LANDS
 Sampler Initials: ALC

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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).

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.



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 #:		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses					
Contact Name: Daniel Skruch		Contact Name:		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS					
Address: 6800 Campobello Road		Address:		Project #: 18-2525		Rush TAT (Surcharges will be applied)					
Phone: 905-794-2325 (ext: 229) Fax: 905-794-2338		Phone: Fax:		Site Location: NS Lands		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days					
Email: dskruch@ecometrix.ca		Email:		Site #:		Date Required:					
Sampled By: ALC+FL+CL		Sampled By:		Date Required:		Rush Confirmation #:					
MDE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY											
Regulation 153		Other Regulations		Analysis Requested				LABORATORY USE ONLY			
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		<input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO Region <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED)		# OF CONTAINERS SUBMITTED FIELD FILTERED Low Level Dissolved Metals (TCP+MS, include Sulphur) FILTERED to Burnaby* Alkalinity FILTERED Acidity FILTERED Dissolved Cyanide (Free/Total/WAD) FILTERED Dissolved Mercury** FILTERED				CUSTODY SEAL Y/N Present Intact COOLER TEMPERATURES 15/15/15 COOLING MEDIA PRESENT: Y <input checked="" type="checkbox"/> N			
Include Criteria on Certificate of Analysis: Y / N								COMMENTS			
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM											
SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	FIELD FILTERED	Low Level Dissolved Metals (TCP+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	X		
2 G-2018-SFC-12	12/02/2019	12:00	Water	3	X	X	X	X	X		
3 G-2018-SFC-13	12/02/2019	12:00	Water	3	X	X	X	X	X		
4 G-2018-SFC-14	12/02/2019	12:00	Water	3	X	X	X	X	X		
5 G-2018-SFC-15	12/02/2019	12:00	Water	3	X	X	X	X	X		
6 G-2018-SFC-16	12/02/2019	12:00	Water	3	X	X	X	X	X		
7	12/02/2019	12:00	Water	3	X	X	X	X	X		
8	12/02/2019	12:00	Water	3	X	X	X	X	X		
9	12/02/2019	12:00	Water	3	X	X	X	X	X		
10	12/02/2019	12:00	Water	3	X	X	X	X	X		
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)				TIME: (HH:MM)			
C. Larsen Christian Larsen		12/02/2019	13:17	Dipr Singh DITKA SINGH				2019/02/12	13:20		

*NOTE Required/Targeted Detection Limits: Sulphur (0.6 mg/L); Arsenic (0.00002 mg/L); Copper (0.00005 mg/L); Lead (0.000005 mg/L); Nickel (0.00002 mg/L); Zinc (0.0001 mg/L); **Mercury 0.00001 mg/L

PLEASE CONTACT IF SAMPLE VOLUME CONCERNS

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



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 #: _____		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses								
Contact Name: Daniel Skruch		Contact Name: _____		P.O. #/ AFE#: _____		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS								
Address: 6800 Campobello Road		Address: _____		Project #: 18-2525		Rush TAT (Surcharges will be applied)								
Phone: 905-794-2325 (ext. 229) Fax: 905-794-2338		Phone: _____ Fax: _____		Site Location: NS Lands		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days								
Email: dskruch@ecometrix.ca		Email: _____		Site #: _____		Date Required: _____								
Email: _____		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		Analysis Requested				LABORATORY USE ONLY						
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		<input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO Region <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED)		# 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				CUSTODY SEAL Y / N COOLER TEMPERATURES Present Intact						
Include Criteria on Certificate of Analysis: Y / N								COOLING MEDIA PRESENT: Y / N						
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM								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*						
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				
3	G-2018-C1 (20-40)	12/02/2019	12:00	Water	3	X	X			X				
4	G-2018-C1 (60-80)	12/02/2019	12:00	Water	3	X	X			X				
5	G-2018-C1 (140-160)	12/02/2019	12:00	Water	3	X	X			X				
6	G-2018-C4 (10-20)	12/02/2019	12:00	Water	3	X	X			X				
7														
8														
9														
10														
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)				TIME: (HH:MM)		MAXXAM JOB #				
Christian Larsen <i>C. Larsen</i>		12/02/2019	13:17	See page 1						13 926096 max				

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.

Your Project #: MB937829
Site#: NS LANDS
Site Location: 18-2525

Attention: KYLE REINHART

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Your C.O.C. #: b937829-m058-01-01, b937829-m058-02-01

Report Date: 2019/02/20
Report #: R2687382
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B911252
Received: 2019/02/14, 08:50

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jennifer Villocero, Project Manager
Email: JVillocero@maxxam.ca
Phone# (604)638-5020
=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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

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

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		VF7311	VF7312	VF7313	VF7314	
Sampling Date		2019/02/12	2019/02/12	2019/02/12	2019/02/12	
COC Number		b937829-m058-01-01	b937829-m058-01-01	b937829-m058-01-01	b937829-m058-01-01	
	UNITS	G-2018-SFC-10	G-2018-SFC-12	G-2018-SFC-13	G-2018-SFC-14	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF7315	VF7316	VF7317	VF7318	
Sampling Date		2019/02/12	2019/02/12	2019/02/12	2019/02/12	
COC Number		b937829-m058-01-01	b937829-m058-01-01	b937829-m058-01-01	b937829-m058-01-01	
	UNITS	G-2018-SFC-15	G-2018-SFC-16	G-2018-SFC-18	G-2018-C1 (0-10)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		VF7319	VF7320	VF7321	VF7322	
Sampling Date		2019/02/12	2019/02/12	2019/02/12	2019/02/12	
COC Number		b937829-m058-01-01	b937829-m058-01-01	b937829-m058-02-01	b937829-m058-02-01	
	UNITS	G-2018-C1(20-40)	G-2018-C1(60-80)	G-2018-C1 (140-160)	G-2018-C1 (10-20)	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	ONSITE

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
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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	0.0000050	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	0.0000050	0.235	0.00025	0.175	0.00010	9324434
Dissolved Molybdenum (Mo)	mg/L	0.000811	0.0000050	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	0.0000050	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

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF7311		VF7312		VF7313		
Sampling Date		2019/02/12		2019/02/12		2019/02/12		
COC Number		b937829-m058-01-01		b937829-m058-01-01		b937829-m058-01-01		
	UNITS	G-2018-SFC-10	RDL	G-2018-SFC-12	RDL	G-2018-SFC-13	RDL	QC Batch
Dissolved Potassium (K)	mg/L	1.73	0.050	1.08	0.25	2.85	0.10	9323408
Dissolved Sodium (Na)	mg/L	0.934	0.050	0.38	0.25	0.98	0.10	9323408
Dissolved Sulphur (S)	mg/L	1.08	0.60	69.1	3.0	6.6	1.2	9324434

RDL = Reportable Detection Limit

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF7314	VF7315	VF7316		
Sampling Date		2019/02/12	2019/02/12	2019/02/12		
COC Number		b937829-m058-01-01	b937829-m058-01-01	b937829-m058-01-01		
	UNITS	G-2018-SFC-14	G-2018-SFC-15	G-2018-SFC-16	RDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	32.3	13.5	40.7	0.50	9323406
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	mg/L	0.124	0.0558	0.0805	0.00050	9324434
Dissolved Antimony (Sb)	mg/L	0.0110	0.00221	0.00591	0.000020	9324434
Dissolved Arsenic (As)	mg/L	1.70	0.184	0.978	0.000020	9324434
Dissolved Barium (Ba)	mg/L	0.00145	0.00161	0.0119	0.000020	9324434
Dissolved Beryllium (Be)	mg/L	<0.000010	0.000026	<0.000010	0.000010	9324434
Dissolved Bismuth (Bi)	mg/L	0.0000694	<0.0000050	0.000133	0.0000050	9324434
Dissolved Boron (B)	mg/L	<0.010	<0.010	<0.010	0.010	9324434
Dissolved Cadmium (Cd)	mg/L	0.0000283	0.0000292	0.0000370	0.0000050	9324434
Dissolved Chromium (Cr)	mg/L	0.00033	<0.00010	0.00030	0.00010	9324434
Dissolved Cobalt (Co)	mg/L	0.000624	0.00600	0.00115	0.0000050	9324434
Dissolved Copper (Cu)	mg/L	0.00201	0.0184	0.00340	0.000050	9324434
Dissolved Iron (Fe)	mg/L	1.19	0.0081	0.655	0.0010	9324434
Dissolved Lead (Pb)	mg/L	0.00444	0.0000862	0.0115	0.0000050	9324434
Dissolved Lithium (Li)	mg/L	0.00117	0.00276	0.00054	0.00050	9324434
Dissolved Manganese (Mn)	mg/L	0.0221	0.211	0.366	0.000050	9324434
Dissolved Molybdenum (Mo)	mg/L	0.00116	<0.0000050	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						

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF7314	VF7315	VF7316		
Sampling Date		2019/02/12	2019/02/12	2019/02/12		
COC Number		b937829-m058-01-01	b937829-m058-01-01	b937829-m058-01-01		
	UNITS	G-2018-SFC-14	G-2018-SFC-15	G-2018-SFC-16	RDL	QC Batch
Dissolved Potassium (K)	mg/L	3.34	1.91	6.77	0.050	9323408
Dissolved Sodium (Na)	mg/L	1.50	1.31	2.70	0.050	9323408
Dissolved Sulphur (S)	mg/L	10.6	6.61	6.19	0.60	9324434
RDL = Reportable Detection Limit						

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
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						

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						

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						

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

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

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		VF7320	VF7321	VF7322		
Sampling Date		2019/02/12	2019/02/12	2019/02/12		
COC Number		b937829-m058-01-01	b937829-m058-02-01	b937829-m058-02-01		
	UNITS	G-2018-C1(60-80)	G-2018-C1 (140-160)	G-2018-C1 (10-20)	RDL	QC Batch
Dissolved Potassium (K)	mg/L	4.41	1.81	0.324	0.050	9323408
Dissolved Sodium (Na)	mg/L	0.691	2.99	2.98	0.050	9323408
Dissolved Sulphur (S)	mg/L	45.9	39.3	4.27	0.60	9324434
RDL = Reportable Detection Limit						

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

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

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

TEST SUMMARY

Maxxam ID: VF7316
Sample ID: G-2018-SFC-16
Matrix: Water

Collected: 2019/02/12
Shipped:
Received: 2019/02/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9323406	N/A	2019/02/20	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9323408	N/A	2019/02/20	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9324434	N/A	2019/02/19	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/15	Aldean Alicando

Maxxam ID: VF7317
Sample ID: G-2018-SFC-18
Matrix: Water

Collected: 2019/02/12
Shipped:
Received: 2019/02/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9323406	N/A	2019/02/20	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9323408	N/A	2019/02/20	Automated Statchk
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9324434	N/A	2019/02/19	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/15	Aldean Alicando

Maxxam ID: VF7318
Sample ID: G-2018-C1 (0-10)
Matrix: Water

Collected: 2019/02/12
Shipped:
Received: 2019/02/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9323406	N/A	2019/02/20	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9323408	N/A	2019/02/20	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9324434	N/A	2019/02/19	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/15	Aldean Alicando

Maxxam ID: VF7319
Sample ID: G-2018-C1(20-40)
Matrix: Water

Collected: 2019/02/12
Shipped:
Received: 2019/02/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9323406	N/A	2019/02/20	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9323408	N/A	2019/02/20	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9324434	N/A	2019/02/20	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/15	Aldean Alicando

Maxxam ID: VF7320
Sample ID: G-2018-C1(60-80)
Matrix: Water

Collected: 2019/02/12
Shipped:
Received: 2019/02/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9323406	N/A	2019/02/20	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9323408	N/A	2019/02/20	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9324434	N/A	2019/02/20	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/15	Aldean Alicando

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

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

TEST SUMMARY

Maxxam ID: VF7321
Sample ID: G-2018-C1 (140-160)
Matrix: Water

Collected: 2019/02/12
Shipped:
Received: 2019/02/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9323406	N/A	2019/02/20	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9323408	N/A	2019/02/20	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9324434	N/A	2019/02/20	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/15	Aldean Alicando

Maxxam ID: VF7322
Sample ID: G-2018-C1 (10-20)
Matrix: Water

Collected: 2019/02/12
Shipped:
Received: 2019/02/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	9323406	N/A	2019/02/20	Report Automation Engine
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	CALC	9323408	N/A	2019/02/20	Report Automation Engine
Elements by ICPMS Low Level (dissolved)	ICP/CRCM	9324434	N/A	2019/02/20	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2019/02/15	Aldean Alicando

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
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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.



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

QUALITY ASSURANCE REPORT

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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



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

QUALITY ASSURANCE REPORT(CONT'D)

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

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>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).</p>										

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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February 20, 2019

EcoMetrix Incorporated
Amanda L. Ciosek
6800 Campobello Road
Mississauga, Ontario L5N 2L8
aciosek@ecomatrix.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,

A handwritten signature in black ink, appearing to read "Collette Machado", with a stylized flourish at the end.

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.



Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
M-2018-C1 (0-5)	1906007-01	Groundwater	Sample	02/05/2019	02/06/2019
M-2018-SFC-T9	1906007-02	Groundwater	Sample	02/05/2019	02/06/2019
M-2018-C13 (2.5-10)	1906007-03	Groundwater	Sample	02/05/2019	02/06/2019
M-2018-C5 (2.5-10)	1906007-04	Groundwater	Sample	02/05/2019	02/06/2019
M-2018-SFC-T23	1906007-05	Groundwater	Sample	02/05/2019	02/06/2019
M-2018-SFC-T35	1906007-06	Groundwater	Sample	02/05/2019	02/06/2019
M-2018-C4 (0-10)	1906007-07	Groundwater	Sample	02/05/2019	02/06/2019
M-2018-C18 (0-2.5)	1906007-08	Groundwater	Sample	02/05/2019	02/06/2019
G-2018-C3 (0-5)	1906007-09	Groundwater	Sample	02/05/2019	02/06/2019
G-2018-C6 (28NOV) (2.5-10)	1906007-10	Groundwater	Sample	02/05/2019	02/06/2019
G-2018-C9 (0-7.5)	1906007-11	Groundwater	Sample	02/05/2019	02/06/2019
G-2018-SFC-3	1906007-12	Groundwater	Sample	02/05/2019	02/06/2019
G-2018-SFC-8	1906007-13	Groundwater	Sample	02/05/2019	02/06/2019
G-2018-SFC-11	1906007-14	Groundwater	Sample	02/05/2019	02/06/2019
G-2018-C4 (0-5)	1906007-15	Groundwater	Sample	02/05/2019	02/06/2019

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
As(III)	Water	SOP BAL-4100	02/15/2019	02/18/2019	B190328	1900190
As(V)	Water	SOP BAL-4100	02/15/2019	02/18/2019	B190328	1900190
DMAs	Water	SOP BAL-4100	02/15/2019	02/18/2019	B190328	1900190
MMAs	Water	SOP BAL-4100	02/15/2019	02/18/2019	B190328	1900190



Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
M-2018-C1 (0-5)										
1906007-01	As(III)	Groundwater	D	5200		4.00	20.0	µg/L	B190328	1900190
1906007-01	As(V)	Groundwater	D	326		4.00	20.0	µg/L	B190328	1900190
1906007-01	DMAs	Groundwater	D	≤ 5.00	U	5.00	21.0	µg/L	B190328	1900190
1906007-01	MMAs	Groundwater	D	≤ 9.00	U	9.00	23.0	µg/L	B190328	1900190
M-2018-SFC-T9										
1906007-02	As(III)	Groundwater	D	85.3		0.100	0.500	µg/L	B190328	1900190
1906007-02	As(V)	Groundwater	D	299		0.100	0.500	µg/L	B190328	1900190
1906007-02	DMAs	Groundwater	D	≤ 0.125	U	0.125	0.525	µg/L	B190328	1900190
1906007-02	MMAs	Groundwater	D	≤ 0.225	U	0.225	0.575	µg/L	B190328	1900190
M-2018-C13 (2.5-10)										
1906007-03	As(III)	Groundwater	D	6.39		0.100	0.500	µg/L	B190328	1900190
1906007-03	As(V)	Groundwater	D	36.2		0.100	0.500	µg/L	B190328	1900190
1906007-03	DMAs	Groundwater	D	≤ 0.125	U	0.125	0.525	µg/L	B190328	1900190
1906007-03	MMAs	Groundwater	D	≤ 0.225	U	0.225	0.575	µg/L	B190328	1900190
M-2018-C5 (2.5-10)										
1906007-04	As(III)	Groundwater	D	44.7		4.00	20.0	µg/L	B190328	1900190
1906007-04	As(V)	Groundwater	D	1170		4.00	20.0	µg/L	B190328	1900190
1906007-04	DMAs	Groundwater	D	≤ 5.00	U	5.00	21.0	µg/L	B190328	1900190
1906007-04	MMAs	Groundwater	D	≤ 9.00	U	9.00	23.0	µg/L	B190328	1900190
M-2018-SFC-T23										
1906007-05	As(III)	Groundwater	D	≤ 4.00	U	4.00	20.0	µg/L	B190328	1900190
1906007-05	As(V)	Groundwater	D	3470		4.00	20.0	µg/L	B190328	1900190
1906007-05	DMAs	Groundwater	D	≤ 5.00	U	5.00	21.0	µg/L	B190328	1900190
1906007-05	MMAs	Groundwater	D	≤ 9.00	U	9.00	23.0	µg/L	B190328	1900190
M-2018-SFC-T35										
1906007-06	As(III)	Groundwater	D	1.47		0.100	0.500	µg/L	B190328	1900190
1906007-06	As(V)	Groundwater	D	489		0.100	0.500	µg/L	B190328	1900190
1906007-06	DMAs	Groundwater	D	≤ 0.125	U	0.125	0.525	µg/L	B190328	1900190
1906007-06	MMAs	Groundwater	D	≤ 0.225	U	0.225	0.575	µg/L	B190328	1900190



Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
M-2018-C4 (0-10)										
1906007-07	As(III)	Groundwater	D	2.47		0.100	0.500	µg/L	B190328	1900190
1906007-07	As(V)	Groundwater	D	279		0.100	0.500	µg/L	B190328	1900190
1906007-07	DMAs	Groundwater	D	≤ 0.125	U	0.125	0.525	µg/L	B190328	1900190
1906007-07	MMAs	Groundwater	D	≤ 0.225	U	0.225	0.575	µg/L	B190328	1900190
M-2018-C18 (0-2.5)										
1906007-08	As(III)	Groundwater	D	17.9		0.100	0.500	µg/L	B190328	1900190
1906007-08	As(V)	Groundwater	D	5.97		0.100	0.500	µg/L	B190328	1900190
1906007-08	DMAs	Groundwater	D	≤ 0.125	U	0.125	0.525	µg/L	B190328	1900190
1906007-08	MMAs	Groundwater	D	≤ 0.225	U	0.225	0.575	µg/L	B190328	1900190
G-2018-C3 (0-5)										
1906007-09	As(III)	Groundwater	D	11600		4.00	20.0	µg/L	B190328	1900190
1906007-09	As(V)	Groundwater	D	525		4.00	20.0	µg/L	B190328	1900190
1906007-09	DMAs	Groundwater	D	≤ 5.00	U	5.00	21.0	µg/L	B190328	1900190
1906007-09	MMAs	Groundwater	D	≤ 9.00	U	9.00	23.0	µg/L	B190328	1900190
G-2018-C6 (28NOV) (2.5-10)										
1906007-10	As(III)	Groundwater	D	1080		4.00	20.0	µg/L	B190328	1900190
1906007-10	As(V)	Groundwater	D	110		4.00	20.0	µg/L	B190328	1900190
1906007-10	DMAs	Groundwater	D	≤ 5.00	U	5.00	21.0	µg/L	B190328	1900190
1906007-10	MMAs	Groundwater	D	≤ 9.00	U	9.00	23.0	µg/L	B190328	1900190
G-2018-C9 (0-7.5)										
1906007-11	As(III)	Groundwater	D	61.4		0.100	0.500	µg/L	B190328	1900190
1906007-11	As(V)	Groundwater	D	41.8		0.100	0.500	µg/L	B190328	1900190
1906007-11	DMAs	Groundwater	D	≤ 0.125	U	0.125	0.525	µg/L	B190328	1900190
1906007-11	MMAs	Groundwater	D	≤ 0.225	U	0.225	0.575	µg/L	B190328	1900190
G-2018-SFC-3										
1906007-12	As(III)	Groundwater	D	88.6		4.00	20.0	µg/L	B190328	1900190
1906007-12	As(V)	Groundwater	D	2320		4.00	20.0	µg/L	B190328	1900190
1906007-12	DMAs	Groundwater	D	≤ 5.00	U	5.00	21.0	µg/L	B190328	1900190
1906007-12	MMAs	Groundwater	D	≤ 9.00	U	9.00	23.0	µg/L	B190328	1900190



Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
G-2018-SFC-8										
1906007-13	As(III)	Groundwater	D	8.56		0.100	0.500	µg/L	B190328	1900190
1906007-13	As(V)	Groundwater	D	132		0.100	0.500	µg/L	B190328	1900190
1906007-13	DMAs	Groundwater	D	≤ 0.125	U	0.125	0.525	µg/L	B190328	1900190
1906007-13	MMAs	Groundwater	D	≤ 0.225	U	0.225	0.575	µg/L	B190328	1900190
G-2018-SFC-11										
1906007-14	As(III)	Groundwater	D	1.57		0.100	0.500	µg/L	B190328	1900190
1906007-14	As(V)	Groundwater	D	59.1		0.100	0.500	µg/L	B190328	1900190
1906007-14	DMAs	Groundwater	D	≤ 0.125	U	0.125	0.525	µg/L	B190328	1900190
1906007-14	MMAs	Groundwater	D	≤ 0.225	U	0.225	0.575	µg/L	B190328	1900190
G-2018-C4 (0-5)										
1906007-15	As(III)	Groundwater	D	4960		4.00	20.0	µg/L	B190328	1900190
1906007-15	As(V)	Groundwater	D	113		4.00	20.0	µg/L	B190328	1900190
1906007-15	DMAs	Groundwater	D	≤ 5.00	U	5.00	21.0	µg/L	B190328	1900190
1906007-15	MMAs	Groundwater	D	≤ 9.00	U	9.00	23.0	µg/L	B190328	1900190



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)						
	MMAAs		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
	MMAAs	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	
	MMAAs	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
	MMAAs	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
	MMAAs	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	
	MMAAs	ND	500.0	507.6	µg/L	102% 75-125	



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



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			MDL: 0.009
Limit: 0.023			MRL: 0.023



Sample Containers

Lab ID: 1906007-01		Report Matrix: Groundwater				Collected: 02/05/2019	
Sample: M-2018-C1 (0-5)		Sample Type: Sample				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		Report Matrix: Groundwater				Collected: 02/05/2019	
Sample: M-2018-SFC-T9		Sample Type: Sample				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		Report Matrix: Groundwater				Collected: 02/05/2019	
Sample: M-2018-C13 (2.5-10)		Sample Type: Sample				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		Report Matrix: Groundwater				Collected: 02/05/2019	
Sample: M-2018-C5 (2.5-10)		Sample Type: Sample				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		Report Matrix: Groundwater				Collected: 02/05/2019	
Sample: M-2018-SFC-T23		Sample Type: Sample				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		Report Matrix: Groundwater				Collected: 02/05/2019	
Sample: M-2018-SFC-T35		Sample Type: Sample				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:	Sample:	Report Matrix:	Sample Type:	Collected:				
1906007-07	M-2018-C4 (0-10)	Groundwater	Sample	02/05/2019				
Des	Container	Size	Lot	Preservation	P-Lot	Received:	pH	Ship. Cont.
A	Vacutainer	10mL	18-0169	EDTA (PP)	na	02/06/2019	na	Cooler - 1906007
1906007-08	M-2018-C18 (0-2.5)	Groundwater	Sample	02/05/2019				
Des	Container	Size	Lot	Preservation	P-Lot	Received:	pH	Ship. Cont.
A	Vacutainer	10mL	18-0169	EDTA (PP)	na	02/06/2019	na	Cooler - 1906007
1906007-09	G-2018-C3 (0-5)	Groundwater	Sample	02/05/2019				
Des	Container	Size	Lot	Preservation	P-Lot	Received:	pH	Ship. Cont.
A	Vacutainer	10mL	18-0169	EDTA (PP)	na	02/06/2019	na	Cooler - 1906007
1906007-10	G-2018-C6 (28NOV) (2.5-10)	Groundwater	Sample	02/05/2019				
Des	Container	Size	Lot	Preservation	P-Lot	Received:	pH	Ship. Cont.
A	Vacutainer	10mL	18-0169	EDTA (PP)	na	02/06/2019	na	Cooler - 1906007
1906007-11	G-2018-C9 (0-7.5)	Groundwater	Sample	02/05/2019				
Des	Container	Size	Lot	Preservation	P-Lot	Received:	pH	Ship. Cont.
A	Vacutainer	10mL	18-0169	EDTA (PP)	na	02/06/2019	na	Cooler - 1906007
1906007-12	G-2018-SFC-3	Groundwater	Sample	02/05/2019				
Des	Container	Size	Lot	Preservation	P-Lot	Received:	pH	Ship. Cont.
A	Vacutainer	10mL	18-0169	EDTA (PP)	na	02/06/2019	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



Chain-of-Custody Form

BAL Report 1906007

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: 1036
 Project ID: _____

Client: EcoMetrix Incorporated
 Contact: Daniel Skruch
 Client Project ID: 18-2525
 Samples Collected By: Amanda Ciosek & Fei Luo

PO Number: 05FEB2019-ALC
 Phone: 1-905-794-2325 ext. 229
 Email: dskruch@ecometrix.ca

Mailing Address: 6800 Campobello Road; Mississauga, ONT
 L5N 2L8; CANADA
 Email Receipt Confirmation? Yes
 BAL PM: Collette Machado

Requested TAT (business days) <input type="checkbox"/> 20 (standard) <input type="checkbox"/> 15* <input type="checkbox"/> 10* <input type="checkbox"/> 5* <input type="checkbox"/> Other _____		Collection		Client Sample Info				BRL Analyses Required							Comments	
		Date	Time	Matrix Type	Number of Containers	Field Filtered?	Preservation Type	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)
*Surcharges may apply to expedited TATs																
Sample ID																
1	M-2018-C1 (0-5)	05-02-19	15:00	Groundwater	1	Yes	Other									Specify Here
2	M-2018-SFC-T9	05-02-19	15:00	Groundwater	1	Yes	Other									*APPLY TO ALL*
3	M-2018-C13 (2.5-10)	05-02-19	15:00	Groundwater	1	Yes	Other									SWA000
4	M-2018-C5 (2.5-10)	05-02-19	15:00	Groundwater	1	Yes	Other									IC-ICP-CRC-MS
5	M-2018-SFC-T23	05-02-19	15:00	Groundwater	1	Yes	Other									Dissolved
6	M-2018-SFC-T35	05-02-19	15:00	Groundwater	1	Yes	Other									As(III)As(V) MMA DMA
7	M-2018-C4 (0-10)	05-02-19	15:00	Groundwater	1	Yes	Other									
8	M-2018-C18 (0-2.5)	05-02-19	15:00	Groundwater	1	Yes	Other									
9	G-2018-C3 (0-5)	05-02-19	15:00	Groundwater	1	Yes	Other									
10	G-2018-C6 (28NOV) (2.5-10)	05-02-19	15:00	Groundwater	1	Yes	Other									
Trip Blank (specify)																
Relinquished By: <u>ACIOSEK</u>		Date: <u>05/02/19</u>	Time: <u>16:00</u>	Relinquished By:				Date:	Time:							
Received By:		Date:	Time:	Total Number of Packages:												

Print



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) <input type="checkbox"/> 20 (standard) <input type="checkbox"/> 15* <input type="checkbox"/> 10* <input type="checkbox"/> 5* <input type="checkbox"/> Other _____ <small>*Surcharges may apply to expedited TATs</small>	Collection		Client Sample Info					BRL Analyses Required							Comments
	Date	Time	Matrix Type	Number of Containers	Field Filtered?	Preservation Type	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)	
Sample ID															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				✓					SWA000
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										
	Tip Blank (specify)		Groundwater		Yes										
Relinquished By: <u>A. Ciosek</u>		Date: <u>02/02/19</u>	Time: <u>16:00</u>	Relinquished By:		Date:	Time:								
Received By:		Date:	Time:	Total Number of Packages:											

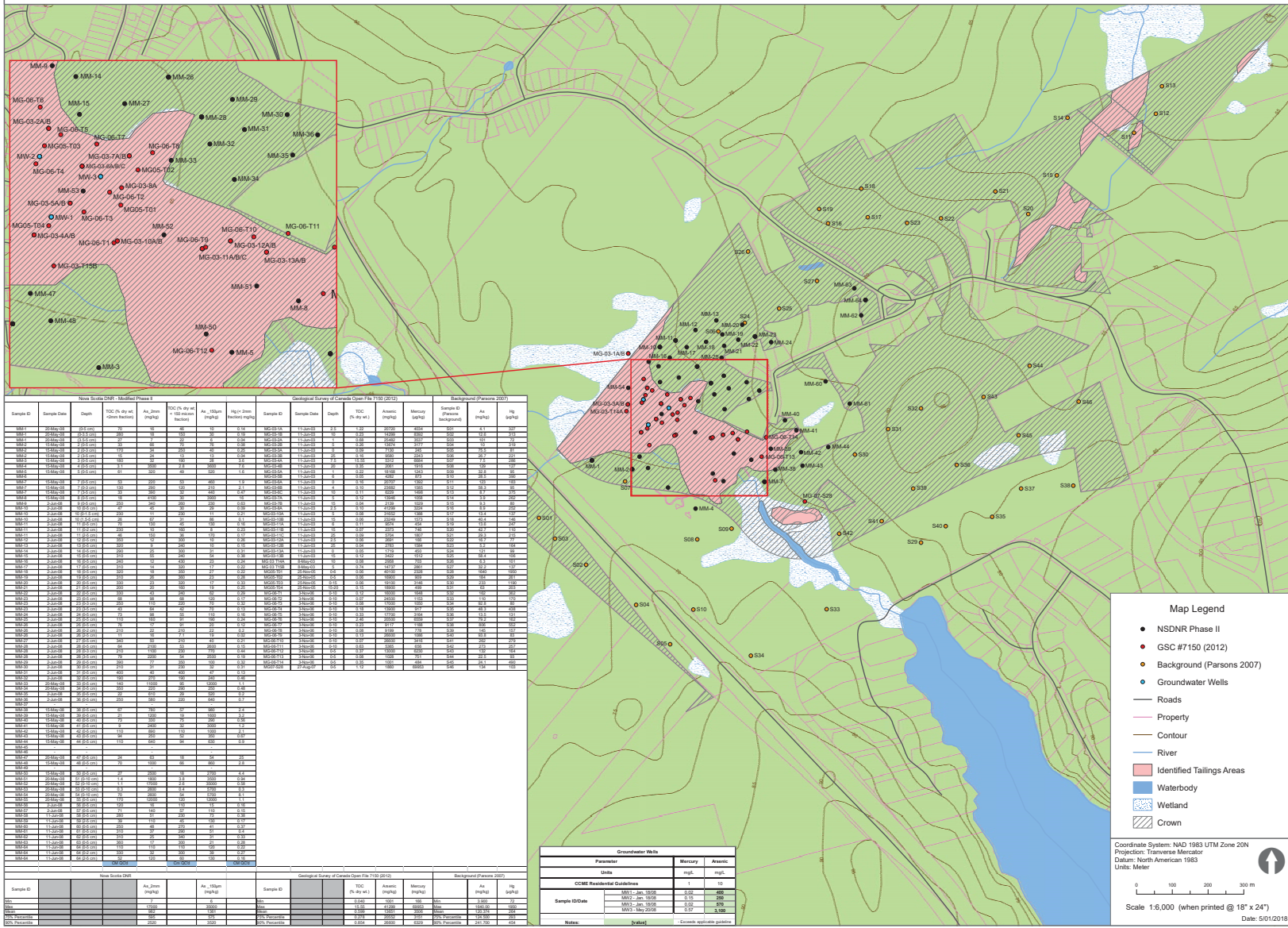
List Hazardous Contaminants: _____





APPENDIX D
Historic Tailings Maps

Montague Site Samples - Arsenic, Total Organic Carbon & Mercury



Coordinate System: NAD 1983 UTM Zone 20N
 Projection: Transverse Mercator
 Datum: North American 1983
 Units: Meter

Scale: 1:6,000 (when printed @ 18" x 24")
 Date: 5/01/2018

X
110130 A1-14-43(00)
432018
402013

Transparency in Ate File



MONTAGUE TAILINGS DISPOSAL



APPENDIX E

Site Water Management Strategy and Treatment

High level hydrological assessment was completed at the Goldenville Site. Detailed water management for the final design and phased construction water management should be completed in future stages of work. 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 further appreciation of the site would be valuable to support future, detailed design work.

The overall objectives of the water management strategy during construction are 1) capture and treat runoff from disturbed areas and 2) divert, where possible, clean water away from the disturbed areas. An area of excavation and disturbance was defined and surrounding watersheds were delineated. Very limited undisturbed catchment area exists upstream of the disturbed area and therefore, no clean water diversions were identified for this site. The downstream boundary of the site is located within the floodplain of the Gegogan River. Due to nature of the floodplain, a diversion berm or equivalent, will need to be installed in order to keep any flooded waters from the Gegogan River separate from the disturbed area and treatment pond. The conceptual water management strategy and watershed boundaries are shown on [Figure 1](#).

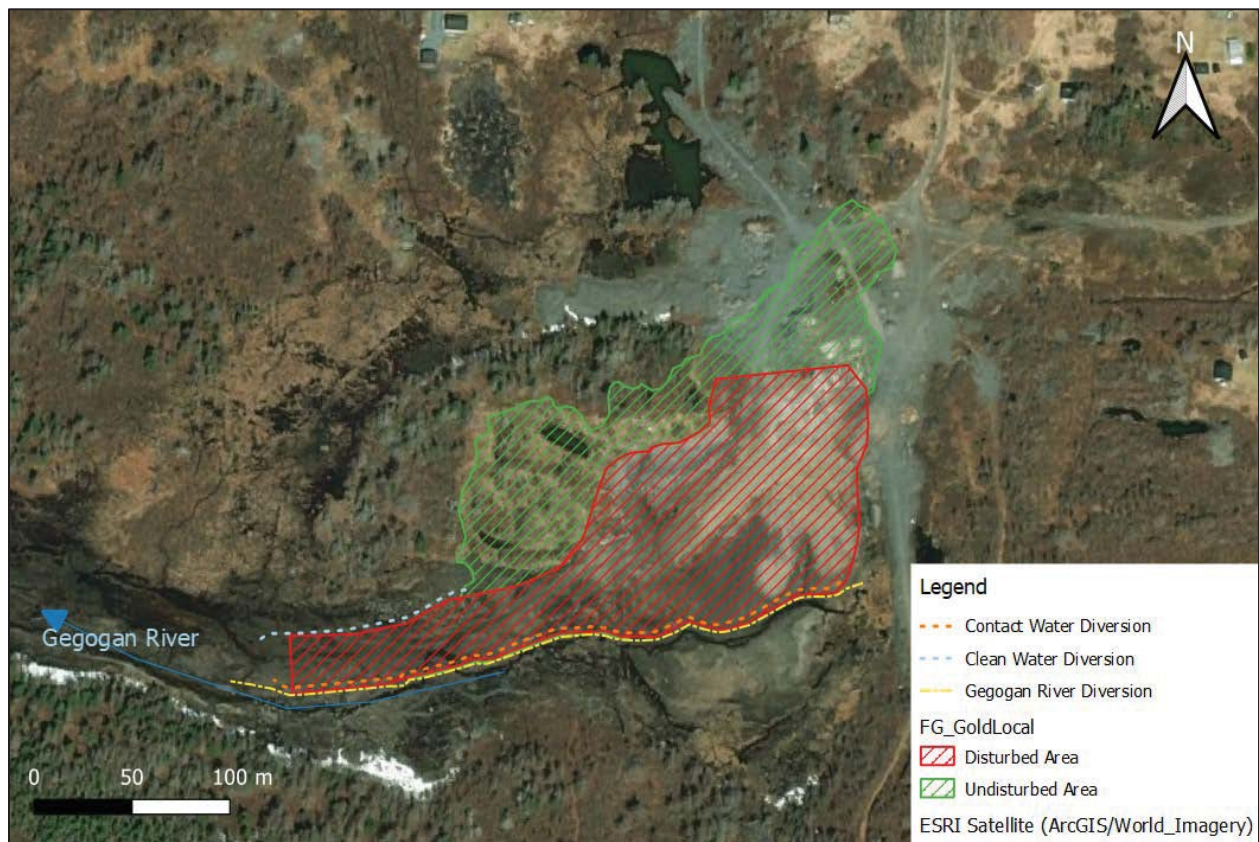


Figure 1: Goldenville Conceptual Water Management Strategy During Construction

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 the purpose of determining the capacity of the pond. This is considered to be 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 4665 m³, consisting of 985 m³ of runoff during the 7 average days of rain and 3680 m³ 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	3.45	ha
Runoff Coefficient	0.9	
Volume of Storage for 7 days	985	m ³
1:10 Year Storm Volume	3,680	m ³
Total Volume Storage	4,665	m ³



APPENDIX F
Detailed Cost Table

TABLE A1: DETAILED COST FOR CONSTRUCTION STAGE 1 - GOLDENVILLE

ITEM	DESCRIPTION	UNIT	BREAKDOWN OF LINE ITEM TOTALS							
			No. Units			ESTIMATE OF UNIT PRICE (\$/UNIT)	Line Item Cost			Total
			Area 1A - Excavation (Non)	Area 1B - Excavation (Non)	Area 3A - Cover		Area 1A - Excavation (Non)	Area 1B - Excavation (Non)	Area 3A - Cover	
DIRECTS										
1.0	Water Diversion									
1.1	Ditch 1 (Water Diversion)									
	Clearing, Stripping, Grubbing	m2	2,023		\$15	30,345			\$30,345	
	Excavation and Stockpiling	m3	476		\$33	15,708			\$15,708	
	Geotextile Placement	m2	1,229		\$3	4,054			\$4,054	
	200 mm Riprap Liner, 0.3 m Thick	m3	369		\$15	5,529			\$5,529	
1.2	Swale 1 (for Containment)									
	Clearing, Stripping, Grubbing	m2			\$15	0				
	Excavation and Stockpiling	m3			\$33	0				
	Geotextile Placement	m2	1,858	1,858	\$3	6,133	6,133		\$12,266	
	200 mm Riprap Liner, 0.3 m Thick	m3	558	558	\$15	8,363	8,363		\$16,726	
1.3	Ditch 3 (for Low Permeability Cover)									
	Clearing, Stripping, Grubbing	m2			\$15					
	Excavation and Stockpiling	m3		3,052	\$33		100,708	156,371	\$257,078	
	Geotextile Placement	m2		4,534	\$3		14,963	23,234	\$38,197	
	200 mm Riprap Liner, 0.3 m Thick	m3		1,360	\$15		20,405	31,683	\$52,087	
2.0	Access Roads/Laydown									
2.1	Access Road 1									
	Clearing, Stripping, Grubbing	m2	4,554	4,010	6,732	\$15	\$66,310	\$60,143	\$100,980	
	Geogrid	m2	4,554	4,010	6,732	\$3	\$15,028	\$13,231	\$22,216	
	<150 mm Rockfill, 1 m Thick	m3	3,450	3,038	5,100	\$22	\$75,900	\$66,825	\$112,200	
	<75 mm Road Topping, 0.3 m Thick	m3	890	784	1,316	\$22	\$19,582	\$17,241	\$28,948	
2.2	Laydown Area 1									
	Clearing, Stripping, Grubbing	m2	1,756			\$15	\$26,340		\$26,340	
	Geogrid	m2	1,756			\$3	\$5,795		\$5,795	
	<150 mm Rockfill, 1 m Thick	m3	1,660			\$22	\$36,520		\$36,520	
	<75 mm Road Topping, 0.3 m Thick	m3	485			\$22	\$10,679		\$10,679	
2.3	Laydown Area 2									
	Clearing, Stripping, Grubbing	m3	1,756	1,756	1,756	\$15	\$26,340	\$26,340	\$26,340	
	Geogrid	m3	1,756	1,756	1,756	\$3	\$5,795	\$5,795	\$5,795	
	<150 mm Rockfill, 1 m Thick	m3	1,660	1,660	1,660	\$22	\$36,520	\$36,520	\$109,560	
	<75 mm Road Topping, 0.3 m Thick	m3	485	485	485	\$22	\$10,679	\$10,679	\$32,036	
3.0	Cut-off Wall									
3.1	Cutoff Wall 1									
	Excavation of Tailings, Mixing, Placement of Soil/Bentonite Cutoff Wall	m	3,465			\$30	\$103,950		\$103,950	
4.0	Containment Cell									
4.1	Containment Cell 1									
	Berm Excavated Tailings/Till (Workable)	m3	52,500			\$33	\$1,732,500		\$1,732,500	
	Liner/Cover Bituminous Geomembrane	m2	71,990			\$22	\$1,583,773		\$1,583,773	
	Drainage <75 mm Clear Stone Drainage Blanket, 0.3 m Thick	m3	7,560			\$22	\$166,320		\$166,320	
	Drainage Geotextile	m2	27,794			\$3	\$91,722		\$91,722	
	Cover Till Cover, 0.3 m Thick	m2	10,905			\$15	\$163,573		\$163,573	
	Cover Vegetative Medium, 0.3 m Thick	m3	10,905			\$15	\$163,573		\$163,573	
	Cover Revegetation	m2	36,350			\$2	\$54,524		\$54,524	
4.2	Containment Cell 2									
	Berm Excavated Tailings/Till (Workable)	m3	36,750			\$33	\$1,212,750		\$1,212,750	
	Liner/Cover Bituminous Geomembrane	m2	40,614			\$22	\$893,508		\$893,508	
	Drainage <75 mm Clear Stone Drainage Blanket, 0.3 m Thick	m3	2,953			\$22	\$64,969		\$64,969	
	Drainage Geotextile	m2	14,267			\$3	\$47,081		\$47,081	
	Cover Till Cover, 0.3 m Thick	m2	6,170			\$15	\$92,549		\$92,549	
	Cover Vegetative Medium, 0.3 m Thick	m3	6,170			\$15	\$92,549		\$92,549	
	Cover Revegetation	m2	20,567			\$2	\$30,850		\$30,850	
5.0	Excavation									
5.1	Area Tailings									
	Excavate Area Tailings and Place in Containment Cell, 2 m Depth	m3	85,208	34,974		\$33	\$2,811,864		\$2,811,864	
6.0	Backfilling									
6.1	Area Tailings									
	Backfill Area Tailings Excavation with "Clean" Fill, 2 m Depth	m3	85,208	34,974		\$15	\$1,278,120		\$1,278,120	
7.0	Cover									
7.1	Area Tailings									
	GCL	m2			23,673	\$19			\$442,687	
	Till Cover, 0.3 m Thick	m3			7,102	\$15			\$106,529	
	Vegetative Medium, 0.3 m Thick	m3			7,102	\$15			\$106,529	
	Revegetation	m2			23,673	\$2			\$35,510	
	Subtotal Direct Costs						\$8,557,539	\$2,821,601	\$1,246,219	\$12,625,358
9.0	Mob/Demob	%	3%	3%	3%		\$256,726	\$84,648	\$37,387	\$378,761
	TOTAL DIRECT COSTS						\$8,814,265	\$2,906,249	\$1,283,605	\$13,004,119
	TOTAL DIRECT COSTS (Rounded)						\$8,820,000	\$2,910,000	\$1,290,000	\$13,020,000
INDIRECTS (% OF TOTAL DIRECT COSTS)										
10.0	Engineering and Construction Supervision	%	13%	13%	13%		\$1,145,855	\$377,812	\$166,869	\$1,690,535
11.0	Owners Costs									
	Procurement	%	3%	3%	3%		\$264,428	\$87,187	\$38,508	\$390,124
	Project Management	%	9%	9%	9%		\$793,284	\$261,562	\$115,524	\$1,170,371
	Administrative Expenses	%	8%	8%	8%		\$705,141	\$232,500	\$102,688	\$1,040,330
	TOTAL INDIRECT COSTS						\$2,908,708	\$959,062	\$423,590	\$4,291,359
	TOTAL INDIRECT COSTS (Rounded)						\$2,910,000	\$960,000	\$430,000	\$4,300,000
CONTINGENCY (% OF TOTAL DIRECT + TOTAL INDIRECT COSTS)										
12.0	General Contingency	%	20%	20%	20%		\$2,344,595	\$772,910	\$341,367	\$3,458,871
	TOTAL CONTINGENCY						\$2,344,595	\$772,910	\$341,367	\$3,458,871
	TOTAL CONTINGENCY (Rounded)						\$2,350,000	\$780,000	\$350,000	\$3,480,000
SUBTOTAL CONSTRUCTION COST										
	SUBTOTAL CONSTRUCTION						\$14,067,668	\$4,638,221	\$2,048,561	\$20,754,350
	SUBTOTAL CONSTRUCTION (Rounded)						\$14,080,000	\$4,650,000	\$2,070,000	\$20,800,000
ADDITIONAL ALLOWANCES - WATER TREATMENT (% OF TOTAL DIRECT COSTS)										
13.0	Water Treatment	%	7%	2%	2%		\$616,999	\$58,125	\$25,672	\$700,796
	TOTAL WATER TREATMENT (Rounded)						\$620,000	\$60,000	\$30,000	\$710,000
ADDITIONAL ALLOWANCES - SITE CONTROL MEASURES (% OF TOTAL DIRECT COSTS)										
14.0	Site Control Measures	%	3%	3%	3%		\$264,428	\$87,187	\$38,508	\$390,124
	TOTAL SITE CONTROL MEASURES (Rounded)						\$270,000	\$90,000	\$40,000	\$400,000
TOTAL CONSTRUCTION COST										
	TOTAL CONSTRUCTION						\$14,948,994	\$4,783,533	\$2,112,742	\$21,845,269
	TOTAL CONSTRUCTION (Rounded)						\$14,970,000	\$4,800,000	\$2,140,000	\$21,910,000



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 Goldenville Mines Tailings. This process was planned to be used to support of the closure options for the Goldenville 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 Goldenville Mine site.

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 Goldenville 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 – HISTORIC GOLDENVILLE 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 Goldenville 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 than 10 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.

