

**APPENDIX 15-F**  
**2010 WATER QUALITY AND AQUATIC RESOURCES**  
**BASELINE REPORT**

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Seabridge Gold Inc.

# KSM PROJECT

## 2010 Water Quality and Aquatic Resources Baseline Report

SEABRIDGE GOLD



# KSM PROJECT

## 2010 WATER QUALITY AND AQUATIC RESOURCES BASELINE REPORT

June 2011  
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Prepared for:

**SEABRIDGE GOLD**

Seabridge Gold Inc.

Prepared by:



Engineers and Scientists

Rescan™ Environmental Services Ltd.  
Vancouver, British Columbia

KSM PROJECT  
2010 Water Quality and Aquatic Resources Baseline Report

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## Executive Summary

## Executive Summary

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The 2010 KSM Project Water Quality and Aquatic Resource baseline program was designed to continue work started in 2007 by collecting baseline water quality data for streams and rivers within the Project study area. To meet the program objectives, 30 stream sites were selected within the KSM study area (i.e., Mitchell/Sulphurets/Unuk, Teigen/Snowbank/Bell-Irving and Treaty/Bell-Irving watersheds). At each site, water quality samples were collected to characterize the natural spatial and temporal variation present in these systems. Water samples were collected on a monthly and quarterly basis and water quality parameter concentrations were compared to federal and provincial water quality guidelines.

The aquatic resource program added a new site in Gingras Creek in August, a south flowing tributary that joins Sulphurets Creek immediately downstream of the mouth of Mtichell Creek. This site was sampled for sediment quality, periphyton, and benthic invertebrates.

Overall, most streams in the KSM Project area in 2010 were slightly basic, with low to moderate buffering capacity and soft to moderately hard water. pH values were slightly basic at most sites and were within the CCME water quality guidelines for the protection of aquatic life. Alkalinity at most sites was moderate and was lowest during the summer months due to the dilution from freshet and glacial melt waters. The exception was three sites within the Mitchell Creek watershed, MC1A, MC1A-US, and MC1 located just below the toe of the Mitchell Glacier. pH at these sites was acidic (ranging from 2.9 to 4.7), and was below the lower CCME and BC Maximum guidelines limit (pH=6.5). Alkalinity at these sites was also low.

General physical parameters of water, such as hardness, total dissolved solids and conductivity were lowest during freshet in the spring and early summer and during the heavy rains in the fall. Total suspended solid concentrations, turbidity and metal concentrations, were generally highest during high flow periods. Concentrations of many metals naturally exceeded the provincial and federal water quality guidelines for the protection of aquatic life, reflecting the naturally high mineral content of the KSM Project waters. Parameters that exceeded provincial and federal water quality guidelines were fluoride, sulphate and a group of metals that included total aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, selenium, silver, zinc, and dissolved aluminum and dissolved iron. The frequency of exceedances was highest in the Mitchell and Sulphurets watersheds. The lowest concentrations of metals were found within the Teigen Creek watershed.

At the three low-pH sites within the Mitchell Creek watershed (MC1A, MC1A-US, and MC1), metal concentrations were higher during the low flow period. These sites were most likely influenced by groundwater seepage and naturally occurring acid rock drainage.

The sediments at the Gingras Creek sampling site were largely composed of sand (89%). Concentrations of total nitrogen and available phosphate were low, while arsenic, chromium, copper, and nickel all exceeded the CCME and BC sediment quality guidelines.

The average density of periphyton was  $6.6 \times 10^6$  cells/cm<sup>2</sup> and the periphyton community was dominated by a single species of blue-green algae, *Homoeothrix varians*. The average periphyton biomass was 0.13 µg chl a/cm<sup>2</sup>, with an average richness of 19 taxa, and Simpson's Diversity Index of 0.024.

Benthic invertebrate communities had an average density of 163 organisms/m<sup>2</sup> and consisted of 15 taxa. Benthos was dominated by insects, particularly *Plecoptera* (64%), followed by *Chironomidae* (20%).

KSM PROJECT  
2010 Water Quality and Aquatic Resources Baseline Report

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## Table of Contents

# KSM PROJECT

## 2010 WATER QUALITY AND AQUATIC RESOURCES BASELINE REPORT

### Table of Contents

---

Executive Summary .....	i
Table of Contents .....	iii
List of Figures .....	iv
List of Tables .....	v
List of Plates .....	v
List of Appendices .....	vi
1. Introduction .....	1-1
1.1 Project Proponent .....	1-1
1.2 KSM Project Location .....	1-1
1.3 KSM Project Description .....	1-1
2. Objectives .....	2-1
3. Study Area .....	3-1
4. Methodology .....	4-1
4.1 Stream Water Quality .....	4-1
4.2 Gingras Creek Aquatic Resources .....	4-3
4.2.1 Sediment Quality .....	4-3
4.2.2 Primary Producers - Periphyton .....	4-4
4.3 Quality Assurance and Quality Control (QA/QC) .....	4-5
5. Results .....	5-1
5.1 Water Quality .....	5-1
5.1.1 General Parameters .....	5-1
5.1.2 Suspended Material, Anions and Cyanides .....	5-6
5.1.3 Nutrients .....	5-11
5.1.4 Total and Dissolved Metals .....	5-11
5.1.5 Comparison to Water Quality Guidelines .....	5-29
5.1.5.1 Teigen Creek and Bell-Irving River .....	5-29
5.1.5.2 Treaty Creek and Reference Sites .....	5-29
5.1.5.3 Unuk River .....	5-30
5.1.5.4 Mitchell and Sulphurets Creek .....	5-30

## 2010 WATER QUALITY AND AQUATIC RESOURCES BASELINE REPORT

5.2	Gingras Creek Sediment quality and Aquatic Resources.....	5-33
5.2.1	Sediment Quality .....	5-33
5.2.2	Primary Producers - Periphyton.....	5-34
5.2.3	Benthic Invertebrates.....	5-34
5.3	Quality Assurance and Quality Control (QA/QC) .....	5-35
6.	Summary .....	6-1
6.1	Water Quality .....	6-1
6.2	Gingras Creek Aquatic Resources.....	6-1
	References.....	R-1

### List of Figures

FIGURE	PAGE
Figure 1.2-1. KSM Project Location .....	1-2
Figure 1.3-1. 2011 KSM Project Layout .....	1-3
Figure 3-1. 2010 KSM Project Aquatic and Water Quality Sampling Sites .....	3-2
Figure 5.1-1. pH in the KSM Project Streams, 2010 .....	5-2
Figure 5.1-2. Alkalinity in the KSM Project Streams, 2010.....	5-3
Figure 5.1-3. Hardness in the KSM Project Streams, 2010 .....	5-4
Figure 5.1-4. Total Dissolved Solids Concentrations in the KSM Project Streams, 2010 .....	5-5
Figure 5.1-5. Total Suspended Solids Concentrations in the KSM Project Streams, 2010.....	5-7
Figure 5.1-6. Turbidity in the KSM Project Streams, 2010 .....	5-8
Figure 5.1-7. Fluoride Concentrations in the KSM Project Streams, 2010.....	5-9
Figure 5.1-8. Sulphate Concentrations in the KSM Project Streams, 2010 .....	5-10
Figure 5.1-9. Total Cyanide Concentrations in the KSM Project Streams, 2010 .....	5-12
Figure 5.1-10. Nitrate Concentrations in the KSM Project Streams, 2010.....	5-13
Figure 5.1-11. Total Phosphorus Concentrations in the KSM Project Streams, 2010 .....	5-14
Figure 5.1-12. Total Organic Carbon Concentrations in the KSM Project Streams, 2010 .....	5-15
Figure 5.1-13. Total Aluminum Concentrations in the KSM Project Streams, 2010.....	5-16
Figure 5.1-14. Dissolved Aluminum Concentrations in the KSM Project Streams, 2010.....	5-17
Figure 5.1-15. Total Arsenic Concentrations in the KSM Project Streams, 2010 .....	5-18
Figure 5.1-16. Total Cadmium Concentrations in the KSM Project Streams, 2010.....	5-19

## TABLE OF CONTENTS

Figure 5.1-17. Total Chromium Concentrations in the KSM Project Streams, 2010.....	5-20
Figure 5.1-18. Total Copper Concentrations in the KSM Project Streams, 2010 .....	5-21
Figure 5.1-19. Total Iron Concentrations in the KSM Project Streams, 2010 .....	5-22
Figure 5.1-20. Dissolved Iron Concentrations in the KSM Project Streams, 2010 .....	5-23
Figure 5.1-21. Total Lead Concentrations in the KSM Project Streams, 2010 .....	5-24
Figure 5.1-22. Total Manganese Concentrations in the KSM Project Streams, 2010.....	5-25
Figure 5.1-23. Total Selenium Concentrations in the KSM Project Streams, 2010.....	5-26
Figure 5.1-24. Total Silver Concentrations in the KSM Project Streams, 2010 .....	5-27
Figure 5.1-25. Total Zinc Concentrations in the KSM Project Streams, 2010 .....	5-28

### List of Tables

TABLE	PAGE
Table 3-1. Baseline Water Quality and Aquatic Resource Sampling Sites, KSM Project, 2010.....	3-3
Table 4.1-1. Water Quality Parameters and Detection Limits, KSM Project, 2010. ....	4-1
Table 4.1-2. Container, Preservation and Handling Requirements for Water Quality Samples .....	4-3
Table 4.2-1. Sediment Quality Realized Analytical Detection Limits, KSM Project, 2010.....	4-4
Table 5.1-1. Summary of Water Quality Frequency and Magnitude of Guideline Exceedances, KSM Project, 2010 .....	5-31
Table 5.2-1. Summary of Sediment Quality and Comparisons to Sediment Quality Guidelines, Gingras Creek, 2010.....	5-33
Table 5.2-2. Summary of Gingras Creek Periphyton Taxonomy and Biomass, KSM Project, 2010. ....	5-34
Table 5.2-3. Summary of the Gingras Creek Benthic Invertebrate Taxonomy, KSM Project, 2010. ...	5-35

### List of Plates

PLATE	PAGE
Plate 4.1-1. Stream water quality sampling. ....	4-2

List of Appendices

- Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010
- Appendix 5.1-2. Stream Water Quality Field and Travel Blanks, KSM Project, 2010
- Appendix 5.1-3. Relative Percent Difference (RPD) Results for Water Quality Duplicate Samples, KSM Project, 2010
- Appendix 5.2-1. Sediment Quality Data for GC1 (Gingras Creek), KSM Project Area, 2010
- Appendix 5.2-2. Periphyton Taxonomic Composition and Abundance at GC1 (Gingras Creek), KSM Project Area, 2010
- Appendix 5.2-3. Periphyton Biomass (chlorophyll *a*) at GC1 (Gingras Creek), KSM Project Area, 2010
- Appendix 5.2-4. Taxonomic Composition and Density of Benthic Invertebrates at GC1 (Gingras Creek), KSM Project Area, 2010

KSM PROJECT  
2010 Water Quality and Aquatic Resources Baseline Report

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# 1. Introduction

# **1. Introduction**

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## **1.1 PROJECT PROPOSER**

The proponent for the KSM (Kerr-Sulphurets-Mitchell) Project is Seabridge Gold Inc. (Seabridge), a publicly traded junior gold company with common shares trading on the Toronto Stock Exchange in Canada and on the American Stock Exchange in the United States.

## **1.2 KSM PROJECT LOCATION**

The KSM Project is a gold/copper project located in the mountainous terrain of northwestern British Columbia, approximately 950 km northwest of Vancouver, British Columbia, and approximately 65 km northwest of Stewart, British Columbia (Figure 1.2-1). The proposed Project lies approximately 20 km southeast of Barrick Gold's recently-closed Eskay Creek Mine and 30 km northeast of the Alaska border. The proposed processing plant and tailing management facility will be located about 15 km southwest of the community of Bell II on Highway 37.

The north and west parts of the Project area drain towards the Unuk River, which crosses into Alaska and enters the Pacific Ocean at Burroughs Bay. The eastern part of the Project area drains towards the Bell-Irving River, which joins the Nass River and empties into the Canadian waters of Portland Inlet. Elevations in the Project area range from under 240 m at the confluence of Sulphurets Creek with the Unuk River, to over 2,300 m at the nearby peak of the Unuk Finger.

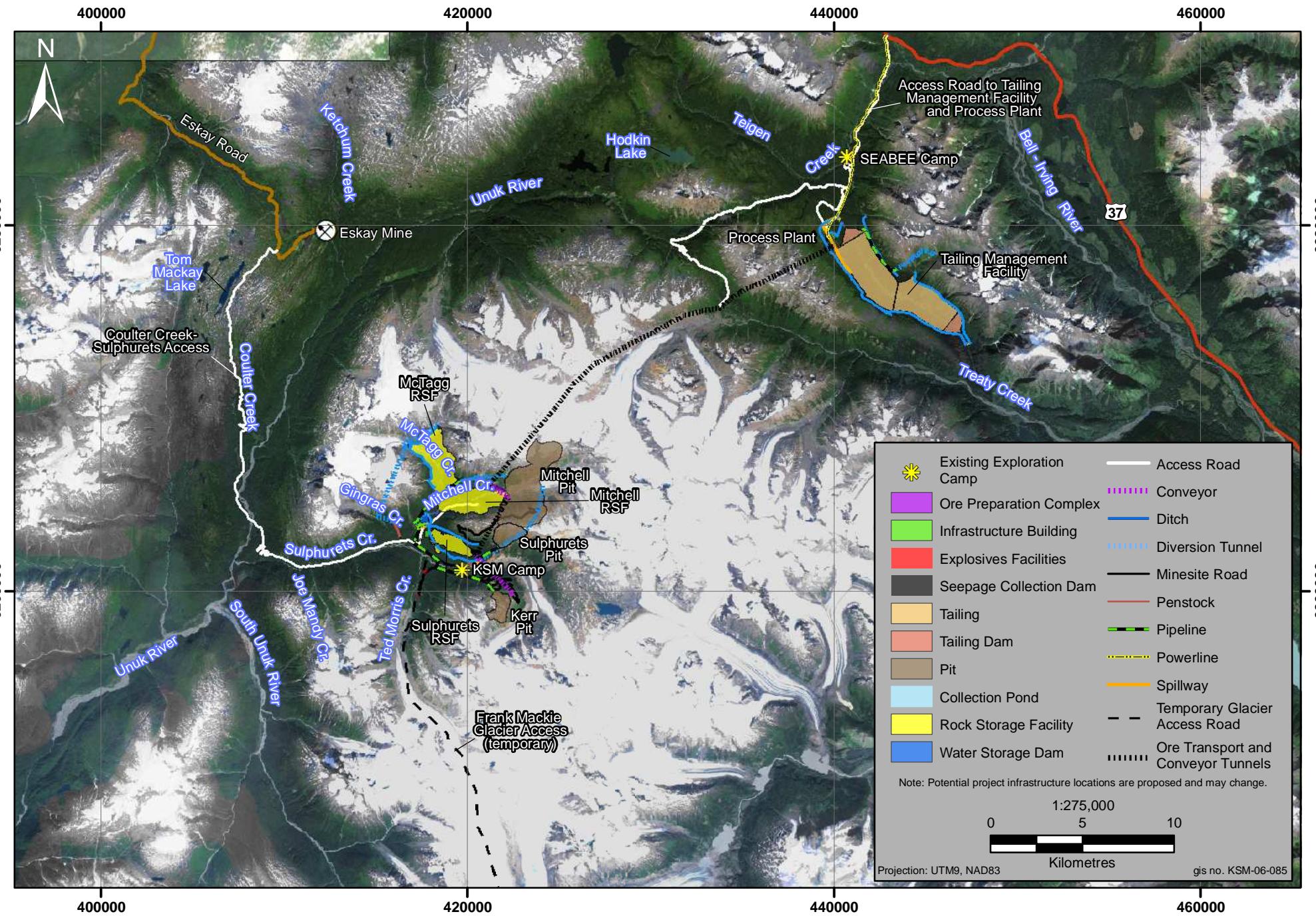
## **1.3 KSM PROJECT DESCRIPTION**

The proposed Project as defined for the purposes of this environmental baseline study will be comprised of two distinct and geographically separate areas (the Mining Area, and Process Plant and Tailing Management Area; Figure 1.3-1).

The proposed Mining Area is located in the drainage basin of Sulphurets Creek, a major tributary of the Unuk River. It will be accessed by a new road, the Coulter Creek Access Road, to be constructed from the current Eskay Creek Mine road. Four deposits will be mined: the Kerr, Sulphurets, Mitchell, and Iron Cap. Ore will be crushed and ground at an Ore Preparation Complex and then pumped as slurry through one of two parallel 23 km long tunnels to the Process Plant. Non-ore mined (waste) rock will be stored in engineered facilities to be located in the vicinity of the pits. Surface water that contacts disturbed areas will be collected and treated at a Water Treatment Plant.

The Process Plant and Tailing Management Facility (TMF) will be located in the headwaters of tributaries of Teigen and Treaty Creeks, which flow to the Bell-Irving River. A new road parallel to Teigen Creek will connect the Process Plant to Highway 37 about 14 km to the northeast. The Process Plant will process up to 120,000 tonnes per day of ore to produce an average of 1,200 tonnes per day of concentrate that will be transported to the port of Stewart by truck. The tailing will be pumped to the TMF, to be located in the headwaters of a southern tributary of Teigen Creek and a northern tributary of Treaty Creek.





KSM PROJECT  
2010 Water Quality and Aquatic Resources Baseline Report

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## 2. Objectives

## **2. Objectives**

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The initial assessment of baseline water quality conditions in the Project-related water courses began in 2007 and continued through to 2009. A comprehensive stream and lake aquatic ecology baseline was conducted in 2008 and 2009. The purpose of the baseline studies was to characterize the physical and chemical nature of the water and sediment in the Project area as well as the biology of the surrounding streams, rivers, and lakes. This information will provide support for the proposed Project design and the anticipated environmental assessment.

The purpose of the 2010 water quality baseline monitoring was to provide further monitoring and baseline data at key stream sites within the receiving environments to support the proposed Project design and the anticipated environmental assessment. In addition, one site in Gingras Creek was surveyed in 2010 for sediment, periphyton and benthic invertebrates as a receiving environment stream from a potential location of an additional waste rock storage area. The objectives of this 2010 baseline study were:

- To characterize the spatial and temporal background conditions of water quality in rivers and streams within the vicinity of the proposed Project so that monitoring programs can identify any significant changes resulting from proposed Project activities;
- Obtain baseline information of sediment quality (physical, organics, metals, nutrients) in Gingras Creek;
- Obtain baseline information regarding the diversity and distribution of algal and benthic invertebrate communities in Gingras Creek.

KSM PROJECT  
2010 Water Quality and Aquatic Resources Baseline Report

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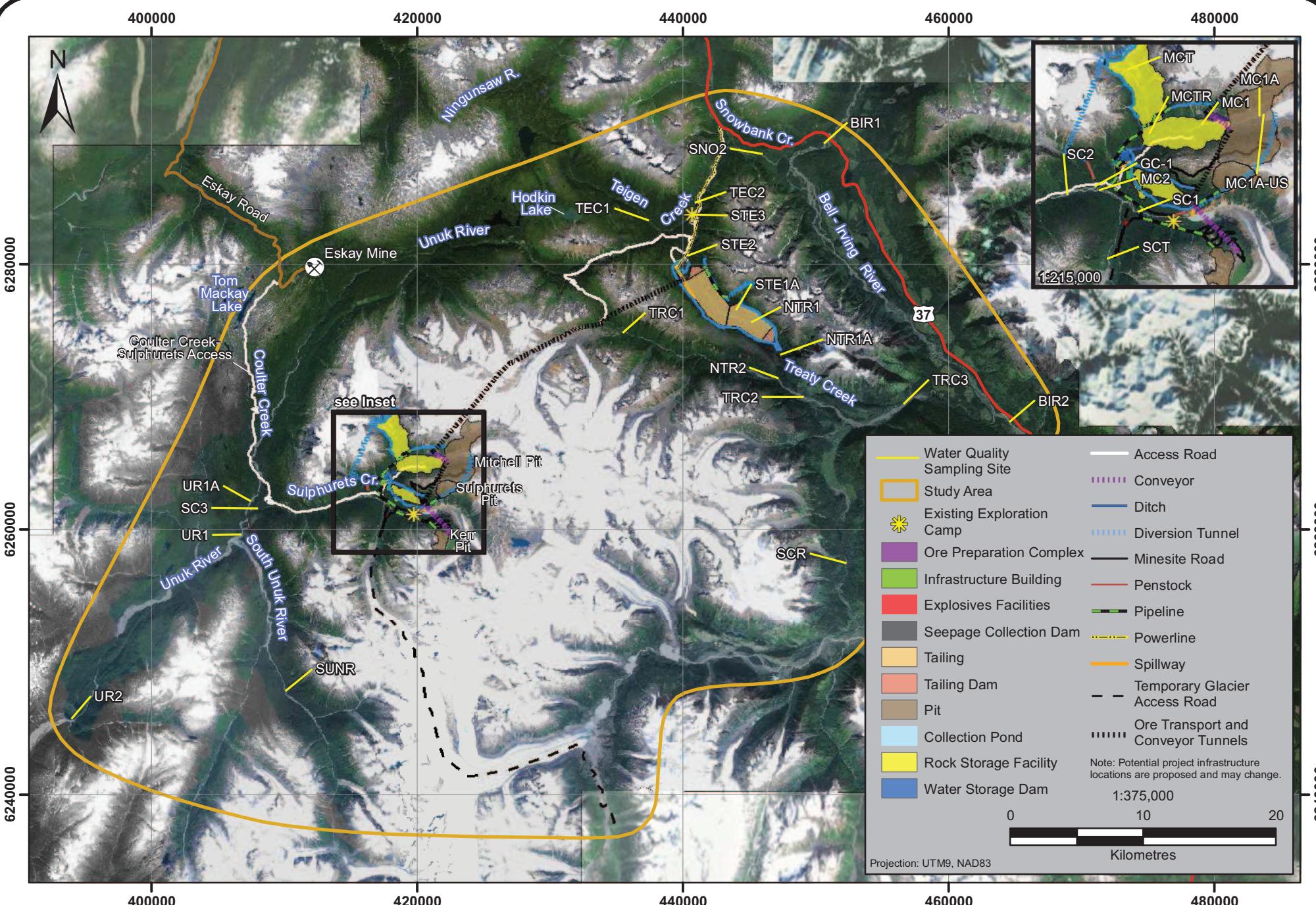
### 3. Study Area

### **3. Study Area**

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The 2010 baseline stream water quality program focussed on the watersheds that could potentially be affected by mine development and operation (i.e., Mitchell/Sulphurets/Unuk, Teigen/Snowbank/Bell-Irving and Treaty/Bell-Irving) (Figure 3-1). A total of 30 stream and river sampling sites spanning eight watersheds were included in the stream water quality program. These sampling sites were within or near the Project site and included two reference sites: Scott Creek (SCT) and South Unuk River (SUNR). Sites in the Teigen Creek watershed were selected to address the potential impacts of the proposed process plant, tailing management facility and associated roads. McTagg, Gingras, Sulphurets, and Mitchell creeks, and Unuk River were selected to examine the area potentially affected by the proposed mine site and the associated access roads. In addition, two sites on the Bell-Irving River were monitored to provide an additional reference site and to monitor far-field changes to water quality. A detailed list of study sites is provided in Table 3-1.

An aquatic resources assessment that included sediment, periphyton and benthic invertebrate assessment was conducted at one site in Gingras Creek in August to expand the baseline to allow future effects assessment of any development in that watershed (Table 3-1).



**Table 3-1. Baseline Water Quality and Aquatic Resource Sampling Sites, KSM Project, 2010**

Watershed	Site Code	Site Name	Water Quality		Aquatic Resources			Coordinates	
			Monthly	Quarterly	Sediment	Periphyton	Benthos	Easting	Northing
Teigen Creek	SNO2	Teigen Creek, downstream of Snowbank Creek		1				445983	6288319
	STE1A	South Teigen Creek, in tailing pond	1					443985	6276533
	STE2	South Teigen Creek, at discharge of tailing pond	1					440301	6280622
	STE3	South Teigen Creek, downstream	1					440798	6283737
	TEC1	Teigen Creek, alternate tailing area	1					437433	6283300
	TEC2	Teigen Creek, downstream	1					440891	6284631
Bell-Irving River	BIR1	Bell-Irving River, upper		1				450584	6289098
	BIR2	Bell-Irving River, lower		1				464582	6268090
Unuk River	UR1A	Unuk River, upstream of Sulphurets	1					407466	6262103
	UR1	Unuk River, mid	1					406723	6259606
	UR2	Unuk River, lower		1				393969	6245694
South Unuk River	SUNR	South Unuk River, reference site	1					410050	6247805
Treaty Creek	TRC1	Treaty Creek upstream		1				435452	6274827
	TRC2	Treaty Creek, mid		1				449071	6269971
	TRC3	Treaty Creek, lower	1					456592	6269436
	NTR1	Treaty Creek Tributary, upper		1				445153	6275601
	NTR1A	Treaty Creek Tributary, mid	1					447342	6273154
	NTR2	Treaty Creek Tributary, lower		1				447201	6271387
Scott Creek	SCR	Scott Creek, reference site		1				452294	6257434
Mitchell Creek	MC1A	Mitchell Creek, 200 m from toe of glacier	1						
	MC1A-US	Mitchell Creek, at toe of glacier	1					423594	6265726
	MC1	Mitchell Creek, mid	1					420887	6265290
	MC2	Mitchell Creek, lower	1					416478	6262475
	MCT	McTagg Creek, confluence of 2 upper tributaries		1				417683	6267675
	MCTR	McTagg Creek, lower		1				418645	6264904
	GC1	Gingras Creek		1	1	1	1	416295	6262639
Sulphurets Creek	SC1	Sulphurets Creek, upstream	1					418143	6261557
	SC2	Sulphurets Creek, mid	1					415127	6262273
	SC3	Sulphurets Creek, lower	1					408001	6261574
	SCT	Sulphurets Creek Tributary		1	1	1	1	416821	6259507
<b>Sub-total</b>			<b>17</b>	<b>13</b>					
<b>Total number of sampling sites</b>				<b>30</b>					

KSM PROJECT  
2010 Water Quality and Aquatic Resources Baseline Report

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## 4. Methodology

## 4. Methodology

### 4.1 STREAM WATER QUALITY

Water quality samples were analyzed for general variables, anions, nutrients, cyanides, total organic carbon, and total and dissolved metals. In addition to total cyanide, thiocyanate and weak acid dissociable (WAD) cyanide were analyzed in 2010 to gain a better understanding of the naturally occurring cyanide components in select streams near the proposed tailing management facility. These samples were collected at NTR1A, NTR2, STE2, STE3, TEC2, TRC2, and the reference stream, SUNR. One sample for thiocyanate and weak acid dissociable (WAD) cyanide was taken at UR1A in March. All water quality samples were analyzed at the lowest available detection limit by ALS Environmental Services in Burnaby, BC. A list of the water quality parameters analyzed is presented in Table 4.1-1 along with their realized analytical detection limits.

**Table 4.1-1. Water Quality Parameters and Detection Limits, KSM Project, 2010.**

Parameter	Unit	Detection Limit (mg/L)	Parameter	Unit	Detection Limit (mg/L)
<b>Physical/Dissolved Anions</b>					
Colour (CU)	CU	5	Antimony	mg/L	0.0001 to 0.0002
Conductivity	µS/cm	2	Arsenic	mg/L	0.0001 to 0.0005
pH	pH units	0.1	Barium	mg/L	0.00005 to 0.0001
Total Suspended Solids	mg/L	3 to 9	Beryllium	mg/L	0.0005 to 0.001
Turbidity	NTU	0.1	Bismuth	mg/L	0.0005 to 0.001
Total Dissolved Solids	mg/L	10 to 13	Boron	mg/L	0.01 to 0.02
Hardness	mg/L	0.5	Cadmium	mg/L	0.00001 to 0.00002
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	1 to 2	Calcium	mg/L	0.02 to 0.04
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	1 to 2	Chromium	mg/L	0.0001 to 0.001
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	1 to 2	Cobalt	mg/L	0.0001 to 0.0002
Total Alkalinity (as CaCO <sub>3</sub> )	mg/L	1 to 2	Copper	mg/L	0.0001 to 0.0007
Acidity	mg/L	1	Iron	mg/L	0.03
Bromide	mg/L	0.05 to 2.5	Lead	mg/L	0.00005 to 0.0002
Chloride	mg/L	0.5 to 25	Lithium	mg/L	0.005 to 0.01
Fluoride	mg/L	0.02 to 1	Magnesium	mg/L	0.005 to 0.01
Sulphate	mg/L	0.5 to 25	Manganese	mg/L	0.00005 to 0.0001
<b>Nutrients</b>					
Ammonia (as N)	mg/L	0.005 to 0.02	Mercury	mg/L	0.00001
Nitrate (as N)	mg/L	0.005 to 0.25	Molybdenum	mg/L	0.00005 to 0.0001
Nitrite (as N)	mg/L	0.001 - 0.05	Nickel	mg/L	0.0005 to 0.001
Total Kjeldahl Nitrogen	mg/L	0.05 to 0.1	Phosphorus	mg/L	0.3
Total Nitrogen	mg/L	0.0025 to 0.06	Potassium	mg/L	0.05 to 0.1
			Selenium	mg/L	0.0001 to 0.0004

*(continued)*

**Table 4.1-1. Water Quality Parameters and Detection Limits, KSM Project, 2010. (completed)**

Parameter	Unit	Detection Limit (mg/L)	Parameter	Unit	Detection Limit (mg/L)
Total Phosphate (as P)	mg/L	0.001 to 0.05	Silicon	mg/L	0.05
Ortho Phosphate (as P)	mg/L	0.001 to 0.05	Silver	mg/L	0.00001 to 0.00002
<b>Cyanides</b>			Sodium	mg/L	2
Total Cyanide	mg/L	0.001 to 0.002	Strontium	mg/L	0.0001 to 0.0002
Cyanide, Weak Acid Dissociable (WAD)	mg/L	0.001 to 0.002	Thallium	mg/L	0.0001 to 0.0002
Thiocyanate (SCN)	mg/L	0.5	Tin	mg/L	0.0001 to 0.0002
<b>Organic / Inorganic Carbon</b>			Titanium	mg/L	0.01
Total Organic Carbon	mg/L	0.5	Uranium	mg/L	0.00001 to 0.00002
<b>Total/Dissolved Metals</b>			Vanadium	mg/L	0.001 to 0.002
Aluminum	mg/L	0.001 to 0.01	Zinc	mg/L	0.001 to 0.003

All stream water quality samples were collected as single replicates in clean, labelled bottles. At all streams, field sampling personnel wore nitrile gloves and collected water samples while facing upstream by submerging the bottles until they were almost full, leaving enough room for the addition of any necessary preservatives (Plate 4.1-1). Dissolved metal samples were filtered and preserved at ALS to avoid risk of contamination in the field. Where safety considerations allowed, water samples were collected in mid-stream; however, for larger rivers it was necessary to collect samples closer to the shore. After preservation, samples were stored in a dark, cool place until shipment. Table 4.1-2 summarizes the sample container, preservation and handling requirements for water quality samples.

*Plate 4.1-1. Stream water quality sampling.*

**Table 4.1-2. Container, Preservation and Handling Requirements for Water Quality Samples**

Analyte	Container	Preservative	Handling
Physical/ Anions/ Nutrients	1 L plastic	None	ship in cooler with ice packs; store at 4°C
Total Organic Carbon	125 mL amber glass	hydrochloric acid	ship in cooler with ice packs; store at 4°C
Dissolved Metals	250 mL plastic	nitric acid (lab)	ship in cooler with ice packs; store at 4°C
Total Metals	250 mL plastic	nitric acid	ship in cooler with ice packs; store at 4°C
Ammonia, total Kjeldahl nitrogen	250 mL amber glass	sulphuric acid	ship in cooler with ice packs; store at 4°C
Total Cyanide	1 L plastic	sodium hydroxide	ship in cooler with ice packs; store at 4°C

All raw data are presented in the appendices. Some variables could not be measured reliably below a specified detection limit and are reported by the analytical laboratory as below that detection limit. For the purposes of statistical analyses and graphical presentation, these values (called non-detects) were replaced with half of the detection limit. More than one detection limit was realized for some samples during the course of the 2010 program, as indicated in Table 4.1-1. This occurred when dilution of a sample was required to compensate for high concentrations of other, interfering parameters.

Stream water quality samples were collected monthly at 17 sites, and quarterly at 13 sites (30 sites total) (Table 3-1). Monthly sampling began in late January, 2010, while quarterly sampling began in late March, with other surveys conducted in June, August, and November. MC1A, a Mitchell Creek site downstream of the Mitchell glacier, was relocated in July to approximately 200 m upstream to the very toe of the glacier and continued to be monitored at the new location under a new name, MC1A-US (it was sampled at both locations in July). Avalanche risk and dangerous helicopter access limited sampling at select sites in the winter.

## 4.2 GINGRAS CREEK AQUATIC RESOURCES

Sediment, periphyton and benthic invertebrate samples were collected at the Gingras Creek site, GS1, in August, 2010.

### 4.2.1 Sediment Quality

Sediment samples were collected and analyzed for moisture, particle size, cyanides, nutrients, organic carbon, and total metal concentrations at the lowest available detection limit. A list of sediment quality variables determined from the stream sites is presented in Table 4.2-1. Metal analyses were done on the fine fraction of the sediment (<0.63 µm) because metals are predominantly associated with the fine-grained fraction in aquatic sediments. In smaller grain sizes, the fraction of silica decreases, surface area increases, ion exchange capacity increases, and clay mineral content increases, thereby increasing the capacity for metals to bind to these fractions (Filion and Morin 2000). Whole sediment samples were analyzed for particle size distribution.

Sediment samples were collected in triplicate using a plastic bowl and spoon. Sampling was conducted at three distinct areas of the creek. For each sample, sediment was spooned from the top 2 cm at three points along the stream. The sample was pooled, excess water was drained off, and the sediment was manually homogenized for one minute in the mixing bowl.

Sediment was then carefully spooned into clean, pre-labeled Whirl-Pak bags, sealed (no air bubbles), and kept cool in the dark until the samples were shipped to and analyzed by ALS Environmental Services (Burnaby, BC). The bowl and spoon were rinsed with diluted nitric acid and sample water between sample sites.

**Table 4.2-1. Sediment Quality Realized Analytical Detection Limits, KSM Project, 2010**

Parameters	Detection Limit	Parameters	Detection Limit
<b>Physical Tests</b>	0.1	<b>Metals</b>	10
% Moisture	0.1	Antimony (Sb)	10
pH	0.1	Arsenic (As)	5
<b>Particle Size</b>		Beryllium (Be)	0.5
% Gravel (>2 mm)	0.1	Barium (Ba)	1
% Sand (2.0 mm - 0.063 mm)	0.1	Cadmium (Cd)	0.5
% Silt (0.063 mm - 4 µm)	0.1	Calcium (Ca)	50
% Clay (<4 µm)	0.1	Chromium (Cr)	2
<b>Nutrients</b>		Cobalt (Co)	2
Total Nitrogen	0.02	Copper (Cu)	1
<b>Cyanides</b>		Lead (Pb)	30
Cyanide, Total	3	Mercury (Hg)	0.01
<b>Organic / Inorganic Carbon</b>		Molybdenum (Mo)	4
CaCO <sub>3</sub> Equivalent (%)	0.8	Nickel (Ni)	5
Inorganic Carbon (%)	0.1	Phosphorus (P)	90
Total Carbon (%)	0.1	Selenium (Se)	0.5 to 4
Total Organic Carbon (%)	0.1	Silver (Ag)	2
<b>Plant Available Nutrients</b>		Sulphur (S)	100
Available Phosphate-P	2	Thallium (Tl)	1
		Tin (Sn)	5
		Uranium (U)	0.05
		Vanadium (V)	2
		Zinc (Zn)	1

\*All units are in mg/kg unless otherwise noted.

For data interpretation purposes, values below the detection limit (“non-detects”) were considered to be half of the detection limit. Data was compared to the most recent CCME and BC sediment quality guidelines. The BC working guidelines are predominantly based on the CCME Interim Sediment Quality Guideline (ISQG) and Probable Effect Level (PEL) guidelines. The exceptions to this are the working guidelines for nickel, selenium, and silver. The BC guideline for nickel is based on the screening level concentration to give both the Lowest Effect Level (SEL) and Severe Effect Level (Ontario guidelines). The selenium guideline is based on the BC developed guideline. The silver guideline is based on Ontario sediment quality guideline.

#### 4.2.2 Primary Producers - Periphyton

Periphyton samples were collected from five replicate rocks within the riffle zone in Gingras Creek. The periphyton was gently scraped off the rocks (replicates spaced a minimum of 5 m apart) using a rubber stencil, a small brush, funnel and squirt bottle. For each rock, a fixed area (i.e., circular areas of known size) from three patches on the rock was scraped and pooled together in order to accurately characterize periphyton coverage on a rock. Periphyton results were later normalized to the area sampled.

Samples were collected separately in two 500 mL plastic jars for taxonomy and for biomass (as chlorophyll *a*).

Taxonomy samples were preserved with Lugol's iodine solution and were shipped to Fraser Environmental Services (Surrey, BC) for identification and enumeration to the lowest possible taxonomic level. For each sample, density, genus richness, relative abundance, and diversity (as Simpson's Diversity Index) were calculated and the mean and standard error was determined and presented in a table.

Chlorophyll *a* (biomass) samples were prepared by filtering the sample through a 0.45 µm filter, folding the filter in half, and wrapping it in aluminum foil. It was then labeled and frozen until analysis was done by ALS Environmental Services (Burnaby, BC).

#### 4.3 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

A separate set of bottles for field and travel blanks were included as part of the field QA/QC program. The travel blank bottles were filled with distilled deionized water in the laboratory and remained closed throughout the field trip. This allowed assessment of contamination associated with the laboratory procedures or during shipping. The field blank bottles were also filled with distilled deionized water, but were opened in the field and preserved as required for certain analyses. This allowed assessment of potential contamination associated with field sampling (airborne contamination, contamination of the lid/bottle, etc.) and preservation procedures. All data for field and travel QA/QC are reported in Appendices 5.1-2 and 5.1-3. Detected concentrations of water quality parameters (concentrations above the method detection limit (MDL)) were noted for both travel and field blanks, indicating possible contamination.

For QA/QC purposes, 7% of the water samples were randomly collected as duplicates to assess the magnitude and potential causes of variability between samples. For each pair of QA/QC field duplicate water samples, the relative percent differences (RPD) were calculated,

$$\text{where: } RPD = 100 |rep1 - rep2| / [(rep1 + rep2) / 2].$$

The RPD between the duplicates is a measure of the variability inherent in field sampling (environmental heterogeneity, sampler handling leading to contamination, potential laboratory errors). Water quality variables where one or both values were less than five times the MDL were not included in the RPD calculations because variability near the MDL is too high according to the BC Field Sampling Manual (BCMOE 2006). Also, RPD values less than 20% were not considered notable. The BC provincial government suggests that any field duplicates with RPD values exceeding 20% should be noted and data should be interpreted accordingly. The results of RPD calculations were examined to detect patterns of high variation for multiple variables within sample pairs, indicating possible contamination during field sampling.

KSM PROJECT  
2010 Water Quality and Aquatic Resources Baseline Report

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## 5. Results

## 5. Results

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### 5.1 WATER QUALITY

The following section presents water quality parameters with their most recent CCME and BC maximum (BCMOE 2006) guidelines as well as additional parameters of interest. These parameters are grouped by watersheds and discussed accordingly. On the graphs, duplicate samples collected for QA/QC purposes were averaged and standard errors of the mean are shown. Within each figure, sites were grouped by watershed and displayed upstream to downstream. If available, CCME and BC guideline levels are indicated.

All stream water quality data are provided in Appendix 5.1-1. Travel and field blank data are presented in Appendix 5.1-2. Analysis of Relative Percent Difference (RPD) can be found in Appendix 5.1-3. RPD results are discussed in the Quality Assurance and Quality Control section (Section 5.3).

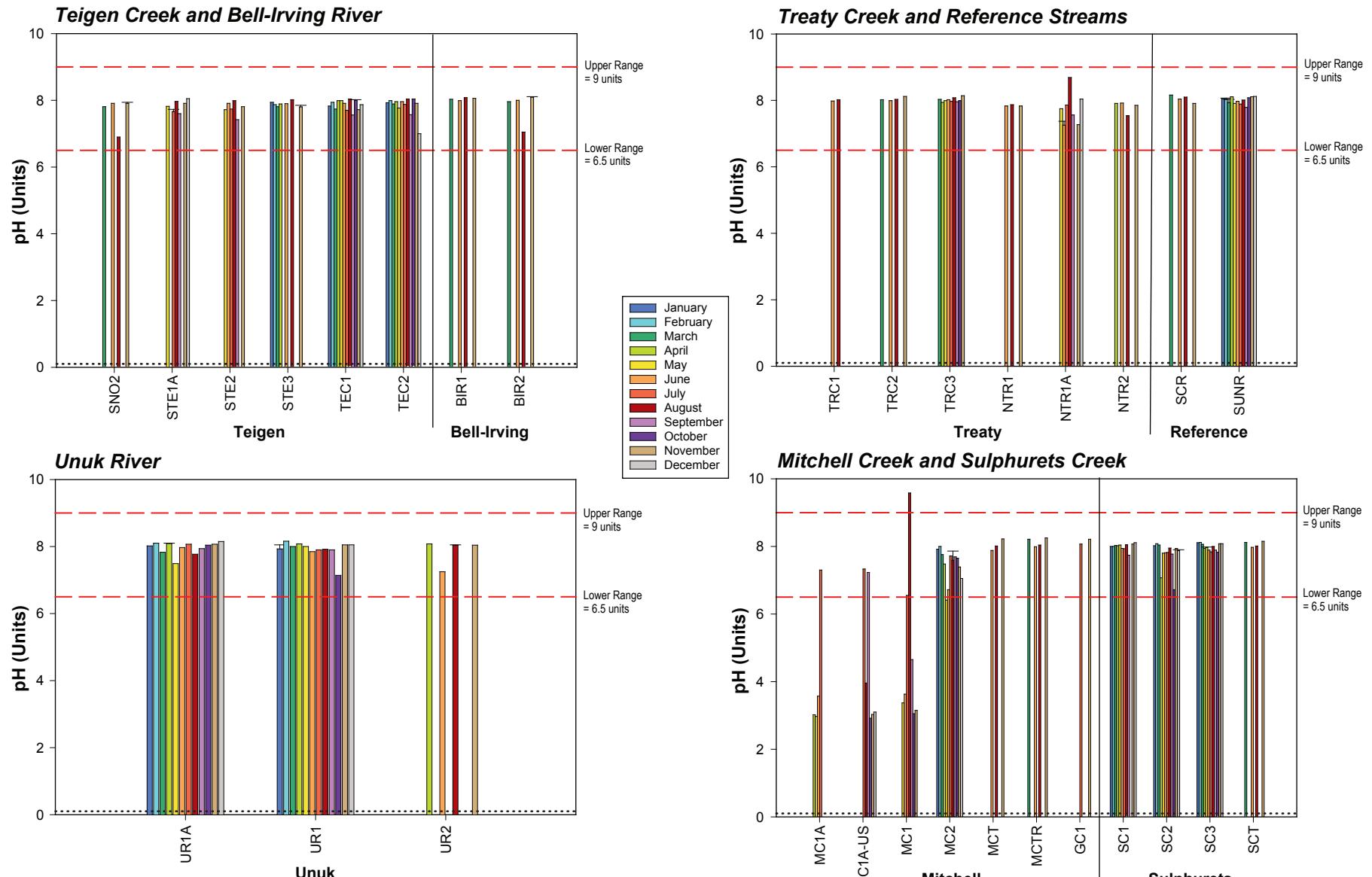
#### 5.1.1 General Parameters

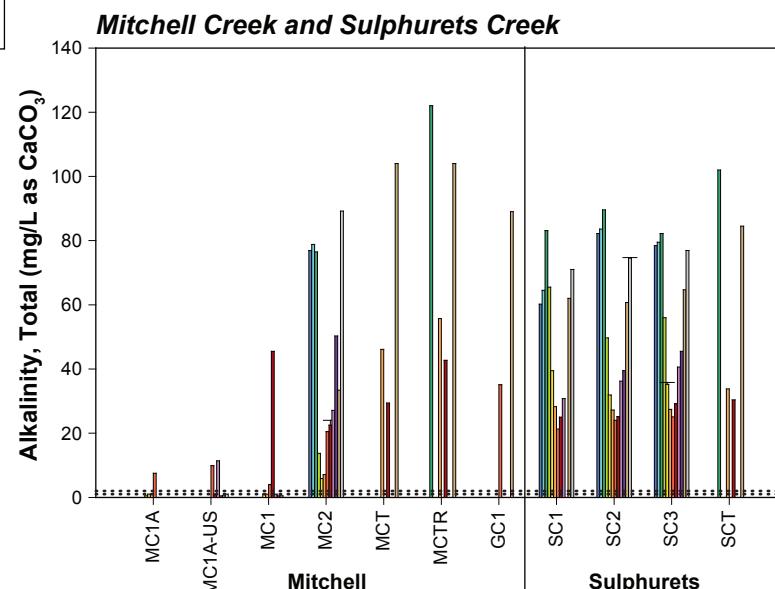
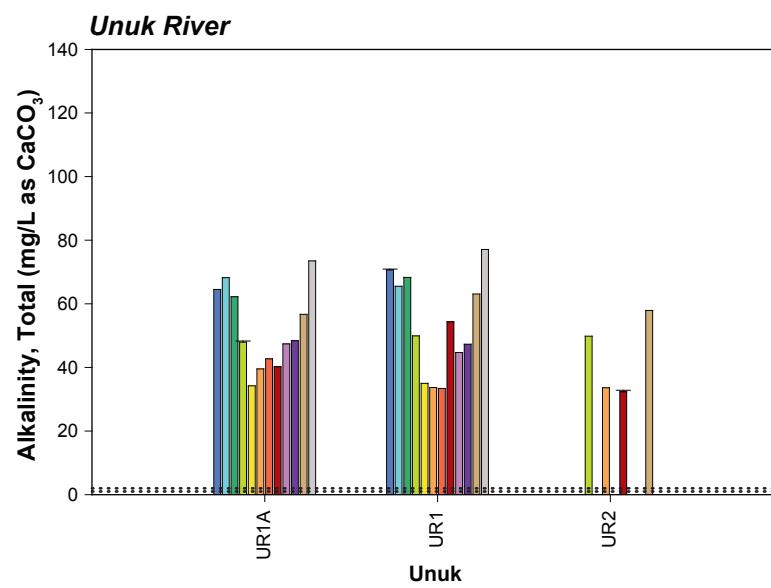
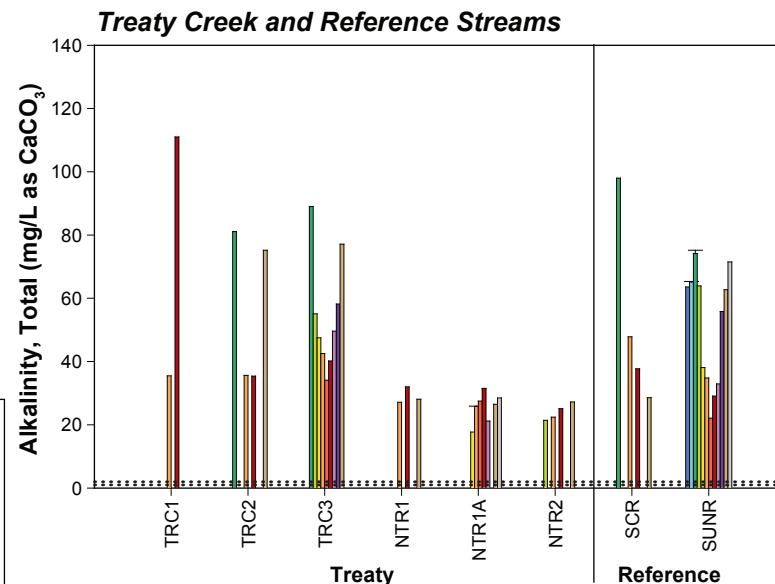
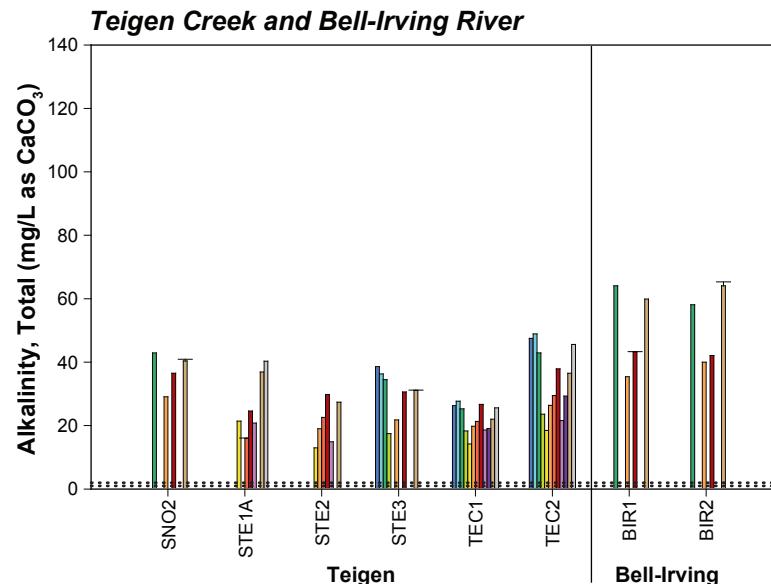
In general, most streams in the KSM Project area were slightly basic with low to moderate buffering capacity and soft to moderately hard water. The exception was Mitchell Creek watershed where poorly buffered, acidic conditions were observed at the most upstream sites MC1A, MC1A-US, and MC1.

At all streams, except Mitchell Creek, pH values were mostly moderately basic and ranged from 6.72 (SC2, October) to 8.69 (NTR1A, August) (Figure 5.1-1). No seasonal or spatial trends were observed within these watersheds and all values were within the range of the CCME and BC maximum guideline of pH 6.5 to 9.0. Total alkalinity, primarily as bicarbonate, was low (<40 mg/L) to moderate (40 mg/L to 100 mg/L). It was lower in the summer due to dilution during freshet, and was higher through the winter into spring (Figure 5.1-2). On occasion, peaks of alkalinity were observed at several sites in August (STE2, NTR1, and NTR1A). The highest alkalinity other than in the Mitchell Creek watershed sites, was found at TRC1 in August (111 mg/L), but since this site was sampled only twice it is impossible to say whether it was the highest concentration at this site for the whole year. The lowest alkalinity was found at STE2 in May (13 mg/L).

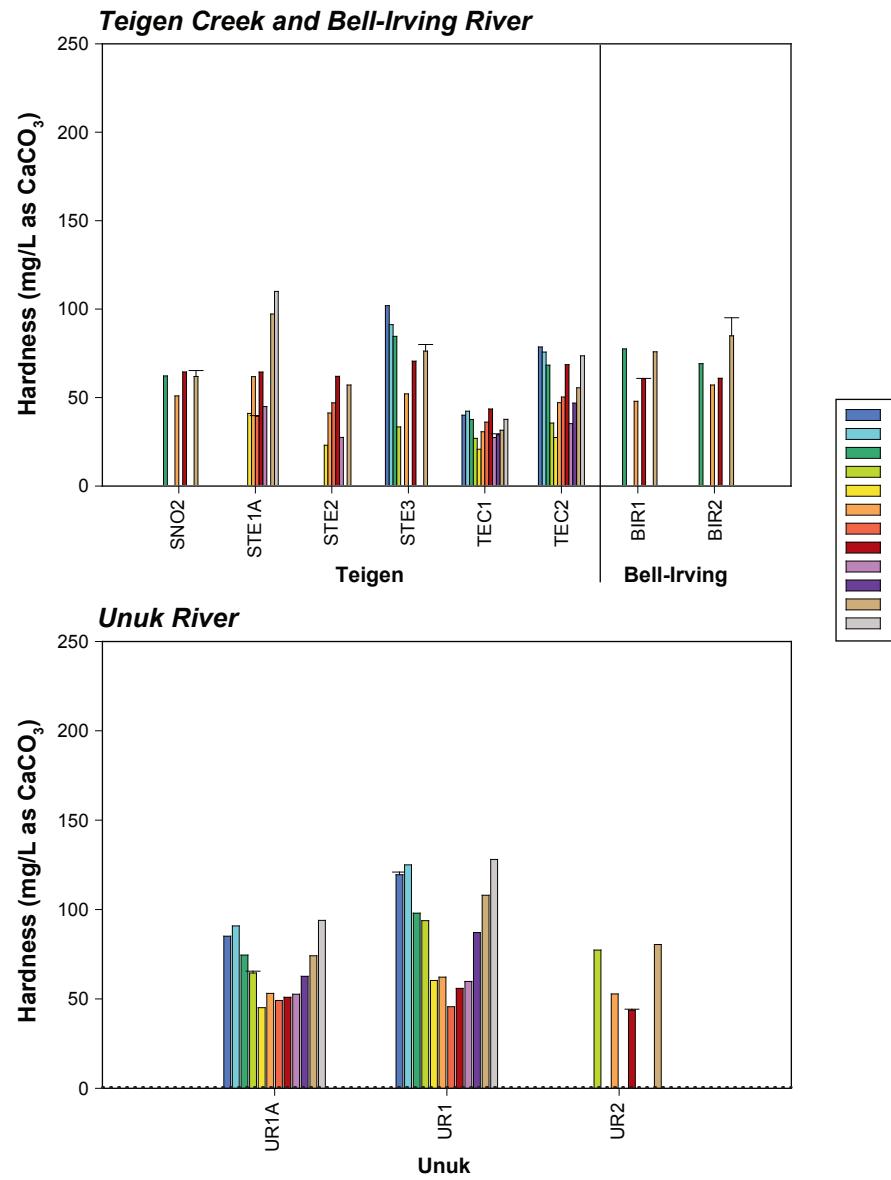
Hardness, total dissolved solids (TDS) concentrations (Figures 5.1-3 and 5.1-4), and conductivity (Appendix 5.1-1) all followed similar spatial and temporal patterns as alkalinity. These parameters were highest in the highly mineralized Mitchell watershed, but were also elevated in the Sulphurets watershed. The hardness and TDS levels in the other watersheds were often half that seen in Mitchell and Sulphurets, and were lowest at TEC1 in May. Hardness, TDS, and conductivity tended to follow hydrological cycles. They were generally highest in winter into early spring during periods of low flow, and were lowest during the summer, likely due to the dilution from the freshet and rainfall events. In August, occasional peaks were observed at several sites (e.g., TEC1, TEC2, and NTR1A) (Figures 5.1-3, 5.1-4, Appendix 5.1-1). Overall, hardness at all sites, except Mitchell Creek, ranged from 20.8 mg/L (TEC1, May) to 213 mg/L (SCT, March); TDS concentrations ranged from 32 mg/L (TEC1, May) to 297 mg/L (SCT, March); while conductivity ranged from 47.7 µS/cm (TEC1, May) to 431 µS/cm (SCT, December).

In the Mitchell Creek watershed, acidic conditions were observed at the three sites (MC1A-US, MC1A, and MC1) in upper Mitchell Creek just below the toe of the glacier. With the exception of July and September for MC1A-US and MC1A, and July and August for MC1, pH levels at these sites were very low, ranging from 2.9 (MC1A, October) to 4.7 (MC1, September). This was far below the lower limit of the CCME and BC water quality guidelines (6.5). At MC1 in August, the pH was 9.6, which is above the upper limit of the water quality guidelines (9.0).



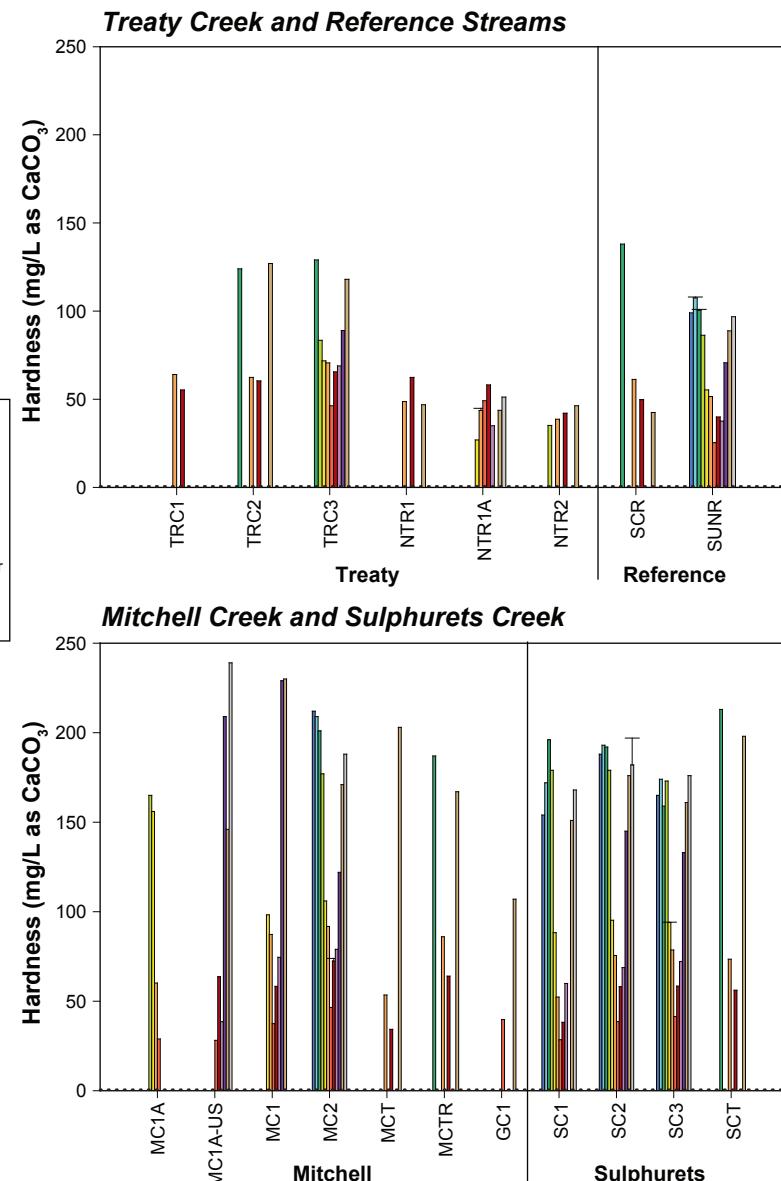


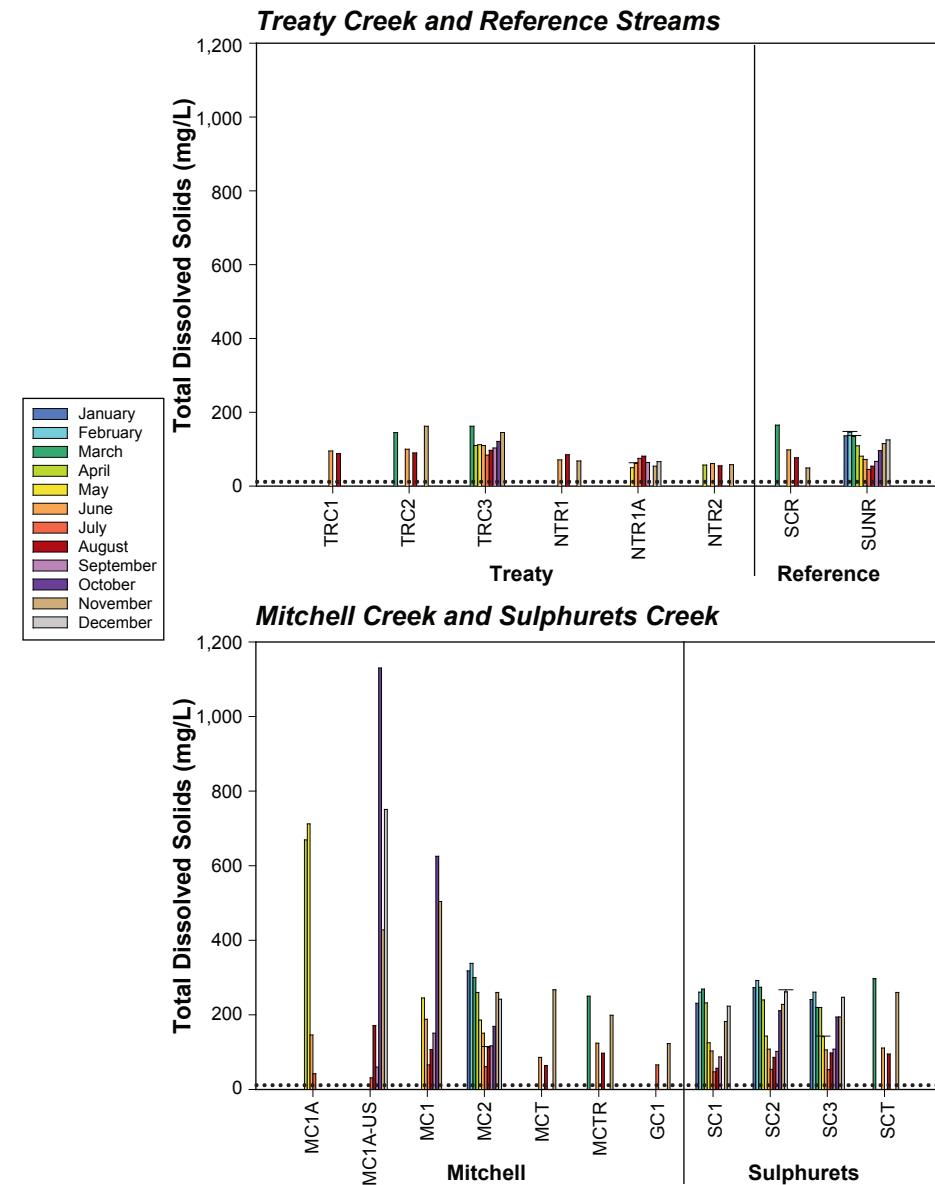
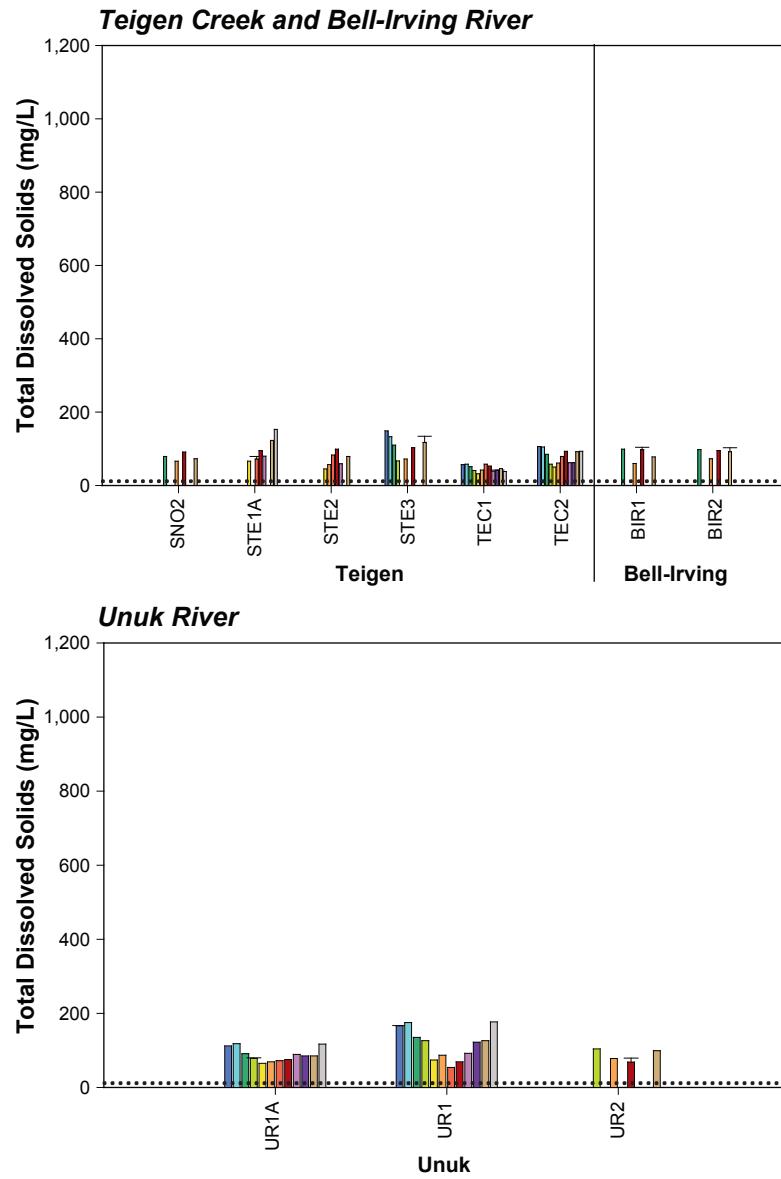
Notes: Error bars represent standard error of the mean.  
Dotted line represents the analytical detection limit (1 to 2 mg/L).



Notes: Error bars represent standard error of the mean.

Dotted line represents the analytical detection limit (0.5 mg/L).





Notes: Error bars represent standard error of the mean.  
Dotted line represents the analytical detection limit (10 to 13 mg/L).

Alkalinity at the three Mitchell Creek sites was also low, as it ranged from below the detection at MC1A and MC1A-US (all months except July and September) and MC1 (all months except July and August) to 45.5 mg/L (MC1, August). Further downstream, pH and alkalinity in Mitchell Creek increased as water was diluted from its tributaries. At other sites in this watershed, the water was slightly basic and was within the water quality guidelines range, except MC2 in May with pH of 6.41 (alkalinity was 5.9 mg/L).

In general, hardness, TDS and conductivity at Mitchell Creek sites followed similar temporal patterns as at the other Project sites, with lower values in the summer and higher values in the spring and winter. This trend did tend to show greater fluctuations over the course of the survey (Figures 5.1-3 and 5.1-4, Appendix 5.1-1) and peaks of TDS concentrations and conductivity were observed in October. At MC1A and MC1A-US, hardness ranged from 28 mg/L in July to 239 mg/L in December. TDS at these two sites ranged from 31 mg/L in July to 1130 mg/L in October. Conductivity ranged from 63 µS/cm in July to 1270 µS/cm in October. At MC1, hardness ranged from 37 mg/L in July to 230 mg/L in November; TDS ranged from 66 mg/L (July) to 625 mg/L (October); and conductivity ranged from 94 µS/cm (July) to 955 µS/cm (October).

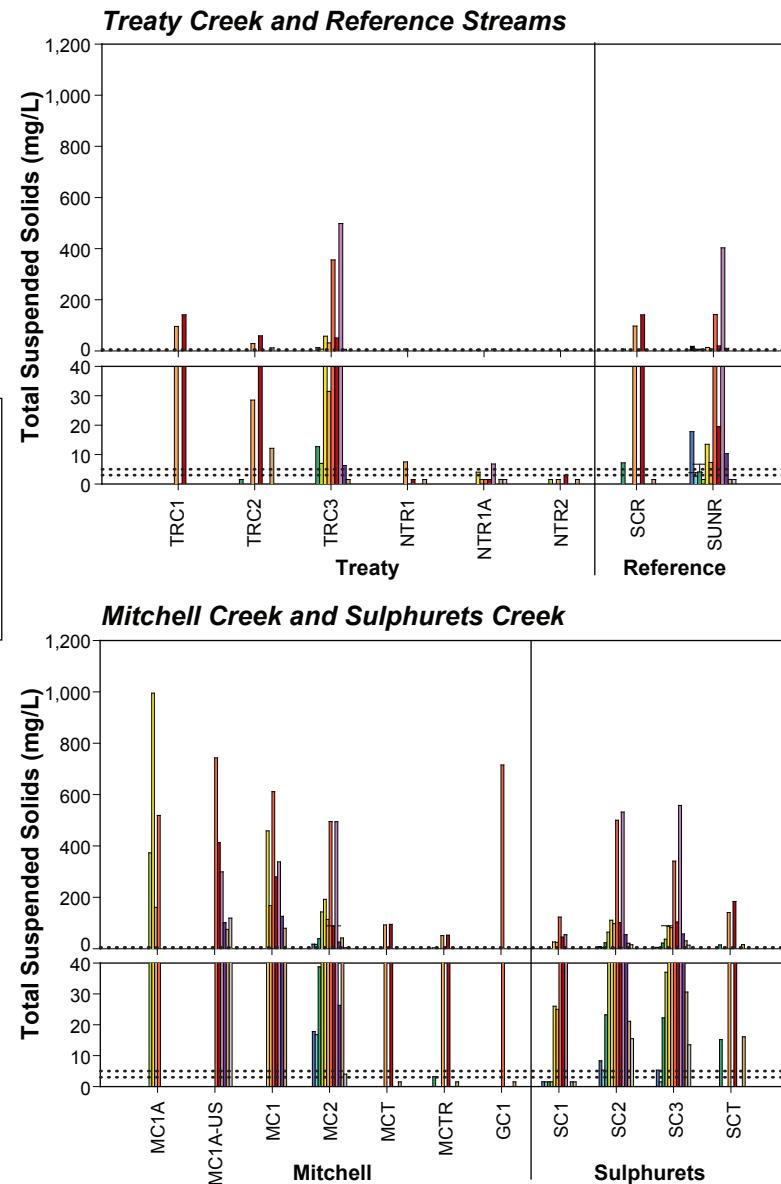
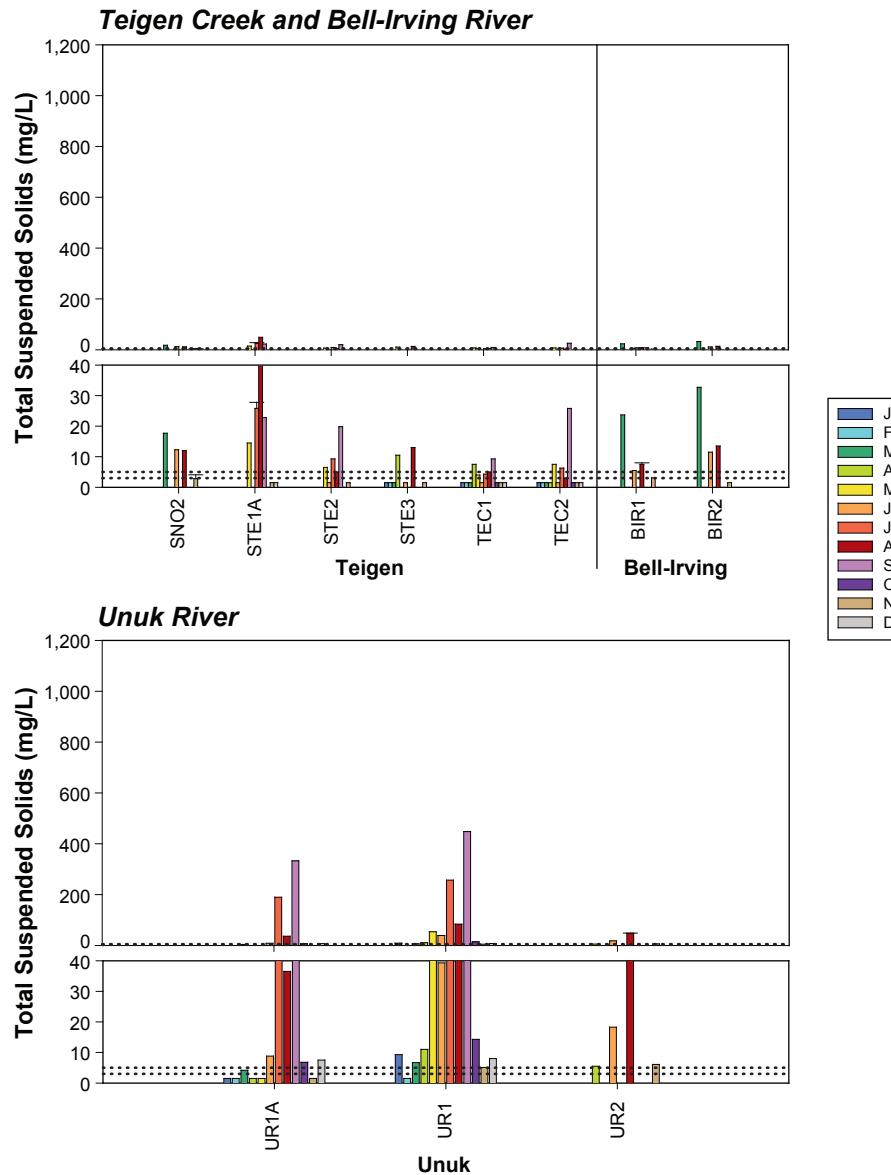
### **5.1.2 Suspended Material, Anions and Cyanides**

Total suspended solids (TSS) concentrations were usually highest during the summer months. Peak TSS levels at MC1A and MC1 occurred in May and in July, probably following freshet and increased glacial melt. At other sites, peaks occurred in July, August, and September, which was likely related to episodic rainfall events (Figure 5.1-5). The freshet, glacial melt and rainfall each contributed to increased sediment loadings and the re-suspension of bed substrates by increasing stream discharge. Due to the high mineralization of the area, these peaks in TSS often resulted in elevated metal concentrations (see Section 5.1.4). The highest TSS levels in Bell-Irving River (BIR1 and BIR2) were observed in March.

Spatially, the lowest TSS concentrations were observed at the Teigen Creek and Bell-Irving River sites as well as at three sites in the Treaty Creek watershed: NTR1, NTR1A, and NTR2. TSS concentrations at these sites were below or slightly above detection limits in most of the samples. The highest TSS concentrations were at the Mitchell and Sulphurets watershed sites. The average TSS concentration in these watersheds (153 mg/L) was twice as high as the average TSS concentration for all sites combined (76 mg/L). The highest TSS concentration was at MC1A in May (995 mg/L). TSS concentrations in Mitchell Creek decreased with the distance downstream; the lowest TSS levels in this watershed were in McTagg Creek (MCTR; Figure 5.1-5).

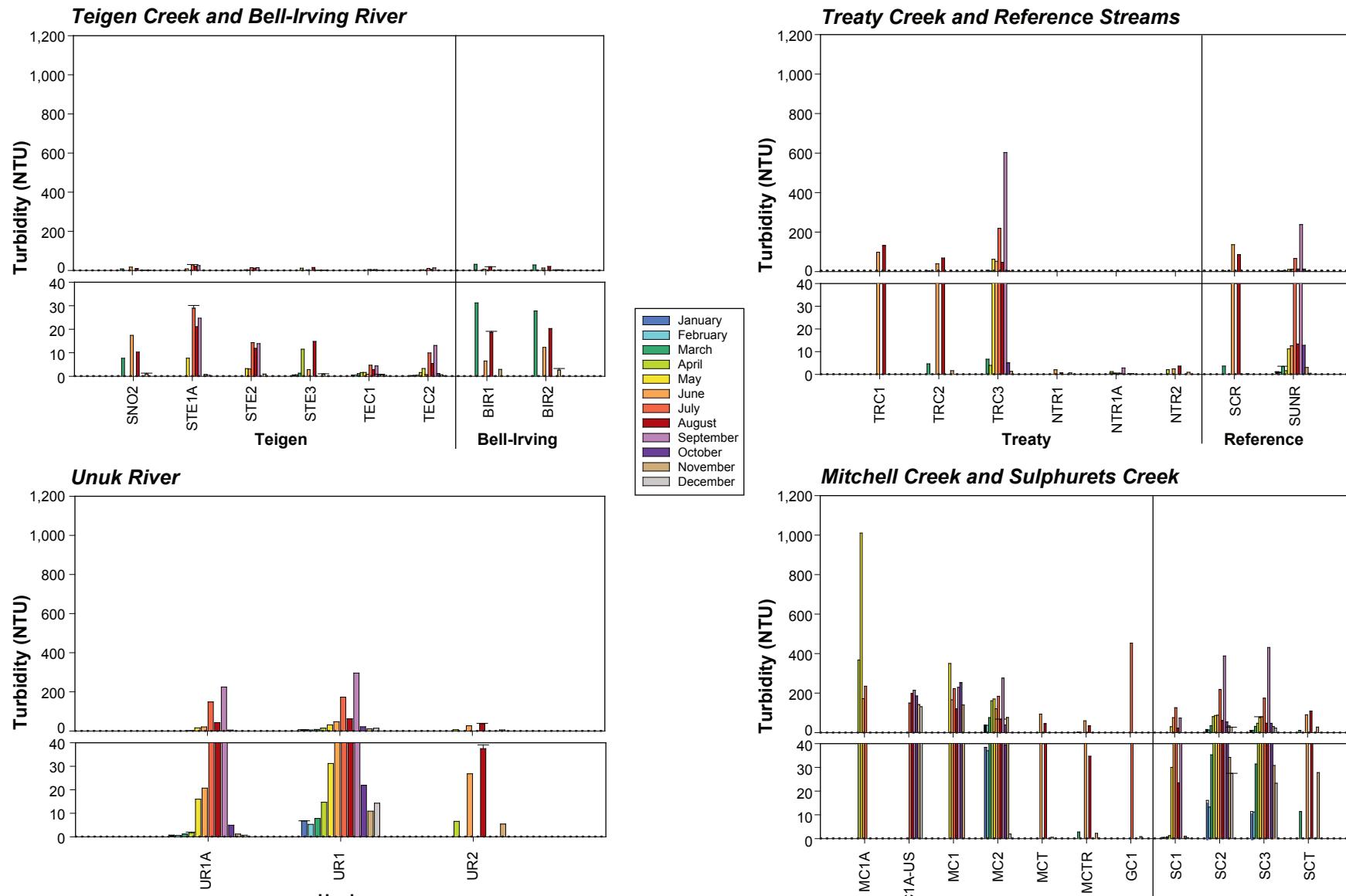
Turbidity in the Project area streams was probably controlled by the sediment load and followed largely similar spatial and temporal patterns as TSS (Figure 5.1-6). Turbidity ranged from 0.24 NTU (TEC2, December) to 1010 NTU (MC1A, May), and was highest in the Mitchell and Sulphurets watersheds and lowest in Teigen, Bell-Irving, and the NTR sites in the Treaty watershed.

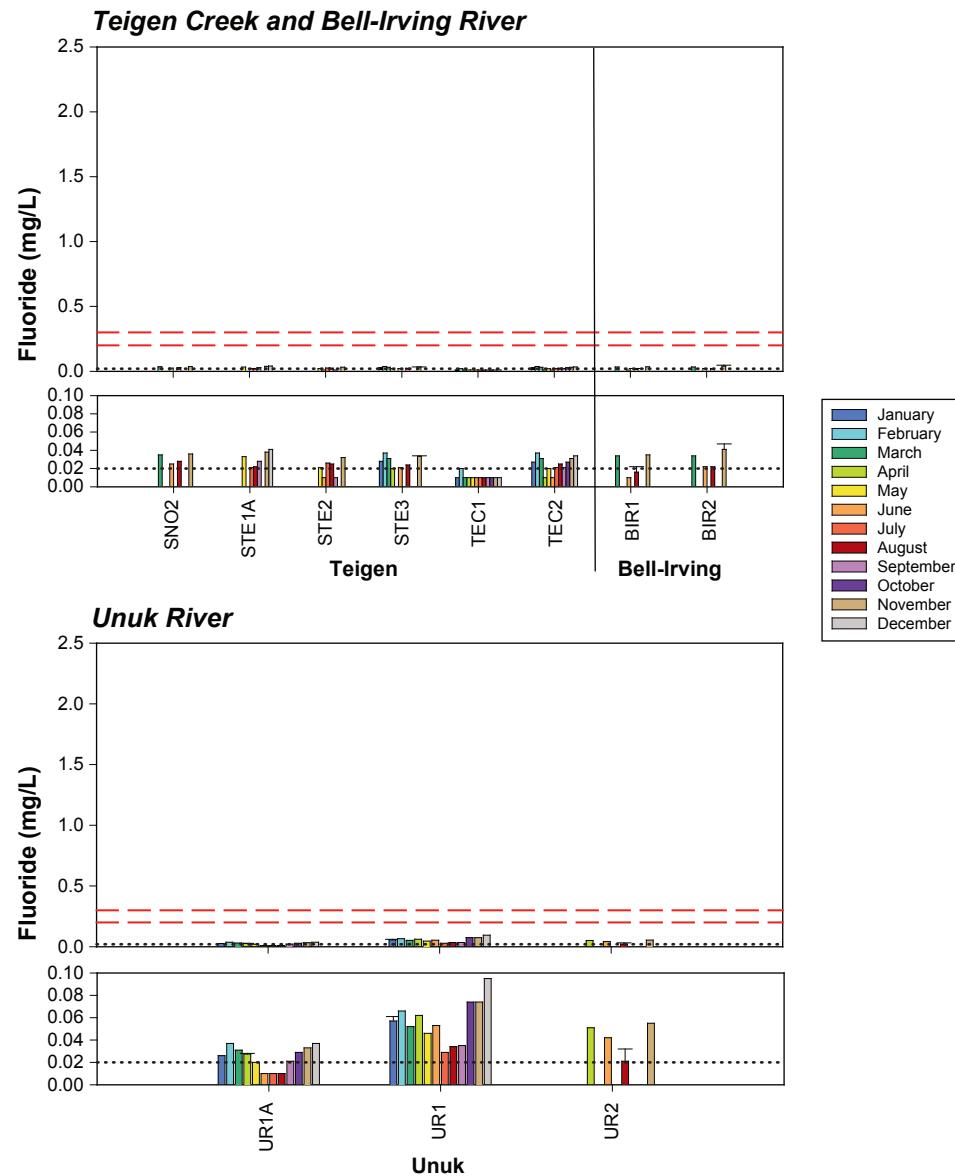
Fluoride and sulphate followed similar patterns as hardness, TDS and conductivity, with higher concentrations in the winter, autumn and early spring, and lower concentrations in the summer (Figures 5.1-7 and 5.1-8). In Mitchell and Sulphurets watersheds, fluoride and sulphate concentrations were considerably higher than in other watersheds, with average concentrations (0.25 mg/L and 113 mg/L respectively) approximately twice as high as the average concentrations for all sites combined (0.11 mg/L and 59 mg/L). Fluoride concentrations ranged from below the detection limit 0.02 mg/L at several sites (TEC1, STE2, BIR1, NTR2, SCR, UR1A, MCT, MCTR, GC1, and SC1) to 2.32 mg/L at MC1A-US in December. Fluoride concentrations were particularly high in the Mitchell Creek watershed sites, as several samples exceeded their hardness-dependent BC maximum water quality guideline (see section 5.1-5) Sulphate concentrations ranged from 6.1 mg/L (TEC1, May) to 648 mg/L (MC1A-US, October). Sulphate concentrations exceeded the BC maximum water quality guideline of 100 mg/L in samples from several sites in the Mitchell Creek watershed and in several samples at all sites in Sulphurets Creek watershed.



Notes: Error bars represent standard error of the mean.  
Dotted line represents the analytical detection limit (3 to 5 mg/L).  
CCME guideline for TSS depends on the background concentration.

FIGURE 5.1-5





Notes: Error bars represent standard error of the mean.

Dotted line represents the analytical detection limit (0.02 mg/L); Red dashed line represents BC Maximum guideline.  
BC Maximum guideline is hardness-dependent; Hardness >50 mg/L = 0.3 mg/L, Hardness <50 mg/L = 0.2 mg/L.

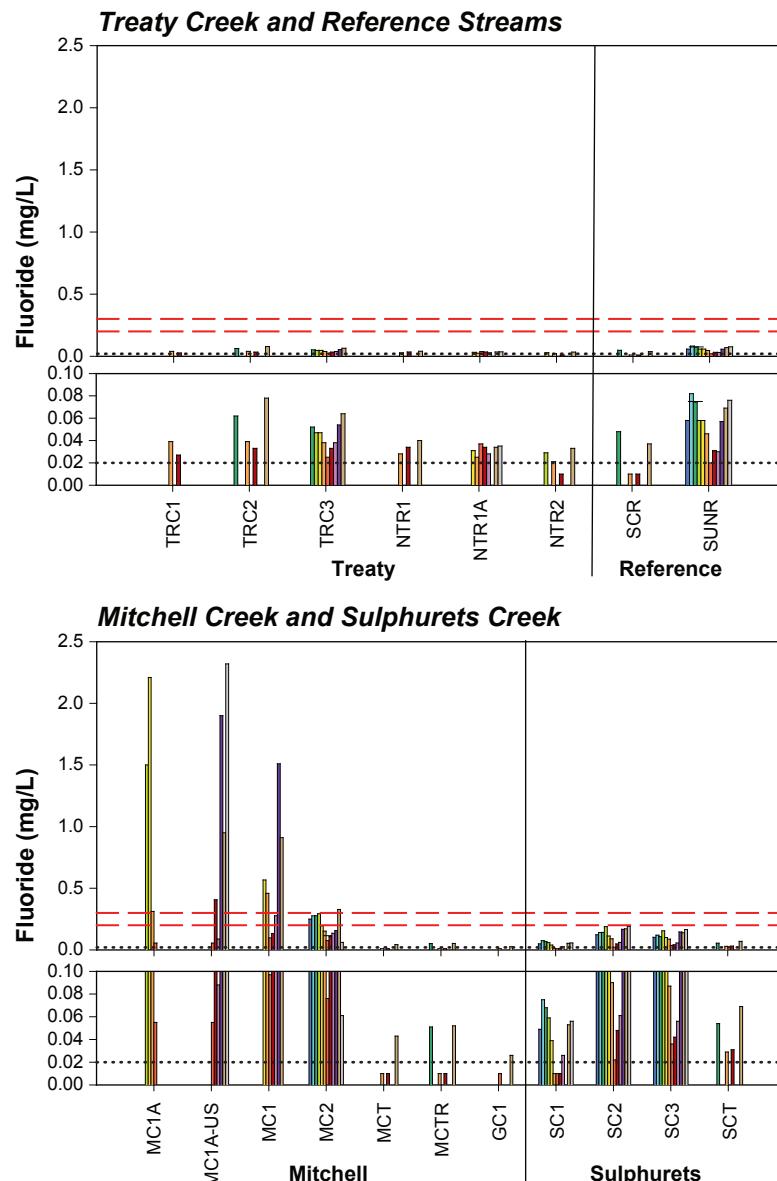
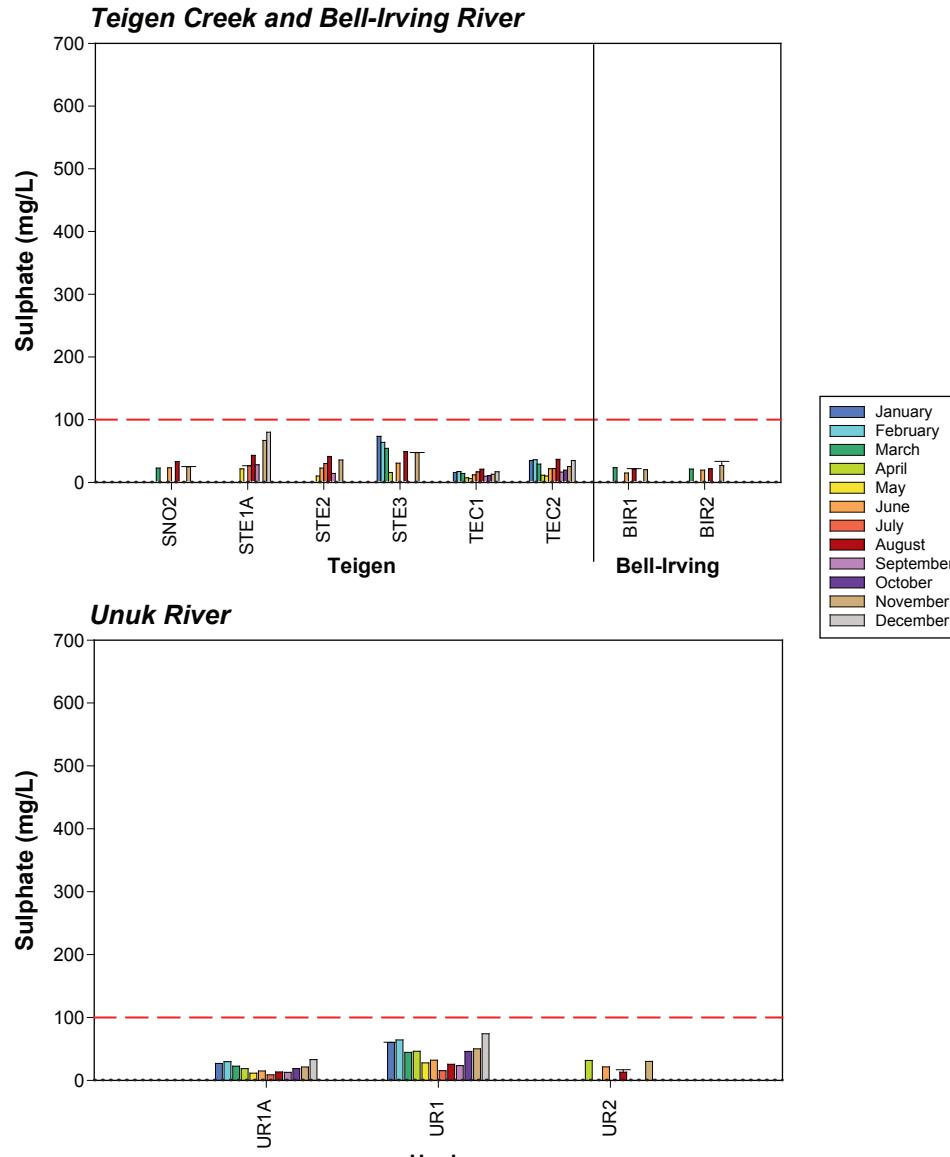


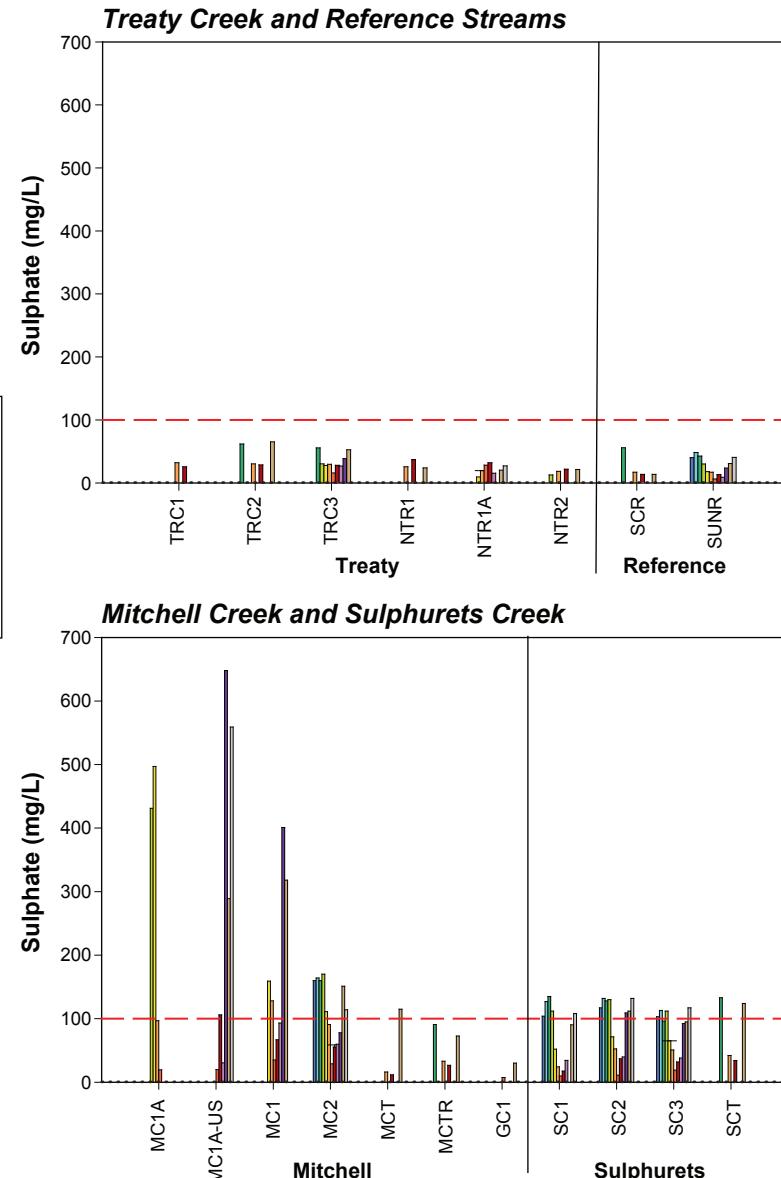
FIGURE 5.1-7



Notes: Error bars represent standard error of the mean.

Dotted line represents the analytical detection limit (0.5 mg/L).

Dashed red line represents BC Maximum guideline (100 mg/L).



Total cyanide was usually not detectable in the Project waters, with more than 50% of the samples below analytic detection (Figure 5.1-9). Naturally detectable total cyanide was most often observed in the Teigen Creek watershed, with the highest number of concentrations above the detection limits (73%), and the highest cyanide concentration (0.0056 mg/L; STE3, September) found here. The lowest number of observed concentrations (14%) were in the Mitchell and Sulphurets Creek watersheds. Higher cyanide concentrations were observed in the spring (April and May) and autumn (September). WAD cyanide concentrations were less than the analytical detection limit (0.0010 mg/L) at all sites. Thiocyanate was below the analytical detection limit (0.50 mg/L) in 81% of the samples. The highest concentration of thiocyanate (4.56 mg/L) was found at SUNR in July (Appendix 5.1-1). No CCME nor BC maximum water quality guidelines for cyanide were exceeded.

### 5.1.3 Nutrients

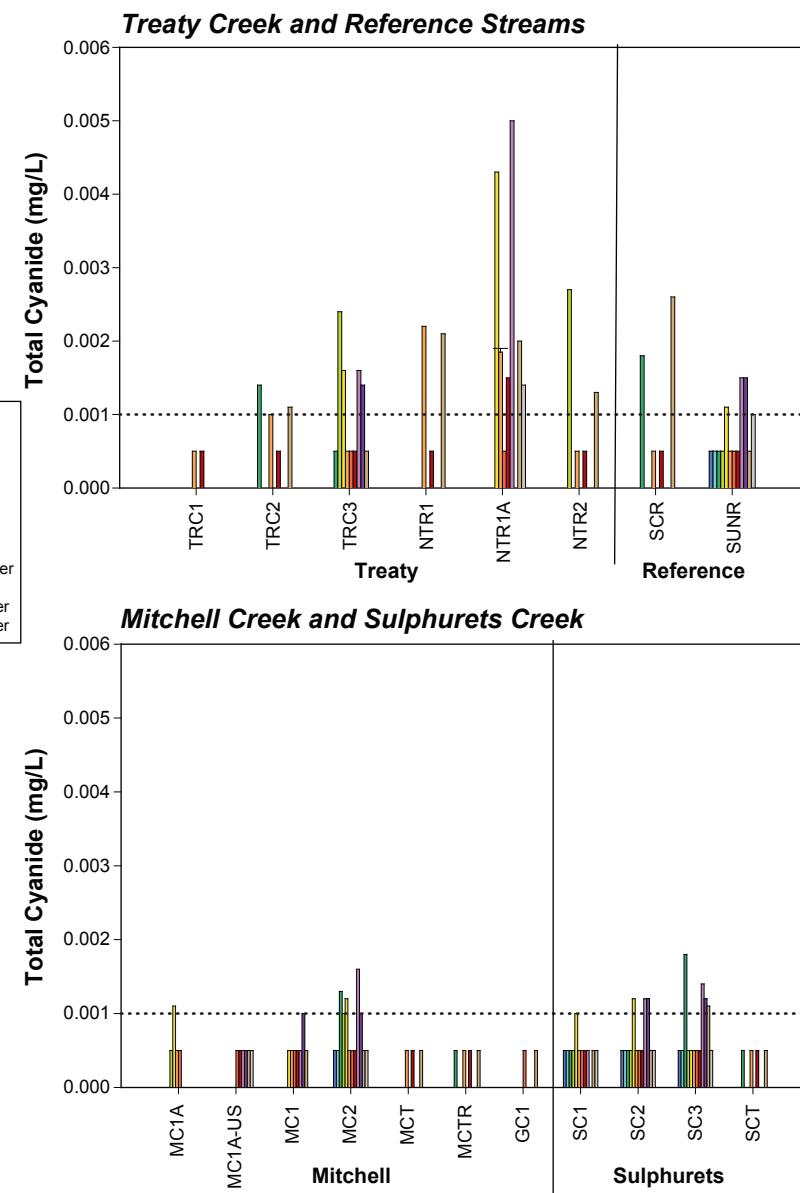
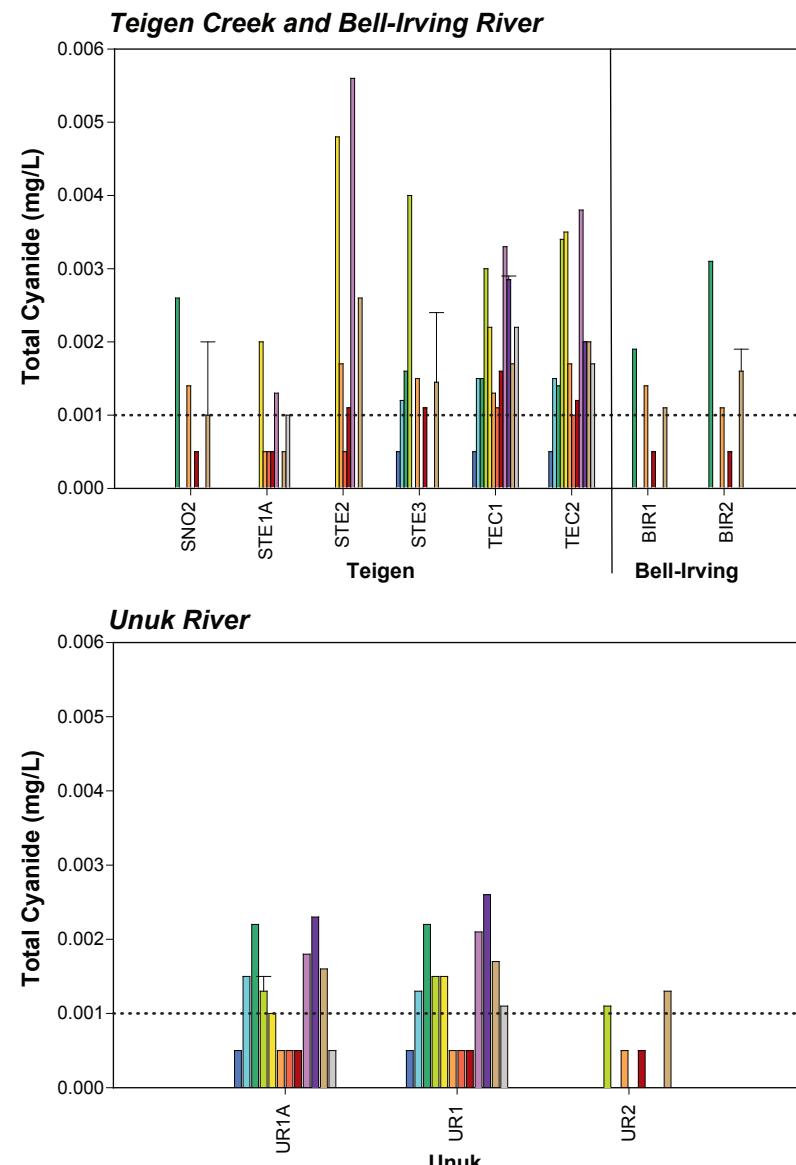
Ammonia concentrations were below their analytical detection limit (0.005 mg/L) in most samples from all sites. The highest ammonia concentration (0.0177 mg/L) was found at MC1A in May (Appendix 5.1-1). Total nitrogen was mostly in the form of nitrate; nitrate concentrations were higher in the early spring and autumn and lower in the summer (Figure 5.1-10). The low summer concentrations likely resulted from elevated periphyton uptake because of the high phosphorus concentrations in the region (see below). Overall, the nitrate concentrations ranged from below the analytical detection limits of 0.005 mg/L (STE1A, STE2, STE3, and TEC1, summer months) to 1.2 mg/L (NTR2, April). Nitrite concentrations were below analytical detection limits in all samples (Appendix 5.1-1). Ammonia, nitrate and nitrite concentrations were far below the CCME and BC water quality guidelines.

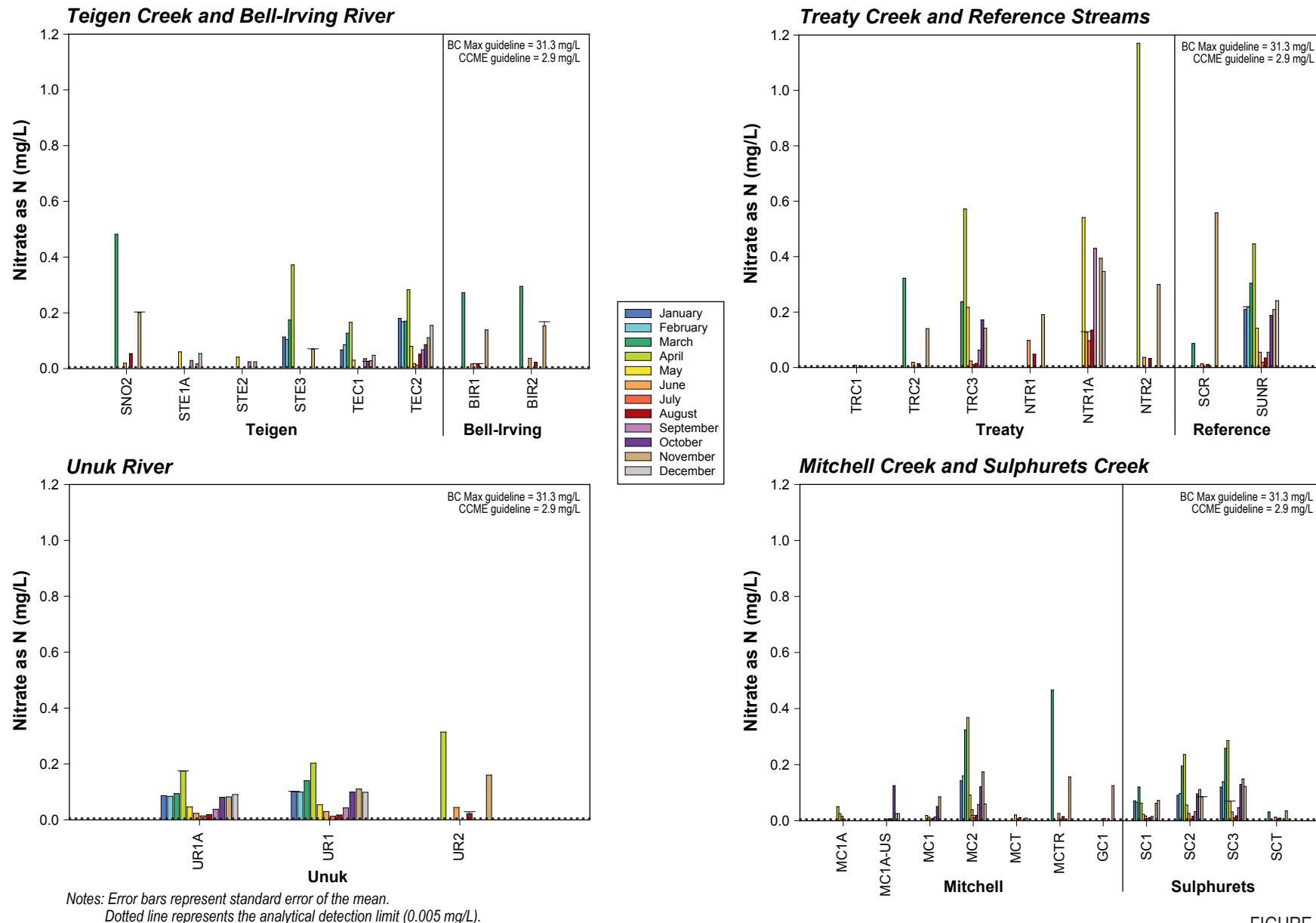
Total phosphate concentrations were high; only at the Teigen Creek and Bell-Irving River watersheds did the total phosphate concentrations fall below the CCME total phosphorus trigger range for eutrophic freshwater ecosystems (Figure 5.1-11). Particularly high phosphorus concentrations were observed in the Mitchell and Sulphurets creeks watersheds, reaching as high as 10.1 mg/L at MC1A in April. Most samples collected in these watersheds were above the CCME trigger range for hyper-eutrophic ecosystems. The lowest total phosphate concentrations below the detection limits of 0.002 mg/L were observed in the winter, early spring and late autumn at several sites, e.g. TEC1, MC2, SC1, SURN, TRC2, and UR1A. The high total phosphorus levels in the presence of nitrate suggest primary production at most sites in the Project area was not nutrient-limited.

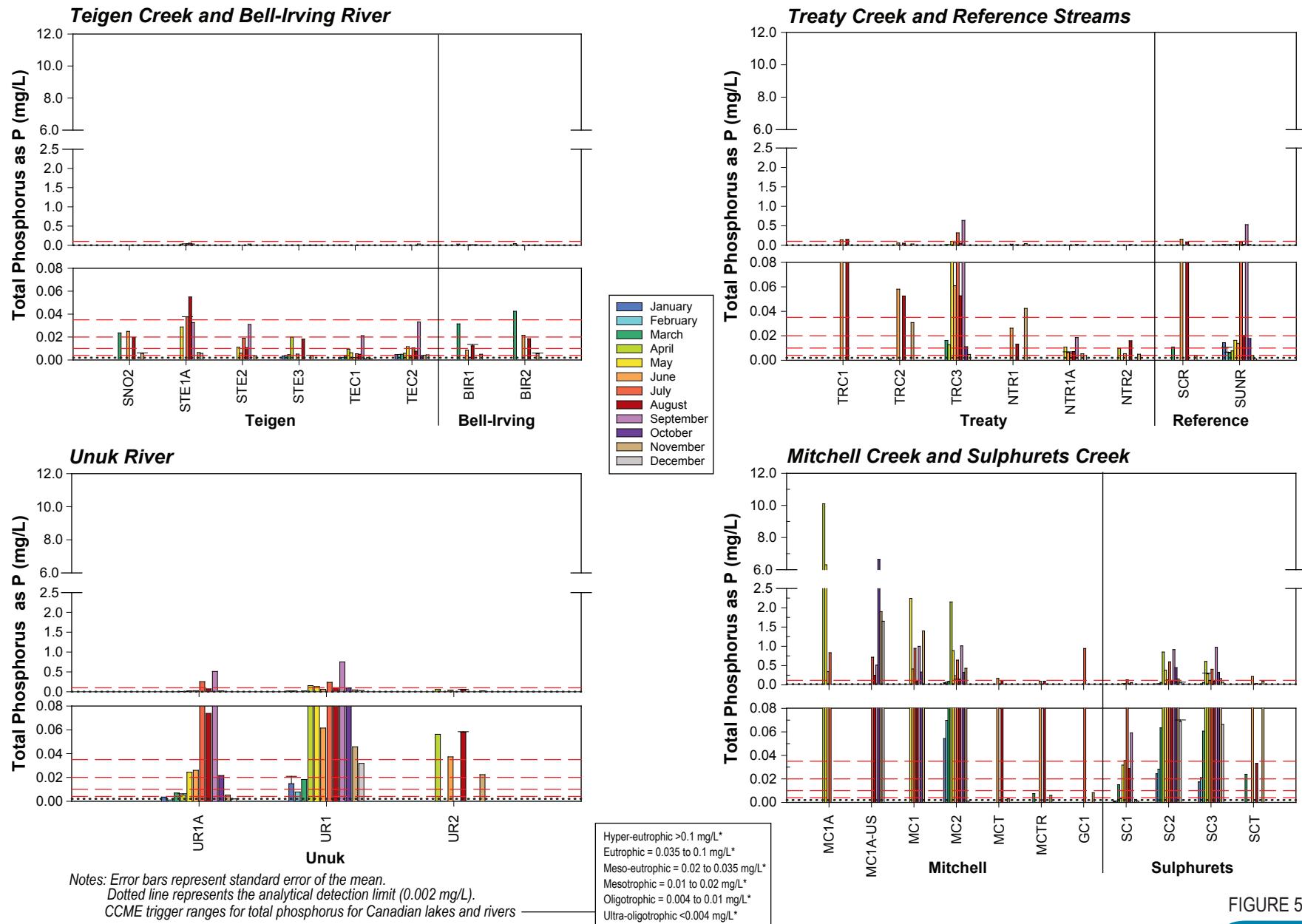
Total organic carbon (TOC) concentrations were below or slightly above the detection limit of 0.5 mg/L at most sites in the Mitchell and Sulphurets creeks watersheds, with peaks mostly observed in May, July or September (Figure 5.1-12). The low TOC concentrations found in these watersheds reflect the harsh acidic environment, which would not favour primary productivity. In contrast, the higher TOC levels found elsewhere suggest more favourable habitats for primary production. The highest TOC concentrations were observed in the Teigen Creek (4.2 mg/L, STE2) and Treaty Creek (4.64 mg/L, NTR1A) watersheds in September. The higher TOC seen in spring (e.g., TEC1 and TEC2) likely reflects an increase of organic flux from run-off during freshet.

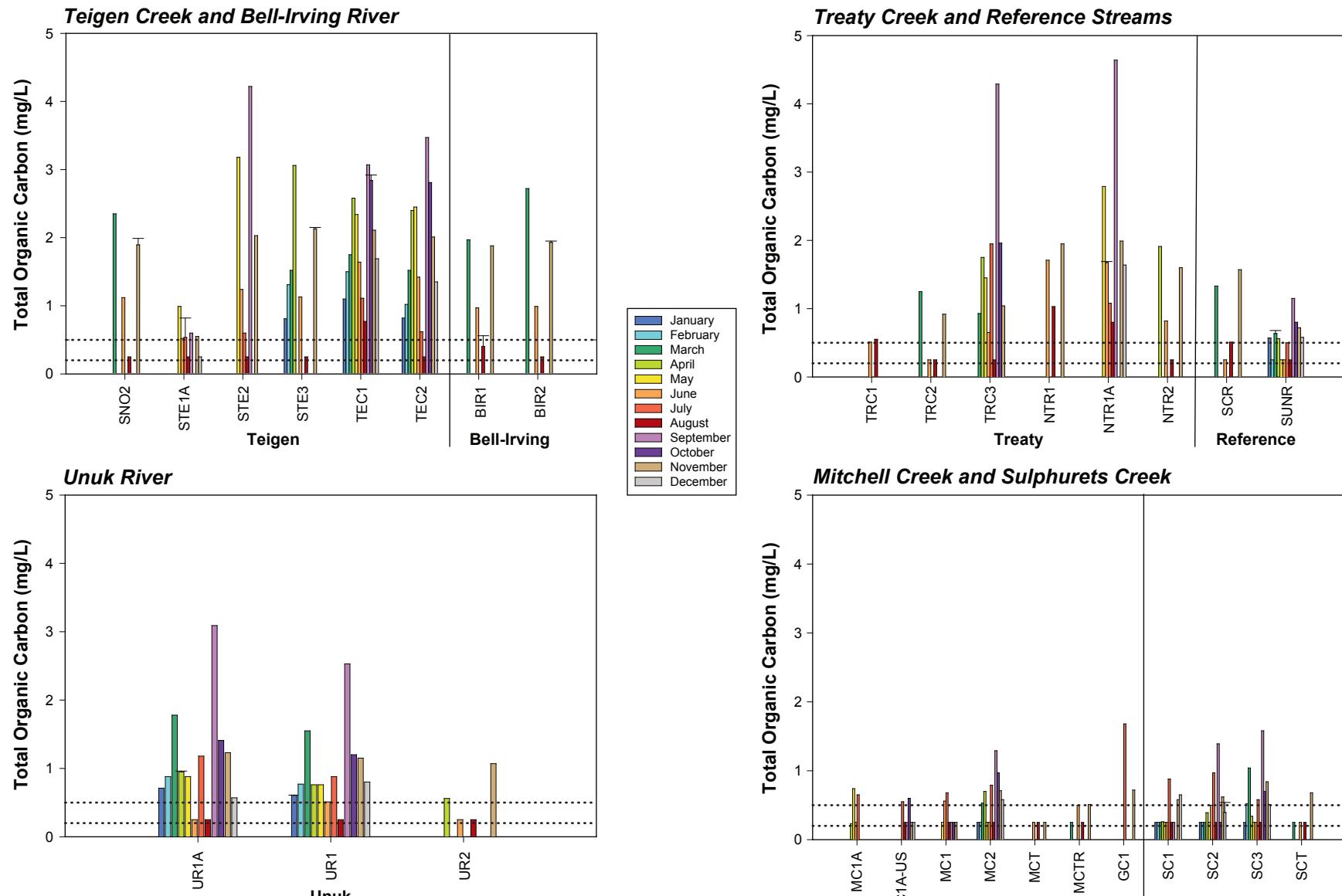
### 5.1.4 Total and Dissolved Metals

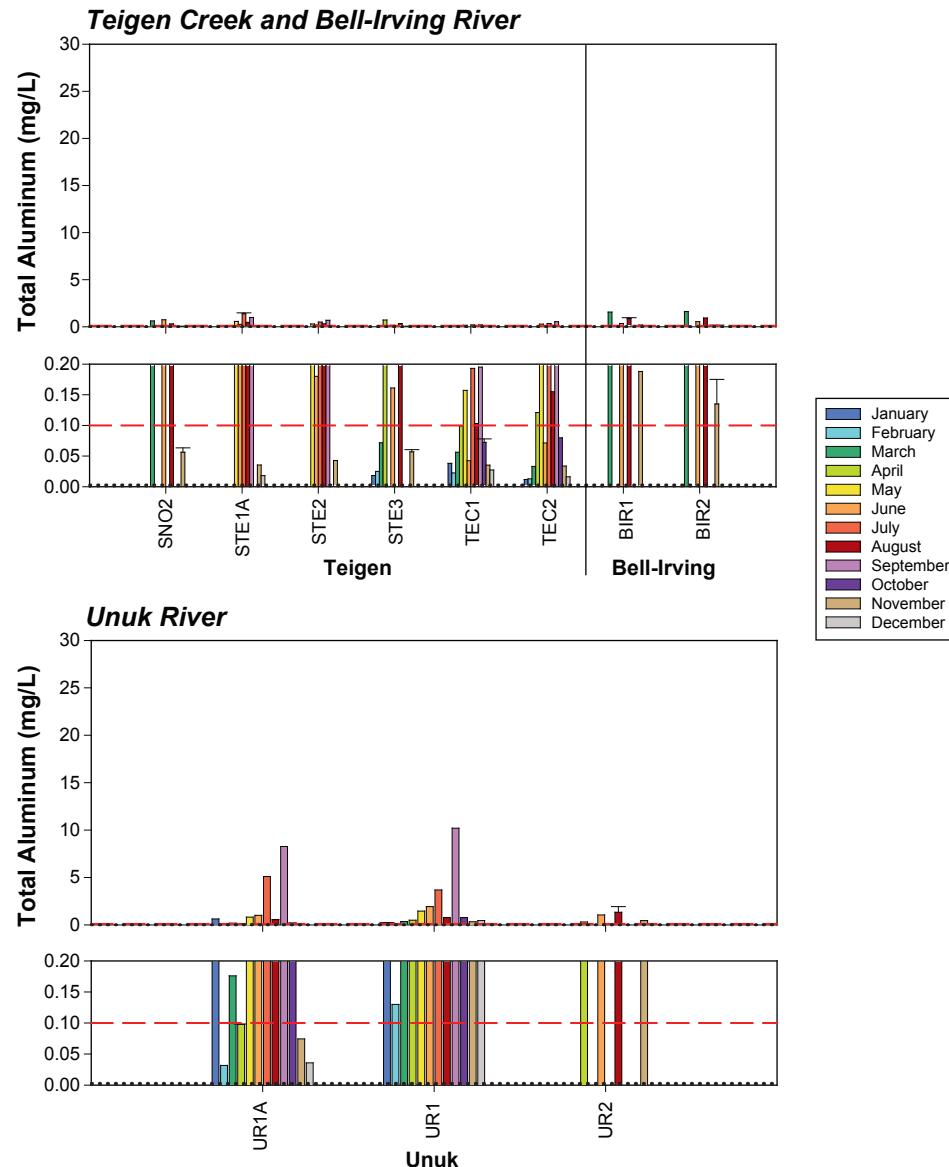
There were two distinctive temporal patterns in metal concentrations between the sampling sites. At most of the sites, metal concentrations followed similar spatial and temporal patterns as total suspended solids. This suggests that particulate or particulate-bound metals entered the aquatic environment due to sediment loadings over the summer months. As in TSS, higher concentrations of metals at these sites were observed during the summer months, with spikes in July and September (Figures 5.1-13 to 5.1-25).











Notes: Error bars represent standard error of the mean.

Dotted line represents the analytical detection limit (0.001 to 0.003 mg/L).

Dashed red line represents CCME water quality guideline for the protection of aquatic life; ( $pH > 6.5$ ) = 0.1 mg/L, ( $pH < 6.5$ ) = 0.005 mg/L.

\*CCME guidelines for  $pH < 6.5$  only applies to MC1A, MC1A-US, MC1, and MC2. No BC guideline exists.

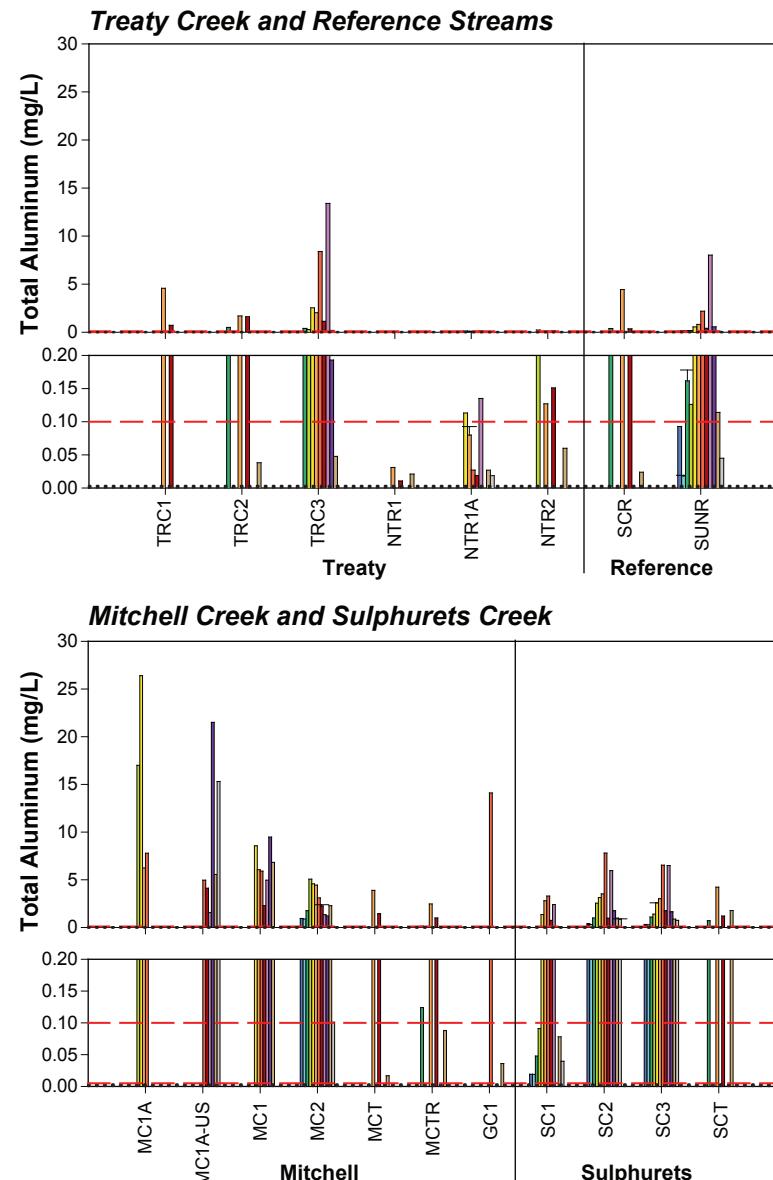
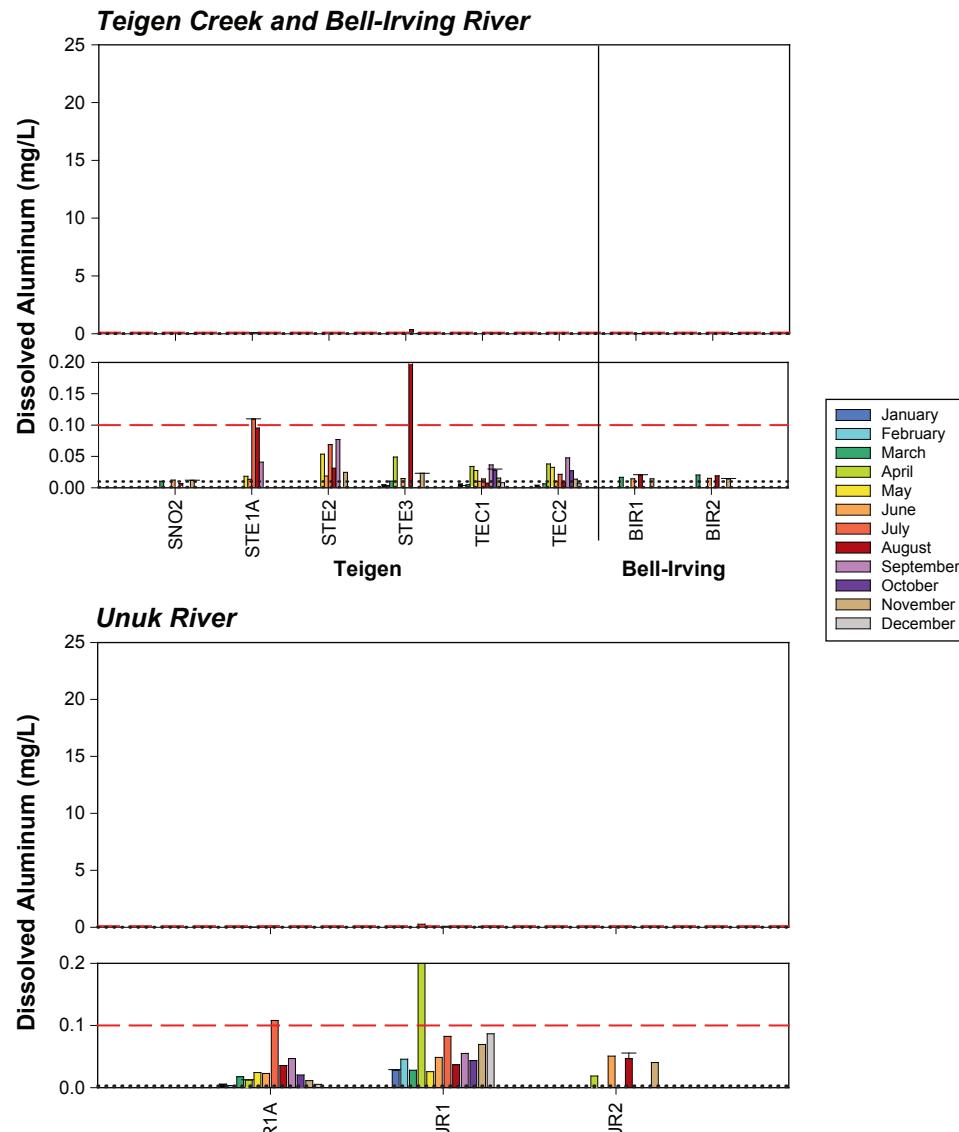


FIGURE 5.1-13



Notes: Error bars represent standard error of the mean.

Dotted line represents the analytical detection limit (0.001 to 0.003 mg/L).

Dashed red line represents BC maximum water quality guideline for the protection of aquatic life; ( $pH > 6.5$ ) = 0.1 mg/L, ( $pH < 6.5$ ) = 0.005 mg/L.

BC Maximum guidelines for  $pH < 6.5$  only apply to MC1A, MC1A-US, and MC1.

No CCME guideline for dissolved aluminum exists.

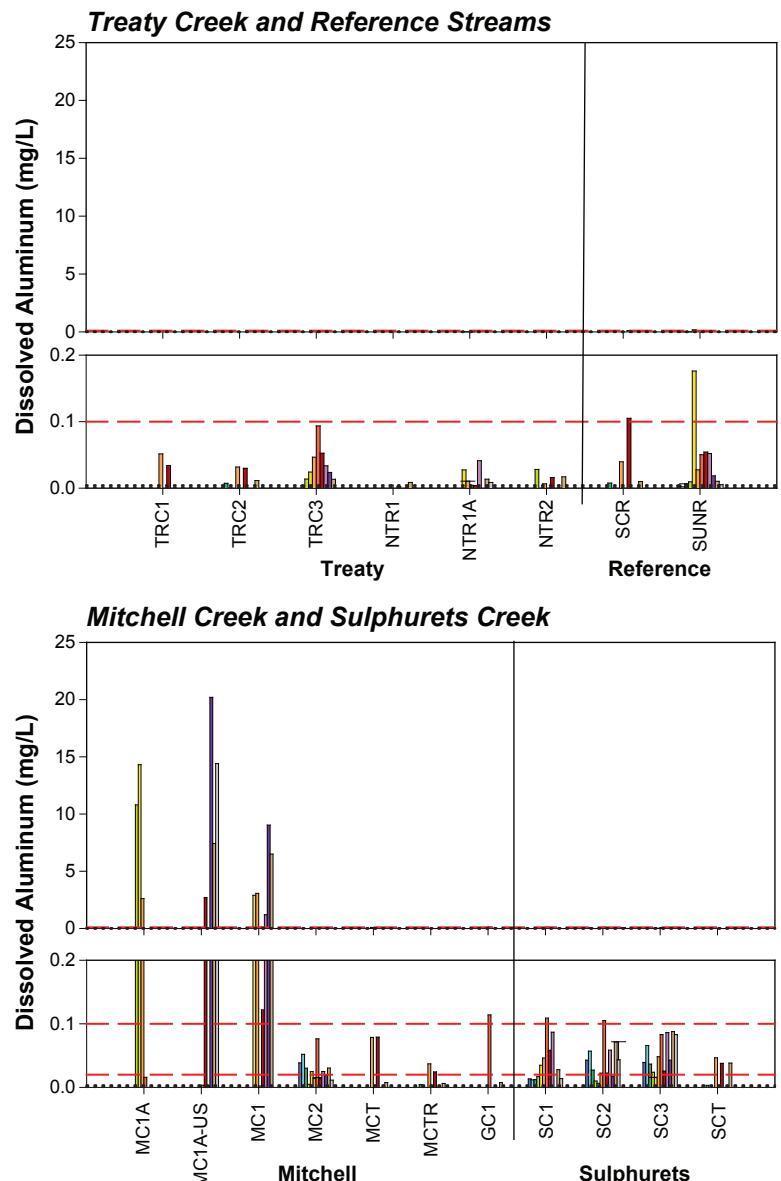
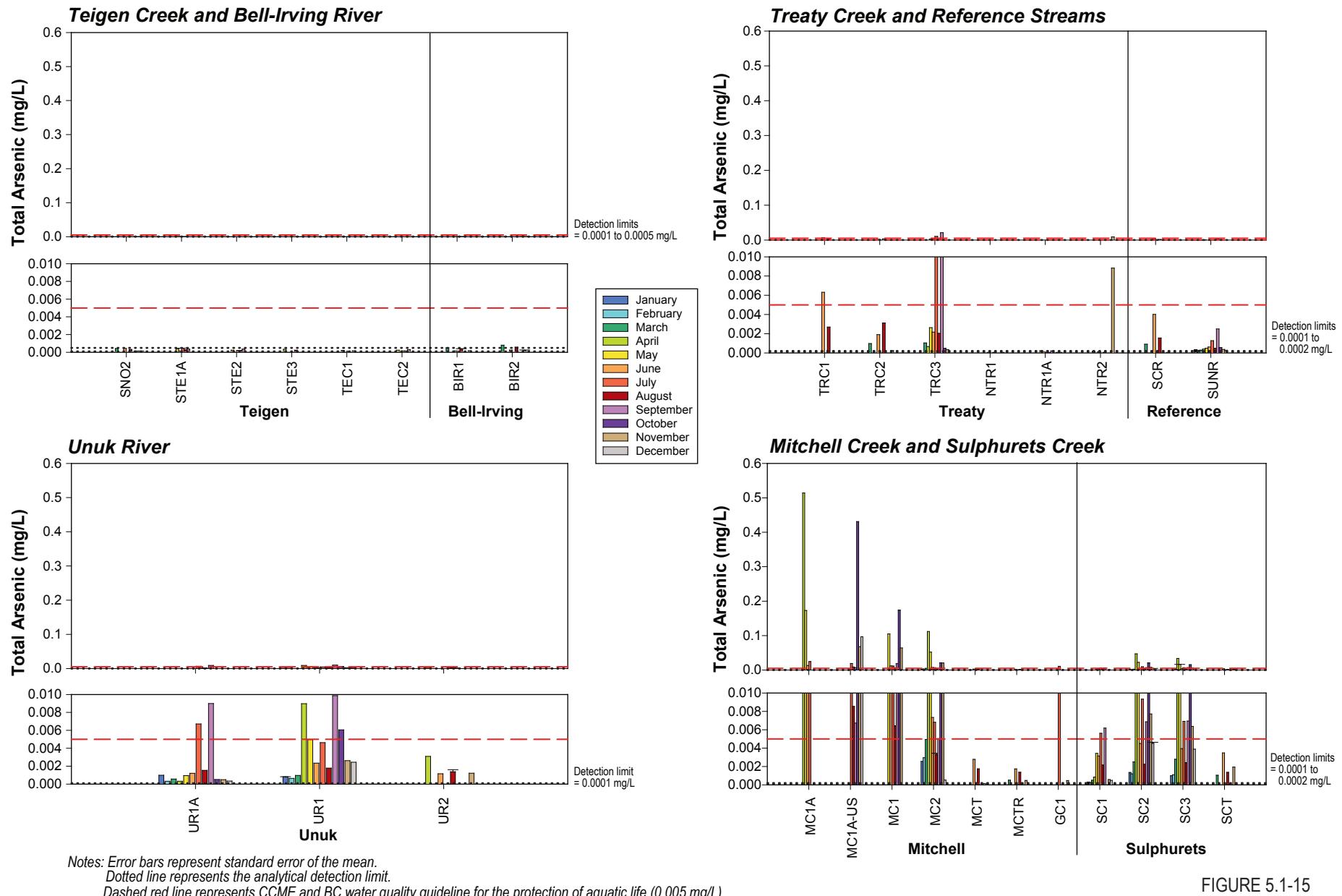
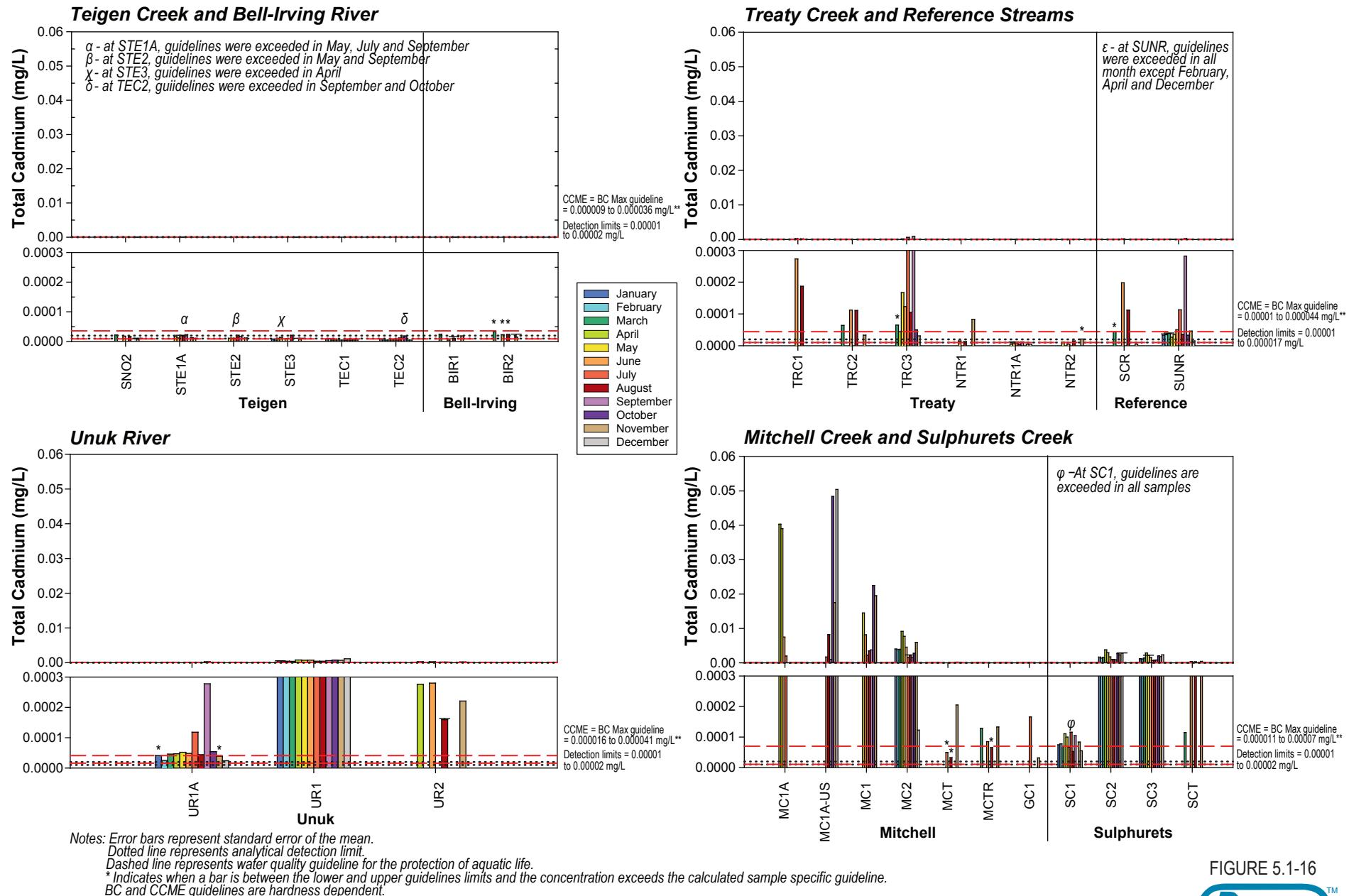
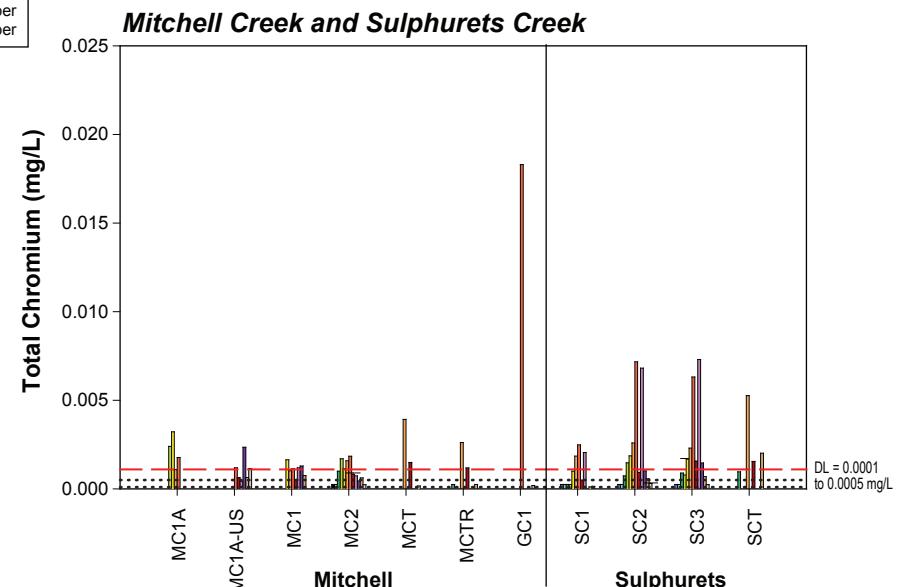
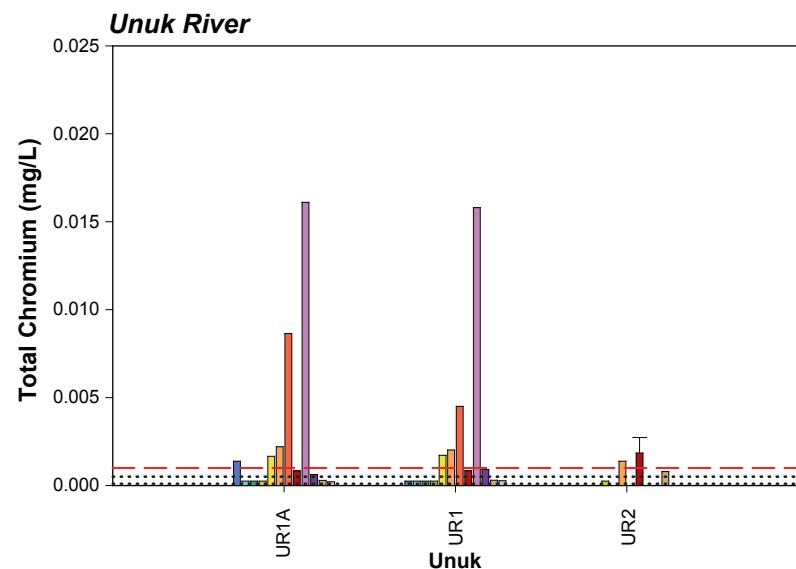
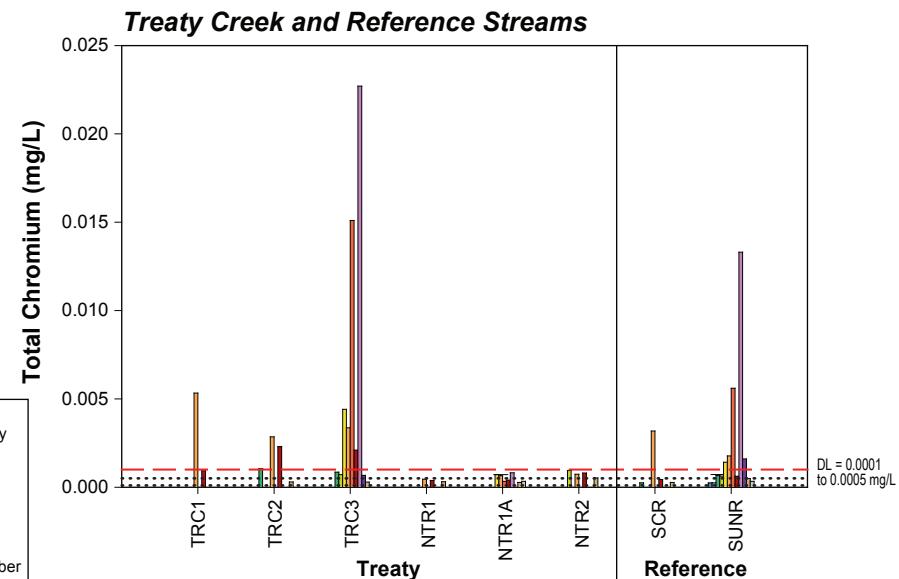
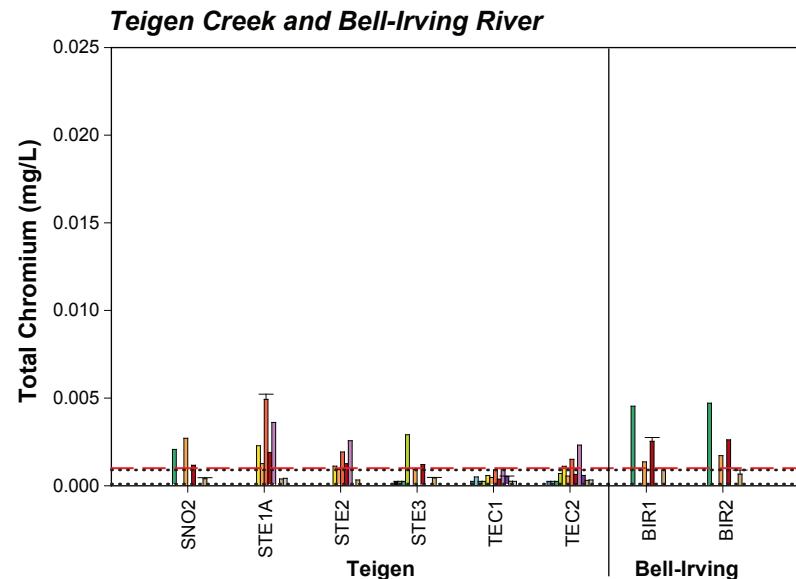


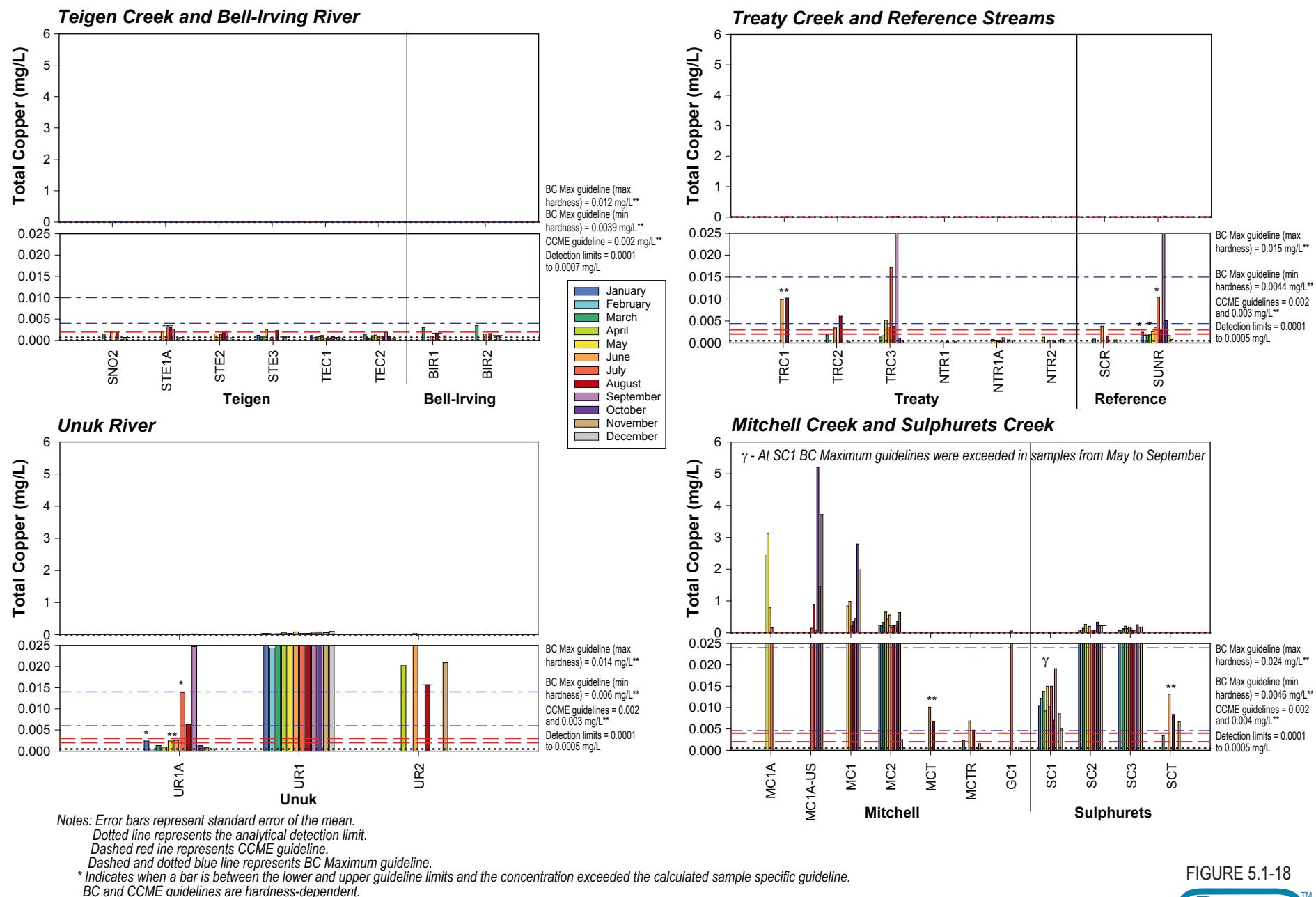
FIGURE 5.1-14

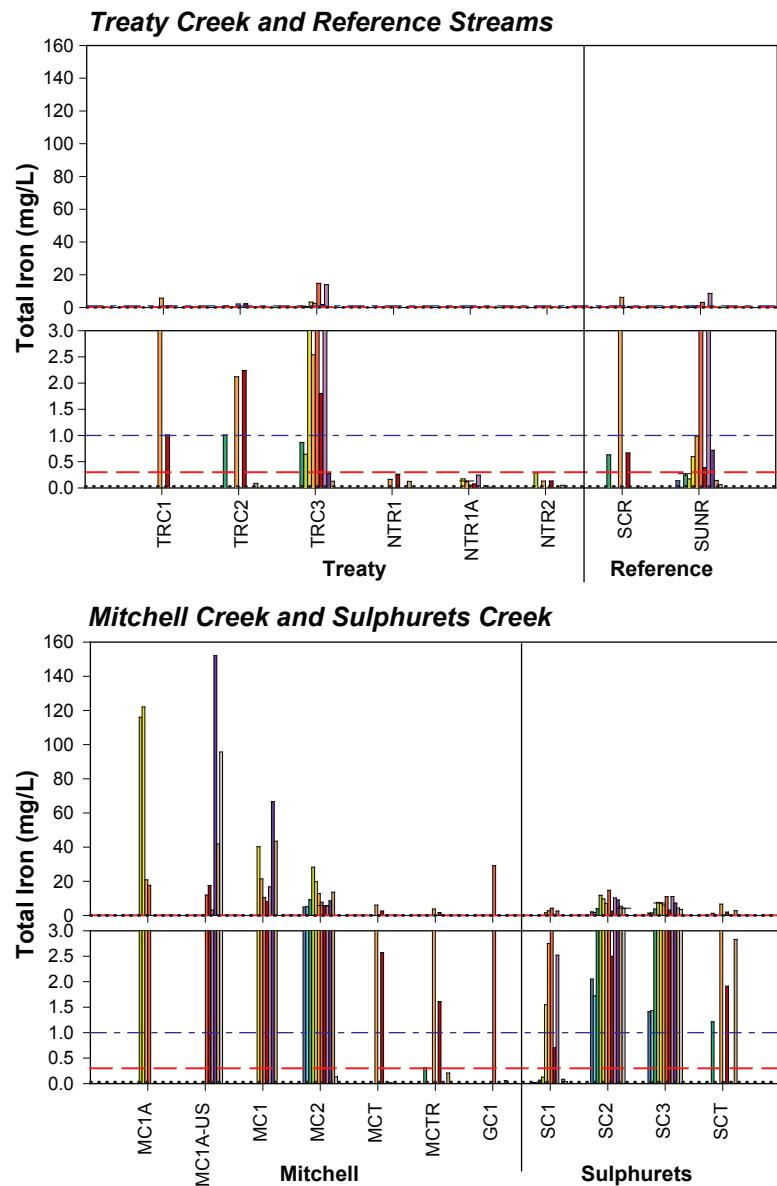
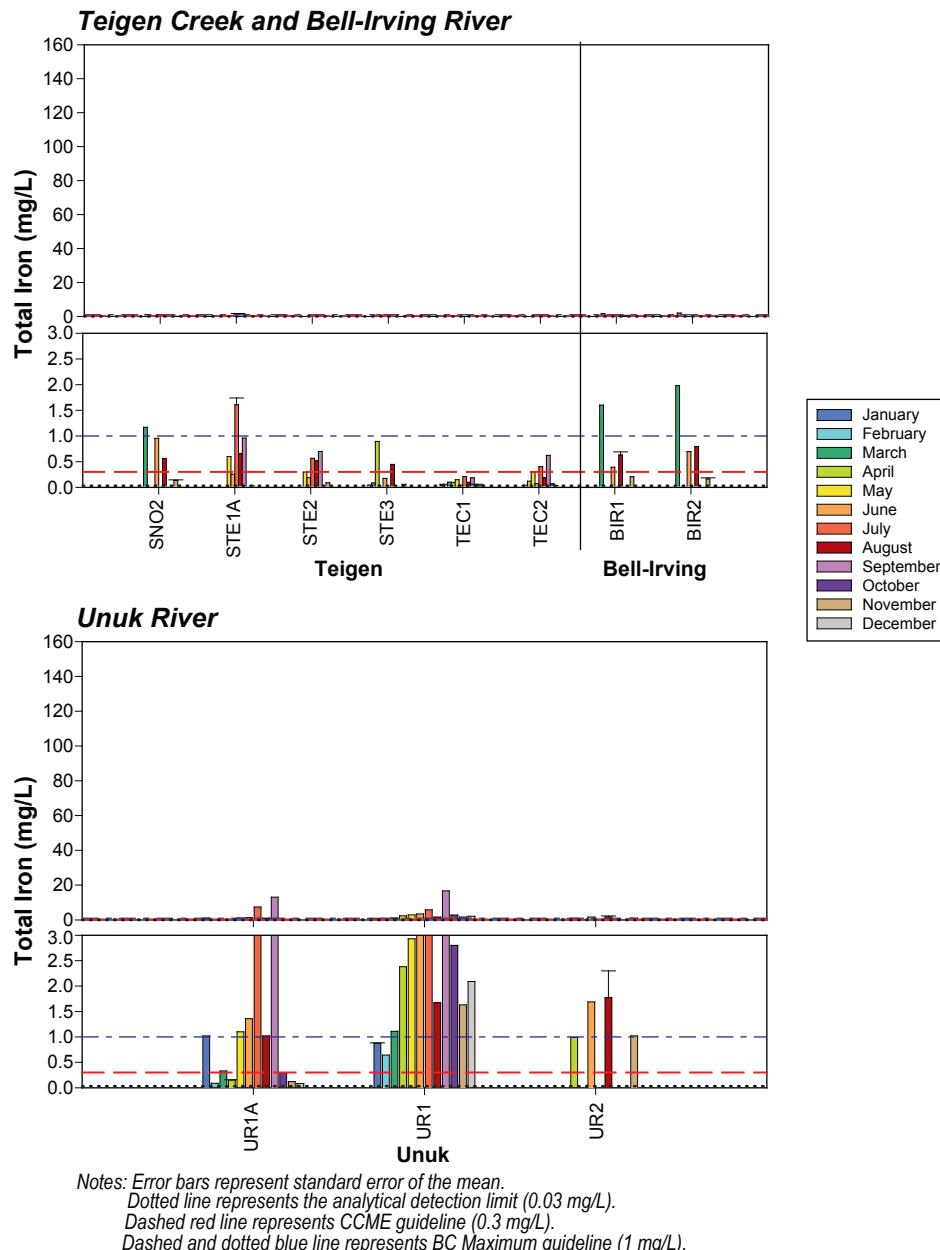


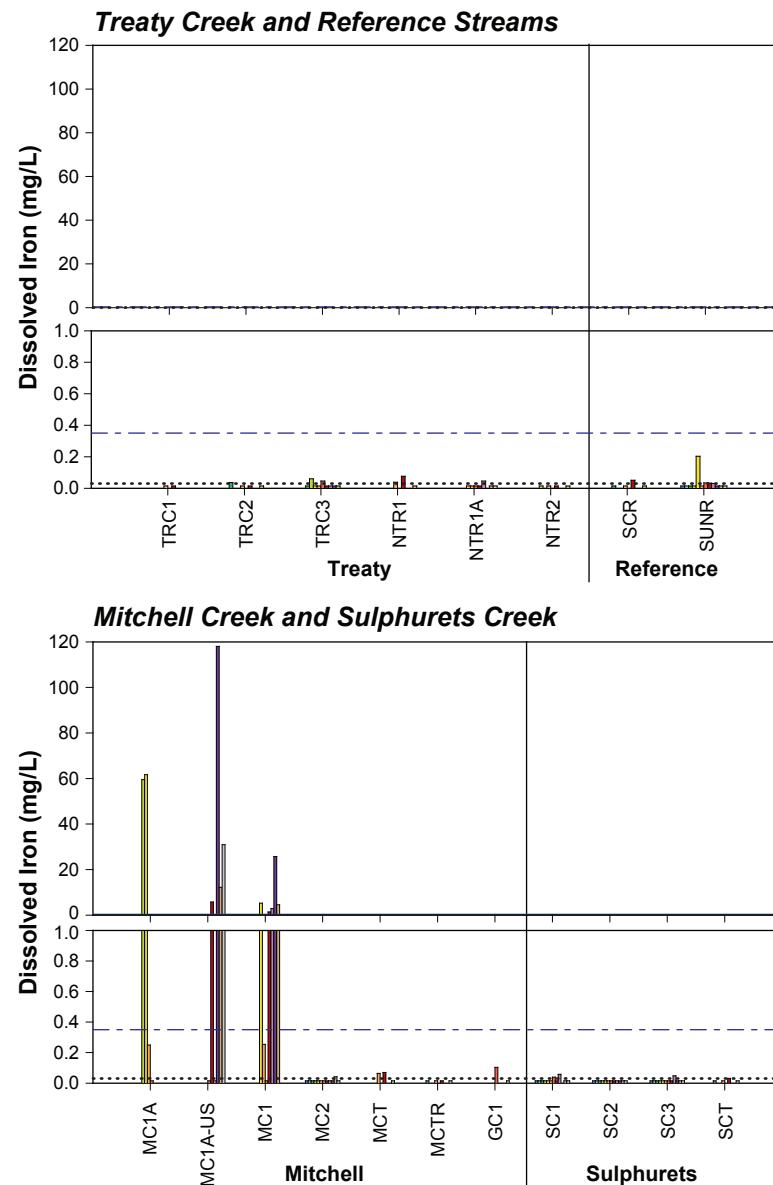
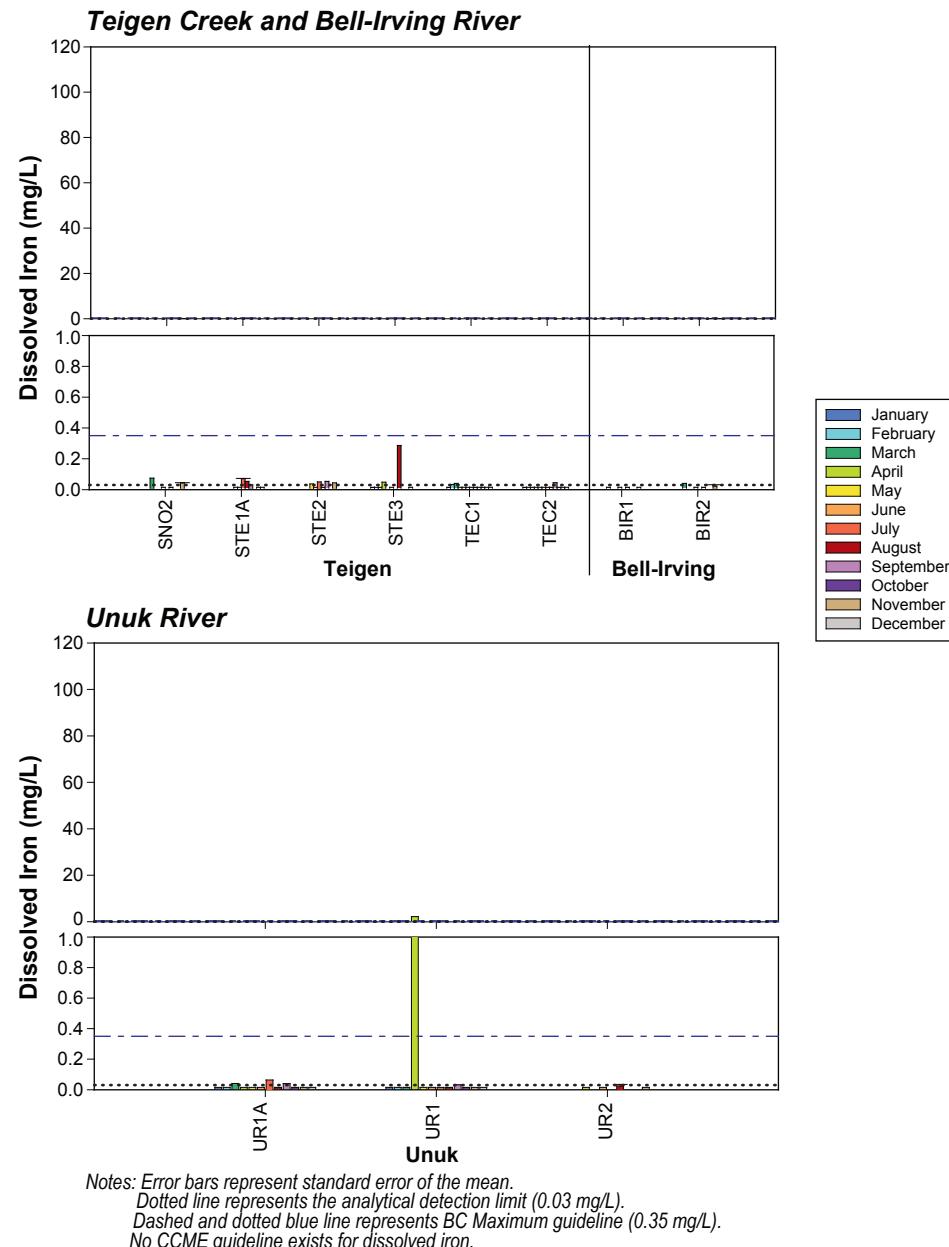


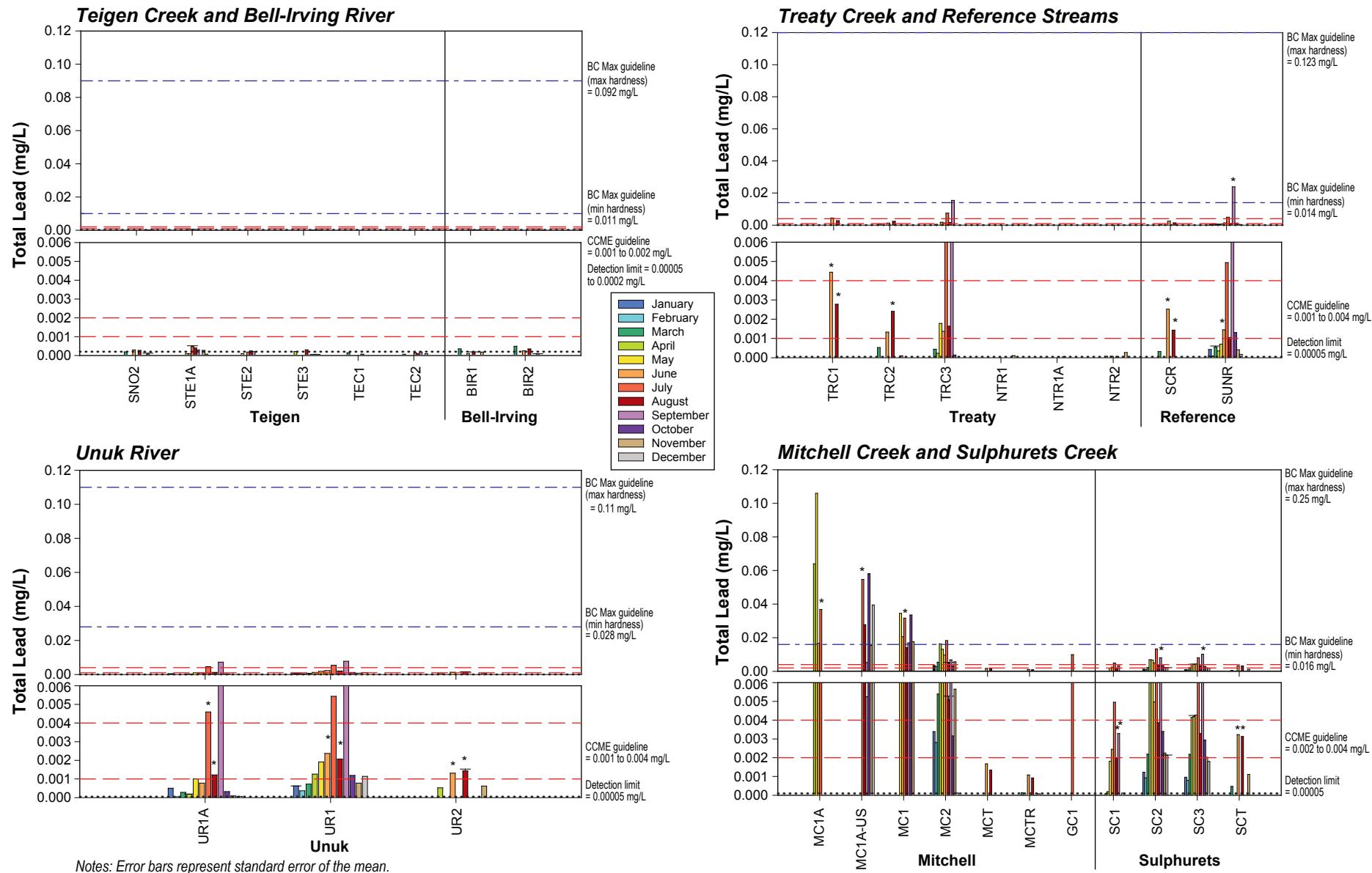


Notes: Error bars represent standard error of the mean.  
 Dotted line represents the analytical detection limit.  
 Dashed red line represents BC Max and CCME water quality guideline for the protection of aquatic life (BC or CCME where applicable (0.001 mg/L)).  
 Guidelines used are for hexavalent chromium (Cr(VI)).









Notes: Error bars represent standard error of the mean.

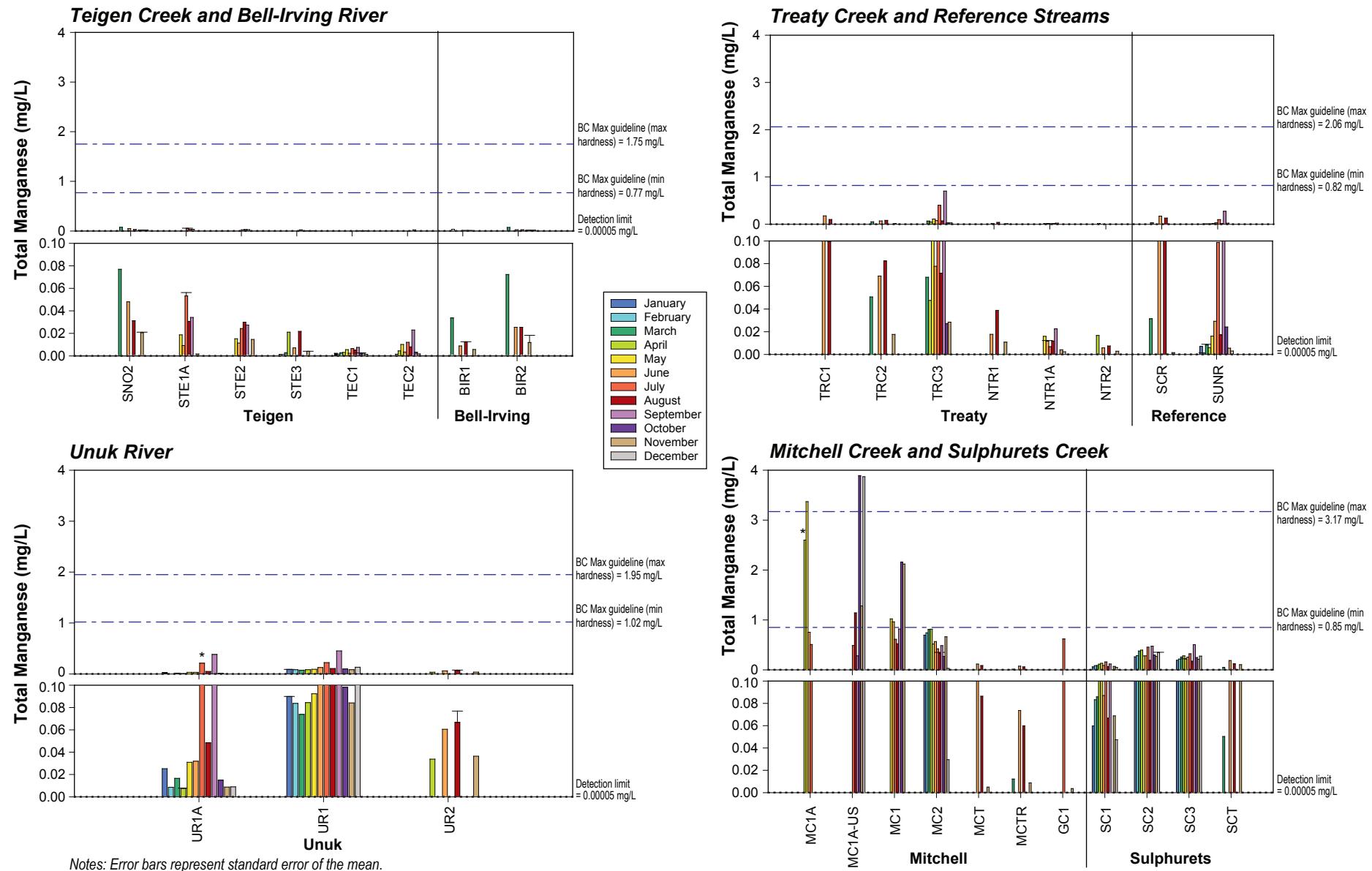
Dotted line represents the analytical detection limit.

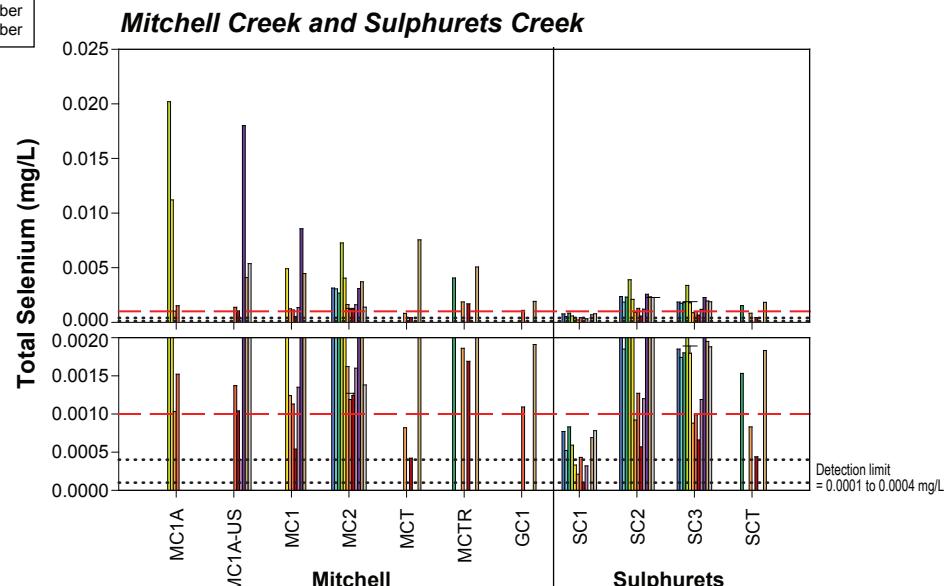
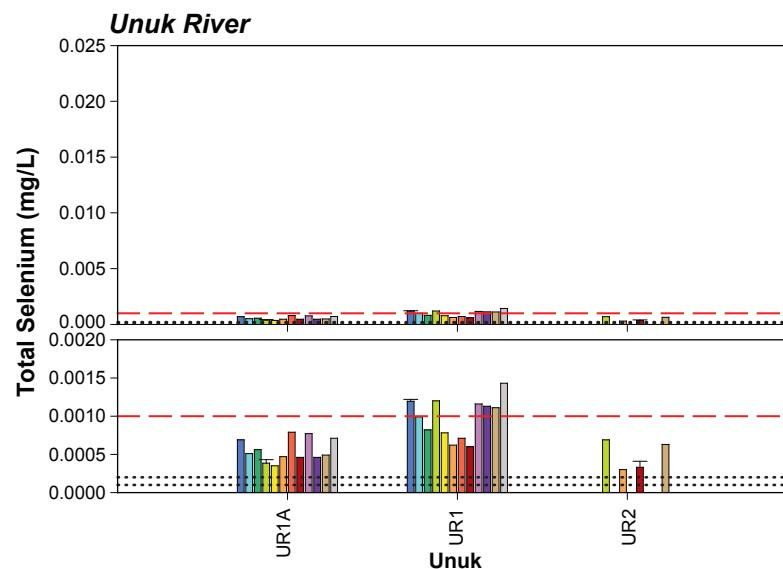
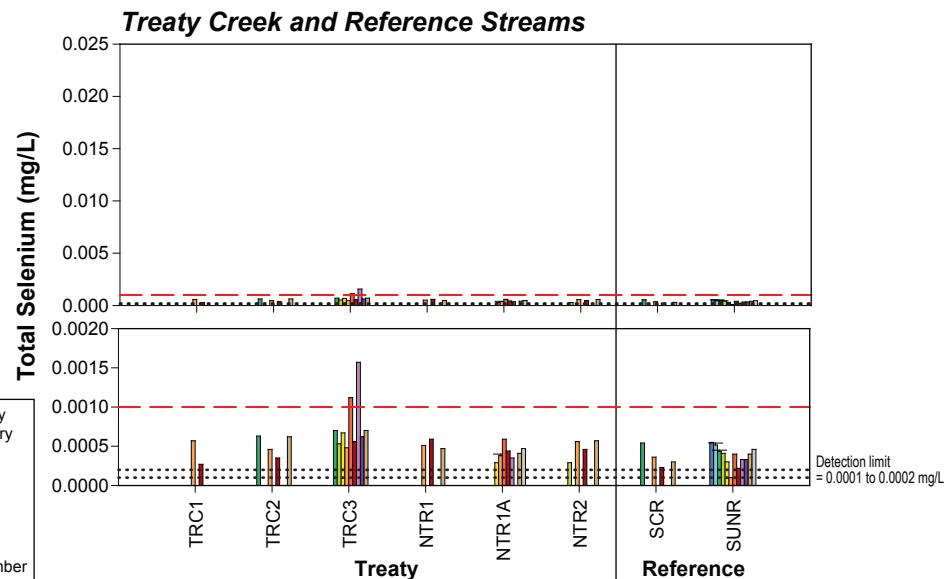
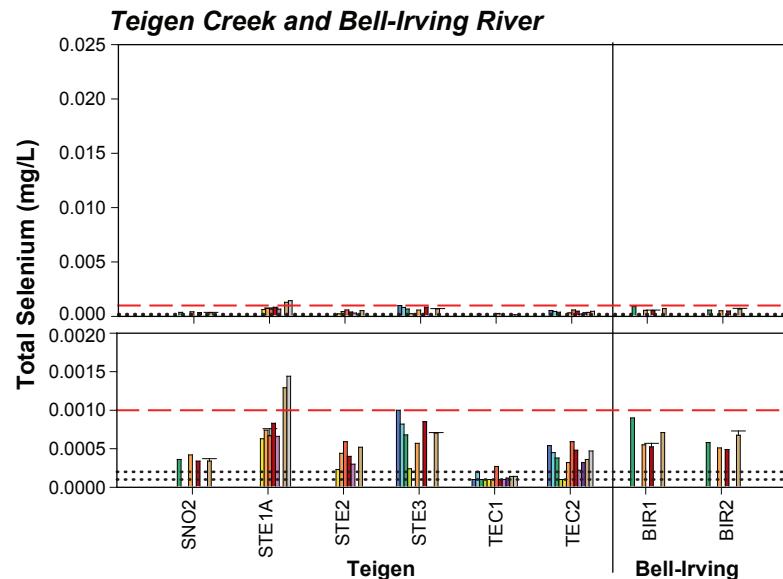
Dashed and dotted blue line represents BC Maximum guideline.

Dashed red line represents CCME guideline. BC and CCME guidelines are hardness-dependent.

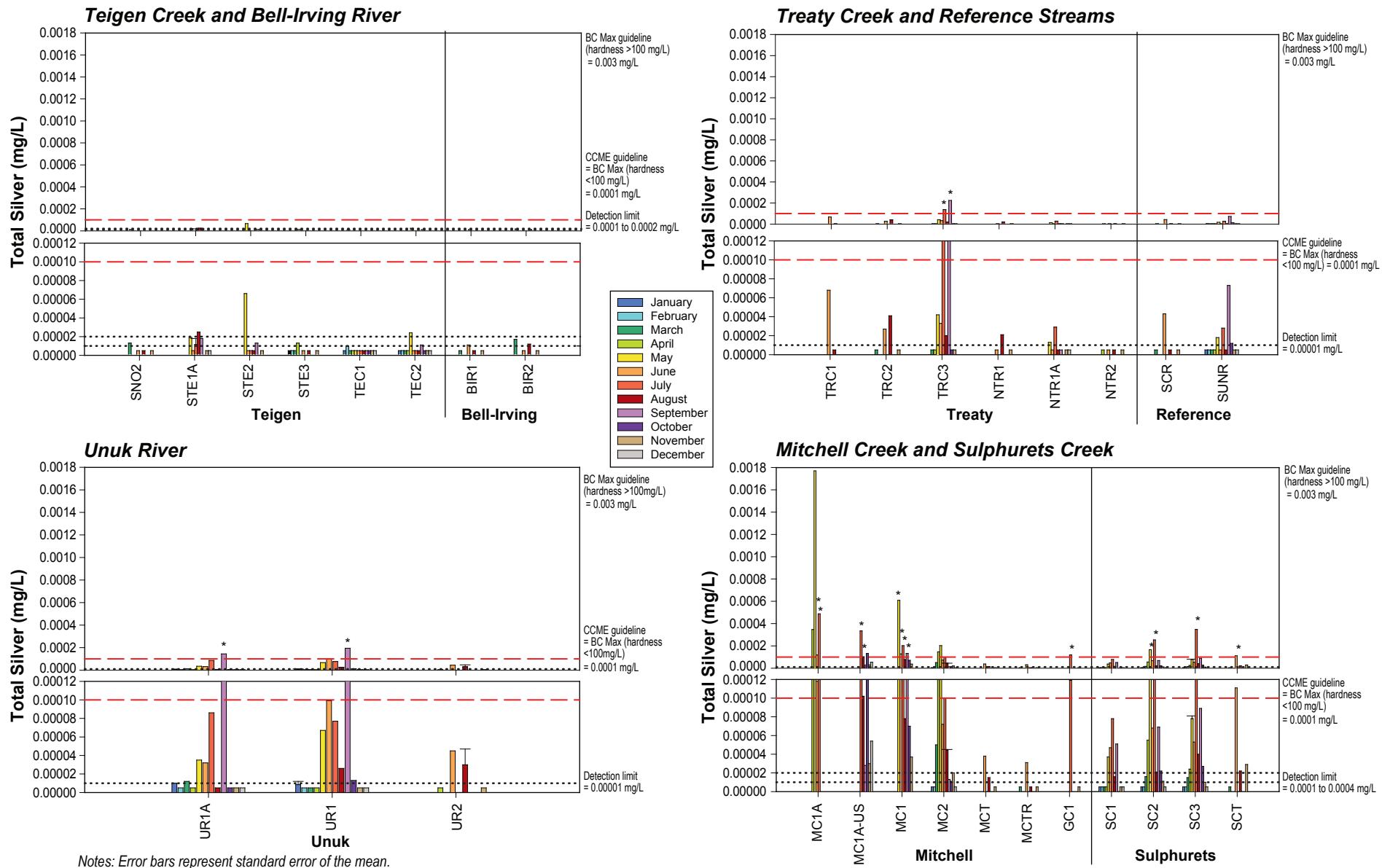
\* Indicates when a bar is between the lower and upper guideline limits and the concentration exceeded the calculated sample specific guideline.

FIGURE 5.1-21





Notes: Error bars represent standard error of the mean.  
Dotted line represents the analytical detection limit.  
Dashed red line represents CCME guideline (0.001 mg/L).



Notes: Error bars represent standard error of the mean.

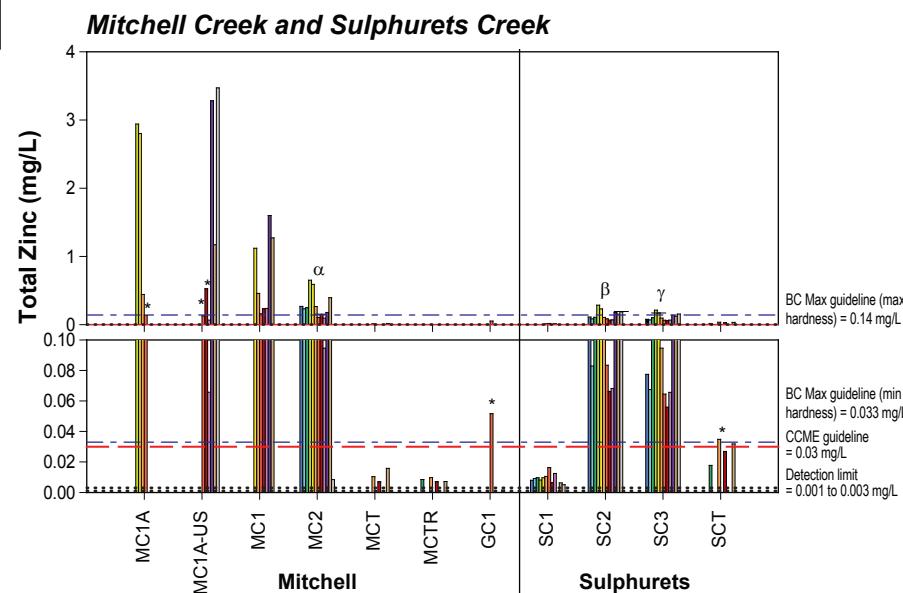
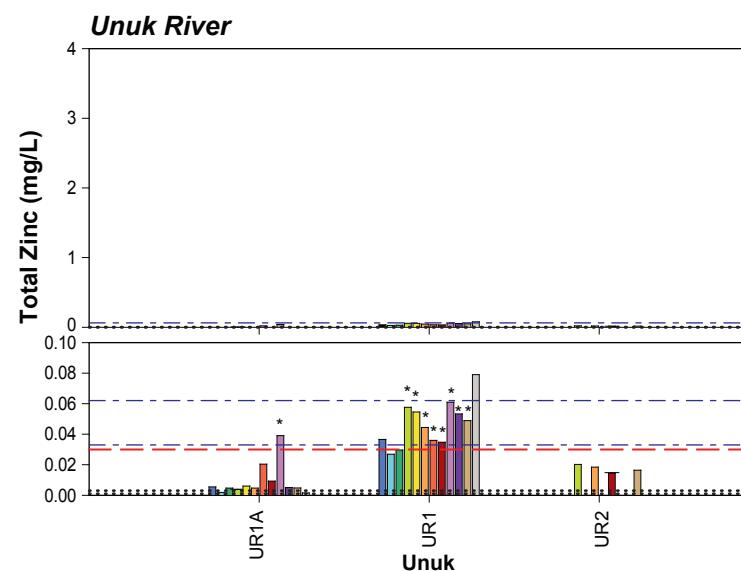
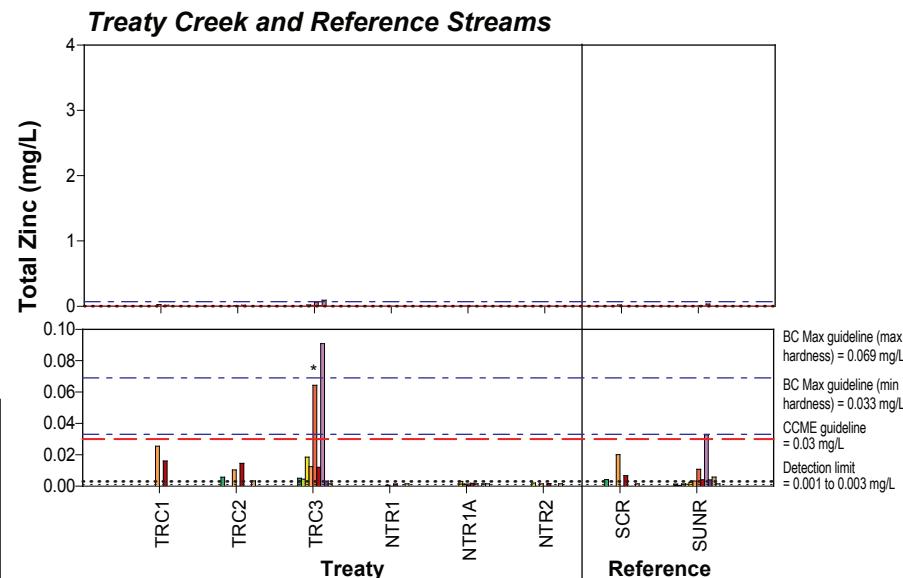
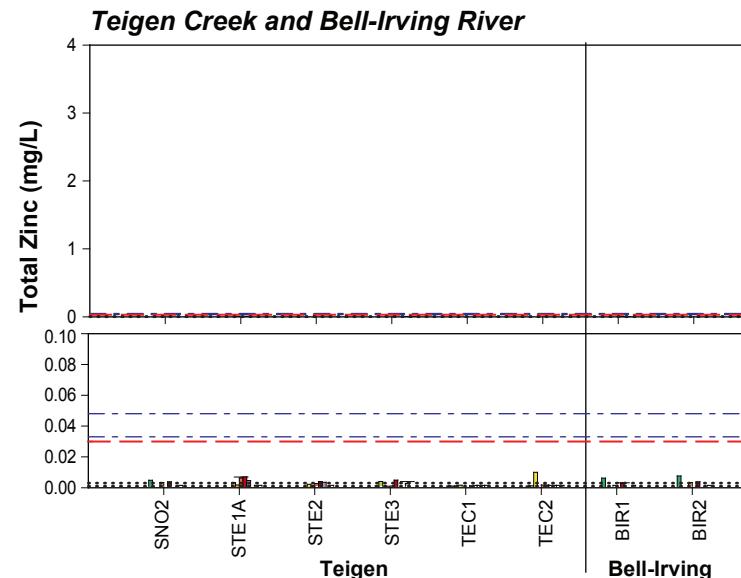
Dotted line represents the analytical detection limit.

Dashed red line represents CCME guideline.

BC Maximum guidelines for silver are hardness-dependent.

\* Denotes concentrations above calculated sample-specific BC Maximum guideline.

FIGURE 5.1-24



The second group includes the following sites located below the Mitchell glacier: MC1A, MC1A-UDS, and MC1. At these stations, metal concentrations followed temporal patterns of total dissolved solids. The lowest metal concentrations were observed during the summer months, high concentrations were observed in the winter, early spring and autumn during the low flow period. Peak metal concentrations at these sites were observed in October.

The lowest concentrations of all metals were observed in the Teigen Creek watershed and highest in the Mitchell Creek watershed. The exception was chromium concentrations that were relatively low in the Mitchell Creek watershed.

### **5.1.5 Comparison to Water Quality Guidelines**

BC maximum or CCME water quality guidelines were exceeded by fluoride, sulphate and the group of metals discussed below. These included total aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, selenium, silver, and zinc as well as dissolved aluminum and dissolved iron. The frequency of exceedances was highest in the Mitchell Creek watershed, which also had acidic water at four sites. Table 5.1-1 shows a summary of guideline exceedances with their calculated frequencies and magnitudes for all watersheds surveyed in 2010.

#### *5.1.5.1 Teigen Creek and Bell-Irving River*

Teigen Creek and Bell-Irving sites had the lowest frequency and magnitude of guideline exceedances among the Project sites. Parameters that exceeded CCME and/or BC water quality guidelines were total aluminum, cadmium, chromium, copper, iron, selenium, and dissolved aluminum (Table 5.1-1). The exceedances mostly occurred in the summer.

In the Teigen Creek watershed, the highest concentrations of most metals and highest frequencies and factors of exceedances were observed at STE1A, the most upstream site in South Teigen Creek. This was particularly true in July. The lowest concentrations, frequencies and factors of exceedances were found at TEC1 in Teigen Creek.

At the Bell-Irving River sites (BIR1 and BIR2), the highest observed concentrations of metals occurred in March. However, samples were only taken quarterly at these two sites (March, June, August, and November) and, therefore cannot be temporally compared to other watersheds, which were sampled monthly.

In the Teigen Creek and Bell-Irving watersheds, the highest frequencies and factors of exceedances were observed for total aluminum. Total aluminum concentrations in the Bell-Irving River sites exceeded the CCME guideline (0.1 mg/L) in 90% of samples, with the median magnitude of exceedances of 7.6 (Figure 5.1-13; Table 5.1-1). In the Teigen Creek watershed, 50% of samples exceeded the CCME guideline for aluminum, with a median magnitude of exceedance of 3.3.

#### *5.1.5.2 Treaty Creek and Reference Sites*

In the Treaty Creek watershed, CCME and/or BC water quality guidelines were exceeded by total aluminum, arsenic, cadmium, chromium, copper, iron, lead, selenium, silver, thallium, and zinc. At the reference site, SCR, the water quality guidelines were exceeded by total aluminum, cadmium, chromium, copper, iron, and lead, and dissolved aluminum. The other reference site, SUNR, also exceeded several CCME and/or BC maximum guidelines, including guidelines for total aluminum, cadmium, chromium, copper, iron, lead, zinc and dissolved aluminum.

In the Treaty Creek watershed, most exceedances occurred at TRC3, particularly in July and September, with highest concentrations observed in September (Figures 5.1-13 to 5.1-25). At SUNR, most exceedances occurred in September; and at SCR, where samples were collected quarterly, highest concentrations and most exceedances were observed in June.

In the Treaty Creek watershed, the highest frequencies of exceedances were observed for total aluminum. Total aluminum concentrations in the Treaty Creek sites exceeded the CCME guideline (0.1 mg/L) in 60% of samples (Figure 5.1-13; Table 5.1-1). In the Treaty Creek watershed, the highest factors of exceedances were observed for total iron. The median factor of exceedances of the total iron CCME guideline (0.3 mg/L) was 7.3 (Figure 5.1-19; Table 5.1-1).

At SCR, the highest frequencies of exceedances were observed for total aluminum, cadmium and iron and the highest factors of exceedances were observed for total cadmium and iron. Total aluminum, cadmium and iron concentrations at SCR exceeded the water quality guidelines in 75% of samples with the median magnitude of exceedances of 3.8, 6 and 6 (Figure 5.1-13 and 5.1-19; Table 5.1-1). At SUNR, the highest frequency of exceedances was observed for total cadmium (79% of samples), and highest median factor of exceedances was observed for total iron (6) (Figure 5.1-13; Table 5.1-1).

#### 5.1.5.3 *Unuk River*

In the Unuk River, federal and provincial water quality guidelines were exceeded by total aluminum, arsenic, cadmium, chromium, copper, iron, lead, selenium, silver, zinc, and dissolved aluminum and iron. The highest concentrations of most metals were observed at UR1, downstream the confluence of Sulphurets Creek; the lowest concentrations of metals were at UR2, the most downstream, far-field site. The spikes of most metal concentrations at both UR1A (upstream the Sulphurets Creek confluence) and UR1 were observed in July and September with highest concentrations in the September samples. Concentrations of total cadmium and copper at UR1 were elevated in excess of the provincial and federal water quality guidelines in all samples collected through the entire year (Figures 5.1-16 and 5.1-18).

In the Unuk River watershed, the highest frequencies of exceedances were observed for total cadmium and highest factors of exceedances were observed for total copper. Total cadmium concentrations in the Unuk sites exceeded the CCME guideline in 94% of samples, with the median magnitude of exceedances of 11 (Figure 5.1-13; Table 5.1-1). Total copper concentrations exceeded the CCME hardness-dependent guideline in 77% of samples, with the median factor of exceedances of 14 (Figure 5.1-18; Table 5.1-1).

#### 5.1.5.4 *Mitchell and Sulphurets Creek*

These two watersheds, particularly the Mitchell Creek watershed, were characterized by the highest number of parameters exceeding provincial and federal guidelines and by the highest frequencies and factors of exceedances. In the Mitchell Creek watershed, CCME and BC maximum water quality guidelines were exceeded for pH, fluoride, sulphate, total aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, selenium, silver, thallium, zinc, and dissolved aluminum and iron. The highest frequencies and factors of exceedances in the Mitchell Creek watershed occurred just below the toe of the Mitchell glacier at MC1A, MC1A-US, and MC1. The lowest concentrations and frequencies and factors of exceedances were at the McTagg sites, MCT and MCTR. The exception was total selenium, which was higher at MCT in June and GC1 in July.

The highest guideline exceedances in the Mitchell Creek watershed were observed for total cadmium (97%), aluminum (92%), copper (87%), and iron (90%). In the Mitchell Creek watershed, total cadmium exceeded the water quality guidelines by the median factor of 130 (Figure 5.1-13; Table 5.1-1); dissolved aluminum exceeded the BC maximum guideline by the median factor of 189 (Figure 5.1-14; Table 5.1-1). Total copper exceeded the BC hardness dependent guideline by the median factor of 114 (Figure 5.1-18; Table 5.1-1), and total aluminum exceeded the CCME guideline by the median factor of 55 (Figure 5.1-19; Table 5.1-1).

**Table 5.1-1. Summary of Water Quality Frequency and Magnitude of Guideline Exceedances, KSM Project, 2010**

Parameter Guideline Jurisdiction	pH 6.5-9 CCME = BC Maximum		Fluoride (F) Hardness-dependent BC Maximum		Sulphate ( $\text{SO}_4$ ) 100 mg/L BC Maximum		Aluminum (Al)-Total pH-dependent CCME		Aluminum (Al)-Dissolved* pH-dependent BC Maximum		Arsenic (As)-Total 0.005 mg/L CCME = BC Maximum		Cadmium (Cd)-Total Hardness-dependent CCME = BC Maximum		Chromium (Cr)-Total 0.001 mg/L CCME = BC Maximum		Copper (Cu)-Total Hardness-dependent CCME		Copper (Cu)-Total Hardness-dependent CCME		Iron (Fe)-Total 1 mg/L BC Maximum		
Watershed	N	Frequency (%)	Factor*	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor
Teigen Creek	51	0	0	0	0	0	0	50	3.3	6	1.1	0	0	17	1.2	35	2	0	0	15	1.3	6	1.5
Bell-Irving River	10	0	0	0	0	0	0	90	7.6	0	0	0	0	30	1.1	70	2.6	0	0	20	1.6	20	1.8
Treaty Creek	30	0	0	0	0	0	0	60	6.1	0	0	13	1.9	50	5.0	30	3.4	13	2.1	30	3.0	33	2.4
SCR - Reference Site	4	0	0	0	0	0	0	75	3.8	25	1	0	0	75	6	25	3	0	0	25	1.9	25	6
SUNR - Reference Site	14	0	0	0	0	0	0	64	5.5	7	2	0	0	79	2	36	2	14	4	50	1.8	14	6
Unuk River	31	0	0	0	0	0	0	84	7	6	1.8	16	1.8	94	11	35	2.2	65	4.2	77	14	65	2.2
Mitchell Creek	39	33	3.4	31	3.1	46	2	92	55	36	189	64	4.1	97	130	54	1.5	82	40	87	114	87	15
Sulphurets Creek	41	0	0	0	0	46	1	85	16	5	1.1	37	1.9	100	29	46	2.0	80	10	98	36	83	4.2

Parameter Guideline Jurisdiction	Iron (Fe)-Total 0.3 mg/L CCME		Iron (Fe)-Dissolved 0.35 mg/L BC Maximum		Lead (Pb)-Total Hardness-dependent BC Maximum		Lead (Pb)-Total Hardness-dependent CCME		Manganese (Mn)-Total Hardness-dependent BC Maximum		Selenium		Silver (Ag)-Total 0.001 mg/L CCME		Silver (Ag)-Total 0.0001 mg/L CCME		Thallium (Th)-Total 0.0003 mg/L BC Maximum		Zinc (Zn)-Total Hardness-dependent BC Maximum		Zinc (Zn)-Total 0.03 mg/L CCME		
Watershed	N	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor	Frequency (%)	Factor
Teigen Creek	51	29	2.2	0	0	0	0	0	0	4	1.4	0	0	0	0	0	0	0	0	0	0	0	0
Bell-Irving River	10	70	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Treaty Creek	30	40	7.3	0	0	0	0	17	2.8	0	0	7	1.3	7	1.8	7	1.8	3	1.03	7	2.4	7	2.6
SCR - Reference Site	4	75	2.2	0	0	0	0	50	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
SUNR - Reference Site	14	57	2.8	0	0	7	1	29	3.2	0	0	0	0	0	0	0	0	0	0	0	0	7	1.1
Unuk River	31	81	5	3	6.1	0	0	32	2	0	0	23	1	6	1.7	6	2	0	0	32	1.3	39	2
Mitchell Creek	39	90	37	28	35	8	2.2	72	5	10	1.3	90	2	23	1.3	36	2	3	1.2	77	6.8	77	8
Sulphurets Creek	41	85	14	0	0	0	0	46	3	0	0	56	2	10	2.1	10	2	0	0	56	2.1	68	4

Notes:

Frequency: Indicates the % of all samples that exceeded a water quality guideline.

Factor: Indicates the median magnitude by which the samples exceeded the guideline, based on concentrations of only the samples that exceed.

n = number of water samples collected at all sites in given watershed.

\* For pH, factor is a median difference between the guideline and sample pH level below the guideline.

In the Sulphurets Creek watershed, the guidelines were exceeded by sulphate, total aluminum, arsenic, cadmium, chromium, copper, iron, lead, selenium, silver, zinc, and dissolved aluminum. The highest frequencies and factors of exceedances were observed for total cadmium and copper. Total cadmium and copper concentrations in the Sulphurets Creek sites exceeded the CCME hardness dependent guidelines in 100% and 98% of samples, with the median magnitude of exceedances of 29 and 36 respectively (Figure 5.1-18; Table 5.1-1).

## 5.2 GINGRAS CREEK SEDIMENT QUALITY AND AQUATIC RESOURCES

Sediment quality, periphyton taxonomy and biomass, and benthic invertebrate samples were collected from Gingras Creek in August.

### 5.2.1 Sediment Quality

Sediment quality data is provided in Appendix 5.2-1. A summary of the sediment data and comparisons to sediment quality guidelines is provided in Table 5.2-1.

**Table 5.2-1. Summary of Sediment Quality and Comparisons to Sediment Quality Guidelines, Gingras Creek, 2010**

Sample ID	Units	GC1-A	GC1-B	GC1-C	Average	Standard Error	CCME, BC <sup>1</sup>	
							ISQG <sup>2</sup>	PEL <sup>3</sup>
pH	pH	8.46	8.56	8.65	8.56	0.05		
<b>Particle Size</b>								
Gravel (>2 mm)	%	0.81	1.66	2.1	1.5	0.38		
Sand (2 mm - 0.063 mm)	%	86.3	91.5	88.6	88.8	1.50		
Silt (0.063 mm - 4 µm)	%	11.8	5.6	8.2	8.6	1.79		
Clay (<4 µm)	%	1.15	1.22	1.05	1.1	0.05		
<b>Metals</b>								
Arsenic (As)	mg/kg	<b>17.4</b>	<b>20.3</b>	<b>17.7</b>	<b>18.5</b>	0.92	5.9	17
Cadmium (Cd)	mg/kg	<0.5	<0.5	<0.5	<0.5	NA	0.6	3.5
Chromium (Cr)	mg/kg	<b>37.3</b>	<b>40.0</b>	32.6	36.6	2.16	37.3	90
Copper (Cu)	mg/kg	<b>88.8</b>	<b>93.9</b>	<b>86.6</b>	<b>89.8</b>	2.16	35.7	197
Lead (Pb)	mg/kg	<30	<30	<30	<30	NA	35	91.3
Mercury (Hg)	mg/kg	0.0605	0.0742	0.0634	0.07	0.00	0.17	0.486
Nickel (Ni)	mg/kg	<b>17.6</b>	<b>23.2</b>	<b>17.2</b>	<b>19.3</b>	1.94	16 <sup>a</sup>	75 <sup>b</sup>
Selenium (Se)	mg/kg	<2.0	<0.50	<4.0	<2.0	NA	2 <sup>c</sup>	
Silver (Ag)	mg/kg	<2.0	<2.0	<2.0	<2.0	NA	0.5 <sup>d</sup>	
Zinc (Zn)	mg/kg	60.9	72.8	64.3	66	3.54	123	315

Notes:

<sup>1</sup> - BC Working Guidelines for Sediment.

<sup>2</sup> - CCME Interim Sediment Quality Guidelines (ISQG).

<sup>3</sup> - Probable Effect Level (PEL).

<sup>a</sup> - Lowest effect level for nickel based on screening level concentration, BC Working SQG.

<sup>b</sup> - Severe effect level for nickel based on screening level concentration, BC Working SQG.

<sup>c</sup> - BC Working SQG.

<sup>d</sup> - BC Working SQG and Ontario SQG.

**Bold** denotes exceedance of ISQG; **Italics** denotes exceedance of PEL.

Sand was dominant particle size in Gingras Creek (mean: 89%), with silt (8.6 %), gravel (1.5%), and clay (1.1%) making up much smaller fractions. Nutrient concentrations were low, as total nitrogen and available phosphate were each below their analytical detection limits (Appendix 5.2-1).

Several sediment parameters, including cyanides, cadmium, lead, selenium, and silver were also below their analytical detection limits. Average arsenic concentrations in Gingras Creek were high (18.5 mg/kg), exceeding both their CCME and BC interim sediment quality guideline (ISQG; 5.9 mg/kg) and the probable effect level (PEL; 17 mg/kg). Chromium concentrations exceeded the ISQG (37.3 mg/kg) in two samples, and averaged 36.6 mg/kg, overall. Copper concentrations exceeded the ISQG (35.7 mg/kg) in all three samples, with an average concentration of 89.8 mg/kg. Nickel exceeded the lowest effect level (16 mg/kg) in all three samples, and averaged 19.3 mg/kg.

Elevated concentrations of arsenic, chromium, and copper corresponded to elevated concentrations of these parameters found in the water sample collected at this site in July (Appendix 5.1-1).

### 5.2.2 Primary Producers - Periphyton

Periphyton taxonomy data is provided in Appendix 5.2-2, biomass data is provided in Appendix 5.2-3. A summary for the periphyton taxonomy and biomass data, including the density, biomass, richness, diversity and relative abundance of the dominant taxonomic group is provided in Table 5.2-2.

**Table 5.2-2. Summary of Gingras Creek Periphyton Taxonomy and Biomass, KSM Project, 2010.**

Site	Sub-sample	Density (cells./cm <sup>2</sup> )	Biomass (µg/cm <sup>2</sup> )	Richness (# taxa)	Simpson's Diversity Index	Dominant Species	Relative Abundance (%)
GC 1	A	5,211,930	0.11	18	0.011	<i>Homoeothrix varians</i> ( <i>Cyanophyta</i> )	99.5
GC 1	B	2,384,312	0.07	18	0.061	<i>Homoeothrix varians</i> ( <i>Cyanophyta</i> )	96.9
GC 1	C	5,577,143	0.10	18	0.008	<i>Homoeothrix varians</i> ( <i>Cyanophyta</i> )	99.6
GC 1	D	9,672,151	0.09	22	0.018	<i>Homoeothrix varians</i> ( <i>Cyanophyta</i> )	99.1
GC 1	E	9,946,552	0.30	20	0.021	<i>Homoeothrix varians</i> ( <i>Cyanophyta</i> )	98.9
<b>Average</b>		6,558,418	0.13	19	0.024		98.8
<b>Standard Error</b>		1,438,296	0.04	0.8	0.010		0.50

Periphyton density in the Gingras Creek replicates ranged from  $2.4 \times 10^6$  cells/cm<sup>2</sup> to  $9.9 \times 10^6$  cells/cm<sup>2</sup>, with an average density of  $6.6 \times 10^6$  cells/cm<sup>2</sup>. Chlorophyll *a* biomass was low, as it ranged from 0.07 µg/cm<sup>2</sup> to 0.3 µg/cm<sup>2</sup>, with the average concentration of 0.13 µg chl *a*/cm<sup>2</sup>.

A total 22 periphyton taxa were identified, and the vast majority were the blue-green algae, *Cyanophyta*. Diversity of periphyton communities was low, since up to 99% of the communities consisted of filamentous blue-green algae, *Homoeothrix varians*. The Simpson's diversity index ranged from 0.008 to 0.021.

### 5.2.3 Benthic Invertebrates

The benthos taxonomy data is provided in Appendix 5.2-4. A summary of the benthic invertebrate data, including density, biomass, richness, diversity and relative abundance of the dominant taxonomic group is provided in Table 5.2-3.

**Table 5.2-3. Summary of the Gingras Creek Benthic Invertebrate Taxonomy, KSM Project, 2010.**

Sub-sample	Density (org./m <sup>2</sup> )	Richness (# taxa)	Simpson's Diversity Index	Dominant Taxa	Relative Abundance (%)
A	54	6	0.59	<i>Taenionema (Plecoptera)</i>	62
B	202	15	0.73	<i>Taenionema (Plecoptera)</i>	55
C	192	15	0.66	<i>Taenionema (Plecoptera)</i>	60
D	202	13	0.52	<i>Taenionema (Plecoptera)</i>	71
E	165	12	0.56	<i>Taenionema (Plecoptera)</i>	71
Average	163	12	0.61		64
Standard Error	28.0	1.7	0.04		3.2

Benthic invertebrate density in the Gingras Creek replicates ranged from 54 organisms/m<sup>2</sup> to 202 organisms/m<sup>2</sup>, with an average density of 163 organisms/m<sup>2</sup>. A high of 15 taxa were identified in any one replicate, with Plecoptera (stoneflies) making up as much as 71% of the entire benthos communities. Chironomidae also made up a large part of the benthos community (up to 33%). The diversity in Gingras Creek was quite high, ranging from 0.52 to 0.73, with an average index of 0.61.

### 5.3 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

Field and travel blank data for water quality are presented in Appendix 5.1-2. Field blanks were usually below the analytical detection. Besides pH and acidity, only 1% of the field blank parameters were above detection limits. Ammonia exceeded the detection limit of 0.005 mg/L in four samples. Travel blanks had 5% of their parameters exceed their detection limits. The travel blank on May 26th had multiple parameters that were above the analytical detection limit, indicating that the set of travel blanks may have been contaminated either in the field or in the laboratory before or after shipment.

The RPD analysis of QA/QC field duplicate data for the Project streams is presented in Appendix 5.1-3. Sixteen duplicate stream samples were collected during the 2010 field season. The duplicate samples were compared for each parameter, using the RPD between the replicates as a measure of the variability inherent in field samples (environmental heterogeneity). Of the 523 RPD calculations, 448 (86%) were below the 20% threshold indicated by the provincial guidance. Of the 75 (14%) RPD that were greater than the 20% threshold, 18 (24%) occurred for the November 15th field duplicates taken at BIR2. Total aluminum, total and dissolved calcium, total and dissolved manganese were among those parameters that frequently had RPD calculations greater than 20%. Also, 19 duplicate parameters that did not exceed five times the detection limit had difference greater than two detection limits.

KSM PROJECT  
2010 Water Quality and Aquatic Resources Baseline Report

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## 6. Summary

## **6. Summary**

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### **6.1 WATER QUALITY**

The physical processes, particularly the hydrological regime, were major factors influencing the water quality in the KSM Project area streams. Increased discharge during freshet, glacial melt and increased rainfall events diluted concentrations of major ions resulting in the low levels of total dissolved solids, hardness, conductivity and alkalinity during the summer months. On the other hand, freshet and glacial melt resulted in increased sediment load and transport, which was reflected in an increase in concentrations of total suspended solids and turbidity in July and September. Due to the high mineralization of the area, increased sediment load often resulted in elevated metal concentrations.

Particulate and particulate-bound metals were transported with suspended sediments, resulting in several total metal concentrations naturally exceeding federal or provincial water quality guidelines. These metals largely followed similar spatial and temporal patterns as total suspended solids, with higher concentrations occurring during the summer and early fall. The exceptions were the most upstream sites in Mitchell Creek, MC1A, MC1A-US, and MC1 just below the toe of the Mitchell Glacier. Concentrations of metals at these sites were highest in the winter, early spring and late fall, during the low flow period. Water quality at these sites was, most probably, affected by the groundwater flow and naturally occurring acid-rock drainage. pH levels at these sites were often very acidic, with low alkalinity.

The majority of other streams in the Project area were slightly basic with low to moderate buffering capacity and primarily soft to moderately hard water.

Sites within the Mitchell and Sulphurets watersheds had higher concentrations of different constituents and greater temporal and spatial variation in water chemistry than those sites within the Teigen, Bell-Irving, Treaty, and Reference creeks, and Unuk River watersheds. Sites in the Mitchell and Sulphurets watersheds had greater frequencies of exceedances of the provincial and federal water quality guidelines and greater factors of exceedances than sites in the other watersheds. The fewest parameters exceeding water quality guidelines and lowest frequencies and magnitudes of exceedances were observed in the Teigen Creek watershed.

Within the Mitchell Creek watershed, the highest concentrations of different parameters were observed at the upstream Mitchell Creek sites, the lowest at the McTagg sites. Concentrations of metals in Mitchell Creek decreased with the distance downstream. Water quality in Unuk River most likely was affected by the inflow from Mitchell and Sulphurets creeks, since concentrations of TSS and metals at UR1, the site located downstream the Sulphurets Creek confluence, were higher than those at UR1A, located upstream, and UR2 located further downstream.

### **6.2 GINGRAS CREEK AQUATIC RESOURCES**

The sediments in the Gingras Creek were largely comprised of sand (89%). Concentrations of total nitrogen and available phosphate were low. Concentrations of arsenic, chromium, copper, and nickel exceeded CCME and BC sediment quality guidelines.

Average density of periphyton was  $6.6 \times 10^6$  cells/cm<sup>2</sup> and was nearly wholly made up of a single species of blue-green algae (*Cyanophyta*), *Homoeothrix varians*. Periphyton biomass and diversity in Gingras Creek was low.

Benthic invertebrates communities had an average density of 163 organisms/m<sup>2</sup> and consisted of 15 taxa. Benthos was dominated by insects, particularly *Plecoptera* (64%), followed by *Chironomidae* (20%).

KSM PROJECT  
2010 Water Quality and Aquatic Resources Baseline Report

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## References

## References

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**KSM PROJECT**  
**2010 Water Quality and Aquatic Resources Baseline Report**

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## **Appendix 5.1-1**

### **Stream Water Quality Data, KSM Project, 2010**

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		UR1	UR1A	SUNR	TEC1	TEC2	MC2	SC1	SC2	SC3	
Date Sampled		17-Jan-10									
ALS Sample ID		L855505-1	L855505-2	L855505-3	L855505-4	L855505-5	L855505-6	L855505-7	L855505-8	L855505-9	
<b>QA/QC</b>		Units									
<b>Physical Tests</b>											
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	
Conductivity	µS/cm	256	181	208	89.6	172	450	338	398	362	
Hardness (as CaCO <sub>3</sub> )	mg/L	121	85.1	99.0	40.0	78.6	212	154	188	165	
pH	pH unit	7.81	8.02	8.05	7.83	7.93	7.92	8.00	8.02	8.11	
Total Suspended Solids	mg/L	9.3	<3.0	17.8	<3.0	<3.0	17.8	<3.0	8.3	5.3	
Total Dissolved Solids	mg/L	166	112	136	57	106	318	231	273	241	
Turbidity	NTU	6.82	0.74	1.19	0.50	0.31	38.4	0.52	16.1	11.4	
<b>Anions and Nutrients</b>											
Acidity (as CaCO <sub>3</sub> )	mg/L	3.8	2.9	2.8	2.6	3.0	3.9	3.2	3.4	2.8	
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	70.4	64.5	63.6	26.3	47.5	76.9	60.2	82.2	78.4	
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	70.4	64.5	63.6	26.3	47.5	76.9	60.2	82.2	78.4	
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Fluoride (F)	mg/L	0.061	0.026	0.058	<0.020	0.027	0.250	0.049	0.123	0.102	
Nitrate (as N)	mg/L	0.0986	0.0863	0.210	0.0673	0.180	0.142	0.0706	0.0901	0.120	
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Total Nitrogen	mg/L	0.140	0.110	0.260	0.110	0.210	0.160	0.080	0.110	0.140	
Ortho Phosphate as P	mg/L	<0.0010	0.0019	<0.0010	0.0013	0.0053	<0.0010	0.0039	<0.0010	<0.0010	
Total Phosphate as P	mg/L	0.0086	0.0035	0.0143	0.0021	0.0047	0.0543	<0.0020	0.0244	0.0174	
Sulphate (SO <sub>4</sub> )	mg/L	59.6	26.9	40.1	15.8	34.9	160	104	117	103	
<b>Cyanides</b>											
Cyanide, Weak Acid Dissociable	mg/L	-	-	<0.0010	-	-	-	-	-	-	
Cyanide, Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Thiocyanate	mg/L	-	-	<0.50	-	-	-	-	-	-	
<b>Organic / Inorganic Carbon</b>											
Total Organic Carbon	mg/L	0.61	0.71	0.57	1.10	0.82	<0.50	<0.50	<0.50	<0.50	
<b>Total Metals</b>											
Aluminum (Al)	mg/L	0.237	0.623	0.0928	0.0382	0.0118	0.940	0.0191	0.374	0.309	
Antimony (Sb)	mg/L	0.00176	0.00282	0.00011	<0.00010	<0.00010	0.00063	0.00113	0.00066	0.00057	
Arsenic (As)	mg/L	0.00082	0.00099	0.00034	<0.00010	0.00010	0.00256	0.00031	0.00135	0.00100	
Barium (Ba)	mg/L	0.0344	0.0399	0.0409	0.00853	0.0175	0.0301	0.0413	0.0383	0.0363	
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.010	
Cadmium (Cd)	mg/L	0.000522	0.000041	0.000033	<0.000017	<0.000017	0.00402	0.000075	0.00166	0.00118	
Calcium (Ca)	mg/L	42.7	28.6	37.6	12.7	23.1	75.1	53.8	65.5	58.5	
Chromium (Cr)	mg/L	<0.00050	0.00138	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Cobalt (Co)	mg/L	0.00061	0.00046	0.00012	<0.00010	<0.00010	0.00474	0.00044	0.00179	0.00133	
Copper (Cu)	mg/L	0.0339	0.00239	0.00242	0.00114	0.00133	0.236	0.0103	0.0872	0.0666	
Iron (Fe)	mg/L	0.884	1.02	0.137	0.059	<0.030	4.86	<0.030	2.05	1.41	
Lead (Pb)	mg/L	0.000622	0.000507	0.000426	<0.000050	<0.000050	0.00339	<0.000050	0.00123	0.000957	
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Magnesium (Mg)	mg/L	4.67	4.74	2.10	2.28	5.70	6.73	4.24	5.42	4.96	
Manganese (Mn)	mg/L	0.0899	0.0252	0.00712	0.00232	0.000763	0.695	0.0597	0.260	0.192	
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Molybdenum (Mo)	mg/L	0.00165	0.00107	0.00747	0.000225	0.000349	0.00338	0.00132	0.00251	0.00231	
Nickel (Ni)	mg/L	0.00106	0.00161	<0.00050	0.00062	<0.00050	0.00293	0.00069	0.00175	0.00163	
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Potassium (K)	mg/L	0.945	0.616	1.32	0.112	0.258	0.809	0.400	1.50	1.40	
Selenium (Se)	mg/L	0.00122	0.00069	0.00055	<0.00020	0.00054	0.00313	0.00077	0.00235	0.00185	
Silicon (Si)	mg/L	2.28	2.73	2.22	1.55	2.20	3.13	1.81	2.66	2.50	
Silver (Ag)	mg/L	<0.000012	0.000010	<0.000010	<0.000010	<0.000010	<				

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		STE3 17-Jan-10 L855505-10	RES1 17-Jan-10 L855505-11	UR1 3-Mar-10 L866873-1	UR1A 3-Mar-10 L866873-2	SUNR 3-Mar-10 L866873-3	TEC1 3-Mar-10 L866873-4	TEC2 3-Mar-10 L866873-5	MC2 3-Mar-10 L866873-6	SC1 3-Mar-10 L866873-7
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity	µS/cm	236	260	275	193	232	95.4	172	477	382
Hardness (as CaCO <sub>3</sub> )	mg/L	102	118	125	90.8	107	42.3	75.7	209	172
pH	pH unit	7.94	8.05	8.16	8.10	8.07	7.94	7.99	8.00	8.00
Total Suspended Solids	mg/L	<3.0	9.3	<3.0	<3.0	<3.0	<3.0	<3.0	16.8	<3.0
Total Dissolved Solids	mg/L	149	167	175	118	148	58	105	338	261
Turbidity	NTU	0.57	6.74	5.33	0.61	0.47	0.52	0.35	37.0	0.48
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	3.0	2.7	2.6	2.4	2.7	2.6	2.9	3.8	3.2
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	38.6	70.9	65.5	68.2	65.3	27.7	48.9	78.8	64.5
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	38.6	70.9	65.5	68.2	65.3	27.7	48.9	78.8	64.5
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0078	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.028	0.053	0.066	0.037	0.082	0.020	0.037	0.276	0.075
Nitrate (as N)	mg/L	0.113	0.102	0.0996	0.0840	0.218	0.0856	0.168	0.160	0.0654
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	0.060	<0.050	0.072	0.054	0.062	<0.050	<0.050
Total Nitrogen	mg/L	0.140	0.110	0.160	0.130	0.290	0.140	0.230	0.210	0.080
Ortho Phosphate as P	mg/L	0.0043	<0.0010	<0.0010	<0.0010	<0.0010	0.0015	0.0033	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.0035	0.0209	0.0078	<0.0020	0.0027	0.0023	0.0048	0.0697	<0.0020
Sulphate (SO <sub>4</sub> )	mg/L	73.4	60.6	64.3	29.6	48.4	17.4	36.1	164	127
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	<0.0010	-	-	-	<0.0010	-	<0.0010	-	-
Cyanide, Total	mg/L	<0.0010	<0.0010	0.0013	0.0015	<0.0010	0.0015	0.0015	<0.0010	<0.0010
Thiocyanate	mg/L	<0.50	-	-	-	<0.50	-	<0.50	-	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	0.81	0.60	0.77	0.88	<0.50	1.50	1.02	<0.50	<0.50
<b>Total Metals</b>										
Aluminum (Al)	mg/L	0.0183	0.231	0.130	0.0316	0.0172	0.0225	0.0128	0.891	0.0189
Antimony (Sb)	mg/L	<0.00010	0.00177	0.00148	0.00231	0.00010	<0.00020	<0.00010	0.00073	0.00109
Arsenic (As)	mg/L	<0.00010	0.00080	0.00063	0.00031	0.00021	<0.00020	<0.00010	0.00296	0.00027
Barium (Ba)	mg/L	0.0225	0.0346	0.0344	0.0325	0.0440	0.00895	0.0175	0.0317	0.0412
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	0.014	<0.010
Cadmium (Cd)	mg/L	<0.000017	0.000515	0.000429	0.000025	0.000032	<0.000020	<0.000010	0.00383	0.000078
Calcium (Ca)	mg/L	30.8	40.9	42.9	30.7	41.4	13.6	22.8	80.0	62.6
Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
Cobalt (Co)	mg/L	<0.00010	0.00066	0.00052	<0.00010	<0.00010	<0.00020	<0.00010	0.00464	0.00057
Copper (Cu)	mg/L	0.00122	0.0349	0.0244	0.00049	0.00044	0.00064	0.00040	0.213	0.0122
Iron (Fe)	mg/L	<0.030	0.866	0.642	0.088	<0.030	0.060	<0.030	5.16	<0.030
Lead (Pb)	mg/L	<0.000050	0.000627	0.000366	0.000051	0.000073	<0.00010	<0.000050	0.00281	<0.000050
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	6.76	4.52	4.64	4.79	2.27	2.28	5.73	7.19	4.85
Manganese (Mn)	mg/L	0.00128	0.0898	0.0837	0.00858	0.00113	0.00170	0.000649	0.741	0.0832
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.000441	0.00159	0.00156	0.00100	0.00822	0.00022	0.000337	0.00360	0.00142
Nickel (Ni)	mg/L	<0.00050	0.00113	0.00077	<0.00050	<0.00050	<0.0010	<0.00050	0.00297	0.00091
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.277	0.933	0.869	0.483	1.39	<0.10	0.257	0.856	0.455
Selenium (Se)	mg/L	0.00100	0.00117	0.00099	0.00051	0.00049	<0.00040	0.00045	0.00306	0.00052
Silicon (Si)	mg/L	2.26	2.27	2.18	2.00	2.21	1.59	2.19	3.20	1.82
Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	2.9	2.7	2.6	2.5	<2.0	<2.0	2.0	4.9	<2.0
Strontium (Sr)	mg/L	0.347	0.276	0.280	0.253	0.372	0.0987	0.201	0.457	0.360
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L									

## **Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

**Note:**

"<" sign indicates that the value is below the detection limit.

## Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010

Note:  
"<" sign indicates that the value is below the detection limit

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		SC1 28-Mar-10 L873293-9	SC2 28-Mar-10 L873293-10	SC3 28-Mar-10 L873293-11	SCR 28-Mar-10 L873293-12	BIR1 28-Mar-10 L873293-13	BIR2 28-Mar-10 L873293-14	STE3 1-May-10 L884476-1	TRC3 1-May-10 L884476-2	NTR2 1-May-10 L884476-3
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	<5.0	5.0	5.3	9.5	15.0	8.1	8.4
Conductivity	µS/cm	401	402	335	279	167	150	77.4	176	83.3
Hardness (as CaCO <sub>3</sub> )	mg/L	196	192	159	138	77.5	69.2	33.4	83.4	35.1
pH	pH unit	8.03	8.04	8.06	8.16	8.03	7.96	7.89	7.94	7.91
Total Suspended Solids	mg/L	<3.0	23.2	22.2	7.2	23.7	32.7	10.5	7.0	<3.0
Total Dissolved Solids	mg/L	269	274	220	165	99	98	67	110	57
Turbidity	NTU	0.75	35.3	31.4	3.65	31.2	27.8	11.5	3.96	2.05
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	2.3	2.4	2.2	1.7	1.9	2.0	3.7	4.0	3.5
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	83.1	89.6	82.2	98.0	64.1	58.1	17.5	55.1	21.4
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	83.1	89.6	82.2	98.0	64.1	58.1	17.5	55.1	21.4
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0061	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.068	0.142	0.108	0.048	0.034	0.034	0.020	0.047	0.029
Nitrate (as N)	mg/L	0.120	0.195	0.258	0.0863	0.272	0.295	0.372	0.572	1.17
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.126	0.097	0.153
Total Nitrogen	mg/L	0.120	0.190	0.290	0.090	0.320	0.330	0.580	0.800	1.63
Ortho Phosphate as P	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.0010	0.0013	0.0019	
Total Phosphate as P	mg/L	0.0150	0.0634	0.0606	0.0108	0.0314	0.0425	0.0198	0.0127	0.0097
Sulphate (SO <sub>4</sub> )	mg/L	135	128	96.1	55.8	23.5	21.2	15.9	30.3	12.6
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	-	-	-	<0.0010	-	<0.0010
Cyanide, Total	mg/L	<0.0010	<0.0010	0.0018	0.0018	0.0019	0.0031	0.0040	0.0024	0.0027
Thiocyanate	mg/L	-	-	-	-	-	-	0.61	-	<0.50
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	<0.50	<0.50	1.04	1.33	1.97	2.72	3.06	1.75	1.91
<b>Total Metals</b>										
Aluminum (Al)	mg/L	0.0478	0.991	1.09	0.376	1.55	1.61	0.711	0.276	0.226
Antimony (Sb)	mg/L	0.00108	0.00079	0.00071	0.00025	0.00010	0.00012	<0.00010	0.00021	<0.00010
Arsenic (As)	mg/L	0.00051	0.00251	0.00280	0.00091	0.00051	0.00080	0.00034	0.00066	0.00016
Barium (Ba)	mg/L	0.0419	0.0486	0.0439	0.0526	0.0676	0.0541	0.0178	0.0318	0.0160
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	0.012	0.011	<0.010	0.014	0.013	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.000071	0.00162	0.00139	0.000044	0.000025	0.000033	0.000014	0.000044	0.000011
Calcium (Ca)	mg/L	75.8	74.0	59.6	47.9	20.0	20.6	10.9	26.6	11.9
Chromium (Cr)	mg/L	<0.00050	0.00073	0.00089	<0.00050	0.00454	0.00471	0.00291	0.00071	0.00094
Cobalt (Co)	mg/L	0.00054	0.00286	0.00194	0.00030	0.00091	0.00110	0.00058	0.00033	0.00020
Copper (Cu)	mg/L	0.0138	0.143	0.120	0.0086	0.00303	0.00350	0.00257	0.00162	0.00129
Iron (Fe)	mg/L	0.067	4.00	3.77	0.631	1.60	1.98	0.893	0.641	0.287
Lead (Pb)	mg/L	0.000084	0.00219	0.00218	0.000320	0.000352	0.000488	0.000212	0.000229	0.000075
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	5.32	6.18	5.04	7.22	8.67	6.23	2.56	5.58	2.38
Manganese (Mn)	mg/L	0.0859	0.376	0.256	0.0314	0.0337	0.0723	0.0211	0.0476	0.0167
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.00160	0.00273	0.00231	0.000928	0.000912	0.000570	0.000201	0.000594	0.000294
Nickel (Ni)	mg/L	0.00082	0.00254	0.00195	0.00078	0.00590	0.00632	0.00339	0.00158	0.00138
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.538	1.65	1.40	0.429	0.756	0.702	0.348	0.366	0.281
Selenium (Se)	mg/L	0.00083	0.00231	0.00180	0.00054	0.00090	0.00058	0.00024	0.00053	0.00029
Silicon (Si)	mg/L	1.86	3.49	3.71	2.61	5.23	5.11	3.37	2.82	2.87
Silver (Ag)	mg/L	<0.000010	0.000016	0.000015	<0.000010	<0.000010	0.000017	0.000013	<0.000010	<0.000010
Sodium (Na)	mg/L	<2.0	3.1	2.6	2.1	3.6	2.5	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.376	0.395	0.317	0.402	0.182	0.150	0.109	0.209	0.114
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	0.00013	<0.00010	0.00017	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L									

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		MC2 1-May-10 L884476-4	SC1 1-May-10 L884476-5	MC1A 2-May-10 L884476-6	UR1 1-May-10 L884476-7	UR1A 1-May-10 L884476-8	SUNR 1-May-10 L884476-9	UR2 1-May-10 L884476-10	RES2 1-May-10 L884476-11	TEC1 2-May-10 L884476-12
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	63.2	<5.0	<5.0	<5.0	<5.0	<5.0	12.3
Conductivity	µS/cm	384	348	998	200	135	184	169	135	56.0
Hardness (as CaCO <sub>3</sub> )	mg/L	177	179	165	93.8	63.5	86.3	77.3	65.5	26.9
pH	pH unit	7.48	8.02	3.02	8.08	8.10	8.11	8.08	8.08	7.99
Total Suspended Solids	mg/L	143	<3.0	373	11.0	<3.0	<3.0	5.5	<3.0	7.5
Total Dissolved Solids	mg/L	260	232	669	126	80	109	104	77	41
Turbidity	NTU	161	1.25	368	14.7	1.50	1.63	6.59	2.00	1.60
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	4.7	4.0	287	3.1	2.8	2.9	3.1	2.9	2.8
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	13.7	65.5	<1.0	49.9	47.6	63.9	49.8	48.3	18.3
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	13.7	65.5	<1.0	49.9	47.6	63.9	49.8	48.3	18.3
Ammonia as N	mg/L	0.0066	0.0080	0.0058	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<1.0	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.293	0.059	1.50	0.062	0.027	0.058	0.051	0.028	<0.020
Nitrate (as N)	mg/L	0.368	0.0626	<0.10	0.203	0.175	0.446	0.314	0.174	0.166
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.068	<0.050	2.07	0.767	0.095	0.096	0.147	0.076	0.145
Total Nitrogen	mg/L	0.570	0.060	2.07	0.970	0.270	0.650	0.460	0.250	0.310
Ortho Phosphate as P	mg/L	0.0091	<0.0010	0.607	0.0031	<0.0010	<0.0010	0.0027	<0.0010	<0.0010
Total Phosphate as P	mg/L	2.15	0.0031	10.1	0.154	0.0063	0.0076	0.0562	0.0043	0.0094
Sulphate (SO <sub>4</sub> )	mg/L	170	112	431	46.3	18.6	30.1	31.6	18.6	7.32
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	-	-	<0.0010	-	-	-
Cyanide, Total	mg/L	0.0010	<0.0010	<0.0010	0.0015	0.0011	<0.0010	0.0011	0.0015	0.0030
Thiocyanate	mg/L	-	-	-	-	-	<0.50	-	-	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	0.70	0.26	0.23	0.76	0.96	0.56	0.56	0.94	2.58
<b>Total Metals</b>										
Aluminum (Al)	mg/L	5.06	0.0910	17.0	0.495	0.0971	0.126	0.303	0.0984	0.0991
Antimony (Sb)	mg/L	0.00164	0.00128	0.00339	0.00142	0.00169	0.00013	0.00070	0.00177	<0.00010
Arsenic (As)	mg/L	0.112	0.00085	0.514	0.00897	0.00031	0.00040	0.00309	0.00031	<0.00010
Barium (Ba)	mg/L	0.188	0.0396	0.350	0.0311	0.0226	0.0369	0.0319	0.0248	0.00723
Beryllium (Be)	mg/L	0.00112	<0.00050	0.0050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.00914	0.000111	0.0403	0.000779	0.000047	0.000027	0.000276	0.000047	<0.000010
Calcium (Ca)	mg/L	63.0	69.5	60.0	34.7	21.5	35.9	29.6	23.2	8.93
Chromium (Cr)	mg/L	0.00170	<0.00050	0.0024	<0.00050	<0.00050	0.00063	<0.00050	<0.00050	<0.00050
Cobalt (Co)	mg/L	0.0126	0.00074	0.0484	0.00118	<0.00010	0.00015	0.00044	0.00011	<0.00010
Copper (Cu)	mg/L	0.652	0.00922	2.42	0.0567	0.00095	0.00184	0.0202	0.00090	0.00091
Iron (Fe)	mg/L	28.2	0.125	116	2.38	0.156	0.171	0.990	0.150	0.095
Lead (Pb)	mg/L	0.0163	0.000191	0.0640	0.00126	0.000176	0.000349	0.000525	0.000191	<0.000050
Lithium (Li)	mg/L	<0.0050	<0.0050	0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	6.61	4.87	8.03	3.84	3.32	1.85	2.66	3.59	1.51
Manganese (Mn)	mg/L	0.813	0.113	2.60	0.0844	0.00731	0.00591	0.0338	0.00778	0.00307
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.00752	0.00167	0.0232	0.00136	0.000586	0.00685	0.00214	0.000660	0.000114
Nickel (Ni)	mg/L	0.00526	0.00096	0.0112	0.00117	0.00063	<0.00050	0.00057	0.00064	0.00078
Phosphorus (P)	mg/L	2.13	<0.30	9.49	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	1.32	0.544	2.24	0.692	0.353	1.40	0.912	0.378	0.113
Selenium (Se)	mg/L	0.00727	0.00059	0.0202	0.00120	0.00043	0.00041	0.00069	0.00034	<0.00020
Silicon (Si)	mg/L	6.84	1.67	9.11	2.36	1.93	2.20	2.70	1.88	1.67
Silver (Ag)	mg/L	0.000147	<0.000010	0.000347	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	3.1	<2.0	2.9	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.330	0.339	0.390	0.222	0.179	0.260	0.166	0.194	0.0684
Thallium (Tl)	mg/L	<0.00010	<0.00010	0.00025	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	0.00013	<0.00010	0.00037	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.152	<0.010							

## **Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID	TEC2	SC2	SC3	UR1	UR1A	SUNR	STE1A	STE2	TEC2
Date Sampled	2-May-10	1-May-10	1-May-10	26-May-10	26-May-10	26-May-10	26-May-10	26-May-10	26-May-10
ALS Sample ID	L884476-13	L884476-14	L884476-15	L891484-1	L891484-2	L891484-3	L891484-4	L891484-5	L891484-6
QA/QC		Units							
Physical Tests									
Colour, True	color unit	13.9	<5.0	<5.0	<5.0	<5.0	<5.0	15.3	10.9
Conductivity	µS/cm	76.1	359	338	136	90.2	117	94.3	53.5
Hardness (as CaCO <sub>3</sub> )	mg/L	35.6	179	173	60.3	45.1	55.3	41.0	23.0
pH	pH unit	7.96	7.07	7.94	8.00	7.49	7.91	7.82	7.72
Total Suspended Solids	mg/L	<3.0	64.5	37.0	54.0	<3.0	13.5	14.5	7.5
Total Dissolved Solids	mg/L	58	240	220	74	65	81	66	50
Turbidity	NTU	1.59	81.0	47.2	31.2	16.0	11.2	7.70	3.30
Anions and Nutrients									
Acidity (as CaCO <sub>3</sub> )	mg/L	3.2	6.3	4.5	2.1	3.0	2.5	2.4	2.4
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	23.6	49.7	56.0	35.0	34.2	38.1	21.4	18.5
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	23.6	49.7	56.0	35.0	34.2	38.1	21.4	18.5
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	<0.020	0.189	0.155	0.046	0.020	0.058	0.033	0.021
Nitrate (as N)	mg/L	0.283	0.236	0.286	0.0538	0.0465	0.142	0.0600	0.0412
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.147	0.064	0.074	<0.050	<0.050	<0.050	<0.050	0.079
Total Nitrogen	mg/L	0.430	0.300	0.360	0.100	0.050	0.160	0.090	0.120
Ortho Phosphate as P	mg/L	<0.0010	0.0015	0.0023	0.0017	0.0011	0.0011	0.0053	0.0016
Total Phosphate as P	mg/L	0.0058	0.850	0.605	0.130	0.0243	0.0163	0.0288	0.0111
Sulphate (SO <sub>4</sub> )	mg/L	11.4	130	112	27.8	11.4	18.0	21.6	10.2
Cyanides									
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	-	<0.0010	-	<0.0010	-
Cyanide, Total	mg/L	0.0034	<0.0010	<0.0010	0.0015	0.0010	0.0011	0.0020	0.0048
Thiocyanate	mg/L	-	-	-	-	-	<0.50	-	<0.50
Organic / Inorganic Carbon									
Total Organic Carbon	mg/L	2.40	0.39	0.34	0.76	0.88	<0.50	0.99	3.18
Total Metals									
Aluminum (Al)	mg/L	0.121	2.54	1.40	1.46	0.814	0.546	0.560	0.286
Antimony (Sb)	mg/L	<0.00010	0.00112	0.00083	0.00122	0.00134	0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.00011	0.0470	0.0337	0.00496	0.00094	0.00049	0.00038	0.00023
Barium (Ba)	mg/L	0.0103	0.0890	0.0515	0.0522	0.0291	0.0292	0.0197	0.0115
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	<0.000010	0.00377	0.00286	0.000679	0.000052	0.000035	0.000017	0.000011
Calcium (Ca)	mg/L	11.4	65.2	65.7	21.4	14.3	21.5	12.2	6.99
Chromium (Cr)	mg/L	0.00070	0.00147	0.00078	0.00172	0.00166	0.00141	0.00228	0.00112
Cobalt (Co)	mg/L	<0.00010	0.00593	0.00407	0.00149	0.00055	0.00041	0.00042	0.00023
Copper (Cu)	mg/L	0.00110	0.268	0.205	0.0414	0.00238	0.00255	0.00197	0.00154
Iron (Fe)	mg/L	0.119	11.8	7.59	2.93	1.10	0.596	0.597	0.298
Lead (Pb)	mg/L	<0.000050	0.00686	0.00415	0.00191	0.00100	0.000706	<0.00020	<0.00020
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	2.47	5.85	5.34	2.88	2.58	1.41	3.35	1.69
Manganese (Mn)	mg/L	0.00451	0.395	0.280	0.0923	0.0309	0.0161	0.0187	0.0152
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.000165	0.00415	0.00358	0.00110	0.000477	0.00623	0.000410	0.000159
Nickel (Ni)	mg/L	0.00098	0.00342	0.00227	0.00203	0.00165	0.00080	0.00235	0.00141
Phosphorus (P)	mg/L	<0.30	0.84	0.54	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.181	1.70	1.47	0.876	0.527	1.09	0.386	0.202
Selenium (Se)	mg/L	<0.00020	0.00390	0.00338	0.00078	0.00035	0.00030	0.00063	0.00023
Silicon (Si)	mg/L	2.03	4.69	3.22	4.25	2.88	2.44	3.02	2.00
Silver (Ag)	mg/L	<0.000010	0.000055	0.000024	0.000067	0.000035	0.000018	0.000019	0.000066
Sodium (Na)	mg/L	<2.0	2.3	2.2	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.0957	0.350	0.339	0.148	0.125	0.169	0.125	0.0723
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	<0.010	0.094	0.035	0.058	0.029	0.034	<0.010	<0.010
Uranium (U)	mg/L	<0.000010	0.000791	0.000623	0.000135	0.000028	0.000433	0.000013	<0.000010
Vanadium (V)	mg/L	<0.0010	0.0071	0.0033	0.0050	0.0033	0.0017	0.0017	<0.0010
Zinc (Zn)	mg/L	0.0013	0.285	0.211	0.0545	0.0060	0.0025	0.0034	0.0022
Dissolved Metals									
Aluminum (Al)	mg/L	0.0378	0.0100	0.0238	0.0257	0.0243	0.176	0.0183	0.0536
Antimony (Sb)	mg/L	<0.00010	0.00047	0.00050	0.00100	0.00131	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	<0.00010	0.00017	0.00028	0.00023	0.00025	0.00042	0.00012	<0.00010
Barium (Ba)	mg/L	0.00872	0.0269	0.0241	0.0219	0.0162	0.0261	0.0114	0.00821
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	<0.000010	0.00122	0.000592	0.000272	0.000026	0.000037	<0.000010	<0.000010
Calcium (Ca)	mg/L	10.5	63.2	61.2	20.3	14.2	20.3	11.5	6.66
Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00020	<0.00020	0.00038	0.00026	0.00030
Cobalt (Co)	mg/L	<0.00010	0.00385	0.00238	0.00047	<0.00010	0.00029	<0.00010	<0.00010
Copper (Cu)	mg/L	0.00085	0.00250	0.00209	0.00250	0.00044	0.00204	0.00054	0.00069
Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	0.203	<0.030	<0.030
Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000853	<0.000050	<0.000050	<0.000050
Lithium (Li)	mg/L	<0.005							

**Note:**

"<" sign indicates that the value is below the detection limit.

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		NTR1A 26-May-10 L891484-7	MC1A 26-May-10 L891484-8	MC2 26-May-10 L891484-9	MC1 26-May-10 L891484-10	SC2 26-May-10 L891484-11	SC3 26-May-10 L891484-12	RES12 26-May-10 L891484-13	SC1 26-May-10 L891484-15	TEC1 26-May-10 L891484-17
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	12.0	34.3	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	10.1
Conductivity	µS/cm	63.9	1130	259	481	219	210	210	191	47.7
Hardness (as CaCO <sub>3</sub> )	mg/L	26.9	156	106	98.2	95.2	94.1	93.9	88.3	20.8
pH	pH unit	7.75	2.97	6.41	3.37	7.80	7.96	7.98	8.04	7.99
Total Suspended Solids	mg/L	4.0	995	192	459	111	89.5	85.5	26.0	4.0
Total Dissolved Solids	mg/L	50	712	186	245	143	143	140	125	32
Turbidity	NTU	1.22	1010	170	350	86.9	80.6	72.2	30.0	1.62
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	2.3	309	5.4	62.8	4.6	4.1	3.9	3.7	3.2
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	17.7	<2.0	5.9	<2.0	31.9	34.6	35.8	39.5	14.2
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	17.7	<2.0	5.9	<2.0	31.9	34.6	35.8	39.5	14.2
Ammonia as N	mg/L	<0.0050	0.0177	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.50	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.031	2.21	0.195	0.567	0.112	0.100	0.100	0.039	<0.020
Nitrate (as N)	mg/L	0.541	<0.050	0.0917	0.0187	0.0554	0.0697	0.0698	0.0226	0.0301
Nitrite (as N)	mg/L	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.128	0.102	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.060
Total Nitrogen	mg/L	0.669	0.102	0.090	0.054	0.050	0.050	0.080	<0.050	0.090
Ortho Phosphate as P	mg/L	0.0069	0.306	<0.0010	0.0039	0.0016	0.0017	0.0016	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.0108	6.30	0.886	2.24	0.380	0.303	0.265	0.0317	0.0062
Sulphate (SO <sub>4</sub> )	mg/L	9.50	497	111	159	71.3	65.2	64.9	52.1	6.09
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	<0.0010	-	-	-	-	-	-	-	-
Cyanide, Total	mg/L	0.0043	0.0011	0.0012	<0.0010	0.0012	<0.0010	<0.0010	0.0010	0.0022
Thiocyanate	mg/L	<0.50	-	-	-	-	-	-	-	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	2.79	0.74	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.34
<b>Total Metals</b>										
Aluminum (Al)	mg/L	0.113	26.4	4.57	8.56	3.13	2.57	2.58	1.36	0.157
Antimony (Sb)	mg/L	<0.00010	0.00538	0.00146	0.00305	0.00125	0.00101	0.00104	0.00141	<0.00010
Arsenic (As)	mg/L	0.00022	0.173	0.0522	0.105	0.0222	0.0164	0.0162	0.00343	0.00021
Barium (Ba)	mg/L	0.0109	1.36	0.209	0.535	0.128	0.0974	0.0945	0.0565	0.00618
Beryllium (Be)	mg/L	<0.00050	0.0050	0.00087	0.00166	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	<0.000010	0.0390	0.00770	0.0145	0.00291	0.00219	0.00220	0.000100	<0.000010
Calcium (Ca)	mg/L	8.47	51.3	38.5	37.7	36.1	34.4	35.1	32.4	6.50
Chromium (Cr)	mg/L	0.00071	0.00322	0.00113	0.00164	0.00186	0.00167	0.00171	0.00100	0.00058
Cobalt (Co)	mg/L	0.00011	0.0528	0.00884	0.0173	0.00441	0.00340	0.00352	0.00117	0.00011
Copper (Cu)	mg/L	0.00078	3.12	0.430	0.844	0.178	0.128	0.131	0.0150	0.00115
Iron (Fe)	mg/L	0.173	122	19.7	40.2	9.66	7.09	7.30	1.55	0.148
Lead (Pb)	mg/L	<0.000050	0.106	0.0131	0.0345	0.00673	0.00425	0.00412	0.00181	<0.000050
Lithium (Li)	mg/L	<0.0050	0.020	0.0054	0.0091	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	1.80	11.1	3.93	4.42	3.65	3.29	3.41	2.85	1.22
Manganese (Mn)	mg/L	0.0159	3.37	0.516	1.02	0.278	0.219	0.221	0.131	0.00553
Mercury (Hg)	mg/L	<0.000010	0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.000230	0.0235	0.00501	0.00999	0.00277	0.00233	0.00240	0.00119	0.000079
Nickel (Ni)	mg/L	0.00075	0.0126	0.00306	0.00465	0.00269	0.00217	0.00232	0.00103	0.00076
Phosphorus (P)	mg/L	<0.30	5.87	0.94	2.28	0.43	0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.230	2.78	1.44	1.91	1.60	1.46	1.49	0.822	0.104
Selenium (Se)	mg/L	0.00029	0.0112	0.00404	0.00490	0.00210	0.00170	0.00189	0.00033	<0.00020
Silicon (Si)	mg/L	2.49	21.4	9.54	12.9	6.70	6.05	5.68	3.57	1.44
Silver (Ag)	mg/L	0.000013	0.00177	0.000202	0.000609	0.000166	0.000081	0.000075	0.000037	<0.000010
Sodium (Na)	mg/L	<2.0	2.9	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.0877	0.398	0.212	0.249	0.199	0.186	0.187	0.172	0.0484
Thallium (Tl)	mg/L	<0.00010	0.00036	<0.00010	0.00018	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	<0.010	0.579	0.191	0.350	0.152</td				

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		TRC3 26-May-10 L891484-18	UR1 5-Jul-10 L905787-1	UR2 5-Jul-10 L905787-2	UR1A 5-Jul-10 L905787-3	SUNR 5-Jul-10 L905787-4	STE1A 5-Jul-10 L905787-5	STE3 5-Jul-10 L905787-6	STE2 5-Jul-10 L905787-7	TEC1 5-Jul-10 L905787-8
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	<5.0	-	<5.0	<5.0	5.5
Conductivity	µS/cm	156	138	116	111	110	-	116	93.1	69.0
Hardness (as CaCO <sub>3</sub> )	mg/L	71.8	62.2	52.8	53.1	51.5	61.8	52.1	41.3	30.7
pH	pH unit	7.99	7.85	7.25	7.97	7.97	-	7.90	7.91	7.91
Total Suspended Solids	mg/L	57.5	39.3	18.3	8.8	7.3	-	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	112	87	78	69	72	-	72	57	42
Turbidity	NTU	62.5	47.4	26.8	20.7	12.6	-	2.85	3.11	0.89
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	3.8	2.0	4.7	3.2	3.1	-	2.9	2.7	2.7
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	47.5	33.7	33.6	39.5	34.8	-	21.8	19.0	19.8
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	-	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	-	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	47.5	33.7	33.6	39.5	34.8	-	21.8	19.0	19.8
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	-	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.047	0.053	0.042	<0.020	0.046	-	0.021	<0.020	<0.020
Nitrate (as N)	mg/L	0.217	0.0296	0.0441	0.0234	0.0552	-	<0.0050	<0.0050	<0.0050
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.084	<0.050	<0.050	<0.050	<0.050	-	<0.050	<0.050	<0.050
Total Nitrogen	mg/L	0.300	0.060	0.050	<0.050	0.070	<0.050	<0.050	<0.050	<0.050
Ortho Phosphate as P	mg/L	0.0022	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.0972	0.0615	0.0373	0.0260	0.0139	-	0.0051	0.0059	0.0022
Sulphate (SO <sub>4</sub> )	mg/L	27.8	32.1	21.5	14.8	17.1	-	30.7	22.7	11.9
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	-	<0.0010	-	-	<0.0010	-
Cyanide, Total	mg/L	0.0016	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0015	0.0017	0.0013
Thiocyanate	mg/L	-	-	-	-	<0.50	-	-	<0.50	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	1.45	0.51	<0.50	<0.50	<0.50	0.52	1.13	1.24	1.64
<b>Total Metals</b>										
Aluminum (Al)	mg/L	2.54	1.93	1.05	1.01	0.814	0.245	0.161	0.180	0.0424
Antimony (Sb)	mg/L	0.00057	0.00151	0.00073	0.00197	0.00011	0.00011	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.00263	0.00234	0.00115	0.00120	0.00062	0.00014	<0.00010	0.00011	<0.00010
Barium (Ba)	mg/L	0.0660	0.0595	0.0404	0.0338	0.0330	0.0189	0.0142	0.0136	0.00695
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	0.010	<0.010	0.011
Cadmium (Cd)	mg/L	0.000167	0.000717	0.000280	0.000048	0.000050	0.000012	0.000010	0.000011	<0.000010
Calcium (Ca)	mg/L	23.4	22.1	19.2	16.8	19.4	17.5	15.8	12.9	10.2
Chromium (Cr)	mg/L	0.00441	0.00202	0.00138	0.00220	0.00177	0.00126	0.00093	0.00092	0.00047
Cobalt (Co)	mg/L	0.00170	0.00176	0.00084	0.00057	0.00069	0.00019	0.00011	0.00015	<0.00010
Copper (Cu)	mg/L	0.00515	0.0885	0.0339	0.00253	0.00354	0.00097	0.00063	0.00065	0.00050
Iron (Fe)	mg/L	3.31	3.46	1.69	1.36	0.989	0.256	0.173	0.188	0.042
Lead (Pb)	mg/L	0.00178	0.00237	0.00131	0.000779	0.00145	0.000095	0.000050	0.000057	<0.000050
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	5.30	3.10	2.07	3.04	1.45	4.45	3.56	2.82	1.85
Manganese (Mn)	mg/L	0.110	0.126	0.0605	0.0319	0.0292	0.00919	0.00714	0.0114	0.00243
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.000963	0.00137	0.00178	0.000839	0.00540	0.000628	0.000342	0.000321	0.000165
Nickel (Ni)	mg/L	0.00634	0.00222	0.00117	0.00173	0.00138	0.00114	<0.0010	<0.0010	<0.0010
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.909	1.08	0.920	0.657	0.977	0.316	0.220	0.198	0.091
Selenium (Se)	mg/L	0.00067	0.00062	0.00030	0.00047	<0.00020	0.00074	0.00057	0.00044	<0.00020
Silicon (Si)	mg/L	7.03	4.94	3.46	3.26	2.67	2.15	1.86	1.85	1.25
Silver (Ag)	mg/L	0.000042	0.000099	0.000045	0.000032	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.187	0.147	0.109	0.140	0.157	0.183	0.164	0.123	0.0715
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.085								

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		TEC2 5-Jul-10 L905787-9	SNO2 5-Jul-10 L905787-10	TRC1 5-Jul-10 L905787-11	TRC2 5-Jul-10 L905787-12	TRC3 5-Jul-10 L905787-13	NTR1 5-Jul-10 L905787-14	NTR2 5-Jul-10 L905787-15	NTR1A 5-Jul-10 L905787-16	MC1A 5-Jul-10 L905787-17
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	5.5	<5.0	<5.0	<5.0	<5.0
Conductivity	µS/cm	105	109	142	139	149	115	89.9	98.1	300
Hardness (as CaCO <sub>3</sub> )	mg/L	47.1	50.9	64.0	62.4	70.6	48.7	38.6	42.4	60.1
pH	pH unit	7.96	7.91	7.98	7.99	8.02	7.83	7.92	7.14	3.57
Total Suspended Solids	mg/L	<3.0	12.3	95.8	28.5	31.5	7.5	<3.0	<3.0	161
Total Dissolved Solids	mg/L	61	66	95	100	110	71	61	60	146
Turbidity	NTU	0.76	17.4	97.9	40.0	52.6	2.01	2.39	0.56	172
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	2.8	3.1	3.0	3.0	3.1	2.6	4.7	42.3	
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	26.4	29.1	35.5	35.6	42.5	27.1	22.4	25.9	<2.0
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	26.4	29.1	35.5	35.6	42.5	27.1	22.4	25.9	<2.0
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0053	<0.0050	0.0064	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	<0.020	0.025	0.039	0.039	0.038	0.028	0.021	0.025	0.312
Nitrate (as N)	mg/L	0.0173	0.0196	0.0086	0.0183	0.0233	0.0979	0.0368	0.129	0.0157
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Total Nitrogen	mg/L	<0.050	0.050	<0.050	<0.050	<0.050	0.140	0.050	0.150	<0.050
Ortho Phosphate as P	mg/L	<0.0010	<0.0010	0.0022	0.0013	<0.0010	0.0039	0.0011	0.0027	<0.0010
Total Phosphate as P	mg/L	0.0035	0.0249	0.141	0.0581	0.0609	0.0262	0.0054	0.0069	0.342
Sulphate (SO <sub>4</sub> )	mg/L	21.8	23.2	32.1	30.3	29.5	25.6	18.4	19.6	96.9
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	<0.0020	-	-	<0.0010	<0.0010	-
Cyanide, Total	mg/L	0.0017	0.0014	<0.0010	<0.0020	<0.0010	0.0022	<0.0010	0.0019	<0.0010
Thiocyanate	mg/L	-	-	-	0.78	-	-	<0.50	<0.50	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	1.42	1.12	0.51	<0.50	0.65	1.71	0.82	1.69	<0.50
<b>Total Metals</b>										
Aluminum (Al)	mg/L	0.0712	0.735	4.57	1.69	2.03	0.0310	0.127	0.0926	6.24
Antimony (Sb)	mg/L	<0.00010	<0.00010	0.00108	0.00041	0.00050	<0.00010	<0.00010	<0.00010	0.00095
Arsenic (As)	mg/L	<0.00010	0.00043	0.00631	0.00190	0.00217	<0.00010	0.00012	0.00010	0.0133
Barium (Ba)	mg/L	0.0114	0.0216	0.128	0.0502	0.0573	0.0174	0.0154	0.0149	0.188
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00078
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	0.010	<0.010	0.011	<0.010	<0.010	0.010	<0.010
Cadmium (Cd)	mg/L	<0.000010	0.000018	0.000273	0.000112	0.000123	0.000015	<0.000010	0.000012	0.00749
Calcium (Ca)	mg/L	14.0	15.5	22.5	19.7	22.4	15.0	12.0	13.4	21.9
Chromium (Cr)	mg/L	0.00055	0.00271	0.00533	0.00285	0.00336	0.00045	0.00073	0.00059	0.00108
Cobalt (Co)	mg/L	<0.00010	0.00078	0.00254	0.00101	0.00111	<0.00010	0.00011	<0.00010	0.0104
Copper (Cu)	mg/L	0.00053	0.00187	0.00987	0.00341	0.00363	0.00045	0.00061	0.00060	0.784
Iron (Fe)	mg/L	0.071	0.955	5.66	2.12	2.54	0.162	0.130	0.132	20.8
Lead (Pb)	mg/L	<0.000050	0.000294	0.00444	0.00133	0.00137	<0.000050	0.000072	<0.000050	0.0167
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0057
Magnesium (Mg)	mg/L	3.10	3.35	4.89	4.22	4.15	3.62	2.53	2.64	2.84
Manganese (Mn)	mg/L	0.00341	0.0480	0.177	0.0691	0.0777	0.0177	0.00572	0.0122	0.753
Mercury (Hg)	mg/L	<0.000010	<0.000010	0.000023	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000021
Molybdenum (Mo)	mg/L	0.000247	0.000298	0.00186	0.000963	0.00111	0.000294	0.000449	0.000285	0.00256
Nickel (Ni)	mg/L	<0.0010	0.00358	0.00631	0.00352	0.00399	<0.0010	<0.0010	<0.0010	0.00322
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.41
Potassium (K)	mg/L	0.168	0.350	1.45	0.640	0.782	0.210	0.237	0.208	1.15
Selenium (Se)	mg/L	0.00032	0.00042	0.00057	0.00046	0.00048	0.00051	0.00056	0.00036	0.00103
Silicon (Si)	mg/L	1.64	3.04	9.85	5.00	5.67	2.69	2.01	2.53	8.66
Silver (Ag)	mg/L	<0.000010	<0.000010	0.000068	0.000027	0.000033	<0.000010	<0.000010	<0.000010	0.000118
Sodium (Na)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.117	0.125	0.179	0.152	0.171	0.149	0.120	0.134	0.140
Thallium (Tl)	mg/L	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00					

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		MC1 5-Jul-10 L905787-18	MC2 5-Jul-10 L905787-19	MCT 5-Jul-10 L905787-20	MCTR 5-Jul-10 L905787-21	SCT 5-Jul-10 L905787-22	SC1 5-Jul-10 L905787-23	SC2 5-Jul-10 L905787-24	SC3 5-Jul-10 L905787-25	SCR 5-Jul-10 L905787-26
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity	µS/cm	354	220	115	177	165	114	171	171	127
Hardness (as CaCO <sub>3</sub> )	mg/L	87.3	91.7	53.4	86.0	73.4	52.3	75.5	78.6	61.2
pH	pH unit	3.63	6.72	7.88	7.99	7.97	7.94	7.81	7.89	8.04
Total Suspended Solids	mg/L	168	114	92.5	51.0	141	25.0	97.5	82.0	97.0
Total Dissolved Solids	mg/L	188	151	86	124	111	103	108	106	98
Turbidity	NTU	166	121	94.0	60.0	90.2	75.4	87.9	79.4	136
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	44.7	5.4	3.7	3.4	3.1	3.0	3.3	3.2	2.7
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	7.1	46.1	55.7	33.8	28.3	27.2	27.4	47.8
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<1.0	<2.0	<1.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<1.0	<2.0	<1.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	<2.0	7.1	46.1	55.7	33.8	28.3	27.2	27.4	47.8
Ammonia as N	mg/L	<0.0050	<0.0050	0.0052	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.459	0.152	<0.020	<0.020	0.029	<0.020	0.090	0.087	<0.020
Nitrate (as N)	mg/L	0.0123	0.0394	0.0206	0.0256	0.0125	0.0167	0.0258	0.0310	0.0130
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Total Nitrogen	mg/L	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ortho Phosphate as P	mg/L	<0.0010	<0.0010	0.0010	0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.410	0.236	0.164	0.091	0.215	0.0356	0.129	0.115	0.153
Sulphate (SO <sub>4</sub> )	mg/L	128	90.8	16.1	33.1	42.2	24.2	52.4	50.7	17.0
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	-	-	-	-	-	-
Cyanide, Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Thiocyanate	mg/L	-	-	-	-	-	-	-	-	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	0.56	<0.50	<0.50	0.50	<0.50	<0.50	0.50	<0.50	<0.50
<b>Total Metals</b>										
Aluminum (Al)	mg/L	6.05	4.43	3.89	2.46	4.22	2.80	3.52	3.01	4.44
Antimony (Sb)	mg/L	0.00089	0.00070	0.00064	0.00053	0.00069	0.00182	0.00109	0.00095	0.00063
Arsenic (As)	mg/L	0.0120	0.00734	0.00278	0.00174	0.00348	0.00315	0.00451	0.00395	0.00401
Barium (Ba)	mg/L	0.186	0.113	0.0712	0.0520	0.103	0.104	0.105	0.0920	0.114
Beryllium (Be)	mg/L	0.00087	0.00054	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	0.011	0.012	0.010
Cadmium (Cd)	mg/L	0.00816	0.00456	0.000050	0.000085	0.000384	0.000067	0.00171	0.00153	0.000198
Calcium (Ca)	mg/L	31.2	32.8	19.5	30.5	28.0	19.2	27.1	27.6	22.0
Chromium (Cr)	mg/L	0.00102	0.00158	0.00392	0.00261	0.00526	0.00185	0.00259	0.00230	0.00318
Cobalt (Co)	mg/L	0.0119	0.00721	0.00236	0.00145	0.00277	0.00107	0.00357	0.00320	0.00219
Copper (Cu)	mg/L	0.987	0.559	0.0101	0.00686	0.0131	0.0102	0.204	0.182	0.00382
Iron (Fe)	mg/L	21.4	12.8	6.01	3.72	6.57	2.75	7.03	6.17	6.18
Lead (Pb)	mg/L	0.0206	0.00970	0.00167	0.00108	0.00323	0.00245	0.00497	0.00427	0.00252
Lithium (Li)	mg/L	0.0066	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	3.62	3.71	3.24	3.75	4.14	2.42	3.33	3.11	3.52
Manganese (Mn)	mg/L	0.961	0.565	0.115	0.0736	0.186	0.0870	0.280	0.254	0.170
Mercury (Hg)	mg/L	0.000024	0.000012	<0.000010	0.000012	<0.000010	0.000018	0.000013	<0.000010	0.000018
Molybdenum (Mo)	mg/L	0.00299	0.00249	0.00115	0.00207	0.00277	0.00119	0.00207	0.00185	0.00107
Nickel (Ni)	mg/L	0.00403	0.00344	0.00265	0.00285	0.00606	0.00106	0.00315	0.00286	0.00299
Phosphorus (P)	mg/L	0.44	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	1.11	1.24	1.91	1.38	3.09	1.39	1.75	1.54	1.77
Selenium (Se)	mg/L	0.00124	0.00162	0.00082	0.00186	0.00083	0.00021	0.00092	0.00088	0.00036
Silicon (Si)	mg/L	8.68	7.52	9.57	6.41	9.72	6.75	7.67	6.37	9.79
Silver (Ag)	mg/L	0.000128	0.000072	0.000038	0.000031	0.000111	0.000047	0.000068	0.000053	0.000043
Sodium (Na)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.203	0.191	0.130	0.158	0.158	0.111	0.159	0.156	0.155
Thallium (Tl)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	0.00011	0.00013	0.00015	0.00010	0.00010	<0.00010
Titanium (Ti)	mg/L	0.168	0.129	0.215	0.127	0.311	0.			

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		BIR1 5-Jul-10 L905787-27	BIR2 5-Jul-10 L905787-28	RES7 5-Jul-10 L905787-31	UR1 3-Aug-10 L916942-1	UR1A 3-Aug-10 L916942-2	SUNR 3-Aug-10 L916942-3	STE1A 3-Aug-10 L916942-4	STE2 3-Aug-10 L916942-5	TEC2 3-Aug-10 L916942-6
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity	µS/cm	103	123	99.3	98	100	56	95.2	113	120
Hardness (as CaCO <sub>3</sub> )	mg/L	47.9	57.1	44.8	45.6	49.1	25.3	39.2	47	50.3
pH	pH unit	7.99	8.00	7.37	7.9	8.07	7.89	7.73	7.74	7.88
Total Suspended Solids	mg/L	5.5	11.5	<3.0	257	190	142	27.8	9.3	6.3
Total Dissolved Solids	mg/L	60	73	63	54	72	45	65	83	79
Turbidity	NTU	6.52	12.3	0.35	173	148	66.2	30.1	14.3	9.93
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	2.8	2.7	4.2	2.5	2.1	2	2.3	2.3	2.3
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	35.4	40.0	25.8	33.4	42.7	22.1	16.1	22.6	29.5
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	35.4	40.0	25.8	33.4	42.7	22.1	16.1	22.6	29.5
Ammonia as N	mg/L	<0.0050	<0.0050	0.0089	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	<0.020	0.022	0.025	0.029	<0.020	0.02	0.021	0.026	0.021
Nitrate (as N)	mg/L	0.0162	0.0367	0.126	0.0133	0.0139	0.019	<0.0050	<0.0050	0.0124
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	0.053	0.094	<0.050	<0.050	<0.050	<0.050
Total Nitrogen	mg/L	<0.050	0.050	0.130	0.066	0.108	<0.050	<0.050	<0.050	<0.050
Ortho Phosphate as P	mg/L	<0.0010	<0.0010	0.0018	0.0019	<0.0010	0.0016	0.002	0.0038	0.0018
Total Phosphate as P	mg/L	0.0085	0.0215	0.0058	0.237	0.254	0.087	0.0377	0.019	0.0105
Sulphate (SO <sub>4</sub> )	mg/L	14.9	19.5	19.4	15.3	8.82	6.17	26.5	29.9	22.1
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	-	-	<0.0010	-	-	<0.0011	-	<0.0011	-
Cyanide, Total	mg/L	0.0014	0.0011	0.0018	<0.0010	<0.0010	<0.0010	<0.0010	0.001	
Thiocyanate	mg/L	-	-	<0.50	-	-	4.54	-	4.2	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	0.97	0.99	1.66	0.88	1.18	0.5	0.82	0.6	0.62
<b>Total Metals</b>										
Aluminum (Al)	mg/L	0.350	0.542	0.0670	3.69	5.1	2.19	1.47	0.499	0.351
Antimony (Sb)	mg/L	<0.00010	0.00010	<0.00010	0.00099	0.0013	0.00014	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	<0.00030	<0.00050	<0.00020	0.00463	0.00671	0.00127	0.00046	0.00021	0.00015
Barium (Ba)	mg/L	0.0353	0.0377	0.0144	0.117	0.112	0.0462	0.0362	0.0218	0.0171
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.012	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	<0.000010	0.000023	<0.000010	0.000412	0.000118	0.000113	0.000021	0.000011	<0.000010
Calcium (Ca)	mg/L	11.6	15.4	13.7	18	19.1	10.8	11.4	14	14.9
Chromium (Cr)	mg/L	0.00136	0.00172	0.00071	0.0045	0.00864	0.0056	0.00522	0.00193	0.00151
Cobalt (Co)	mg/L	0.00021	0.00042	<0.00010	0.00286	0.00333	0.00205	0.00113	0.00043	0.00033
Copper (Cu)	mg/L	0.00095	0.00149	0.00055	0.039	0.0139	0.0104	0.00344	0.00134	0.00103
Iron (Fe)	mg/L	0.392	0.695	0.105	5.82	7.42	3.08	1.74	0.563	0.402
Lead (Pb)	mg/L	0.000098	0.000250	<0.000050	0.00543	0.00459	0.00494	0.000516	0.000179	0.000137
Lithium (Li)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Magnesium (Mg)	mg/L	5.38	5.26	2.78	2.85	4.04	1.69	3.29	3.05	3.3
Manganese (Mn)	mg/L	0.00882	0.0254	0.0111	0.223	0.211	0.0987	0.0562	0.0243	0.0121
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	0.000025	0.000024	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.000776	0.000708	0.000303	0.000854	0.000701	0.00184	0.000496	0.000391	0.000325
Nickel (Ni)	mg/L	0.00168	0.00233	0.00070	0.00419	0.00756	0.00401	0.00575	0.00209	0.00166
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	0.32	0.31	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.353	0.401	0.215	1.61	1.77	0.846	0.601	0.314	0.26
Selenium (Se)	mg/L	0.00055	0.00051	0.00040	0.00071	0.00079	0.0004	0.00076	0.00059	0.00059
Silicon (Si)	mg/L	2.05	2.54	2.52	8.8	10.4	4.45	3.91	2.34	1.95
Silver (Ag)	mg/L	0.000011	<0.000010	<0.000010	0.000077	0.000086	0.000028	0.000018	<0.000010	<0.000010
Sodium (Na)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.114	0.130	0.139	0.109	0.128	0.0784	0.133	0.142	0.136
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		NTR1A 3-Aug-10 L916942-7	MC1A 3-Aug-10 L916942-8	MC2 3-Aug-10 L916942-9	MC1 3-Aug-10 L916942-10	SC2 3-Aug-10 L916942-11	SC3 3-Aug-10 L916942-12	RES13 3-Aug-10 L916942-15	SC1 3-Aug-10 L916942-16	TEC1 3-Aug-10 L916942-17
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity	µS/cm	121	65.1	106	93.9	87.1	92.1	95.2	63	84.2
Hardness (as CaCO <sub>3</sub> )	mg/L	49.2	28.1	46.5	37.4	38.6	41.4	39.8	28.4	36.1
pH	pH unit	7.86	7.33	7.72	6.55	7.82	7.84	7.6	7.93	7.7
Total Suspended Solids	mg/L	<3.0	743	495	611	500	341	23.8	123	4.3
Total Dissolved Solids	mg/L	75	31	61	66	54	53	79	47	58
Turbidity	NTU	0.35	150	184	223	218	174	27.8	126	4.72
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	2.5	2.6	2.4	3.8	2.4	2.5	2.5	2.1	2.6
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	27.5	9.9	20.5	4	24	25.1	15.9	21.3	21.3
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	27.5	9.9	20.5	4	24	25.1	15.9	21.3	21.3
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.037	0.055	0.076	0.097	0.022	0.036	0.021	<0.020	<0.020
Nitrate (as N)	mg/L	0.0971	0.006	0.0118	0.0058	0.0064	0.0107	<0.0050	0.0073	<0.0050
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Total Nitrogen	mg/L	0.12	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ortho Phosphate as P	mg/L	0.0028	<0.0010	0.0015	<0.0010	0.0012	<0.0010	0.0021	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.0058	0.716	0.641	0.946	0.596	0.404	0.0375	0.131	0.0054
Sulphate (SO <sub>4</sub> )	mg/L	28.2	20	28.9	35.1	11.2	19.1	26.4	9.72	16.7
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	<0.0010	-	-	-	-	-	-	-	-
Cyanide, Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011
Thiocyanate	mg/L	2.45	-	-	-	-	-	-	-	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	1.08	0.55	0.79	0.68	0.97	0.58	<0.50	0.88	1.11
<b>Total Metals</b>										
Aluminum (Al)	mg/L	0.027	4.96	3.1	5.9	7.79	6.53	1.28	3.29	0.193
Antimony (Sb)	mg/L	<0.00010	0.00161	0.00073	0.00131	0.00153	0.00132	<0.00010	0.00166	<0.00010
Arsenic (As)	mg/L	<0.00010	0.0191	0.00682	0.0116	0.00934	0.00692	0.00043	0.00562	0.00012
Barium (Ba)	mg/L	0.0165	0.463	0.172	0.287	0.234	0.19	0.0318	0.107	0.00957
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.00001	0.0017	0.00154	0.00222	0.000961	0.000691	0.000019	0.000116	<0.000010
Calcium (Ca)	mg/L	14.8	16.9	23.1	19.4	20.6	17.1	11.3	10.9	11.7
Chromium (Cr)	mg/L	0.00033	0.00119	0.00184	0.00113	0.00717	0.00631	0.00464	0.00248	0.0009
Cobalt (Co)	mg/L	<0.00010	0.00459	0.00432	0.00509	0.00607	0.0043	0.001	0.00187	0.00016
Copper (Cu)	mg/L	0.00031	0.143	0.16	0.244	0.0915	0.0681	0.00289	0.015	0.00052
Iron (Fe)	mg/L	0.054	11.9	7.65	10.5	14.7	11	1.47	4.19	0.209
Lead (Pb)	mg/L	<0.000050	0.0547	0.0183	0.0316	0.0133	0.00805	0.000434	0.00495	<0.000050
Lithium (Li)	mg/L	<0.0050	0.0057	<0.0050	0.0057	0.0061	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	2.86	1.94	2.23	2.3	4.59	3.8	3.15	1.91	1.88
Manganese (Mn)	mg/L	0.00688	0.488	0.42	0.612	0.454	0.322	0.0503	0.158	0.00649
Mercury (Hg)	mg/L	<0.000010	0.000092	0.000058	0.000054	0.000031	0.000021	<0.000010	0.000026	<0.000010
Molybdenum (Mo)	mg/L	0.000335	0.00304	0.00136	0.00205	0.00206	0.00162	0.000462	0.000555	0.000228
Nickel (Ni)	mg/L	<0.00050	0.00141	0.00348	0.00173	0.00704	0.00492	0.00467	0.00182	0.00097
Phosphorus (P)	mg/L	<0.30	1.45	1.05	1.23	0.95	0.41	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.217	1.26	0.938	1.7	2.63	2.39	0.543	1.37	0.132
Selenium (Se)	mg/L	0.00059	0.00137	0.00019	0.00113	0.00127	0.00099	0.00058	0.00043	0.00027
Silicon (Si)	mg/L	2.43	9.3	6.15	18.4	13.8	11.8	3.36	5.11	1.39
Silver (Ag)	mg/L	0.000029	0.000334	0.0001	0.000202	0.000254	0.000348	<0.000010	0.000078	<0.000010
Sodium (Na)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.156	0.09	0.12	0.0997	0.118	0.0991	0.123	0.0591	0.0787
Thallium (Tl)	mg/L	<0.00010	0.00013	<0.00010	0.00016	0.00012	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00018	0.00015	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	<0.010	0.373	0.176	0.315					

## **Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

**Note:**

"<" sign indicates that the value is below the detection limit.

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		STE2	TEC1	TEC2	SNO2	TRC1	TRC2	TRC3	NTR1	NTR2	
Date Sampled		27-Aug-10	27-Aug-10	27-Aug-10	27-Aug-10	27-Aug-10	27-Aug-10	27-Aug-10	27-Aug-10	27-Aug-10	
ALS Sample ID		L926457-7	L926457-8	L926457-9	L926457-10	L926457-11	L926457-12	L926457-13	L926457-14	L926457-15	
<b>QA/QC</b>		Units									
<b>Physical Tests</b>											
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	
Conductivity	µS/cm	149	101	156	146	122	133	142	146	98.8	
Hardness (as CaCO <sub>3</sub> )	mg/L	62.0	43.5	68.6	64.5	55.3	60.4	65.6	62.4	42.1	
pH	pH unit	7.99	8.04	8.04	6.90	8.02	8.03	8.08	7.87	7.54	
Total Suspended Solids	mg/L	5.0	5.0	3.0	12.0	141	59.0	50.5	<3.0	3.0	
Total Dissolved Solids	mg/L	99	53	93	91	88	90	97	85	55	
Turbidity	NTU	11.9	2.87	5.44	10.3	132	68.6	47.2	0.73	3.64	
<b>Anions and Nutrients</b>											
Acidity (as CaCO <sub>3</sub> )	mg/L	4.2	3.8	4.2	6.7	4.3	4.5	5.3	6.7	5.9	
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	29.8	26.7	37.9	36.5	111	35.4	40.2	32.0	25.1	
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<1.0	<2.0	<2.0	<2.0	<1.0	<1.0	<1.0	<2.0	<1.0	
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<1.0	<2.0	<2.0	<2.0	<1.0	<1.0	<1.0	<2.0	<1.0	
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	29.8	26.7	37.9	36.5	111	35.4	40.2	32.0	25.1	
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Fluoride (F)	mg/L	0.025	<0.020	0.025	0.028	0.027	0.033	0.033	0.034	<0.020	
Nitrate (as N)	mg/L	<0.0050	<0.0050	0.0519	0.0537	0.0052	0.0132	0.0148	0.0478	0.0325	
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Total Nitrogen	mg/L	<0.050	<0.050	0.090	0.080	<0.050	<0.050	<0.050	0.080	0.050	
Ortho Phosphate as P	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0032	0.0058	
Total Phosphate as P	mg/L	0.0107	0.0050	0.0076	0.0196	0.150	0.0525	0.0527	0.0132	0.0160	
Sulphate (SO <sub>4</sub> )	mg/L	41.4	21.1	36.7	33.3	25.8	28.7	27.9	37.0	21.9	
<b>Cyanides</b>											
Cyanide, Weak Acid Dissociable	mg/L	<0.0010	-	-	-	-	<0.0010	-	-	<0.0020	
Cyanide, Total	mg/L	0.0011	0.0016	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Thiocyanate	mg/L	0.62	-	-	-	-	<0.50	-	-	<0.50	
<b>Organic / Inorganic Carbon</b>											
Total Organic Carbon	mg/L	<0.50	0.77	<0.50	<0.50	0.55	<0.50	<0.50	1.03	<0.50	
<b>Total Metals</b>											
Aluminum (Al)	mg/L	0.323	0.103	0.155	0.312	0.722	1.61	1.14	0.0106	0.151	
Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00055	0.00051	0.00046	<0.00010	0.00038	
Arsenic (As)	mg/L	0.00021	0.00010	0.00014	0.00032	0.00269	0.00312	0.00204	<0.00010	<0.00010	
Barium (Ba)	mg/L	0.0211	0.00932	0.0167	0.0195	0.0689	0.0608	0.0455	0.0210	0.0192	
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Cadmium (Cd)	mg/L	0.000021	<0.000010	0.000012	0.000017	0.000187	0.000111	0.000105	0.000013	0.000015	
Calcium (Ca)	mg/L	18.7	13.6	19.4	18.9	19.4	19.9	21.1	20.6	14.0	
Chromium (Cr)	mg/L	0.00126	0.00038	0.00065	0.00117	0.00093	0.00230	0.00210	0.00038	0.00080	
Cobalt (Co)	mg/L	0.00044	0.00012	0.00017	0.00047	0.00106	0.00111	0.00097	<0.00010	0.00013	
Copper (Cu)	mg/L	0.00190	<0.00070	0.00081	0.00201	0.0102	0.00607	0.00379	0.00027	0.00056	
Iron (Fe)	mg/L	0.514	0.097	0.190	0.562	1.01	2.24	1.80	0.262	0.132	
Lead (Pb)	mg/L	0.000246	0.000072	0.000088	0.000272	0.00278	0.00241	0.00164	<0.000050	0.000061	
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Magnesium (Mg)	mg/L	3.91	2.12	4.37	3.81	2.74	3.26	3.23	4.43	2.77	
Manganese (Mn)	mg/L	0.0299	0.00518	0.00809	0.0313	0.0993	0.0823	0.0715	0.0388	0.00745	
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000030	0.000013	<0.000010	<0.000010	<0.000010	
Molybdenum (Mo)	mg/L	0.000385	0.000203	0.000324	0.000268	0.00117	0.00128	0.00122	0.000298	0.000465	
Nickel (Ni)	mg/L	0.00219	0.00091	0.00122	0.00237	0.00290	0.00346	0.00351	0.00058	0.00058	
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Potassium (K)	mg/L	0.281	0.127	0.246	0.264	0.396	0.586	0.442	0.269	0.267	
Selenium (Se)	mg/L	0.00040	<0.00020	0.00048	0.00034	0.00027	0.00035	0.00056	0.00059	0.00046	
Silicon (Si)	mg/L	2.11	1.30	1.90	2.01	1.54	3.03	2.60	2.47	1.86	
Silver (Ag)	mg/L	<0.000010	<0.000010	<0							

## **Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

**Note:**  
"‐" sign indicates that the value is below the detection limit

## **Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		SC3	SCR	BIR1	BIR2	BIR1 (2)	UR2 (2)	MC2 (2)	UR1	UR1A	
Date Sampled		27-Aug-10	28-Sep-10	28-Sep-10							
ALS Sample ID		L926457-25	L926457-26	L926457-27	L926457-28	L926457-31	L926457-32	L926457-33	L938295-1	L938295-2	
QA/QC	Units										
Physical Tests											
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.8	
Conductivity	µS/cm	136	106	136	137	137	101	178	135	115	
Hardness (as CaCO <sub>3</sub> )	mg/L	58.4	49.7	60.8	60.9	60.7	44.2	73.9	59.8	52.6	
pH	pH unit	8.00	8.10	8.08	7.05	8.08	8.05	7.86	7.9	7.94	
Total Suspended Solids	mg/L	104	141	8.0	13.5	7.0	48.0	89.0	448	333	
Total Dissolved Solids	mg/L	98	77	104	95	91	79	115	92	89	
Turbidity	NTU	47.6	86.4	18.3	20.3	19.1	35.9	68.4	296	225	
Anions and Nutrients											
Acidity (as CaCO <sub>3</sub> )	mg/L	4.2	3.6	3.9	8.0	4.3	4.1	5.0	2.4	11.9	
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	29.2	37.7	43.3	42.1	43.2	31.9	24.0	44.7	47.4	
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	29.2	37.7	43.3	42.1	43.2	31.9	24.0	44.7	47.4	
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Fluoride (F)	mg/L	0.042	<0.020	0.022	0.022	<0.020	<0.020	0.101	0.035	0.021	
Nitrate (as N)	mg/L	0.0173	0.0105	0.0176	0.0230	0.0179	0.0155	0.0175	0.0426	0.0378	
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.103	0.132	
Total Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.146	0.17	
Ortho Phosphate as P	mg/L	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0022	0.002	
Total Phosphate as P	mg/L	0.091	0.086	0.0135	0.0185	0.0111	0.0577	0.148	0.751	0.512	
Sulphate (SO <sub>4</sub> )	mg/L	31.9	13.6	22.0	21.5	20.1	9.20	51.5	23.3	12.7	
Cyanides											
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	-	-	-	-	-	-	
Cyanide, Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0021	0.0018	
Thiocyanate	mg/L	-	-	-	-	-	-	-	-	-	
Organic / Inorganic Carbon											
Total Organic Carbon	mg/L	<0.50	0.51	<0.50	<0.50	0.56	<0.50	<0.50	2.53	3.09	
Total Metals											
Aluminum (Al)	mg/L	1.76	0.352	0.962	0.935	0.757	1.92	2.38	10.2	8.27	
Antimony (Sb)	mg/L	0.00069	0.00027	0.00015	0.00017	0.00014	0.00050	0.00058	0.00197	0.00233	
Arsenic (As)	mg/L	0.00243	0.00156	0.00040	0.00058	0.00037	0.00160	0.00344	0.00987	0.00899	
Barium (Ba)	mg/L	0.0690	0.0588	0.0550	0.0482	0.0553	0.0569	0.0915	0.209	0.177	
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Boron (B)	mg/L	<0.010	<0.010	0.011	0.011	0.012	<0.010	<0.010	<0.010	0.012	
Cadmium (Cd)	mg/L	0.000759	0.000112	0.000016	0.000024	<0.000010	0.000163	0.00229	0.000568	0.000278	
Calcium (Ca)	mg/L	23.1	20.5	15.3	18.6	15.7	17.5	28.5	27.8	24.8	
Chromium (Cr)	mg/L	0.00157	0.00043	0.00275	0.00262	0.00232	0.00273	0.00090	0.0158	0.0161	
Cobalt (Co)	mg/L	0.00186	0.00075	0.00049	0.00051	0.00046	0.00106	0.00359	0.00695	0.00603	
Copper (Cu)	mg/L	0.0707	0.00158	0.00171	0.00160	0.00140	0.0157	0.218	0.0547	0.0247	
Iron (Fe)	mg/L	3.09	0.668	0.691	0.795	0.570	2.30	5.79	16.7	13.1	
Lead (Pb)	mg/L	0.00329	0.00143	0.000190	0.000349	0.000186	0.00153	0.00528	0.00778	0.00726	
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0064	0.0071	
Magnesium (Mg)	mg/L	2.14	1.66	6.93	5.35	7.04	1.96	2.52	7.08	6.45	
Manganese (Mn)	mg/L	0.175	0.131	0.0126	0.0254	0.0123	0.0768	0.349	0.453	0.383	
Mercury (Hg)	mg/L	<0.00010	0.000016	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000044	0.000053	
Molybdenum (Mo)	mg/L	0.00117	0.000743	0.000976	0.000816	0.000964	0.00158	0.00183	0.00176	0.000984	
Nickel (Ni)	mg/L	0.00170	0.00052	0.00295	0.00257	0.00254	0.00192	0.00174	0.0129	0.0161	
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.53	0.54	
Potassium (K)	mg/L	1.27	0.277	0.607	0.572	0.551	1.22	0.944	3.37	2.75	
Selenium (Se)	mg/L	0.00066	0.00023	0.00057	0.00049	0.00048	0.00025	0.00121	0.00116	0.00077	
Silicon (Si)	mg/L	3.47	0.956	2.95	2.97	2.64	4.23	4.95	21.4	20.4	
Silver (Ag)	mg/L	0.000040	<0.000010	<0.000010	0.000012	<0.000010	0.000047	0.000045	0.000195	0.000145	
Sodium (Na)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	
Strontium (Sr)	mg/L	0.118	0.130	0.147	0.148	0.149	0.0940	0.149	0.179	0.188	
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	0.00011	
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Titanium (Ti)	mg/L	0.073	<0.010	0.022	0.023	0.020	0.108	0.095	0.572	0.377	
Uranium (U)	mg/L	0.000228	0.000075	0.000043	0.000038	0.000033	0.000238	0.000334	0.000347	0.000171	
Vanadium (V)	mg/L	0.0055	<0.0010	0.0028	0.0027	0.0022	0.0065	0.0062	0.0428	0.0394	
Zinc (Zn)	mg/L	0.0559	0.0067	0.0032	0.0039	0.0028	0.0148	0.152	0.061	0.039	
Dissolved Metals											
Aluminum (Al)	mg/L	0.0256	0.105	0.0202	0.0190	0.0207	0.0378	0.0138	0.055	0.0467	
Antimony (Sb)	mg/L	0.00040	0.00021	0.00010	0.00012	0.00011	0.00036	0.00023	0.00099	0.00143	
Arsenic (As)	mg/L	<0.0010	0.00039	0.00013	0.00016	0.00014	0.00016	<0.00010	0.00025	0.00047	
Barium (Ba)	mg/L	0.0294	0.0268	0.0404	0.0315	0.0404	0.0227	0.0306	0.0252	0.0212	
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Cadmium (Cd)	mg/L	0.000402	0.000017	<0.000010	0.000011	<0.000010	0.000079	0.00163	0.000042	0.000012	
Calcium (Ca)	mg/L	20.9	17.5	13.8							

Note:  
"<" sign indicates that the value is below the detection limit

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		SUNR 28-Sep-10 L938295-3	STE1A 28-Sep-10 L938295-4	STE2 28-Sep-10 L938295-5	TEC2 28-Sep-10 L938295-6	NTR1A 28-Sep-10 L938295-7	MC1A 28-Sep-10 L938295-8	MC2 28-Sep-10 L938295-9	MC1 28-Sep-10 L938295-10	SC2 28-Sep-10 L938295-11
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	21.8	16	20	<5.0	<5.0	<5.0	<5.0
Conductivity	µS/cm	80.5	108	65	81.7	81.7	96.8	188	218	158
Hardness (as CaCO <sub>3</sub> )	mg/L	37.6	44.9	27.5	35.3	35	38.5	79	74.5	68.7
pH	pH unit	7.79	7.6	7.42	7.57	7.56	7.23	7.69	4.65	7.77
Total Suspended Solids	mg/L	403	22.8	19.8	25.8	6.8	299	494	338	532
Total Dissolved Solids	mg/L	67	80	59	62	64	60	117	151	102
Turbidity	NTU	238	24.7	13.9	13.1	2.84	214	276	229	388
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	6.6	6.2	5.3	5.5	5.6	5.5	5.9	22.2	6.9
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	32.9	20.8	14.9	21.6	21.2	11.4	27.1	<2.0	36.2
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<1.0	<2.0	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<1.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<1.0	<2.0	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<1.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	32.9	20.8	14.9	21.6	21.2	11.4	27.1	<2.0	36.2
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.03	0.028	<0.020	0.021	0.028	0.088	0.135	0.277	0.061
Nitrate (as N)	mg/L	0.055	0.029	0.0245	0.0676	0.43	0.0059	0.0577	0.013	0.0323
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	0.076	0.062	0.07	<0.050	<0.050	<0.050	0.055
Total Nitrogen	mg/L	0.101	<0.050	0.1	0.13	0.5	<0.050	0.104	<0.050	0.087
Ortho Phosphate as P	mg/L	0.0023	0.0038	0.0025	0.0014	0.0037	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.528	0.0326	0.0309	0.0331	0.0185	0.51	1.01	0.998	0.914
Sulphate (SO <sub>4</sub> )	mg/L	8.94	28	14.4	16.5	15.5	30.5	59.7	93.2	39.8
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	-	-	-
Cyanide, Total	mg/L	0.0015	0.0013	0.0056	0.0038	0.005	<0.0010	0.0016	<0.0010	0.0012
Thiocyanate	mg/L	<0.50	-	0.62	-	<0.50	-	-	-	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	1.15	0.6	4.22	3.47	4.64	<0.50	1.29	<0.50	1.39
<b>Total Metals</b>										
Aluminum (Al)	mg/L	8.02	0.98	0.681	0.54	0.135	1.56	1.33	4.95	5.95
Antimony (Sb)	mg/L	0.00028	<0.00010	<0.00010	<0.00010	<0.00010	0.00079	0.00034	0.00096	0.00098
Arsenic (As)	mg/L	0.0025	0.00036	0.00036	0.00031	0.00021	0.00673	0.00504	0.0186	0.00687
Barium (Ba)	mg/L	0.139	0.0286	0.0187	0.0157	0.0142	0.113	0.067	0.23	0.16
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.000282	0.000023	0.000017	0.000015	0.000012	0.000981	0.00164	0.00375	0.000864
Calcium (Ca)	mg/L	19.1	14.1	8.82	11.5	10.6	16.7	37.3	30.5	34
Chromium (Cr)	mg/L	0.0133	0.00361	0.00257	0.00232	0.00082	0.00043	0.00073	0.00119	0.00681
Cobalt (Co)	mg/L	0.00576	0.00071	0.00048	0.0005	0.00016	0.00225	0.00562	0.00888	0.00595
Copper (Cu)	mg/L	0.0306	0.00262	0.00219	0.00187	0.00116	0.0689	0.176	0.455	0.0863
Iron (Fe)	mg/L	8.61	0.96	0.698	0.622	0.243	3.08	5.55	16.7	10.3
Lead (Pb)	mg/L	0.0239	0.000296	0.000207	0.00018	0.000058	0.00525	0.0068	0.0169	0.00804
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	4.16	3.65	2.06	2.48	2.1	0.932	2.69	3.01	4.39
Manganese (Mn)	mg/L	0.274	0.0342	0.0274	0.023	0.0225	0.28	0.486	0.818	0.474
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000097	0.000037	0.000034	0.000027
Molybdenum (Mo)	mg/L	0.00238	0.00048	0.000253	0.000229	0.000195	0.000866	0.00163	0.00259	0.00171
Nickel (Ni)	mg/L	0.00989	0.00363	0.003	0.00273	0.00121	0.00086	0.00392	0.00346	0.00668
Phosphorus (P)	mg/L	0.48	<0.30	<0.30	<0.30	<0.30	0.37	0.69	0.93	0.71
Potassium (K)	mg/L	2.24	0.527	0.386	0.33	0.363	0.624	0.736	1.25	2.99
Selenium (Se)	mg/L	0.00033	0.00066	0.0003	0.00022	0.00035	0.0004	0.0016	0.00135	0.0012
Silicon (Si)	mg/L	14.8	3.24	2.58	2.46	2.53	2.89	2.37	7.67	10.6
Silver (Ag)	mg/L	0.000073	0.000018	0.000013	0.000011	<0.000010	0.000028	0.000013	0.000132	0.000069
Sodium (Na)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.133	0.151	0.0878	0.0998	0.116	0.099	0.175	0.175	0.167
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.546	0.016	<0.01						

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		SC3 28-Sep-10 L938295-12	MCT (2) 28-Sep-10 L938295-15	SC1 28-Sep-10 L938295-16	TEC1 28-Sep-10 L938295-17	TRC3 28-Sep-10 L938295-18	UR1 21-Oct-10 L946802-1	UR1A 21-Oct-10 L946802-2	SUNR 21-Oct-10 L946802-3	TEC2 21-Oct-10 L946802-4
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	<5.0	13.3	<5.0	<5.0	5.3	<5.0	10.9
Conductivity	µS/cm	161	97.1	135	60.3	150	195	138	157	104
Hardness (as CaCO <sub>3</sub> )	mg/L	72.1	40.9	59.9	27.4	68.9	87.1	62.6	70.7	46.9
pH	pH unit	7.89	7.24	7.74	7.56	7.96	7.14	8.04	8.08	8.04
Total Suspended Solids	mg/L	558	286	54.3	9.3	498	14.3	6.8	10.3	<3.0
Total Dissolved Solids	mg/L	108	56	87	39	103	122	85	96	62
Turbidity	NTU	431	185	74.4	4.41	603	21.9	4.93	12.8	1.16
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	5.9	4.8	5	4.1	4.9	6.9	3.8	3.7	3.4
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	40.6	11.7	30.8	18.6	49.6	47.3	48.4	55.8	29.3
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<1.0	<2.0	<1.0	<2.0	<1.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<1.0	<2.0	<1.0	<2.0	<1.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	40.6	11.7	30.8	18.6	49.6	47.3	48.4	55.8	29.3
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.056	0.088	0.026	<0.020	0.038	0.074	0.029	0.057	0.027
Nitrate (as N)	mg/L	0.0465	0.0071	0.0148	0.0356	0.0623	0.0995	0.0802	0.188	0.0857
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.068	<0.050	<0.050	0.064	0.244	<0.050	<0.050	<0.050	0.165
Total Nitrogen	mg/L	0.114	<0.050	<0.050	0.1	0.306	0.11	0.08	0.18	0.11
Ortho Phosphate as P	mg/L	0.0014	<0.0010	0.0011	<0.0010	0.0025	0.0014	0.0011	0.0012	0.0012
Total Phosphate as P	mg/L	0.973	0.47	0.0592	0.0212	0.638	0.0956	0.0216	0.0178	0.0039
Sulphate (SO <sub>4</sub> )	mg/L	38	30.3	34.3	10	26.9	45.9	18.5	23.6	19.6
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	-	-	-	-	<0.0010	-
Cyanide, Total	mg/L	0.0014	<0.0010	<0.0010	0.0033	0.0016	0.0026	0.0023	0.0015	0.002
Thiocyanate	mg/L	-	-	-	-	-	-	-	0.52	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	1.58	<0.50	<0.50	3.07	4.29	1.2	1.41	0.8	2.81
<b>Total Metals</b>										
Aluminum (Al)	mg/L	6.49	4.94	2.39	0.195	13.4	0.763	0.209	0.567	0.0799
Antimony (Sb)	mg/L	0.00097	0.00138	0.00163	<0.00010	0.00257	0.00154	0.00215	0.00015	<0.00010
Arsenic (As)	mg/L	0.00695	0.0114	0.00619	0.00016	0.0212	0.00605	0.00051	0.00056	<0.00010
Barium (Ba)	mg/L	0.17	0.267	0.0783	0.0082	0.247	0.0359	0.0287	0.0379	0.012
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.000812	0.00106	0.000105	<0.000010	0.000852	0.000755	0.000054	0.000033	0.000019
Calcium (Ca)	mg/L	36.3	17.9	24	9.19	28.2	28.2	20.4	26.6	13.7
Chromium (Cr)	mg/L	0.0073	0.00155	0.00205	0.00096	0.0227	0.00091	0.00062	0.0016	0.00059
Cobalt (Co)	mg/L	0.00615	0.00393	0.00144	0.00015	0.0102	0.00151	0.00019	0.00051	<0.00010
Copper (Cu)	mg/L	0.0817	0.0824	0.0191	0.0009	0.0301	0.0896	0.00128	0.00506	0.00088
Iron (Fe)	mg/L	11.1	8.31	2.52	0.184	13.9	2.8	0.297	0.719	0.067
Lead (Pb)	mg/L	0.0101	0.00787	0.00329	0.000057	0.0154	0.00119	0.000325	0.00131	<0.000050
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0149	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	4.73	2.09	2.34	1.48	8.6	3.69	3.55	1.89	3.32
Manganese (Mn)	mg/L	0.504	0.387	0.117	0.00752	0.701	0.0981	0.0149	0.0242	0.0034
Mercury (Hg)	mg/L	0.000027	0.000034	0.000013	<0.000010	0.000016	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.00171	0.0014	0.00113	0.000165	0.00256	0.00152	0.000767	0.00677	0.000231
Nickel (Ni)	mg/L	0.00717	0.00195	0.0015	0.00115	0.0301	0.00187	0.00094	0.00119	0.00087
Phosphorus (P)	mg/L	0.81	0.46	<0.30	<0.30	0.53	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	3.13	1.5	1.18	0.176	3.13	0.82	0.442	1.27	0.186
Selenium (Se)	mg/L	0.00119	0.00074	0.00032	<0.00020	0.00157	0.00113	0.00046	0.00033	0.00032
Silicon (Si)	mg/L	11.5	8.7	3.43	1.65	17.4	2.8	2.25	2.89	2.09
Silver (Ag)	mg/L	0.000089	0.000157	0.000051	<0.000010	0.000225	0.000013	<0.000010	0.000012	<0.000010
Sodium (Na)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.176	0.11	0.127	0.0663	0.204	0.209	0.191	0.229	0.124
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00031	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.346	0.261	0.042</						

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		MC1A-US (2)	MC2	MC1	SC2	SC3	TEC1 (2)	TEC1	TRC3	UR1
Date Sampled		21-Oct-10	21-Oct-10	21-Oct-10	21-Oct-10	21-Oct-10	21-Oct-10	21-Oct-10	21-Oct-10	15-Nov-10
ALS Sample ID		L946802-5	L946802-6	L946802-7	L946803-1	L946803-2	L946803-5	L946803-6	L946803-7	L955725-1
<b>QA/QC</b>		Units								
<b>Physical Tests</b>										
Colour, True	color unit	139	<5.0	18.2	<5.0	<5.0	10.3	10.9	7.1	<5.0
Conductivity	µS/cm	1270	261	955	316	291	64.9	65	199	220
Hardness (as CaCO <sub>3</sub> )	mg/L	209	122	229	145	133	29.5	28.4	89	108
pH	pH unit	2.92	7.65	3.05	6.72	7.83	8.02	7.99	7.99	8.05
Total Suspended Solids	mg/L	101	26.3	126	54.8	57.8	<3.0	<3.0	6.3	5.1
Total Dissolved Solids	mg/L	1130	169	625	211	194	41	42	121	126
Turbidity	NTU	186	39.4	253	54.5	47.3	0.88	0.89	5.06	10.9
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	519	9.7	192	9.4	5.9	3.7	3.6	4.6	2.3
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	<1.0	50.3	<1.0	39.5	45.5	19.1	19.1	58.2	63.1
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	<1.0	50.3	<1.0	39.5	45.5	19.1	19.1	58.2	63.1
Ammonia as N	mg/L	<0.0050	<0.0050	0.0077	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<2.5	<0.050	<1.0	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<25	<0.50	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	1.9	0.157	1.51	0.167	0.145	<0.020	<0.020	0.054	0.074
Nitrate (as N)	mg/L	<0.25	0.121	<0.10	0.0954	0.129	0.0246	0.0259	0.172	0.11
Nitrite (as N)	mg/L	<0.050	<0.0010	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.06
Total Nitrogen	mg/L	<0.050	0.12	<0.050	0.1	0.13	0.06	<0.050	0.18	0.17
Ortho Phosphate as P	mg/L	2.34	<0.0010	0.0842	0.0035	0.0012	<0.0010	<0.0010	0.0017	<0.0010
Total Phosphate as P	mg/L	6.64	0.323	0.33	0.444	0.324	<0.0020	<0.0020	0.011	0.0457
Sulphate (SO <sub>4</sub> )	mg/L	648	77.9	401	109	92.4	10.7	10.7	38.6	50.1
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	-	-	-						-
Cyanide, Total	mg/L	<0.0010	0.001	0.001	0.0012	0.0012	0.0028	0.0029	0.0014	0.0017
Thiocyanate	mg/L	-	-	-						-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	0.6	0.97	<0.50	<0.50	0.7	2.76	2.92	1.96	1.15
<b>Total Metals</b>										
Aluminum (Al)	mg/L	21.5	1.21	9.47	1.76	1.63	0.0666	0.078	0.193	0.337
Antimony (Sb)	mg/L	0.00118	0.00037	0.00094	0.00076	0.00071	<0.00010	<0.00010	0.00024	0.00131
Arsenic (As)	mg/L	0.431	0.0212	0.174	0.0209	0.0155	<0.00010	<0.00010	0.00049	0.00262
Barium (Ba)	mg/L	0.0975	0.0218	0.0528	0.0486	0.0528	0.00653	0.00693	0.0298	0.0309
Beryllium (Be)	mg/L	0.00482	<0.00050	0.00196	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.0484	0.00277	0.0225	0.00269	0.00201	<0.000010	<0.000010	0.00005	0.000695
Calcium (Ca)	mg/L	66.9	44.1	76.1	50.3	47	8.88	9.23	28.8	38.2
Chromium (Cr)	mg/L	0.00235	0.00045	0.00129	0.00101	0.00146	0.0005	0.00055	0.00067	0.0003
Cobalt (Co)	mg/L	0.0699	0.00434	0.0335	0.00465	0.00373	<0.00010	<0.00010	0.0002	0.00097
Copper (Cu)	mg/L	5.2	0.356	2.79	0.336	0.252	0.0007	0.00071	0.00109	0.0662
Iron (Fe)	mg/L	152	8.57	66.6	9.12	7.18	0.052	0.06	0.275	1.63
Lead (Pb)	mg/L	0.0581	0.00316	0.0335	0.0034	0.00294	<0.000050	<0.000050	0.000139	0.000779
Lithium (Li)	mg/L	0.0165	<0.0050	0.0084	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	10.6	3.17	8.77	4.89	4.53	1.77	1.81	5.67	4.01
Manganese (Mn)	mg/L	3.89	0.271	2.16	0.297	0.248	0.00216	0.00279	0.0272	0.0841
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.03	0.00322	0.0159	0.00347	0.00296	0.000125	0.000126	0.000962	0.00148
Nickel (Ni)	mg/L	0.0189	0.00214	0.0106	0.00399	0.00365	0.00075	0.00072	0.00147	0.00133
Phosphorus (P)	mg/L	7.24	0.39	3.12	0.39	0.32	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	1.21	0.738	0.845	1.61	1.55	0.102	0.105	0.317	0.805
Selenium (Se)	mg/L	0.018	0.00308	0.00857	0.00257	0.00227	0.00012	0.00012	0.00062	0.00111
Silicon (Si)	mg/L	8.77	2.85	6.3	3.7	3.96	1.6	1.64	2.8	2.5
Silver (Ag)	mg/L	0.000132	0.000011	0.00007	0.000022	0.000027	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	2.9	<2.0	2.5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.453	0.277	0.511	0.287	0.263	0.0705	0.0722	0.251	0.233
Thallium (Tl)	mg/L	0.00022	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0		

## **Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

"<" sign indicates that the value is below the detection

Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010

Sample ID	Date Sampled	ALS Sample ID	TRC2	TRC3	NTR1	NTR2	NTR1A	MC1A	MC1	MC2	MCT		
			15-Nov-10										
			L955725-11	L955725-12	L955725-13	L955725-14	L955725-15	L955725-16	L955725-17	L955725-18	L955725-19		
<b>QA/QC</b>											Units		
<b>Physical Tests</b>													
Colour, True	color unit	<5.0	<5.0	5.7	<5.0	6.3	9.6	6.6	<5.0	<5.0			
Conductivity	µS/cm	274	253	110	105	99.6	824	867	371	420			
Hardness (as CaCO <sub>3</sub> )	mg/L	127	118	46.9	46.3	43.7	146	230	171	203			
pH	pH unit	8.12	8.14	7.83	7.85	7.27	3.03	3.15	7.39	8.22			
Total Suspended Solids	mg/L	12.1	<3.0	<3.0	<3.0	<3.0	75.1	79.6	42.1	<3.0			
Total Dissolved Solids	mg/L	162	145	68	58	54	428	504	260	267			
Turbidity	NTU	1.62	1.31	0.64	0.92	0.42	142	140	76.4	0.58			
<b>Anions and Nutrients</b>													
Acidity (as CaCO <sub>3</sub> )	mg/L	1.8	1.7	2.2	2.1	2.8	152	106	3.4	1.5			
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	75.2	77.1	28.1	27.2	26.5	<1.0	<1.0	33.4	104			
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<1.0	<2.0			
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<1.0	<2.0			
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	75.2	77.1	28.1	27.2	26.5	<1.0	<1.0	33.4	104			
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.020	<0.0050	<0.0050			
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.50	<0.50	<0.050	<0.050			
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<5.0	<5.0	<0.50	<0.50			
Fluoride (F)	mg/L	0.078	0.064	0.04	0.033	0.034	0.95	0.91	0.328	0.043			
Nitrate (as N)	mg/L	0.14	0.142	0.191	0.3	0.394	<0.050	0.085	0.174	0.009			
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.010	<0.0010	<0.0010			
Total Kjeldahl Nitrogen	mg/L	<0.050	0.078	0.089	0.111	0.07	<0.050	<0.050	0.056	<0.050			
Total Nitrogen	mg/L	0.18	0.22	0.28	0.41	0.464	<0.050	0.06	0.23	<0.050			
Ortho Phosphate as P	mg/L	0.0013	0.002	0.0039	0.0021	0.0026	0.0278	0.0066	<0.0010	0.0014			
Total Phosphate as P	mg/L	0.0308	0.0048	0.0424	0.0049	0.0053	1.9	1.4	0.428	0.0029			
Sulphate (SO <sub>4</sub> )	mg/L	65.3	52.7	23.8	21.3	20.3	289	318	151	115			
<b>Cyanides</b>													
Cyanide, Weak Acid Dissociable	mg/L	<0.0010	-	-	<0.0010	<0.0010	-	-	-	-			
Cyanide, Total	mg/L	0.0011	<0.0010	0.0021	0.0013	0.002	<0.0010	<0.0010	<0.0010	<0.0010			
Thiocyanate	mg/L	<0.50	-	-	<0.50	<0.50	-	-	-	-			
<b>Organic / Inorganic Carbon</b>													
Total Organic Carbon	mg/L	0.92	1.04	1.95	1.6	1.99	<0.50	<0.50	0.71	<0.50			
<b>Total Metals</b>													
Aluminum (Al)	mg/L	0.0381	0.0476	0.0209	0.0599	0.0267	5.56	6.82	2.28	0.0167			
Antimony (Sb)	mg/L	0.00025	0.00026	<0.00010	<0.00010	<0.00010	0.00177	0.00088	0.00061	0.00033			
Arsenic (As)	mg/L	0.00024	0.00034	<0.00010	0.00883	<0.00010	0.0679	0.0641	0.0204	0.00015			
Barium (Ba)	mg/L	0.0275	0.0326	0.0151	0.0164	0.0132	0.05	0.0358	0.0348	0.0189			
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00153	0.00165	0.00054	<0.00050			
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			
Boron (B)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			
Cadmium (Cd)	mg/L	0.000033	0.000031	0.000083	0.000021	<0.000010	0.0175	0.0195	0.00595	0.000205			
Calcium (Ca)	mg/L	39.2	37.9	13.2	15.2	13.1	47.9	80.8	59	72.3			
Chromium (Cr)	mg/L	0.0003	0.00029	0.00031	0.00052	0.00027	0.00064	0.00075	0.00062	0.00016			
Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0194	0.0247	0.00793	<0.00010			
Copper (Cu)	mg/L	<0.00050	0.00051	<0.00050	0.00072	0.00068	1.46	1.98	0.64	<0.00050			
Iron (Fe)	mg/L	0.087	0.127	0.125	0.049	0.042	41.8	43.4	13.6	<0.030			
Lead (Pb)	mg/L	0.000098	<0.000050	0.000107	0.000269	<0.000050	0.0153	0.0176	0.00565	<0.000050			
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0054	0.0065	<0.0050	<0.0050			
Magnesium (Mg)	mg/L	7.45	6.84	3.38	2.93	2.83	4.44	7.95	6.03	6.34			
Manganese (Mn)	mg/L	0.0176	0.0285	0.0108	0.00285	0.00411	1.28	2.12	0.662	0.005			
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010			
Molybdenum (Mo)	mg/L	0.00118	0.00115	0.000259	0.000371	0.000259	0.00743	0.00843	0.00442	0.00558			
Nickel (Ni)	mg/L	0.00102	0.00087	0.00069	0.00058	0.0006	0.00561	0.00825	0.004	0.00731			
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	1.35	1.28	0.42	<0.30			
Potassium (K)	mg/L	0.278	0.288	0.236	0.232	0.237	0.715	0.757	0.769	0.231			
Selenium (Se)	mg/L	0.00062	0.0007	0.00047	0.00057	0.00041	0.0041	0.00446	0.00371	0.00755			
Silicon (Si)	mg/L	2.79	2.7	3.16	2.71	2.93	4.44	5.71	3.65	1.78			
Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.00003	0.000037	0.00002	<0.000010			
Sodium (Na)	mg/L	2.2	2	<2.0	<2.0	<2.0	<2.0	2.7	2.4	<2.0			
Strontium (Sr)	mg/L	0.313	0.305	0.138	0.149	0.136	0.343	0.523	0.313	0.281			
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Titanium (Ti)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.014	0.012	0.015	<0.010			
Uranium (U)	mg/L	0.000058	0.000051	<0.000010	<0.000010	<0.000010	0.00104	0.00157	0.000743	0.00088			
Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0097	0.0091	0.0036	<0.0010			
Zinc (Zn)	mg/L	0.0033	<0.0030	<0.0030	<0.0030	<0.0030	1.17	1.27	0.395	0.0158			
<b>Dissolved Metals</b>													
Aluminum (Al)	mg/L	0.0113	0.0133	0.0086	0.017	0.0134	7.42	6.49	0.0303	0.0076			
Antimony (Sb)	mg/L	0.00025	0.00024	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00021	0.00033			
Arsenic (As)	mg/L	0.00019	0.00027	<0.00010	<0.00010	<0.00010	<0.00010	0.00036	0.00029	<0.00010	0.00014		
Barium (Ba)													

Note:  
"<" sign indicates that the value is below the detection limit

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		MCTR 15-Nov-10 L955725-20	SCT 15-Nov-10 L955725-21	SC1 15-Nov-10 L955725-22	SC2 15-Nov-10 L955725-23	SC3 15-Nov-10 L955725-24	SCR 15-Nov-10 L955725-25	BIR1 15-Nov-10 L955725-26	BIR2 15-Nov-10 L955725-27	STE3 (2) 15-Nov-10 L955725-29
QA/QC	Units									
<b>Physical Tests</b>										
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	<5.0	6.9	6	8.1	
Conductivity	µS/cm	339	410	304	351	321	90.8	155	192	165
Hardness (as CaCO <sub>3</sub> )	mg/L	167	198	151	176	161	42.5	75.9	95.1	80
pH	pH unit	8.25	8.15	8.07	7.94	8.08	7.91	8.06	8.11	7.76
Total Suspended Solids	mg/L	<3.0	16.1	<3.0	21.1	30.6	<3.0	3.1	<3.0	<3.0
Total Dissolved Solids	mg/L	199	260	182	228	194	49	78	103	134
Turbidity	NTU	2.21	27.8	0.98	34.2	30.8	0.31	2.92	1.98	0.86
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	<1.0	1.9	2.2	2.4	2.1	2.2	1.8	1.8	2.1
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	104	84.5	62	60.7	64.7	28.6	59.9	65.3	31.1
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	104	84.5	62	60.7	64.7	28.6	59.9	65.3	31.1
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.052	0.069	0.053	0.171	0.139	0.037	0.035	0.047	0.034
Nitrate (as N)	mg/L	0.156	0.0351	0.0619	0.111	0.149	0.558	0.139	0.168	0.0686
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.055	<0.050	<0.050	<0.050	0.061	0.052	0.071	0.062	0.051
Total Nitrogen	mg/L	0.21	0.05	0.09	0.15	0.21	0.61	0.21	0.23	0.12
Ortho Phosphate as P	mg/L	0.0011	0.0015	<0.0010	<0.0010	0.0019	<0.0010	0.0016	0.0015	
Total Phosphate as P	mg/L	0.0059	0.0934	0.0025	0.152	0.161	0.0038	0.005	0.0049	0.004
Sulphate (SO <sub>4</sub> )	mg/L	72.8	124	90.3	112	94.9	13.5	20.2	33.5	47.6
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	-	-	-	-	-	-
Cyanide, Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	0.0026	0.0011	0.0013	<0.0010
Thiocyanate	mg/L	-	-	-	-	-	-	-	-	-
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	0.51	0.68	0.58	0.62	0.84	1.57	1.88	1.91	2.11
<b>Total Metals</b>										
Aluminum (Al)	mg/L	0.0878	1.77	0.078	0.974	0.877	0.0237	0.188	0.0949	0.0605
Antimony (Sb)	mg/L	0.00054	0.0005	0.00132	0.00072	0.00063	<0.00010	<0.00010	0.00016	<0.00010
Arsenic (As)	mg/L	0.00048	0.00194	0.00058	0.00772	0.00637	<0.00010	0.00017	0.00026	<0.00010
Barium (Ba)	mg/L	0.0232	0.0782	0.0399	0.0402	0.0411	0.0133	0.046	0.0337	0.0174
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.000133	0.000401	0.000084	0.00229	0.00178	<0.000010	0.000019	0.000025	<0.000010
Calcium (Ca)	mg/L	58.2	70.8	55.9	59.2	57.2	12.4	18.1	29.3	24.5
Chromium (Cr)	mg/L	0.00025	0.00201	0.00011	0.00057	0.00069	0.00027	0.0009	0.00044	0.00044
Cobalt (Co)	mg/L	0.00017	0.00159	0.00057	0.00323	0.00253	<0.00010	0.00012	0.00011	<0.00010
Copper (Cu)	mg/L	0.0015	0.00668	0.00854	0.228	0.172	0.00069	0.00109	0.00073	0.00079
Iron (Fe)	mg/L	0.208	2.83	0.084	5.28	4.29	<0.030	0.205	0.145	0.06
Lead (Pb)	mg/L	0.000079	0.00111	0.000115	0.00225	0.00202	<0.000050	0.000181	0.000077	0.000062
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	6.53	6.62	3.99	4.91	4.37	3.23	7.38	5.96	5
Manganese (Mn)	mg/L	0.00872	0.104	0.0688	0.269	0.211	0.00159	0.00575	0.0183	0.00414
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.00338	0.00317	0.0015	0.0029	0.00247	0.000137	0.00086	0.000819	0.000335
Nickel (Ni)	mg/L	0.00278	0.00625	0.00084	0.00316	0.00266	0.00066	0.00115	0.00093	0.00071
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.915	4.43	0.469	1.43	1.36	0.154	0.369	0.296	0.234
Selenium (Se)	mg/L	0.00506	0.00183	0.00069	0.00233	0.00195	0.0003	0.00071	0.00062	0.0007
Silicon (Si)	mg/L	2.39	5.63	1.76	3.01	3.11	2.68	2.51	2.7	2.51
Silver (Ag)	mg/L	<0.000010	0.000029	<0.000010	0.000011	0.00001	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.5	2.1	<2.0
Strontium (Sr)	mg/L	0.259	0.403	0.28	0.313	0.281	0.107	0.161	0.214	0.237
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	<0.01								

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID	BIR2 (2)	SNO2 (2)	GC1	SC2	SC3	SC2 (2)	SC1	TEC1	UR1
Date Sampled	15-Nov-10	15-Nov-10	15-Nov-10	15-Dec-10	15-Dec-10	15-Dec-10	15-Dec-10	15-Dec-10	15-Dec-10
ALS Sample ID	L955725-30	L955725-31	L955725-32	L963831-1	L963831-2	L963831-5	L963831-6	L963831-7	L963832-1
<b>QA/QC</b>									
<b>Physical Tests</b>		Units							
Colour, True	color unit	5.7	6.3	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity	µS/cm	155	136	226	409	380	410	355	89.4
Hardness (as CaCO <sub>3</sub> )	mg/L	74.7	65.3	107	167	176	197	168	37.7
pH	pH unit	8.08	7.94	8.21	7.85	8.08	7.9	8.11	8.05
Total Suspended Solids	mg/L	<3.0	<3.0	<3.0	15.5	13.5	15.5	<3.0	8
Total Dissolved Solids	mg/L	81	73	123	267	247	256	223	38
Turbidity	NTU	3.3	0.67	0.83	27.5	23.3	27.3	0.37	14.3
<b>Anions and Nutrients</b>									
Acidity (as CaCO <sub>3</sub> )	mg/L	1.8	2.2	1.4	6.2	4.9	5.9	4.7	4.5
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	62.9	40.9	89	74.7	76.9	74.5	71	25.6
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	62.9	40.9	89	74.7	76.9	74.5	71	25.6
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.035	0.036	0.026	0.191	0.165	0.191	0.056	<0.020
Nitrate (as N)	mg/L	0.138	0.199	0.125	0.085	0.122	0.0853	0.0717	0.0477
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.072	0.071	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Total Nitrogen	mg/L	0.21	0.27	0.17	0.08	0.12	0.07	0.08	0.06
Ortho Phosphate as P	mg/L	<0.0010	0.002	0.0015	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.006	0.0055	0.0082	0.0701	0.0663	0.0678	<0.0020	0.0318
Sulphate (SO <sub>4</sub> )	mg/L	20.3	25	30.1	132	117	132	108	16.9
<b>Cyanides</b>									
Cyanide, Weak Acid Dissociable	mg/L	-	-	-					-
Cyanide, Total	mg/L	0.0019	-	<0.0010	<0.0010	<0.0010	<0.0010	0.0022	0.0011
Thiocyanate	mg/L	-	-	-					-
<b>Organic / Inorganic Carbon</b>									
Total Organic Carbon	mg/L	1.95	1.99	0.72	0.54	0.51	<0.50	0.65	1.69
<b>Total Metals</b>									
Aluminum (Al)	mg/L	0.175	0.0493	0.036	0.898	0.744	0.849	0.0396	0.0272
Antimony (Sb)	mg/L	<0.00010	<0.00010	0.00022	0.00069	0.00064	0.00068	0.00136	<0.00010
Arsenic (As)	mg/L	0.00015	0.00014	0.00047	0.00463	0.00389	0.00443	0.00049	<0.00010
Barium (Ba)	mg/L	0.0458	0.0155	0.0119	0.0415	0.0387	0.0394	0.0447	0.00785
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	<0.000010	0.000011	0.000032	0.00288	0.0023	0.0028	0.000055	<0.000010
Calcium (Ca)	mg/L	18.3	20.3	42.2	71.2	64	69.6	62.2	12.7
Chromium (Cr)	mg/L	0.00089	0.00034	0.00019	0.00028	0.00024	0.00033	0.00014	0.00025
Cobalt (Co)	mg/L	0.00012	<0.00010	<0.00010	0.00304	0.00238	0.00297	0.00031	<0.00010
Copper (Cu)	mg/L	0.00115	0.00065	0.00073	0.225	0.181	0.218	0.00497	0.00055
Iron (Fe)	mg/L	0.184	0.125	0.057	4.21	3.5	4.08	0.039	<0.030
Lead (Pb)	mg/L	0.000092	0.000121	<0.000050	0.00214	0.0018	0.00211	<0.000050	<0.000050
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)	mg/L	7.49	3.99	1.99	6.31	5.67	6.21	4.96	2.29
Manganese (Mn)	mg/L	0.00551	0.0211	0.00362	0.351	0.274	0.343	0.0474	0.00144
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.000863	0.000263	0.00133	0.00282	0.00258	0.00272	0.0016	0.000165
Nickel (Ni)	mg/L	0.00115	0.00077	0.00061	0.00283	0.00234	0.00258	0.00086	0.00059
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.365	0.232	0.731	1.83	1.63	1.75	0.562	0.117
Selenium (Se)	mg/L	0.00073	0.00037	0.00191	0.00226	0.00188	0.00227	0.00078	0.00014
Silicon (Si)	mg/L	2.48	2.48	2.31	3	3.01	2.88	1.91	1.75
Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	2.5	<2.0	<2.0	2.9	2.7	2.8	<2.0	<2.0
Strontium (Sr)	mg/L	0.159	0.15	0.263	0.375	0.35	0.371	0.347	0.0891
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)	mg/L	0.000023	<0.000010	0.00018	0.000528	0.000471	0.000521	0.00011	<0.000010
Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0012	0.0011	0.0011	<0.0010	<0.0010
Zinc (Zn)	mg/L</								

**Appendix 5.1-1. Stream Water Quality Data, KSM Project, 2010**

Sample ID		UR1A 15-Dec-10	SUNR 15-Dec-10	STE1A 15-Dec-10	TEC2 15-Dec-10	NTR1A 15-Dec-10	MC1A 15-Dec-10	MC2 15-Dec-10
Date Sampled		15-Dec-10	15-Dec-10	15-Dec-10	15-Dec-10	15-Dec-10	15-Dec-10	15-Dec-10
ALS Sample ID		L963832-2	L963832-3	L963832-4	L963832-5	L963832-6	L963832-7	L963832-8
<b>QA/QC</b>								
<b>Physical Tests</b>								
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	16.3	<5.0	
Conductivity	µS/cm	206	221	250	161	117	1160	383
Hardness (as CaCO <sub>3</sub> )	mg/L	93.9	96.8	110	73.6	51.2	239	188
pH	pH unit	8.15	8.12	8.05	7	8.04	3.1	7.05
Total Suspended Solids	mg/L	7.5	<3.0	<3.0	<3.0	<3.0	119	4
Total Dissolved Solids	mg/L	117	125	153	93	66	751	242
Turbidity	NTU	0.69	0.49	0.43	0.24	0.35	131	1.92
<b>Anions and Nutrients</b>								
Acidity (as CaCO <sub>3</sub> )	mg/L	3.7	4	4.7	8.6	5.7	320	12.5
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	73.5	71.5	40.3	45.6	28.5	<2.0	89.2
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	73.5	71.5	40.3	45.6	28.5	<2.0	89.2
Ammonia as N	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.50	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<5.0	<0.50
Fluoride (F)	mg/L	0.037	0.076	0.041	0.034	0.035	2.32	0.061
Nitrate (as N)	mg/L	0.0903	0.241	0.054	0.155	0.346	<0.050	0.0596
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Total Nitrogen	mg/L	0.09	0.24	0.05	0.15	0.35	<0.050	0.05
Ortho Phosphate as P	mg/L	<0.0010	<0.0010	0.0047	0.0028	0.0025	0.0876	<0.0010
Total Phosphate as P	mg/L	0.002	<0.0020	0.0057	0.0045	0.0041	1.65	<0.0020
Sulphate (SO <sub>4</sub> )	mg/L	33	40.6	79.9	34.9	27	559	114
<b>Cyanides</b>								
Cyanide, Weak Acid Dissociable	mg/L	-	<0.0010	-	-	<0.0010	-	-
Cyanide, Total	mg/L	<0.0010	0.001	0.001	0.0017	0.0014	<0.0010	<0.0010
Thiocyanate	mg/L	-	<0.50	-	-	<0.50	-	-
<b>Organic / Inorganic Carbon</b>								
Total Organic Carbon	mg/L	0.57	0.58	<0.50	1.35	1.64	<0.50	0.58
<b>Total Metals</b>								
Aluminum (Al)	mg/L	0.0358	0.0449	0.0181	0.0161	0.0185	15.3	0.101
Antimony (Sb)	mg/L	0.00219	<0.00010	<0.00010	<0.00010	<0.00010	0.00148	0.00083
Arsenic (As)	mg/L	0.00034	0.00028	0.0001	<0.00010	<0.00010	0.0968	0.00053
Barium (Ba)	mg/L	0.0339	0.0436	0.0289	0.0165	0.0148	0.0459	0.0496
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00498	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.000024	0.000015	0.000011	<0.000010	<0.000010	0.0504	0.000123
Calcium (Ca)	mg/L	29.4	37.8	31.8	20.7	14.5	81.2	69.1
Chromium (Cr)	mg/L	0.00021	0.00033	0.00042	0.00033	0.00033	0.00115	0.00023
Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0484	0.00025
Copper (Cu)	mg/L	0.00054	0.00076	0.00071	0.0005	0.00051	3.72	0.00248
Iron (Fe)	mg/L	0.084	0.063	<0.030	<0.030	<0.030	95.6	0.134
Lead (Pb)	mg/L	0.000066	0.000173	0.000071	<0.000050	<0.000050	0.0395	0.000118
Lithium (Li)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0159	<0.0050
Magnesium (Mg)	mg/L	5.06	2.16	8.66	5.52	3.28	10.8	5.86
Manganese (Mn)	mg/L	0.0089	0.00297	0.000746	0.000704	0.00229	3.87	0.0295
Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.00115	0.00796	0.000606	0.000333	0.000263	0.00878	0.00237
Nickel (Ni)	mg/L	0.00083	0.00064	0.00098	0.00083	0.00088	0.013	0.0027
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	1.68	<0.30
Potassium (K)	mg/L	0.55	1.38	0.362	0.245	0.26	1.17	2.61
Selenium (Se)	mg/L	0.00071	0.00046	0.00144	0.00047	0.00047	0.00537	0.00138
Silicon (Si)	mg/L	2.09	2.47	2.61	2.47	2.93	8.45	2.5
Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000054	<0.000010
Sodium (Na)	mg/L	2.2	<2.0	2.6	<2.0	<2.0	4.3	<2.0
Strontium (Sr)	mg/L	0.264	0.315	0.343	0.186	0.155	0.616	0.385
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00016	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.013	<0.010
Uranium (U)	mg/L	0.00004	0.000759	0.00002	0.000014	<0.000010	0.00219	0.000412
Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0212	<0.0010
Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	3.47	0.0084
<b>Dissolved Metals</b>								
Aluminum (Al)	mg/L	0.0052	0.0052	<0.0030	0.0064	0.0085	14.4	0.0113
Antimony (Sb)	mg/L	0.00213	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00079
Arsenic (As)	mg/L	0.00029	0.00022	<0.00010				

KSM PROJECT  
2010 Water Quality and Aquatic Resources Baseline Report

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## Appendix 5.1-2

Stream Water Quality Field and Travel Blanks,  
KSM Project, 2010

Appendix 5.1-2. Stream Water Quality Field and Travel Blanks, KSM Project, 2010

Sample ID Date Sampled	Units	Field Blank											Total
		17-Jan-10	3-Mar-10	1-May-10	26-May-10	5-Jul-10	3-Aug-10	27-Aug-10	28-Sep-10	21-Oct-10	15-Nov-10	15-Dec-10	
QA/QC													
Physical Tests													
Colour, True	color unit	<5.0	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity	µS/cm	<2.0	-	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Hardness (as CaCO <sub>3</sub> )	mg/L	<0.50	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
pH	pH unit	5.57	-	5.98	5.73	5.65	6.93	6.08	5.6	5.81	5.68	5.7	
Total Suspended Solids	mg/L	<3.0	-	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	<10	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Turbidity	NTU	<0.10	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anions and Nutrients													
Acidity (as CaCO <sub>3</sub> )	mg/L	1.9	-	2.8	2.1	3.1	2.9	2.7	3.3	2.5	2	2.7	
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	<2.0	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ammonia as N	mg/L	<0.0050	-	0.0063	<0.0050	0.0088	0.0172	<0.0050	<0.0050	<0.0050	0.0121	<0.0050	
Bromide (Br)	mg/L	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrate (as N)	mg/L	<0.0050	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrite (as N)	mg/L	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Total Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ortho Phosphate as P	mg/L	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	<0.0020	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Sulphate (SO <sub>4</sub> )	mg/L	<0.50	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cyanides													
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Cyanide, Total	mg/L	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Thiocyanate	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Organic / Inorganic Carbon													
Total Organic Carbon	mg/L	<0.50	<0.50	<0.20	<0.50	0.55	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals													
Aluminum (Al)	mg/L	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Antimony (Sb)	mg/L	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Beryllium (Be)	mg/L	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.10	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)	mg/L	<0.000017	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)	mg/L	<0.20	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chromium (Cr)	mg/L	<0.00050	-	<0.00050	<0.00020	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)	mg/L	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)	mg/L	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	0.00725
Iron (Fe)	mg/L	<0.030	-	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)	mg/L	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.00053
Lithium (Li)	mg/L	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Magnesium (Mg)	mg/L	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Manganese (Mn)	mg/L	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Mercury (Hg)	mg/L	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel (Ni)	mg/L	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Phosphorus (P)	mg/L	<0.30	-	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Selenium (Se)	mg/L	<0.00020	-	<0.00020	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)	mg/L	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Silver (Ag)	mg/L	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	<2.0	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Thallium (Tl)	mg/L	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	<0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)	mg/L	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Vanadium (V)	mg/L	<0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc (Zn)	mg/L	<0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.030	<0.030	<0.030	<0.030
# exceeding DL		0	0	1	0	3	1	0	0	0	1	2	8
% exceeding DL		0	0	2	0	5	2	0	0	0	2	3	1

Note:

"<" sign indicates that the value is below the detection limit.

**Bold** are concentrations exceeding detection limits.

Appendix 5.1-2. Stream Water Quality Field and Travel Blanks, KSM Project, 2010

Sample ID Date Sampled	Units	Travel Blank											Total
		17-Jan-10	3-Mar-10	28-Mar-10	1-May-10	26-May-10	5-Jul-10	3-Aug-10	27-Aug-10	28-Sep-10	21-Oct-10	15-Dec-10	
<b>QA/QC</b>													
Physical Tests													
Colour, True	color unit	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity	µS/cm	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Hardness (as CaCO <sub>3</sub> )	mg/L	<0.50	<0.50	<0.50	48.0	4.98	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
pH	pH unit	5.58	5.66	6.05	5.94	5.62	5.79	5.61	5.98	5.58	5.81	5.7	
Total Suspended Solids	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Turbidity	NTU	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
<b>Anions and Nutrients</b>													
Acidity (as CaCO <sub>3</sub> )	mg/L	2.3	2.0	1.8	2.7	2.2	2.7	1.8	2.6	3.2	2.4	2.7	
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ammonia N	mg/L	<0.0050	<0.0050	<0.0050	0.0076	<0.0050	0.0086	0.0111	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrate (as N)	mg/L	<0.0050	<0.0050	<0.0050	0.0074	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Total Nitrogen	mg/L	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ortho Phosphate as P	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Sulphate (SO <sub>4</sub> )	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
<b>Cyanides</b>													
Cyanide, Weak Acid Dissociable	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Cyanide, Total	mg/L	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Thiocyanate	mg/L	-	-	-	-	-	-	-	-	-	-	-	
<b>Organic / Inorganic Carbon</b>													
Total Organic Carbon	mg/L	<0.50	-	<0.50	0.36	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
<b>Total Metals</b>													
Aluminum (Al)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0336	0.0022	<0.0010	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030
Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00325	0.000111	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)	mg/L	<0.00017	<0.000010	<0.000010	0.000066	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)	mg/L	<0.20	<0.20	<0.20	<0.20	18.9	1.96	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chromium (Cr)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.00018	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.00065	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)	mg/L	<0.00050	<0.00050	<0.00050	0.000103	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Magnesium (Mg)	mg/L	<0.050	<0.050	<0.050	<0.050	0.223	0.0237	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Manganese (Mn)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00157	0.000173	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Mercury (Hg)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Molybdenum (Mo)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.000538	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	<0.050	<0.050	<0.050	<0.050	0.183	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Selenium (Se)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00083	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Silicon (Si)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.000024	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00943	0.00111	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000023	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Vanadium (V)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0029	<0.0010	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	<0.0030
# exceeding DL		0	0	0	3	1							

**KSM PROJECT**  
**2010 Water Quality and Aquatic Resources Baseline Report**

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## **Appendix 5.1-3**

**Relative Percent Difference (RPD) Results for Water  
Quality Duplicate Samples, KSM Project, 2010**

**Appendix 5.1-3. Relative Percent Difference (RPD) Results for Water Quality Duplicate Samples, KSM Project, 2010**

Stn.Code Station Name Collect Date/Time ALS Sample ID QAQC Sampling Session	UR1	RES1	Replicate	SC2	RES11		
	UR1	UR1 Duplicate		SC2	SC2 Duplicate		
	1/17/2010 L855505-1	1/17/2010 L855505-11		12/15/2010 L963831-1	12/15/2010 L963831-5		
5 MDL	Jan-10	Jan-10	RPD (%)	5 MDL	10-Dec	10-Dec	RPD (%)
<b>Physical Tests</b>							
Colour, True	color unit	25	<5.0	<5.0	25	<5.0	<5.0
Conductivity	µS/cm	10	256	260	10	409	410
Hardness (as CaCO <sub>3</sub> )	mg/L	2.5	121	118	2.5	167	197
pH	pH unit	0.5	7.81	8.05	0.5	7.85	7.9
Total Suspended Solids	mg/L	15	9.3	9.3	15	15.5	15.5
Total Dissolved Solids	mg/L	50	166	167	50	267	256
Turbidity	NTU	0.5	6.82	6.74	0.5	27.5	27.3
<b>Anions and Nutrients</b>							
Acidity (as CaCO <sub>3</sub> )	mg/L	5	3.8	2.7	<b>33.8</b>	6.2	5.9
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	10	70.4	70.9	0.7	74.7	74.5
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	10	<2.0	<2.0	10	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	10	<2.0	<2.0	10	<2.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	10	70.4	70.9	0.7	74.7	74.5
Ammonia as N	mg/L	0.025	<0.0050	<0.0050	0.025	<0.0050	<0.0050
Bromide (Br)	mg/L	0.25	<0.050	<0.050	0.25	<0.050	<0.050
Chloride (Cl)	mg/L	2.5	<0.50	<0.50	2.5	<0.50	<0.50
Fluoride (F)	mg/L	0.1	0.061	0.053	0.1	0.191	0.191
Nitrate (as N)	mg/L	0.025	0.0986	0.102	0.025	0.085	0.0853
Nitrite (as N)	mg/L	0.005	<0.0010	<0.0010	0.005	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.25	<0.050	<0.050	0.25	<0.050	<0.050
Total Nitrogen	mg/L	0.25	0.140	0.110	0.25	0.08	0.07
Ortho Phosphate as P	mg/L	0.005	<0.0010	<0.0010	0.005	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.01	0.0086	0.0209	Dif>2DL	0.01	0.0701
Sulphate (SO <sub>4</sub> )	mg/L	2.5	59.6	60.6	1.7	2.5	132
<b>Cyanides</b>							
Cyanide, Weak Acid Dissociable	mg/L						
Cyanide, Total	mg/L	0.005	<0.0010	<0.0010	0.005	<0.0010	<0.0010
Thiocyanate	mg/L						
<b>Organic / Inorganic Carbon</b>							
Total Organic Carbon	mg/L	2.5	0.61	0.60		0.54	<0.50
<b>Total Metals</b>							
Aluminum (Al)	mg/L	0.005	0.237	0.231	2.6	0.898	0.849
Antimony (Sb)	mg/L	0.0005	0.00176	0.00177	0.6	0.00069	0.00068
Arsenic (As)	mg/L	0.0005	0.00082	0.00080	2.5	0.00463	0.00443
Barium (Ba)	mg/L	0.00025	0.0344	0.0346	0.6	0.00025	0.0394
Beryllium (Be)	mg/L	0.0025	<0.00050	<0.00050		0.0025	<0.00050
Bismuth (Bi)	mg/L	0.0025	<0.00050	<0.00050		0.0025	<0.00050
Boron (B)	mg/L	0.05	<0.010	<0.010		0.05	<0.010
Cadmium (Cd)	mg/L	0.000085	0.000522	0.000515	1.4	0.00005	0.00288
Calcium (Ca)	mg/L	0.1	42.7	40.9	4.3	0.1	71.2
Chromium (Cr)	mg/L	0.0025	<0.00050	<0.00050		0.0005	0.00028
Cobalt (Co)	mg/L	0.0005	0.00061	0.00066	7.9	0.0005	0.00304
Copper (Cu)	mg/L	0.0005	0.0339	0.0349	2.9	0.0025	0.225
Iron (Fe)	mg/L	0.15	0.884	0.866	2.1	0.15	4.21
Lead (Pb)	mg/L	0.00025	0.000622	0.000627	0.8	0.00025	0.00214
Lithium (Li)	mg/L	0.025	<0.0050	<0.0050		0.025	<0.0050
Magnesium (Mg)	mg/L	0.025	4.67	4.52	3.3	0.025	6.31
Manganese (Mn)	mg/L	0.00025	0.0899	0.0898	0.1	0.00025	0.343
Mercury (Hg)	mg/L	0.00005	<0.000010	<0.000010		0.00005	<0.000010
Molybdenum (Mo)	mg/L	0.00025	0.00165	0.00159	3.7	0.00025	0.00282
Nickel (Ni)	mg/L	0.0025	0.00106	0.00113		0.0025	0.00283
Phosphorus (P)	mg/L	1.5	<0.30	<0.30		1.5	<0.30
Potassium (K)	mg/L	0.25	0.945	0.933	1.3	0.25	1.83
Selenium (Se)	mg/L	0.001	0.00122	0.00117	4.2	0.0005	0.00226
Silicon (Si)	mg/L	0.25	2.28	2.27	0.4	0.25	3
Silver (Ag)	mg/L	0.00005	0.000012	<0.000010		0.00005	<0.000010
Sodium (Na)	mg/L	10	2.7	2.7		10	2.8
Strontium (Sr)	mg/L	0.0005	0.283	0.276	2.5	0.0005	0.371
Thallium (Tl)	mg/L	0.0005	<0.00010	<0.00010		0.0005	<0.00010
Tin (Sn)	mg/L	0.0005	<0.00010	<0.00010		0.0005	<0.00010
Titanium (Ti)	mg/L	0.05	0.011	0.011		0.05	<0.010
Uranium (U)	mg/L	0.00005	0.000216	0.000215	0.5	0.00005	0.000521
Vanadium (V)	mg/L	0.005	<0.0010	<0.0010		0.005	0.0012
Zinc (Zn)	mg/L	0.005	0.0366	0.0366		0.015	0.184
<b>Dissolved Metals</b>							
Aluminum (Al)	mg/L	0.005	0.0271	0.0289	6.4	0.015	0.0151
Antimony (Sb)	mg/L	0.0005	0.00173	0.00171	1.2	0.0005	0.00057
Arsenic (As)	mg/L	0.0005	0.00016	0.00013		0.0005	<0.00010
Barium (Ba)	mg/L	0.00025	0.0320	0.0320		0.00025	0.0419
Beryllium (Be)	mg/L	0.0025	<0.00050	<0.00050		0.0025	<0.00050
Bismuth (Bi)	mg/L	0.0025	<0.00050	<0.00050		0.0025	<0.00050
Boron (B)	mg/L	0.05	<0.010	<0.010		0.05	<0.010
Cadmium (Cd)	mg/L	0.000085	0.000348	0.000342	1.7	0.00005	0.00115
Calcium (Ca)	mg/L	0.1	41.0	40.1	2.2	0.1	59
Chromium (Cr)	mg/L	0.0025	<0.00050	<0.00050		0.0005	0.00014
Cobalt (Co)	mg/L	0.0005	0.00046	0.00047		0.0005	0.00244
Copper (Cu)	mg/L	0.0005	0.00292	0.00301	3.0	0.0025	0.00371
Iron (Fe)	mg/L	0.15	<0.030	<0.030		0.15	<0.030
Lead (Pb)	mg/L	0.00025	<0.000050	<0.000050		0.00025	<0.000050
Lithium (Li)	mg/L	0.025	<0.0050	<0.0050		0.025	<0.0050
Magnesium (Mg)	mg/L	0.025	4.48	4.43	1.1	0.025	4.76
Manganese (Mn)	mg/L	0.00025	0.0716	0.0733	2.3	0.00025	0.325
Mercury (Hg)	mg/L	0.00005	<0.000010	<0.000010		0.00005	<0.000010
Molybdenum (Mo)	mg/L	0.00025	0.00158	0.00149	5.9	0.00025	0.00147
Nickel (Ni)	mg/L	0.0025	0.00069	0.00079		0.0025	0.00068
Phosphorus (P)	mg/L	1.5	<0.30	<0.30		1.5	<0.30
Potassium (K)	mg/L	0.25	0.898	0.898		0.25	0.518
Selenium (Se)	mg						

**Appendix 5.1-3. Relative Percent Difference (RPD) Results for Water Quality Duplicate Samples, KSM Project, 2010**

Stn.Code Station Name Collect Date/Time ALS Sample ID QAQC Sampling Session	SC3 SC3 5/26/2010 L891484-12	RES12 SC3 Duplicate 5/26/2010 L891484-15			Replicate May-10	RPD (%)	5 MDL	STE1A STE1A 8/3/2010 L916942-4			Replicate Jul-10	Jul-10	RPD (%)
		SC3 May-10	RES12 May-10	STE1A STE1A 8/3/2010 L916942-4				Replicate STE1A 8/3/2010 L916942-4	RES13 STE1A Duplicate 8/3/2010 L916942-15				
<b>Physical Tests</b>													
Colour, True	color unit	25	<5.0	<5.0			25	<5.0	<5.0				
Conductivity	µS/cm	10	210	210			10	95.2	95.2				
Hardness (as CaCO <sub>3</sub> )	mg/L	2.5	94.1	93.9	0.2		2.5	39.2	39.8				1.5
pH	pH unit	0.5	7.96	7.98	0.3		0.5	7.73	7.6				1.7
Total Suspended Solids	mg/L	15	89.5	85.5	4.6		15	27.8	23.8				15.5
Total Dissolved Solids	mg/L	50	143	140	2.1		50	65	79				19.4
Turbidity	NTU	0.5	80.6	72.2	11.0		0.5	30.1	27.8				7.9
<b>Anions and Nutrients</b>													
Acidity (as CaCO <sub>3</sub> )	mg/L	5	4.1	3.9			5	2.3	2.5				
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	10	34.6	35.8	3.4		5	16.1	15.9				1.3
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	10	<2.0	<2.0			5	<1.0	<1.0				
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	10	<2.0	<2.0			5	<1.0	<1.0				
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	10	34.6	35.8	3.4		5	16.1	15.9				1.3
Ammonia as N	mg/L	0.025	<0.0050	<0.0050			0.025	<0.0050	<0.0050				
Bromide (Br)	mg/L	0.25	<0.050	<0.050			0.25	<0.050	<0.050				
Chloride (Cl)	mg/L	2.5	<0.50	<0.50			2.5	<0.50	<0.50				
Fluoride (F)	mg/L	0.1	0.100	0.100			0.1	0.021	0.021				
Nitrate (as N)	mg/L	0.025	0.0697	0.0698	0.1		0.025	<0.0050	<0.0050				
Nitrite (as N)	mg/L	0.005	<0.0010	<0.0010			0.005	<0.0010	<0.0010				
Total Kjeldahl Nitrogen	mg/L	0.25	<0.050	<0.050			0.25	<0.050	<0.050				
Total Nitrogen	mg/L	0.25	0.050	0.080			0.25	<0.050	<0.050				
Ortho Phosphate as P	mg/L	0.005	0.0017	0.0016			0.005	0.002	0.0021				
Total Phosphate as P	mg/L	0.1	0.303	0.265	13.4		0.01	0.0377	0.0375				0.5
Sulphate (SO <sub>4</sub> )	mg/L	2.5	65.2	64.9	0.5		2.5	26.5	26.4				0.4
<b>Cyanides</b>													
Cyanide, Weak Acid Dissociable	mg/L												
Cyanide, Total	mg/L	0.005	<0.0010	<0.0010			0.005	<0.0010	<0.0010				
Thiocyanate	mg/L												
<b>Organic / Inorganic Carbon</b>													
Total Organic Carbon	mg/L	2.5	<0.50	<0.50			2.5	0.82	<0.50				
<b>Total Metals</b>													
Aluminum (Al)	mg/L	0.005	2.57	2.58	0.4		0.005	1.47	1.28				13.8
Antimony (Sb)	mg/L	0.0005	0.00101	0.00104	2.9		0.0005	<0.00010	<0.00010				
Arsenic (As)	mg/L	0.0005	0.0164	0.0162	1.2		0.0005	0.0046	0.00043				
Barium (Ba)	mg/L	0.00025	0.0974	0.0945	3.0		0.00025	0.0362	0.0318				12.9
Beryllium (Be)	mg/L	0.0025	<0.00050	<0.00050			0.0025	<0.00050	<0.00050				
Bismuth (Bi)	mg/L	0.0025	<0.00050	<0.00050			0.0025	<0.00050	<0.00050				
Boron (B)	mg/L	0.05	<0.010	<0.010			0.05	<0.010	<0.010				
Cadmium (Cd)	mg/L	0.00005	0.00219	0.00220	0.5		0.00005	0.000021	0.000019				
Calcium (Ca)	mg/L	0.1	34.4	35.1	2.0		0.1	11.4	11.3				0.9
Chromium (Cr)	mg/L	0.001	0.00167	0.00171	2.4		0.001	0.00522	0.00464				11.8
Cobalt (Co)	mg/L	0.0005	0.00340	0.00352	3.5		0.0005	0.00113	0.001				12.2
Copper (Cu)	mg/L	0.0005	0.128	0.131	2.3		0.0005	0.00344	0.00289				17.4
Iron (Fe)	mg/L	0.15	7.09	7.30	2.9		0.15	1.74	1.47				16.8
Lead (Pb)	mg/L	0.00025	0.00425	0.00412	3.1		0.00025	0.000516	0.000434				17.3
Lithium (Li)	mg/L	0.025	<0.0050	<0.0050			0.025	<0.0050	<0.0050				
Magnesium (Mg)	mg/L	0.025	3.29	3.41	3.6		0.025	3.29	3.15				4.3
Manganese (Mn)	mg/L	0.00025	0.219	0.221	0.9		0.00025	0.0562	0.0503				11.1
Mercury (Hg)	mg/L	0.00005	<0.000010	<0.000010			0.00005	<0.000010	<0.000010				
Molybdenum (Mo)	mg/L	0.00025	0.00233	0.00240	3.0		0.00025	0.000496	0.000462				7.1
Nickel (Ni)	mg/L	0.0025	0.00217	0.00232			0.0025	0.00237	0.00467				20.7
Phosphorus (P)	mg/L	1.5	<0.30	<0.30			1.5	<0.30	<0.30				
Potassium (K)	mg/L	0.25	1.46	1.49	2.0		0.25	0.601	0.543				10.1
Selenium (Se)	mg/L	0.001	0.00170	0.00189	10.6		0.001	0.00076	0.00058				
Silicon (Si)	mg/L	0.25	6.05	5.68	6.3		0.25	3.91	3.36				15.1
Silver (Ag)	mg/L	0.00005	0.000081	0.000075	7.7		0.00005	0.000018	<0.000010				
Sodium (Na)	mg/L	10	<2.0	<2.0			10	<2.0	<2.0				
Strontium (Sr)	mg/L	0.0005	0.186	0.187	0.5		0.0005	0.133	0.12				

**Appendix 5.1-3. Relative Percent Difference (RPD) Results for Water Quality Duplicate Samples, KSM Project, 2010**

Stn.Code Station Name Collect Date/Time ALS Sample ID QAQC Sampling Session	BIR1 BIR1 8/27/2010 L926457-27	RES16 BIR1 Duplicate 8/27/2010 L926457-31			MC2 MC2 8/27/2010 L926457-19	RES17 MC2 Duplicate 8/27/2010 L926457-33			
		5 MDL	Aug-10	Aug-10	RPD (%)	5 MDL	Aug-10	Aug-10	RPD (%)
<b>Physical Tests</b>									
Colour, True	color unit	25	<5.0	<5.0		25.0	<5.0	<5.0	
Conductivity	$\mu\text{s}/\text{cm}$	10	136	137	0.7	10	176	178	1.1
Hardness (as $\text{CaCO}_3$ )	mg/L	2.5	60.8	60.7	0.2	2.5	71.0	73.9	4.0
pH	pH unit	0.5	8.08	8.08		0.5	7.32	7.86	7.1
Total Suspended Solids	mg/L	15	8.0	7.0		15.0	87.5	89.0	1.7
Total Dissolved Solids	mg/L	50	104	91	13.3	50	109	115	5.4
Turbidity	NTU	0.5	18.3	19.1	4.3	0.5	66.8	68.4	2.4
<b>Anions and Nutrients</b>									
Acidity (as $\text{CaCO}_3$ )	mg/L	5	3.9	4.3		5.0	5.9	5.0	16.5
Alkalinity, Bicarbonate (as $\text{CaCO}_3$ )	mg/L	5	43.3	43.2	0.2	10.0	21.0	24.0	13.3
Alkalinity, Carbonate (as $\text{CaCO}_3$ )	mg/L	5	<1.0	<1.0		10.0	<2.0	<1.0	
Alkalinity, Hydroxide (as $\text{CaCO}_3$ )	mg/L	5	<1.0	<1.0		10.0	<2.0	<1.0	
Alkalinity, Total (as $\text{CaCO}_3$ )	mg/L	5	43.3	43.2	0.2	10.0	21.0	24.0	13.3
Ammonia as N	mg/L	0.025	<0.0050	<0.0050		0.0250	<0.0050	<0.0050	
Bromide (Br)	mg/L	0.25	<0.050	<0.050		0.250	<0.050	<0.050	
Chloride (Cl)	mg/L	2.5	<0.50	<0.50		2.50	<0.50	<0.50	
Fluoride (F)	mg/L	0.1	0.022	<0.020		0.1	0.115	0.101	13.0
Nitrate (as N)	mg/L	0.025	0.0176	0.0179		0.025	0.0190	0.0175	
Nitrite (as N)	mg/L	0.005	<0.0010	<0.0010		0.0050	<0.0010	<0.0010	
Total Kjeldahl Nitrogen	mg/L	0.25	<0.050	<0.050		0.250	<0.050	<0.050	
Total Nitrogen	mg/L	0.25	<0.050	<0.050		0.250	<0.050	<0.050	
Ortho Phosphate as P	mg/L	0.005	<0.0010	<0.0010		0.0050	<0.0010	<0.0010	
Total Phosphate as P	mg/L	0.01	0.0135	0.0111	19.5	0.1	0.101	0.148	37.8
Sulphate ( $\text{SO}_4$ )	mg/L	2.5	22.0	20.1	9.0	2.5	58.8	51.5	13.2
<b>Cyanides</b>									
Cyanide, Weak Acid Dissociable	mg/L								
Cyanide, Total	mg/L	0.005	<0.0010	<0.0010		0.0050	<0.0010	<0.0010	
Thiocyanate	mg/L								
<b>Organic / Inorganic Carbon</b>									
Total Organic Carbon	mg/L	2.5	<0.50	0.56		2.50	<0.50	<0.50	
<b>Total Metals</b>									
Aluminum (Al)	mg/L	0.005	0.962	0.757	23.9	0.005	2.12	2.38	11.6
Antimony (Sb)	mg/L	0.0005	0.00015	0.00014		0.0005	0.00168	0.00058	97.3
Arsenic (As)	mg/L	0.0005	0.00040	0.00037		0.0005	0.00311	0.00344	10.1
Barium (Ba)	mg/L	0.00025	0.0550	0.0553	0.5	0.00025	0.0842	0.0915	8.3
Beryllium (Be)	mg/L	0.0025	<0.00050	<0.00050		0.00250	<0.00050	<0.00050	
Bismuth (Bi)	mg/L	0.0025	<0.00050	<0.00050		0.00250	<0.00050	<0.00050	
Boron (B)	mg/L	0.05	0.011	0.012		0.050	<0.010	<0.010	
Cadmium (Cd)	mg/L	0.00005	0.000016	<0.000010		0.00005	0.00221	0.00229	3.6
Calcium (Ca)	mg/L	0.1	15.3	15.7	2.6	0.1	26.9	28.5	5.8
Chromium (Cr)	mg/L	0.001	0.00275	0.00232	17.0	0.00100	0.00072	0.00090	0.0
Cobalt (Co)	mg/L	0.0005	0.00049	0.00046		0.0005	0.00336	0.00359	6.6
Copper (Cu)	mg/L	0.0005	0.00171	0.00140	19.9	0.0005	0.213	0.218	2.3
Iron (Fe)	mg/L	0.15	0.691	0.570	19.2	0.15	5.41	5.79	6.8
Lead (Pb)	mg/L	0.00025	0.000190	0.000186		0.00025	0.00488	0.00528	7.9
Lithium (Li)	mg/L	0.025	<0.050	<0.050		0.0250	<0.050	<0.050	
Magnesium (Mg)	mg/L	0.025	6.93	7.04	1.6	0.025	2.33	2.52	7.8
Manganese (Mn)	mg/L	0.00025	0.0126	0.0123	2.4	0.00025	0.326	0.349	6.8
Mercury (Hg)	mg/L	0.00005	<0.000010	<0.000010		0.000050	<0.000010	<0.000010	
Molybdenum (Mo)	mg/L	0.00025	0.000976	0.000964	1.2	0.00025	0.00168	0.00183	8.5
Nickel (Ni)	mg/L	0.0025	0.00295	0.00254	14.9	0.0025	0.00153	0.00174	
Phosphorus (P)	mg/L	1.5	<0.30	<0.30		1.50	<0.30	<0.30	
Potassium (K)	mg/L	0.25	0.607	0.551	9.7	0.25	0.822	0.944	13.8
Selenium (Se)	mg/L	0.001	0.00057	0.00048		0.001	0.00127	0.00121	4.8
Silicon (Si)	mg/L	0.25	2.95	2.64	11.1	0.25	3.77	4.95	27.1
Silver (Ag)	mg/L	0.00005	<0.000010	<0.000010		0.00005	0.000044	0.000045	
Sodium (Na)	mg/L	10	<2.0	<2.0		10.0	<2.0	<2.0	
Strontium (Sr)	mg/L	0.0005	0.147	0.149	1.4	0.0005	0.142	0.149	4.8
Thallium (Tl)	mg/L	0.0005	<0.00010	<0.00010		0.00050	<0.00010	<0.00010	
Tin (Sn)	mg/L	0.0005	<0.00010	<0.00010		0.00050	<0.00010	<0.00010	
Titanium (Ti)	mg/L	0.05	0.022	0.020		0.05	0.072	0.095	27.5
Uranium (U)	mg/L	0.00005	0.000043	0.000033		0.00005	0.000333	0.000334	0.3
Vanadium (V)	mg/L	0.005	0.0028	0.0022		0.005	0.0053	0.0062	15.7
Zinc (Zn)	mg/L	0.005	0.0032	0.0028		0.005	0.146	0.152	4.0
<b>Dissolved Metals</b>									
Aluminum (Al)	mg/L	0.005	0.0202	0.0207	2.4	0.005	0.0154	0.0138	11.0
Antimony (Sb)	mg/L	0.0005	0.00010	0.00011		0.0005	0.00022	0.00023	
Arsenic (As)	mg/L	0.0005	0.00013	0.00014		0.00050	<0.00010	<0.00010	
Barium (Ba)	mg/L	0.00025	0.0404	0.0404		0.00025	0.0290	0.0306	5.4
Beryllium (Be)	mg/L	0.0025	<0.00050	<0.00050		0.00250	<0.00050	<0.00050	
Bismuth (Bi)	mg/L	0.0025</							

**Appendix 5.1-3. Relative Percent Difference (RPD) Results for Water Quality Duplicate Samples, KSM Project, 2010**

Stn.Code Station Name Collect Date/Time ALS Sample ID QAQC Sampling Session	UR2 UR2 L926457-2	RES18 UR2 Duplicate L926457-32	Replicate Aug-10	RPD (%)	STE3		RES19	
					5 MDL	Aug-10	5 MDL	Nov-10
<b>Physical Tests</b>								
Colour, True	color unit	25.0	<5.0	<5.0			25	7.5
Conductivity	µS/cm	10	99.1	101	1.9		10	168
Hardness (as CaCO <sub>3</sub> )	mg/L	2.5	43.4	44.2	1.8		2.5	72.5
pH	pH unit	0.5	8.03	8.05	0.2		0.5	7.85
Total Suspended Solids	mg/L	15.0	48.5	48.0	1.0		15.0	<3.0
Total Dissolved Solids	mg/L	50	58	79	<b>30.7</b>		50	101
Turbidity	NTU	0.5	39.1	35.9	8.5		0.5	1.06
<b>Anions and Nutrients</b>								
Acidity (as CaCO <sub>3</sub> )	mg/L	5	4.1	4.1			5	2.3
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	5	32.8	31.9	2.8		10	31.2
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	5.0	<1.0	<1.0			10.0	<2.0
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	5.0	<1.0	<1.0			10.0	<2.0
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	5	32.8	31.9	2.8		10	31.2
Ammonia as N	mg/L	0.0250	<0.0050	<0.0050			0.0250	<0.0050
Bromide (Br)	mg/L	0.250	<0.050	<0.050			0.250	<0.050
Chloride (Cl)	mg/L	2.50	<0.50	<0.50			2.50	<0.50
Fluoride (F)	mg/L	0.100	0.032	<0.020			0.1	0.033
Nitrate (as N)	mg/L	0.025	0.0290	0.0155	<b>Dif&gt;2DL</b>		0.025	0.071
Nitrite (as N)	mg/L	0.0050	<0.010	<0.010			0.0050	<0.010
Total Kjeldahl Nitrogen	mg/L	0.250	<0.050	<0.050			0.25	0.059
Total Nitrogen	mg/L	0.250	<0.050	<0.050			0.25	0.13
Ortho Phosphate as P	mg/L	0.0050	<0.010	<0.010			0.005	<0.010
Total Phosphate as P	mg/L	0.01	0.0584	0.0577	1.2		0.01	0.0037
Sulphate (SO <sub>4</sub> )	mg/L	2.50	16.8	9.20	<b>58.5</b>		2.5	47.5
<b>Cyanides</b>								
Cyanide, Weak Acid Dissociable	mg/L							
Cyanide, Total	mg/L	0.0050	<0.010	<0.010			0.0050	0.0024
Thiocyanate	mg/L							<0.010
<b>Organic / Inorganic Carbon</b>								
Total Organic Carbon	mg/L	2.50	<0.50	<0.50			2.5	2.15
<b>Total Metals</b>								
Aluminum (Al)	mg/L	0.005	0.736	1.92	<b>89.2</b>		0.015	0.0533
Antimony (Sb)	mg/L	0.00050	0.00041	0.00050			0.00050	<0.00010
Arsenic (As)	mg/L	0.00050	0.00115	0.00160	<b>32.7</b>		0.00050	<0.00010
Barium (Ba)	mg/L	0.00025	0.0354	0.0569	<b>46.6</b>		0.00025	0.0168
Beryllium (Be)	mg/L	0.00250	<0.00050	<0.00050			0.00250	<0.00050
Bismuth (Bi)	mg/L	0.00250	<0.00050	<0.00050			0.00250	<0.00050
Boron (B)	mg/L	0.050	<0.010	<0.010			0.050	<0.010
Cadmium (Cd)	mg/L	0.00005	0.000156	0.000163	4.4		0.000050	0.000011
Calcium (Ca)	mg/L	0.1	15.8	17.5	10.2		0.1	22.1
Chromium (Cr)	mg/L	0.001	0.00096	0.00273	<b>Dif&gt;2DL</b>		0.0005	0.00047
Cobalt (Co)	mg/L	0.0005	0.00071	0.00106			0.00050	<0.00010
Copper (Cu)	mg/L	0.0005	0.0155	0.0157	39.5		0.00025	0.00079
Iron (Fe)	mg/L	0.15	1.24	2.30	<b>59.9</b>		0.15	0.06
Lead (Pb)	mg/L	0.00025	0.00134	0.00153	13.2		0.00025	0.000061
Lithium (Li)	mg/L	0.0250	<0.050	<0.050			0.0250	<0.050
Magnesium (Mg)	mg/L	0.025	1.51	1.96	<b>25.9</b>		0.025	4.76
Manganese (Mn)	mg/L	0.00025	0.0563	0.0768	<b>30.8</b>		0.00025	0.00393
Mercury (Hg)	mg/L	0.000050	<0.00010	<0.00010			0.000050	<0.000010
Molybdenum (Mo)	mg/L	0.00025	0.00162	0.00158	2.5		0.00025	0.000336
Nickel (Ni)	mg/L	0.0025	0.00138	0.00192			0.0025	0.00071
Phosphorus (P)	mg/L	1.50	<0.30	<0.30			1.50	<0.30
Potassium (K)	mg/L	0.25	0.764	1.22	<b>46.0</b>		0.25	0.218
Selenium (Se)	mg/L	0.001	0.00041	0.00025			0.0005	0.00071
Silicon (Si)	mg/L	0.25	2.24	4.23	<b>61.5</b>		0.25	2.46
Silver (Ag)	mg/L	0.00005	0.000013	0.000047	<b>Dif&gt;2DL</b>		0.000050	<0.000010
Sodium (Na)	mg/L	10.0	<2.0	<2.0			10.0	<2.0
Strontium (Sr)	mg/L	0.0005	0.0825	0.0940	13.0		0.0005	0.229
Thallium (Tl)	mg/L	0.00050	<0.00010	<0.00010			0.00050	<0.00010
Tin (Sn)	mg/L	0.00050	<0.00010	<0.00010			0.00050	<0.00010
Titanium (Ti)	mg/L	0.05	0.047	0.108	<b>Dif&gt;2DL</b>		0.050	<0.010
Uranium (U)	mg/L	0.00005	0.000181	0.000238			0.00005	0.000011
Vanadium (V)	mg/L	0.005	0.0026	0.0065	<b>Dif&gt;2DL</b>		0.0050	<0.010
Zinc (Zn)	mg/L	0.005	0.0141	0.0148			0.0150	0.004
<b>Dissolved Metals</b>								
Aluminum (Al)	mg/L	0.005	0.0557	0.0378	<b>38.3</b>		0.015	0.023
Antimony (Sb)	mg/L	0.0005	0.00035	0.00036			0.00050	<0.00010
Arsenic (As)	mg/L	0.0005	0.00017	0.00016			0.00050	<0.00010
Barium (Ba)	mg/L	0.00025	0.0235	0.0227	3.5		0.00025	0.0163
Beryllium (Be)	mg/L	0.00250	<0.00050	<0.00050			0.00250	<0.00050
Bismuth (Bi)	mg/L	0.00250	<0.00050	<0.00050			0.00250	<0.00050
Boron (B)	mg/L	0.050	<0.010	<0.010			0.050	<0.010
Cadmium (Cd)	mg/L	0.00005	0.000085	0.000079	7.3		0.00005	<0.000010
Calcium (Ca)	mg/L	0.1	15.4	15.8	2.6		0.1	21.2
Chromium (Cr)	mg/L	0.00100	<0.00020	<0.00020			0.0005	0.00025
Cobalt (Co)	mg/L	0.0005	0.00015	0.00013			0.00050	<0.00010
Copper (Cu)	mg/L	0.0005	0.00076	0.00064	<b>17.1</b>		0.0025	0.00065
Iron (Fe)	mg/L	0.150	0.035	<0.030			0.150	<0.030
Lead (Pb)	mg/L	0.000250	<0.000050	<0.000050			0.00025	0.000068
Lith								

**Appendix 5.1-3. Relative Percent Difference (RPD) Results for Water Quality Duplicate Samples, KSM Project, 2010**

Stn.Code Station Name Collect Date/Time ALS Sample ID QAQC Sampling Session	UR1A UR1A 5/1/2010 L884476-8	RES2 UR1A Duplicate 5/1/2010 L884476-11	Replicate Apr-10	RPD (%)	BIR2 BIR2 11/15/2010 L955725-27		RES20 BIR2 Duplicate 11/15/2010 L955725-30	
					5 MDL	Nov-10	Nov-10	RPD (%)
<b>Physical Tests</b>								
Colour, True	color unit	25.0	<5.0	<5.0	25	6	5.7	
Conductivity	µS/cm	10	135	135	10	192	155	21.3
Hardness (as CaCO <sub>3</sub> )	mg/L	2.5	63.5	65.5	2.5	95.1	74.7	24.0
pH	pH unit	0.5	8.10	8.08	0.5	8.11	8.08	0.4
Total Suspended Solids	mg/L	15.0	<3.0	<3.0	15.0	<3.0	<3.0	
Total Dissolved Solids	mg/L	50	80	77	50	103	81	23.9
Turbidity	NTU	0.50	1.50	2.00	0.5	1.98	3.3	50.0
<b>Anions and Nutrients</b>								
Acidity (as CaCO <sub>3</sub> )	mg/L	5	2.8	2.9	5	1.8	1.8	
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	10	47.6	48.3	10	65.3	62.9	3.7
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	10.0	<2.0	<2.0	10.0	<2.0	<2.0	
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	10.0	<2.0	<2.0	10.0	<2.0	<2.0	
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	10	47.6	48.3	10	65.3	62.9	3.7
Ammonia as N	mg/L	0.0250	<0.0050	<0.0050	0.0250	<0.0050	<0.0050	
Bromide (Br)	mg/L	0.250	<0.050	<0.050	0.250	<0.050	<0.050	
Chloride (Cl)	mg/L	2.50	<0.50	<0.50	2.50	<0.50	<0.50	
Fluoride (F)	mg/L	0.1	0.027	0.028	0.1	0.047	0.035	
Nitrate (as N)	mg/L	0.025	0.175	0.174	0.025	0.168	0.138	19.6
Nitrite (as N)	mg/L	0.0050	<0.0010	<0.0010	0.0050	<0.0010	<0.0010	
Total Kjeldahl Nitrogen	mg/L	0.25	0.095	0.076	0.25	0.062	0.072	
Total Nitrogen	mg/L	0.250	0.270	0.250	0.25	0.23	0.21	
Ortho Phosphate as P	mg/L	0.0050	<0.0010	<0.0010	0.0050	0.0016	<0.0010	
Total Phosphate as P	mg/L	0.01	0.0063	0.0043	37.7	0.01	0.0049	0.006
Sulphate (SO <sub>4</sub> )	mg/L	2.5	18.6	18.6	2.5	33.5	20.3	49.1
<b>Cyanides</b>								
Cyanide, Weak Acid Dissociable	mg/L							
Cyanide, Total	mg/L	0.005	0.0011	0.0015	0.005	0.0013	0.0019	
Thiocyanate	mg/L							
<b>Organic / Inorganic Carbon</b>								
Total Organic Carbon	mg/L	1	0.96	0.94	2.5	1.91	1.95	
<b>Total Metals</b>								
Aluminum (Al)	mg/L	0.005	0.0971	0.0984	1.3	0.015	0.0949	0.175
Antimony (Sb)	mg/L	0.0005	0.00169	0.00177	4.6	0.00050	0.00016	<0.00010
Arsenic (As)	mg/L	0.0005	0.00031	0.00031		0.0005	0.00026	0.00015
Barium (Ba)	mg/L	0.00025	0.0226	0.0248	9.3	0.00025	0.0337	0.0458
Beryllium (Be)	mg/L	0.00250	<0.00050	<0.00050		0.00250	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.00250	<0.00050	<0.00050		0.00250	<0.00050	<0.00050
Boron (B)	mg/L	0.050	<0.010	<0.010		0.050	<0.010	<0.010
Cadmium (Cd)	mg/L	0.00005	0.000047	0.000047		0.000050	0.000025	<0.000010
Calcium (Ca)	mg/L	0.1	21.5	23.2	7.6	0.1	29.3	18.3
Chromium (Cr)	mg/L	0.00250	<0.00050	<0.00050		0.0005	0.00044	0.00089
Cobalt (Co)	mg/L	0.0005	<0.00010	0.00011		0.0005	0.00011	0.00012
Copper (Cu)	mg/L	0.00050	0.00095	0.00090	5.4	0.0025	0.00073	0.00115
Iron (Fe)	mg/L	0.150	0.156	0.150		0.15	0.145	0.184
Lead (Pb)	mg/L	0.00025	0.000176	0.000191		0.00025	0.000077	0.000092
Lithium (Li)	mg/L	0.0250	<0.0050	<0.0050		0.0250	<0.0050	<0.0050
Magnesium (Mg)	mg/L	0.025	3.32	3.59	7.8	0.025	5.96	7.49
Manganese (Mn)	mg/L	0.00025	0.00731	0.00778	6.2	0.00025	0.0183	0.00551
Mercury (Hg)	mg/L	0.000050	<0.000010	<0.000010		0.000050	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.000250	0.000586	0.000660	11.9	0.00025	0.000819	0.000863
Nickel (Ni)	mg/L	0.0025	0.00063	0.00064		0.0025	0.00093	0.00115
Phosphorus (P)	mg/L	1.50	<0.30	<0.30		1.50	<0.30	<0.30
Potassium (K)	mg/L	0.25	0.353	0.378	6.8	0.25	0.296	0.365
Selenium (Se)	mg/L	0.001	0.00043	0.00034		0.0005	0.00062	0.00073
Silicon (Si)	mg/L	0.25	1.93	1.88	2.6	0.25	2.7	2.48
Silver (Ag)	mg/L	0.000050	<0.000010	<0.000010		0.000050	<0.000010	<0.000010
Sodium (Na)	mg/L	10.0	<2.0	<2.0		10	2.1	2.5
Strontium (Sr)	mg/L	0.0005	0.179	0.194	8.0	0.0005	0.214	0.159
Thallium (Tl)	mg/L	0.00050	<0.00010	<0.00010		0.00050	<0.00010	<0.00010
Tin (Sn)	mg/L	0.00050	<0.00010	<0.00010		0.00050	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.050	<0.010	<0.010		0.050	<0.010	<0.010
Uranium (U)	mg/L	0.00005	0.000022	0.000026		0.00005	0.000034	0.000023
Vanadium (V)	mg/L	0.0050	<0.0010	<0.0010		0.0050	<0.0010	<0.0010
Zinc (Zn)	mg/L	0.005	0.0037	0.0039		0.0150	<0.0030	<0.0030
<b>Dissolved Metals</b>								
Aluminum (Al)	mg/L	0.005	0.0126	0.0118	6.6	0.015	0.0148	0.0135
Antimony (Sb)	mg/L	0.0005	0.00165	0.00172	4.2	0.00050	0.00013	<0.00010
Arsenic (As)	mg/L	0.0005	0.00021	0.00021		0.0005	0.00018	0.0001
Barium (Ba)	mg/L	0.00025	0.0212	0.0222	4.6	0.00025	0.0313	0.0447
Beryllium (Be)	mg/L	0.00250	<0.00050	<0.00050		0.00250	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.00250	<0.00050	<0.00050		0.00250	<0.00050	<0.00050
Boron (B)	mg/L	0.050	<0.010	<0.010		0.050	<0.010	<0.010
Cadmium (Cd)	mg/L	0.00005	0.000041	0.000042		0.000050	0.000014	<0.000010
Calcium (Ca)	mg/L	0.1	20.2	20.8	2.9	0.		

#### Appendix 5.1-3. Relative Percent Difference (RPD) Results for Water Quality Duplicate Samples, KSM Project, 2010

Stn.Code Station Name Collect Date/Time ALS Sample ID QAQC Sampling Session	MC1A MC1A 9/28/2010 L938295-8	RES21 MCT Duplicate 9/28/2010 L938295-15	Replicate Sep-10	RPD (%)	5 MDL	SNO2 SNO2 11/15/2010 L955725-10	RES22 SNO2 Duplicate 11/15/2010 L955725-31	Replicate Nov-10	Nov-10	RPD (%)
<b>Physical Tests</b>										
Colour, True	color unit	25.0	2.5	<5.0		25	6.6	6.3		
Conductivity	µS/cm	10	96.8	97.1	0.3	10	136	136		
Hardness (as CaCO <sub>3</sub> )	mg/L	2.5	38.5	40.9	6.0	2.5	58.6	65.3		10.8
pH	pH unit	0.5	7.23	7.24	0.1	0.5	7.88	7.94		0.8
Total Suspended Solids	mg/L	15	299	286	4.4	15.0	4.1	<3.0		
Total Dissolved Solids	mg/L	50	60	56	6.9	50	73	73		
Turbidity	NTU	0.5	214	185	14.5	0.5	1.34	0.67		66.7
<b>Anions and Nutrients</b>										
Acidity (as CaCO <sub>3</sub> )	mg/L	5	5.5	4.8		5	2.5	2.2		
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	5	11.4	11.7	2.6	10	39.9	40.9		2.5
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	5.0	<1.0	<2.0		10.0	<2.0	<2.0		
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	5.0	<1.0	<2.0		10.0	<2.0	<2.0		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	5	11.4	11.7	2.6	10	39.9	40.9		2.5
Ammonia as N	mg/L	0.0250	<0.0050	<0.0050		0.0250	<0.0050	<0.0050		
Bromide (Br)	mg/L	0.250	<0.050	<0.050		0.250	<0.050	<0.050		
Chloride (Cl)	mg/L	2.50	<0.50	<0.50		2.50	<0.50	<0.50		
Fluoride (F)	mg/L	0.1	0.088	0.088		0.1	0.036	0.036		
Nitrate (as N)	mg/L	0.025	0.0059	0.0071		0.025	0.203	0.199		2.0
Nitrite (as N)	mg/L	0.0050	<0.0010	<0.0010		0.0050	<0.0010	<0.0010		
Total Kjeldahl Nitrogen	mg/L	0.250	<0.050	<0.050		0.25	0.057	0.071		
Total Nitrogen	mg/L	0.250	<0.050	<0.050		0.25	0.26	0.27		3.8
Ortho Phosphate as P	mg/L	0.0050	<0.0010	<0.0010		0.005	0.0013	0.002		
Total Phosphate as P	mg/L	0.1	0.51	0.47	8.2	0.01	0.0061	0.0055		
Sulphate (SO <sub>4</sub> )	mg/L	2.5	30.5	30.3	0.7	2.5	25.1	25		0.4
<b>Cyanides</b>										
Cyanide, Weak Acid Dissociable	mg/L									
Cyanide, Total	mg/L	0.0050	<0.0010	<0.0010		0.005	0.002			
Thiocyanate	mg/L									
<b>Organic / Inorganic Carbon</b>										
Total Organic Carbon	mg/L	2.50	<0.50	<0.50		2.5	1.8	1.99		
<b>Total Metals</b>										
Aluminum (Al)	mg/L	0.015	1.56	4.94	104.0	0.015	0.0633	0.0493		24.9
Antimony (Sb)	mg/L	0.0005	0.00079	0.00138	54.4	0.00050	<0.00010	<0.00010		
Arsenic (As)	mg/L	0.0005	0.00673	0.0114	51.5	0.0005	0.00013	0.00014		
Barium (Ba)	mg/L	0.00025	0.113	0.267	81.1	0.00025	0.0146	0.0155		6.0
Beryllium (Be)	mg/L	0.00250	<0.00050	<0.00050		0.00250	<0.00050	<0.00050		
Bismuth (Bi)	mg/L	0.00250	<0.00050	<0.00050		0.00250	<0.00050	<0.00050		
Boron (B)	mg/L	0.050	<0.010	<0.010		0.050	<0.010	<0.010		
Cadmium (Cd)	mg/L	0.00005	0.000981	0.00106	7.7	0.00005	<0.000010	0.000011		
Calcium (Ca)	mg/L	0.1	16.7	17.9	6.9	0.1	16.9	20.3		18.3
Chromium (Cr)	mg/L	0.001	0.00043	0.00155	Dif>2DL	0.0005	0.00046	0.00034		
Cobalt (Co)	mg/L	0.0005	0.00225	0.00393	54.4	0.00050	0.0001	<0.00010		
Copper (Cu)	mg/L	0.0025	0.0689	0.0824	17.8	0.0025	0.00071	0.00065		
Iron (Fe)	mg/L	0.15	3.08	8.31	91.8	0.15	0.145	0.125		
Lead (Pb)	mg/L	0.00025	0.00525	0.00787	39.9	0.00025	<0.000050	0.000121		
Lithium (Li)	mg/L	0.0250	<0.0050	<0.0050		0.0250	<0.0050	<0.0050		
Magnesium (Mg)	mg/L	0.025	0.932	2.09	76.6	0.025	3.84	3.99		3.8
Manganese (Mn)	mg/L	0.00025	0.28	0.387	32.1	0.00025	0.0202	0.0211		4.4
Mercury (Hg)	mg/L	0.00005	0.000097	0.000034	Dif>2DL	0.000050	<0.000010	<0.000010		
Molybdenum (Mo)	mg/L	0.00025	0.000866	0.0014	47.1	0.00025	0.000258	0.000263		1.9
Nickel (Ni)	mg/L	0.0025	0.00086	0.00195	Dif>2DL	0.0025	0.0009	0.00077		
Phosphorus (P)	mg/L	1.5	0.37	0.46		1.50	<0.30	<0.30		
Potassium (K)	mg/L	0.25	0.624	1.5	82.5	0.25	0.219	0.232		
Selenium (Se)	mg/L	0.001	0.0004	0.00074		0.0005	0.00031	0.00037		
Silicon (Si)	mg/L	0.25	2.89	8.7	100.3	0.25	2.36	2.48		5.0
Silver (Ag)	mg/L	0.00005	0.000028	0.000157	Dif>2DL	0.000050	<0.000010	<0.000010		
Sodium (Na)	mg/L	10.0	<2.0	<2.0		10.0	<2.0	<2.0		
Strontium (Sr)	mg/L	0.0005	0.099	0.11	10.5	0.0005	0.141	0.15		6.2
Thallium (Tl)	mg/L	0.00050	<0.00010	<0.00010		0.00050	<0.00010	<0.00010		
Tin (Sn)	mg/L	0.00050	<0.00010	<0.00010		0.00050	<0.00010	<0.00010		
Titanium (Ti)	mg/L	0.05	0.043	0.261	Dif>2DL	0.050	<0.010	<0.010		
Uranium (U)	mg/L	0.00005	0.000194	0.000325	50.5	0.000050	<0.000010	<0.000010		
Vanadium (V)	mg/L	0.005	0.0029	0.0107	Dif>2DL	0.0050	<0.0010	<0.0010		
Zinc (Zn)	mg/L	0.015	0.0657	0.0821	22.2	0.0150	<0.0030	<0.0030		
<b>Dissolved Metals</b>										
Aluminum (Al)	mg/L	0.015	0.003	0.0035		0.015	0.0115	0.0121		
Antimony (Sb)	mg/L	0.0005	0.00051	0.00049		0.00050	<0.00010	<0.00010		
Arsenic (As)	mg/L	0.00050	<0.00010	<0.00010		0.00050	0.00012	<0.00010		
Barium (Ba)	mg/L	0.00025	0.0478	0.0493	3.1	0.00025	0.0141	0.0142		0.7
Beryllium (Be)	mg/L	0.00250	<0.00050	<0.00050		0.00250	<0.00050	<0.00050		
Bismuth (Bi)	mg/L	0.00250	<0.00050	<0.00050		0.00250	<0.00050	<0.00050		
Boron (B)	mg/L	0.050	<0.010	<0.010		0.050	<0.010	<0.010		
Cadmium (Cd)	mg/L	0.00005	0.000681	0.000685	0.6	0.000050	<0.000010	<0.000010		
Calcium (Ca)	mg/L	0.1	14.4	15.4	6.7	0.1	17	19.9		15.7
Chromium (Cr)	mg/L	0.00100	<0.00020	<0.00020		0.0005	0.00016	0.00018		
Cobalt (Co)	mg/L	0.0005	0.00109	0.00116	6.2	0.00050	<0.00010	<0.00010		
Copper (Cu)	mg/L	0.0025	0.00141	0.00138		0.00250	0.00052	<0.00050		
Iron (Fe)	mg/L	0.150	<0.030	<0.030		0.15	0.045	0.044		
Lead (Pb)	mg/L	0.000250	<0.000050	<0.000050		0.000250	<0.000050	<0.000050		
Lithium (Li)	mg/L	0.0250	<0.0050	<0.0050		0.0250	<0.0050	<0.0050		
Magnesium (Mg)	mg/L	0.025	0.602	0.617	2.5	0.025	3.91	3.82		2.3
Manganese (Mn)	mg/L	0.00025	0.131	0.133	1.5	0.00025	0.0164	0.0171		4.2
Mercury (Hg)	mg/L	0.000050	<0.000010	<0.000010		0.000050	<0.000010	<0.000010		
Molybdenum (Mo)	mg/L	0.00025	0.000653	0.000635	2.8	0.00025	0.000258	0.000248		4.0
Nickel (Ni)	mg/L	0.00250	<0.00050	<0.00050		0.0025	0.00071	0.00072		
Phosphorus (P)	mg/L	1.50	<0.30	<0.30		1.50	<0.30	<0.30</td		

## Zinc (Zn)

"<" - value is below the detection limit.

*RPD = Relative Percent Difference relative to mean (in %).  
RPD was not calculated if one or more values were less than five times the detection limit.*

times the detection limit.

*Bold values have a PPD equal to or greater than 20%*

*Bold values have a RPD equal to or greater than 20%.*

*Grey shaded values have a RPD equal to or greater than 50%.  
Dif>2DL - duplicate values that were less than the 5xDL and had a difference between values greater than 2xDL.*

*difference between values greater than  $2 \times DL$ .*

**Appendix 5.1-3. Relative Percent Difference (RPD) Results for Water Quality Duplicate Samples, KSM Project, 2010**

Stn.Code Station Name Collect Date/Time ALS Sample ID QAQC Sampling Session	5 MDL	SUNR SUNR	RES3 SUNR Duplicate	5 MDL	SUNR SUNR	RES3 SUNR Duplicate	RPD (%)
		3/3/2010 L866873-3	3/3/2010 L866873-12		3/28/2010 L873292-3	3/28/2010 L873292-5	
<b>Physical Tests</b>							
Colour, True	color unit	25.0	<5.0	<5.0	25.0	<5.0	<5.0
Conductivity	$\mu\text{s}/\text{cm}$	10	232	233	10	212	215
Hardness (as $\text{CaCO}_3$ )	mg/L	2.5	107	108	2.5	101	100
pH	pH unit	0.50	8.07	8.00	0.5	7.84	8.03
Total Suspended Solids	mg/L	15	<3.0	3.8	15.0	6.7	<3.0
Total Dissolved Solids	mg/L	50	148	144	50	137	132
Turbidity	NTU	0.5	0.47	0.94	Dif>2DL	0.5	3.58
<b>Anions and Nutrients</b>							
Acidity (as $\text{CaCO}_3$ )	mg/L	5.0	2.7	3.0	5	3.0	2.3
Alkalinity, Bicarbonate (as $\text{CaCO}_3$ )	mg/L	10	65.3	65.1	10	73.1	75.2
Alkalinity, Carbonate (as $\text{CaCO}_3$ )	mg/L	10.0	<2.0	<2.0	10.0	<2.0	<2.0
Alkalinity, Hydroxide (as $\text{CaCO}_3$ )	mg/L	10.0	<2.0	<2.0	10.0	<2.0	<2.0
Alkalinity, Total (as $\text{CaCO}_3$ )	mg/L	10	65.3	65.1	10	73.1	75.2
Ammonia as N	mg/L	0.0250	<0.0050	<0.0050	0.0250	<0.0050	<0.0050
Bromide (Br)	mg/L	0.250	<0.050	<0.050	0.250	<0.050	<0.050
Chloride (Cl)	mg/L	2.50	<0.50	<0.50	2.50	<0.50	<0.50
Fluoride (F)	mg/L	0.1	0.082	0.082	0.1	0.074	0.075
Nitrate (as N)	mg/L	0.025	0.218	0.219	0.025	0.304	0.304
Nitrite (as N)	mg/L	0.0050	<0.0010	<0.0010	0.0050	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.25	0.072	0.051	0.250	0.066	<0.050
Total Nitrogen	mg/L	0.250	0.290	0.270	0.250	0.370	0.350
Ortho Phosphate as P	mg/L	0.0050	<0.0010	<0.0010	0.0050	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.01	0.0027	0.0106	Dif>2DL	0.01	0.0055
Sulphate ( $\text{SO}_4$ )	mg/L	2.5	48.4	48.4	2.5	42.6	42.6
<b>Cyanides</b>							
Cyanide, Weak Acid Dissociable	mg/L	0.0050	<0.0010	<0.0010	0.0050	<0.0010	<0.0010
Cyanide, Total	mg/L	0.0050	<0.0010	<0.0010	0.0050	<0.0010	<0.0010
Thiocyanate	mg/L	2.50	<0.50	<0.50	2.50	<0.50	<0.50
<b>Organic / Inorganic Carbon</b>							
Total Organic Carbon	mg/L	2.50	<0.50	<0.50	2.5	0.59	0.68
<b>Total Metals</b>							
Aluminum (Al)	mg/L	0.0050	0.0172	0.0190	9.9	0.178	0.145
Antimony (Sb)	mg/L	0.00050	0.00010	0.00010	0.00050	0.00010	<0.00010
Arsenic (As)	mg/L	0.005	0.00021	0.00023	0.005	0.00028	0.00027
Barium (Ba)	mg/L	0.0003	0.0440	0.0450	2.2	0.00025	0.0448
Beryllium (Be)	mg/L	0.00250	<0.00050	<0.00050	0.00250	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.00250	<0.00050	<0.00050	0.00250	<0.00050	<0.00050
Boron (B)	mg/L	0.050	<0.010	<0.010	0.050	<0.010	<0.010
Cadmium (Cd)	mg/L	0.00005	0.000032	0.000037	0.00005	0.000040	0.000037
Calcium (Ca)	mg/L	0.1	41.4	41.8	1.0	38.2	37.5
Chromium (Cr)	mg/L	0.00250	<0.00050	<0.00050	0.0025	0.00072	0.00062
Cobalt (Co)	mg/L	0.00050	<0.00010	<0.00010	0.00050	0.00024	0.00020
Copper (Cu)	mg/L	0.0005	0.00044	0.00051	0.0005	0.00176	0.00159
Iron (Fe)	mg/L	0.150	<0.030	<0.030	0.15	0.271	0.214
Lead (Pb)	mg/L	0.00025	0.000073	0.000076	0.00025	0.000606	0.000494
Lithium (Li)	mg/L	0.0250	<0.0050	<0.0050	0.0250	<0.0050	<0.0050
Magnesium (Mg)	mg/L	0.025	2.27	2.27	0.025	2.28	2.25
Manganese (Mn)	mg/L	0.00025	0.00113	0.00140	21.3	0.00025	0.00898
Mercury (Hg)	mg/L	0.000050	<0.000010	<0.000010	0.000050	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.00025	0.00822	0.00829	0.8	0.00025	0.00822
Nickel (Ni)	mg/L	0.00250	<0.00050	<0.00050	0.0025	0.00069	0.00059
Phosphorus (P)	mg/L	1.50	<0.30	<0.30	1.50	<0.30	<0.30
Potassium (K)	mg/L	0.25	1.39	1.41	1.4	1.44	1.42
Selenium (Se)	mg/L	0.001	0.00049	0.00054	0.001	0.00045	0.00042
Silicon (Si)	mg/L	0.25	2.21	2.23	0.9	2.27	2.22
Silver (Ag)	mg/L	0.000050	<0.000010	<0.000010	0.000050	<0.000010	<0.000010
Sodium (Na)	mg/L	10.0	<2.0	<2.0	10.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.0005	0.372	0.371	0.3	0.331	0.321
Thallium (Tl)	mg/L	0.00050	<0.00010	<0.00010	0.00050	<0.00010	<0.00010
Tin (Sn)	mg/L	0.00050	<0.00010	<0.00010	0.00050	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.050	<0.010	<0.010	0.05	0.014	0.012
Uranium (U)	mg/L	0.00005	0.000948	0.000982	3.5	0.00005	0.000988
Vanadium (V)	mg/L	0.0050	<0.0010	<0.0010	0.0050	<0.0010	<0.0010
Zinc (Zn)	mg/L	0.0050	<0.0010	<0.0010	0.005	0.0014	0.0014
<b>Dissolved Metals</b>							
Aluminum (Al)	mg/L	0.0200	<0.0040	<0.0040	0.005	0.0061	0.0064
Antimony (Sb)	mg/L	0.00050	<0.00010	<0.00010	0.0005	<0.00010	0.00011
Arsenic (As)	mg/L	0.005	0.00022	0.00022	0.005	0.00021	0.00021
Barium (Ba)	mg/L	0.00025	0.0434	0.0439	1.1	0.0405	0.0411
Beryllium (Be)	mg/L	0.00250	<0.00050	<0.00050	0.00250	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.00250	<0.00050	<0.00050	0.00250	<0.00050	<0.00050
Boron (B)	mg/L	0.050	<0.010	<0.010	0.050	<0.010	<0.010
Cadmium (Cd)	mg/L	0.00005	0.000031	0.000028	0.00005	0.000031	0.000032
Calcium (Ca)	mg/L	0.1	39.4	39.6	0.5	36.9	36.8
Chromium (Cr)	mg/L	0.00250	<0.00050	<0.00050	0.00250	<0.00050	<0.00050
Cobalt (Co)	mg/L	0.00050	<0.00010	<0.00010	0.00050	<0.00010	<0.00010
Copper (Cu)	mg/L	0.0005	0.00027	0.00025	0.0005	0.00051	0.00055
Iron (Fe)	mg/L	0.150	<0.030	<0.030	0.150	<0.030	<0.030
Lead (Pb)	mg/L	0.000250	<0.000050	<0.000050	0.000250	<0.	

**Appendix 5.1-3. Relative Percent Difference (RPD) Results for Water Quality Duplicate Samples, KSM Project, 2010**

Stn.Code Station Name Collect Date/Time ALS Sample ID QAQC Sampling Session	TEC1 TEC1 10/21/2010 L946803-6	RES5 TEC1 Duplicate 10/21/2010 L946803-5			Replicate Oct-10	RPD (%)	5 MDL	NTR1A NTR1A 7/5/2010 L905787-16			RES7 NTR1A Duplicate 7/5/2010 L905787-31		
		5 MDL	Oct-10	Oct-10				5 MDL	Jun-10	Jun-10	RPD (%)		
		5 MDL	Oct-10	Oct-10				5 MDL	Jun-10	Jun-10	RPD (%)		
<b>Physical Tests</b>													
Colour, True	color unit	25	10.9	10.3			25	<5.0	<5.0	<5.0			
Conductivity	µS/cm	10	65	64.9	0.2		10	98.1	99.3	99.3	1.2		
Hardness (as CaCO <sub>3</sub> )	mg/L	2.5	28.4	29.5	3.8		2.5	42.4	44.8	44.8	5.5		
pH	pH unit	0.5	7.99	8.02	0.4		0.5	7.14	7.37	7.37	3.2		
Total Suspended Solids	mg/L	15.0	<3.0	<3.0			15	<3.0	<3.0	<3.0			
Total Dissolved Solids	mg/L	50	42	41			50	60	63	63	4.9		
Turbidity	NTU	0.5	0.89	0.88	1.1		0.5	0.56	0.35	0.35	Dif>2DL		
<b>Anions and Nutrients</b>													
Acidity (as CaCO <sub>3</sub> )	mg/L	5	3.6	3.7			5	4.7	4.2	4.2			
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	mg/L	10	19.1	19.1			10	25.9	25.8	25.8	0.4		
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	mg/L	10.0	<2.0	<2.0			10	<2.0	<2.0	<2.0			
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	mg/L	10.0	<2.0	<2.0			10	<2.0	<2.0	<2.0			
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	10	19.1	19.1			10	25.9	25.8	25.8	0.4		
Ammonia as N	mg/L	0.0250	<0.0050	<0.0050			0.025	0.0064	0.0089	0.0089			
Bromide (Br)	mg/L	0.250	<0.050	<0.050			0.25	<0.050	<0.050	<0.050			
Chloride (Cl)	mg/L	2.50	<0.50	<0.50			2.5	<0.50	<0.50	<0.50			
Fluoride (F)	mg/L	0.100	<0.020	<0.020			0.1	0.025	0.025	0.025			
Nitrate (as N)	mg/L	0.025	0.0259	0.0246			0.025	0.129	0.126	0.126	2.4		
Nitrite (as N)	mg/L	0.0050	<0.010	<0.010			0.005	<0.010	<0.010	<0.010			
Total Kjeldahl Nitrogen	mg/L	0.250	<0.050	<0.050			0.25	<0.050	<0.050	<0.050			
Total Nitrogen	mg/L	0.25	<0.050	0.06			0.25	0.150	0.130	0.130			
Ortho Phosphate as P	mg/L	0.0050	<0.010	<0.010			0.005	0.0027	0.0018	0.0018			
Total Phosphate as P	mg/L	0.0100	<0.020	<0.020			0.01	0.0069	0.0058	0.0058			
Sulphate (SO <sub>4</sub> )	mg/L	2.5	10.7	10.7			2.5	19.6	19.4	19.4	1.0		
<b>Cyanides</b>													
Cyanide, Weak Acid Dissociable	mg/L	0					0.005	<0.0010	<0.0010	<0.0010			
Cyanide, Total	mg/L	0.005	0.0029	0.0028			0.005	0.0019	0.0018	0.0018			
Thiocyanate	mg/L	0					2.5	<0.50	<0.50	<0.50			
<b>Organic / Inorganic Carbon</b>													
Total Organic Carbon	mg/L	2.5	2.92	2.76	5.6		2.5	1.69	1.66	1.66			
<b>Total Metals</b>													
Aluminum (Al)	mg/L	0.015	0.078	0.0666	15.8		0.005	0.0926	0.0670	0.0670	32.1		
Antimony (Sb)	mg/L	0.00050	<0.00010	<0.00010			0.0005	<0.00010	<0.00010	<0.00010			
Arsenic (As)	mg/L	0.00050	<0.00010	<0.00010			0.0005	0.0010	<0.00020	<0.00020			
Barium (Ba)	mg/L	0.00025	0.00693	0.00653	5.9		0.00025	0.0149	0.0144	0.0144	3.4		
Beryllium (Be)	mg/L	0.00250	<0.00050	<0.00050			0.0025	<0.00050	<0.00050	<0.00050			
Bismuth (Bi)	mg/L	0.00250	<0.00050	<0.00050			0.0025	<0.00050	<0.00050	<0.00050			
Boron (B)	mg/L	0.050	<0.010	<0.010			0.05	0.010	<0.010	<0.010			
Cadmium (Cd)	mg/L	0.000050	<0.000010	<0.000010			0.00005	0.000012	<0.000010	<0.000010			
Calcium (Ca)	mg/L	0.1	9.23	8.88	3.9		0.1	13.4	13.7	13.7	2.2		
Chromium (Cr)	mg/L	0.0005	0.00055	0.0005			0.001	0.00059	0.00071	0.00071			
Cobalt (Co)	mg/L	0.00050	<0.00010	<0.00010			0.0005	<0.00010	<0.00010	<0.00010			
Copper (Cu)	mg/L	0.0025	0.00071	0.0007			0.0005	0.00060	0.00055	0.00055	8.7		
Iron (Fe)	mg/L	0.15	0.06	0.052			0.15	0.132	0.105	0.105			
Lead (Pb)	mg/L	0.000250	<0.000050	<0.000050			0.00025	<0.000050	<0.000050	<0.000050			
Lithium (Li)	mg/L	0.0250	<0.050	<0.050			0.025	<0.050	<0.050	<0.050			
Magnesium (Mg)	mg/L	0.025	1.81	1.77	2.2		0.025	2.64	2.78	2.78	5.2		
Manganese (Mn)	mg/L	0.00025	0.00279	0.00216	25.5		0.00025	0.0122	0.0111	0.0111	9.4		
Mercury (Hg)	mg/L	0.000050	<0.000010	<0.000010			0.00005	<0.000010	<0.000010	<0.000010			
Molybdenum (Mo)	mg/L	0.00025	0.000126	0.000125			0.00025	0.000285	0.000303	0.000303	6.1		
Nickel (Ni)	mg/L	0.0025	0.00072	0.00075			0.005	<0.0010	0.00070	0.00070			
Phosphorus (P)	mg/L	1.50	<0.30	<0.30			1.5	<0.30	<0.30	<0.30			
Potassium (K)	mg/L	0.25	0.105	0.102			0.25	0.208	0.215	0.215			
Selenium (Se)	mg/L	0.0005	0.00012	0.00012			0.001	0.00036	0.00040	0.00040			
Silicon (Si)	mg/L	0.25	1.64	1.6	2								

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**2010 Water Quality and Aquatic Resources Baseline Report**

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## **Appendix 5.2-1**

**Sediment Quality Data for GC1 (Gingras Creek),  
KSM Project Area, 2010**

**Appendix 5.2-1. Sediment Quality Data for GC1 (Gingras Creek), KSM Project Area, 2010**

Sample ID	GC1-A	GC1-B	GC1-C
<b>Physical Tests</b>			
Moisture	<b>1.96</b>	<b>2.48</b>	<b>5.24</b>
pH	<b>8.46</b>	<b>8.56</b>	<b>8.65</b>
<b>Particle Size</b>			
% Gravel (> 2 mm)	0.81	1.66	2.11
% Sand (2.0 mm - 0.063 mm)	86.3	91.5	88.6
% Silt (0.063 mm - 4 µm)	11.8	5.64	8.23
% Clay (< 4 µm)	1.15	1.22	1.05
<b>Leachable Anions &amp; Nutrients</b>			
Total Nitrogen by LECO	<0.020	<0.020	<0.020
<b>Cyanides</b>			
Cyanide, Total	<3.0	<3.0	<3.0
<b>Organic / Inorganic Carbon</b>			
CaCO <sub>3</sub> Equivalent	4.33	4.25	4.08
Inorganic Carbon	0.40	0.43	0.41
Total Carbon by Combustion	0.5	0.6	0.5
Total Organic Carbon	<0.10	0.15	0.11
<b>Plant Available Nutrients</b>			
Available Phosphate-P	<2.0	<2.0	<2.0
<b>Metals</b>			
Antimony (Sb)	<10	<10	<10
Arsenic (As)	17.4	20.3	17.7
Barium (Ba)	57.0	60.8	53.0
Beryllium (Be)	0.52	0.25	0.25
Cadmium (Cd)	<0.50	<0.50	<0.50
Chromium (Cr)	37.3	40.0	32.6
Cobalt (Co)	16.9	17.9	16.0
Copper (Cu)	88.8	93.9	86.6
Lead (Pb)	<30	<30	<30
Mercury (Hg)	0.0605	0.0742	0.0634
Molybdenum (Mo)	<4.0	<4.0	<4.0
Nickel (Ni)	17.6	23.2	17.2
Phosphorus, Total	1650	1450	1490
Selenium (Se)	<2.0	<0.50	<4.0
Silver (Ag)	<2.0	<2.0	<2.0
Sulfur (S)-Total	1190	730	930
Thallium (Tl)	<1.0	<1.0	<1.0
Tin (Sn)	2.5	46.5	2.5
Uranium (U)	0.542	0.548	0.511
Vanadium (V)	104	101	92.5
Zinc (Zn)	60.9	72.8	64.3

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2010 Water Quality and Aquatic Resources Baseline Report

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## Appendix 5.2-2

Periphyton Taxonomic Composition and Abundance at  
GC1 (Gingras Creek), KSM Project Area, 2010

## **Appendix 5.2-2. Periphyton Taxonomic Composition and Abundance at GC1 (Gingras Creek), KSM Project Area, 2010**

*UID* = unidentified due to lack of size and / or missing morphological characters.

*cf.* = (*confertim* = close together) = possibly for species.

? = possibly for genus.

\* No intact thallus seen. Some small bits of thallus, but mostly individual cells and some smaller cells in deteriorating colonies.

### *Synonyms:*

*Cymbella lunata* = *Cymbella gracilis*.

*Diatoma mesodon* = *Diatoma hiemale* var. *mesodon*.

Appendix 5.2-2. Periphyton Taxonomic Composition and Abundance at GC1 (Gingras Creek), KSM Project Area, 2010

Sampling Station		GC 1	GC 1	GC 1	GC 1	GC 1	
Sample Replicate		A	B	C	D	E	
Sampling Date		Aug.29,2010	Aug.29,2010	Aug.29,2010	Aug.29,2010	Aug.29,2010	
Area Sampled (cm <sup>2</sup> )		28.9	28.9	28.9	28.9	28.9	
Units = cells/cm <sup>2</sup>							
Chlorophyta	Zygnematales	<i>Arthrodesmus sp.</i> <i>Closterium spp.</i> <i>Cosmarium spp.</i> <i>Euastrum spp.</i> <i>Hyalotheca sp.</i> <i>Mougeotia spp.</i> <i>Netrium sp.</i> <i>Penium sp.</i> <i>Roya sp.</i> <i>Staurastrum spp.</i> <i>Zygema sp.</i> UID Chlorophyta colonial UID Chlorophyta filamentous UID Chlorophyta unicellular				<110.9	
Chrysophyta	Chromulinales	<i>Hydrurus sp. cells*</i>	<107.1	<50.1	<96.5	<110.9	989.1
	Rhizochloridales	<i>Stichogloea sp.</i> UID Chrysophyta cyst UID Chrysophyta colonial UID Chrysophyta unicellular			665.4	6,812.0	
				<50.1			
Cyanophyta	Chamaesiphonales	<i>Chamaesiphon spp.</i> <i>Clastidium sp.</i> <i>Clastidium spp.</i>	4,981.2 3,320.8	23,920.0 47,840.0	1,495.4 4,486.2	4,297.5	13,106.8
	Chroococcales	<i>Aphanothece sp.</i> UID Chroococcales				79,380.0	75,364.1
	Nostocales	<i>Anabaena/Nostoc sp.</i> <i>Calothrix sp.?</i> <i>Tolyphothrix sp.</i> <i>Tolyphothrix sp?</i> UID Nostocales		<50.1			
	Oscillatoriales	<i>Homoeothrix varians</i> <i>Lyngbya sp.</i> <i>Lyngbya spp.</i> <i>Oscillatoria spp.</i> <i>Pseudoanabaena sp.</i> <i>Pseudoanabaena spp.</i> <i>Schizothrix sp.</i> <i>Spirulina sp.</i> UID Oscillatoriales	5,182,046.7 9,210.6	2,308,280.0 1,352.7	5,552,610.0 11,387.0	9,578,520.0 1,774.4	9,836,653.4 6,484.1
			963.9		1,351.0	<110.9	<109.9
					<96.5		
Rhodophyta	Nemalionales	<i>Audouinella sp.</i> UID colonial UID unicellular	1,660.4	1,165.5	2,243.1	4297.5	3406.0

UID = unidentified due to lack of size and / or missing morphological characters.

cf. = (confertim = close together ) = possibly for species.

? = possibly for genus.

\* No intact thallus seen. Some small bits of thallus, but mostly individual cells and some smaller cells in deteriorating colonies.

Synonyms:

*Cymbella lunata* = *Cymbella gracilis*.

*Diatoma mesodon* = *Diatoma hemale* var. *mesodon*.

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2010 Water Quality and Aquatic Resources Baseline Report

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## Appendix 5.2-3

### Periphyton Biomass (chlorophyll *a*) at GC1 (Gingras Creek), KSM Project Area, 2010

**Appendix 5.2-3. Periphyton Biomass (chlorophyll *a*) at GC1 (Gingras Creek),  
KSM Project Area, 2010**

Plant Pigments	Chlorophyll <i>a</i>	
Sample ID	Units	Biomass
GC1-A	µg	3.10
GC1-B	µg	1.94
GC1-C	µg	2.89
GC1-D	µg	2.73
GC1-E	µg	8.52

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## **Appendix 5.2-4**

**Taxonomic Composition and Density of  
Benthic Invertebrates at GC1 (Gingras Creek),  
KSM Project Area, 2010**

**Appendix 5.2-4. Taxonomic Composition and Density of Benthic Invertebrates at GC1 (Gingras Creek), KSM Project Area, 2010**

Major Taxon	Family	Subfamily/Tribe	Genus/Species	Number/Sample					Density (#/m <sup>2</sup> )					
				GC-1 A	GC-1 B	GC-1 C	GC-1 D	GC-1 E	GC-1 A	GC-1 B	GC-1 C	GC-1 D	GC-1 E	
Nematoda				1	1				2.0833	2.0833				
Hydracarina				5	2	2	2	2	10.417	4.1667	4.1667	4.1667	4.1667	
Copepoda-Calanoida						8	1			16.667	2.0833			
Cladocera	Daphnidae		<i>Daphnia</i>		1					2.0833				
Collembola	Isotomidae		<i>Isotomus</i>	1						2.0833				
Ephemeroptera	Baetidae		<i>Baetis</i>		3	1	1	1		6.25	2.0833	2.0833	2.0833	
Ephemeroptera	Ephemerellidae		<i>Ephemerella</i>					1				2.0833		
Ephemeroptera	Heptageniidae (d)					1					2.0833			
Ephemeroptera	Heptageniidae		<i>Epeorus</i>		2	4	4			4.1667	8.3333	8.3333		
Ephemeroptera	Heptageniidae		<i>Rhithrogena</i>		1	1				2.0833	2.0833			
Plecoptera	Chloroperlidae (d)					1					2.0833			
Plecoptera	Nemouridae		<i>Zapada</i>		2	1		3		4.1667	2.0833		6.25	
Plecoptera	Perlodidae		<i>Megarcys</i>		1		2	1		2.0833		4.1667	2.0833	
Plecoptera	Taeniopterygidae		<i>Taenionema</i>	16	50	53	67	52	33.333	104.17	110.42	139.58	108.33	
Diptera	Empididae		<i>Clinocera</i>					2					4.1667	
Diptera	Empididae		<i>Oreogeton</i>			1					2.0833			
Diptera	Simuliidae		<i>Helodon</i>			1					2.0833			
Diptera	Tipulidae		<i>Dicranota</i>		2	3		2		4.1667	6.25		4.1667	
Diptera	Tipulidae		<i>Gonomyodes</i>					1					2.0833	
Diptera	Chironomidae - pupa						2						4.1667	
Diptera	Chironomidae	Orthocladiinae (d)			1						2.0833			
Diptera	Chironomidae	Orthocladiinae	<i>Cardiocladius</i>	1	4		1		2.0833	8.3333		2.0833		
Diptera	Chironomidae	Orthocladiinae	<i>Cricotopus/Orthocladius</i>			1	1				2.0833	2.0833		
Diptera	Chironomidae	Orthocladiinae	<i>Eukiefferiella</i>					1					2.0833	
Diptera	Chironomidae	Orthocladiinae	<i>Parorthocladius</i>		1			1		2.0833			2.0833	
Diptera	Chironomidae	Orthocladiinae	<i>cf. Platysmittia</i>		1	2	1	1		2.0833	4.1667	2.0833	2.0833	
Diptera	Chironomidae	Orthocladiinae	<i>Tvetenia</i>				3					6.25		
Diptera	Chironomidae	Diamesinae	<i>Diamesa</i>	2	25	12	11	12	4.1667	52.083	25	22.917	25	
				6	15	15	13	12	6	15	15	13	12	
			Total (# / sample)	26	97	92	97	79	54.17	202.1	191.7	202.1	164.6	

Collected by Allyson Longmuir on August 29, 2010.

Water temperature at the site was 5.6 °C; pH was 8.10

and conductivity was 127 µS.

# grabs per composite: 5 5 5 5 5  
wetted stream width (m): 6 6 6 10 10  
distance upstream from Mitchell Cr (m): 25 35 45 55 65  
water depth (m): 0.17 0.17 0.17 0.17 0.17  
SA 5 Hesses (m<sup>2</sup>): 0.48