

APPENDIX 27
AQUATICS BASELINE REPORT, 2008



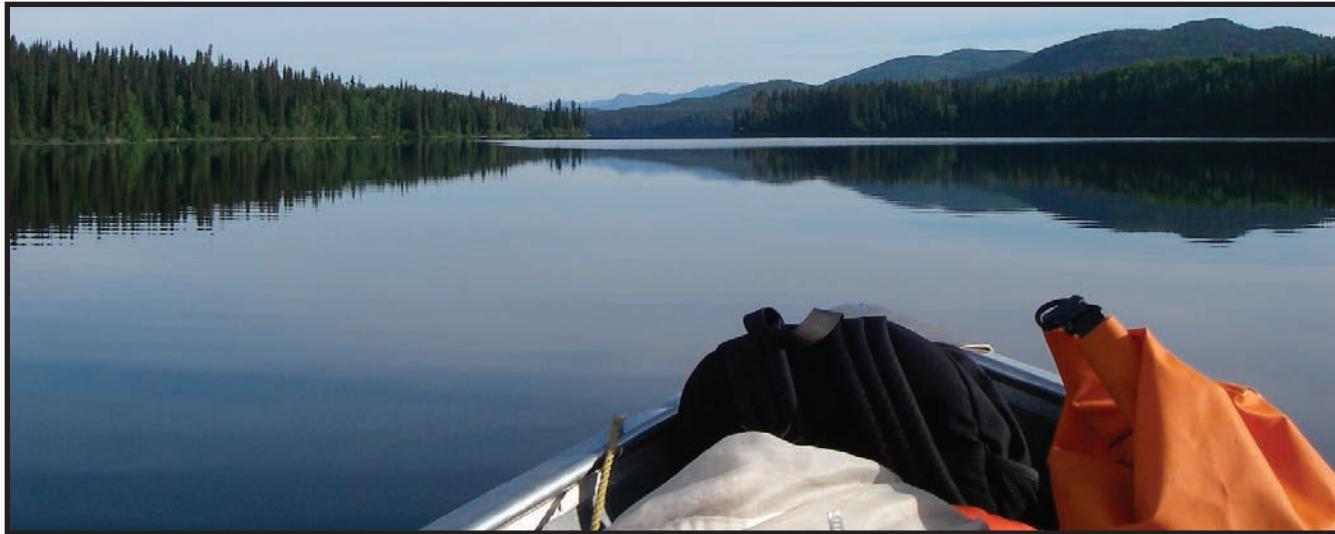


Pacific Booker Minerals Inc.

Morrison Copper/Gold Project

British Columbia, Canada

Morrison Copper/Gold Project Aquatics Baseline Report, 2008



Prepared by:

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Vancouver, British Columbia

December 2008



Executive Summary

This report presents the aquatics study for Pacific Booker Minerals Inc (PBM).

PBM's proposed Morrison Copper/Gold Project (the Project) is 65 km northeast of Smithers and 35 km north of the village of Granisle in north-central British Columbia. The Project is on the east side of Morrison Lake on Crown land and falls within the traditional territory of the Lake Babine Nation. Access to the Project site is by road with barge access across Babine Lake, which is 50 km south of the site. The Project is approximately 35 km north of the former Bell and Granisle copper/gold mines.

The Morrison mine will be a 30,000 tpd open pit operation with ore processed in a conventional milling plant and the copper/gold concentrate transported to the Port of Stewart for shipment to offshore smelters. Molybdenum concentrate will be shipped to Endako, near Fraser Lake, BC, for processing. The mine will produce approximately 224 Mt of tailings and 170 Mt of waste rock.

The information contained in this baseline is intended to support a full environmental and socio-economic impact assessment of the Project.

This report presents the results of field studies conducted in 2008 on the water quality, sediment quality, as well as the primary and secondary producer communities in the Morrison Copper/Gold Project area. The objectives of this assessment were to determine the baseline conditions (adding to the data previously collected in 2006 and 2007) and characterize aquatic ecosystems in the proposed mine site receiving environment and along the proposed power transmission line.

Streams were surveyed for water and sediment quality and aquatic communities in the area of project activities. Stream water quality was sampled on a monthly (January to August) basis while sediment and biotic communities were sampled once in July, 2008. A total of five Morrison Lake sites were also sampled in late July of 2008. These sites were assessed for phytoplankton, benthic invertebrates, sediment quality and water quality. All sites were sampled using standard methods.

Stream water quality data show numerous variables had the lowest concentrations during the freshet months (May and June). The BC Maximum guideline for total cyanide was occasionally exceeded. Total and dissolved arsenic, copper, and molybdenum were highest at Strm5. Many water quality variables had their maximum concentrations either at Strm5 or Lower7, with minimum concentrations often occurring at Strm26. Naturally occurring total cyanide concentrations in Morrison Lake were nearly double in 2008 compared to concentrations in previous years. Only a few metals in lake sites exceeded provincial or federal guidelines; these included total and dissolved chromium and nickel, and total cadmium.

The receiving environment stream sediment composition was dominated by sand. Strm5, Strm9, and Upper7 generally had the highest metal concentrations. Copper concentrations have been

Executive Summary

relatively high in all sample years at Strm5 compared to all other sites. Morrison Lake substrate was dominated by silt. Arsenic, copper, iron, nickel, and mercury exceeded provincial and federal guidelines at all lake stations. Provincial and federal guidelines for cadmium and zinc were exceeded at three lake stations, and chromium was exceeded at four lake stations.

In 2008 Lower7 and Strm26 had the highest stream productivity. The greatest contribution to periphyton density at several sites came from *Oscillartoria*. Genus richness was greatest at Strm17.1. Morrison Lake phytoplankton biomass, density, genus richness, and diversity were all higher in 2008 than in previous years.

Density of stream benthos was generally greater in 2008 than 2007, and Strm4 had the greatest density in all sample years. Dipterans were the predominant taxa at most stream and lake sites in 2008, with Strm4 being the exception, as it was composed primarily of ostracods. Zooplankton communities in 2008 were mainly composed of copepods and rotifers with calanoid copepods being the dominant taxa at four of the five Morrison Lake sites.

Acknowledgements

This report was prepared for Pacific Booker Minerals Inc. (PBM) by Rescan Environmental Services Ltd. The report was written by Allyson Longmuir (M.Sc.), Mark Whelly (M.Sc., RPBio), Carolyn Duckham (B.Sc.) and Stephanie Miller (B.Sc.). Fieldwork was primarily conducted by Mike Stamford (M.Sc.) with assistance from Austin Adams. Accommodation was provided by PBM at Babine Lodge. Report production was coordinated by Joanna Lerner and Sarah Webb (M.A.).

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Morrison Copper/Gold Project Aquatics Baseline Report, 2008

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Acronyms and Abbreviations

BC MOE	British Columbia Ministry of the Environment
BC MWLAP	British Columbia Ministry of Water, Land and Air Protection
CCME	Canadian Council of Ministers of the Environment
EPT	Ephemeroptera/plecoptera/trichoptera
ISQG	Interim Sediment Quality Guideline
LEL	Lowest effect level
masl	Metres above sea level
MDL	Method detection limits
NTS	National Topographic System
NTU	Nephelometric turbidity units
PBM	Pacific Booker Minerals Inc.
PEL	Probable effect level
QA/QC	Quality assurance and quality control
RISC	Resources Information Standards Committee
RPD	Relative percent differences
SEL	Severe effect level
TDS	Total dissolved solid
TKN	Total kjeldahl nitrogen
TN	Total nitrogen
TOC	Total organic carbon

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TSF	Tailings storage facility
TSS	High total suspended solids

1. Introduction

1.1 Project Background

Pacific Booker Minerals Inc. (PBM), a publicly traded company, owns the mineral rights to the Morrison Property located in Central British Columbia, Canada. PBM is proposing an open-pit mining and milling operation for the production of copper/gold/molybdenum concentrate from the Morrison deposit.

Coordinates of the Morrison Property are 55° 11' 24" N Latitude and 126° 19' 17" W Longitude. The National Topographic System (NTS) map sheet that covers the area is 93M01/W. The Property elevation ranges from 737 metres above sea level (masl) at Morrison Lake to 890 masl at the top of the ridge southeast of the deposit.

The Morrison Property is located to the east at the southern end of Morrison Lake approximately 65 km northeast of Smithers and 35 km north of the Village of Granisle. Although there are many possible access routes via the forest service road network, the selected route for mine use is by road North off Highway 16 at Topley via Granisle Highway to Michelle Bay, then by an all-season barge across Babine Lake to Nose Bay then North via forest service roads directly to the Morrison Property.

The Morrison Property is less than 30 km from two former producing copper/gold mines, Bell and Granisle, and is within the forest management area of Canadian Forest Products Ltd. (Canfor). The two mines are no longer active; however, there is a long history of forestry activity in the area. The result of these activities is an extensive forest service road network established and maintained by forestry companies operating in the area. The proposed mine will consist of two development areas: the mine site encompassing the open pit, mill and waste rock disposal, and the Tailings Storage Facility (TSF) north of the main mine site. A corridor for tailings transport, process reclaim water, vehicle access road and power transmission will interconnect the two development areas.

1.2 Study Objectives

This report presents the results of the baseline aquatics assessment in 2008. Aquatic components (water quality, sediment quality, primary producers and secondary producers) were assessed in streams and five Morrison Lake sites. The objectives of the assessment were to determine the baseline conditions (adding to the data previously collected in 2006 and 2007) and characterize limnology and aquatic habitats in the proposed mine receiving environment and along the proposed transmission line route. Baseline data provide an understanding of the natural variation in each component of the freshwater environment.

2. Methods

2.1 Streams

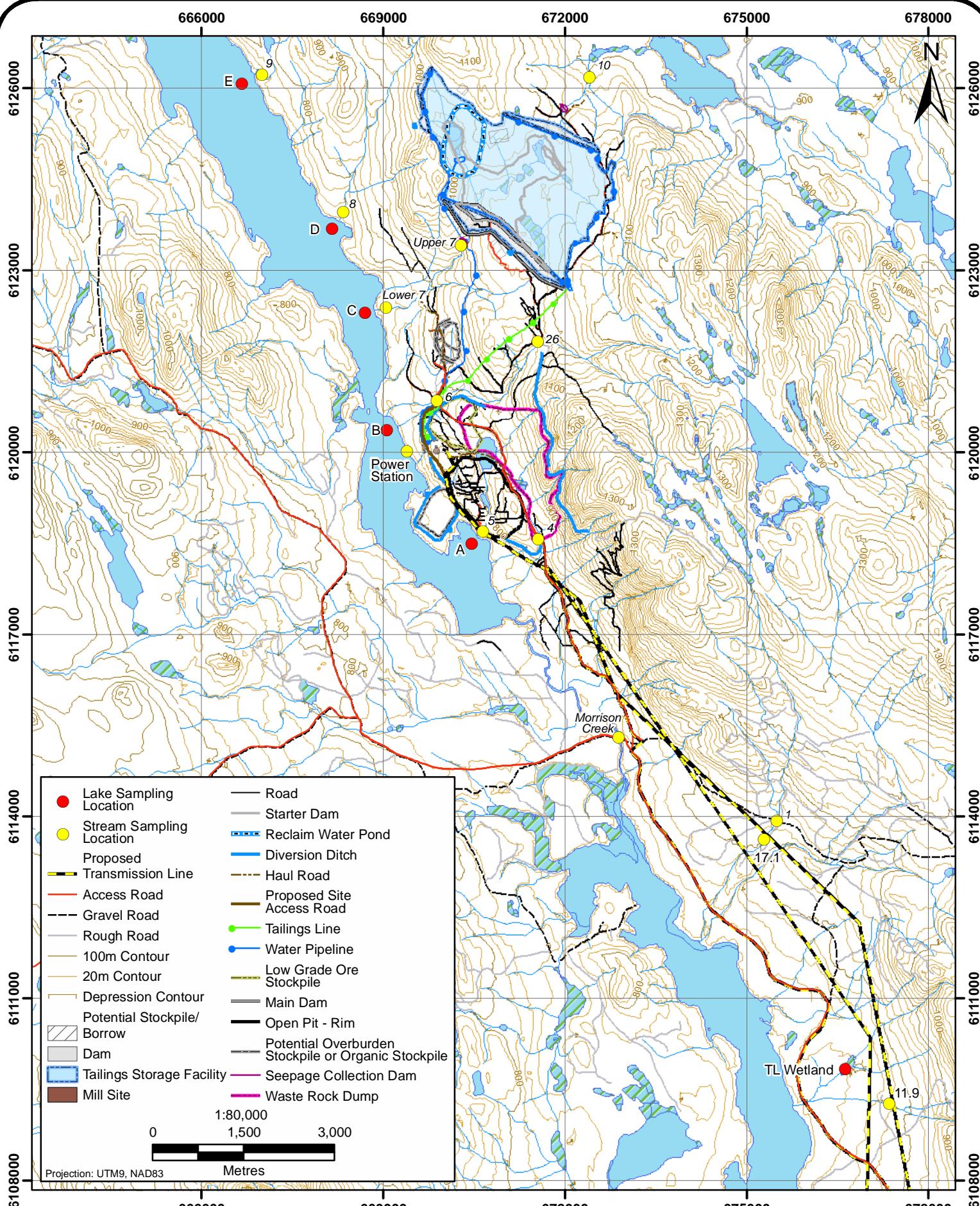
In this report, streams sampled in 2008 include those that drain the mine site area and tailings storage facility, reference sites and those that cross the transmission line corridor. Table 2.1-1 lists the coordinates for these sites.

**Table 2.1-1
Stream Site Coordinates**

Station ID	Northing	Easting
Strm1	675434	6113863
Morrison Creek	672923	6115158
Strm4	671591	6118546
Strm5	670579	6118649
Strm6	669841	6120840
Upper7	670,551	6123785
Lower7	669,253	6122418
Strm8	668393	6123780
Strm9	666887	6126331
Strm10	672390	6126313
Strm26	671,555	6121817
Transmission Line Sites		
Strm17.1	675288	6113622
Wetland	676632	6109839
Strm11.1	677353	6109275
Power Station	670274	6120028

2.1.1 Study Design

Streams were surveyed for water and sediment quality and aquatic communities in the area of project activities (Figure 2.1-1). Stream water quality was sampled on a monthly (January to August) basis while sediment and biotic communities were sampled once in July, 2008. Receiving environment stream sites are located along the access road (Strm6 and 26), in the area of the proposed mine pit and stockpile (Strm4 and 5), and draining the waste management area (Upper7 and Lower7, Strm8 and 10). Strm9 and Strm1 (north of road) drain areas outside of project activities and are reference sites. Morrison Creek, which drains Morrison Lake, was also sampled just north of Babine Lake. Strm10 was almost dry during the July sampling trip (“mostly subsurface flow; only small shallow, slow flow present between dry channels”) and was difficult to access. For this reason the site was not suitable for sediment and primary and secondary producer sampling during the July field work and was not regularly visited during monthly water quality sampling.



Morrison Copper/Gold Project Aquatic Biology Sampling Stations, 2008

Several streams along the proposed transmission line were visited during July, 2008 (Figure 2.1-1). Stream crossings at kilometre 17.1, 11.9 (referred to as Strm17.1 and Strm11.9 in the report below) and Power Station (adjacent to the suggested location of the northern terminus of the transmission line) were the only streams that were not completely dry. Sediment and primary and secondary producer sampling during the July field work at the Power Station stream was not possible since no continuous channel was found and it appeared to flow subsurface in multiple areas.

2.1.2 Water Quality

One water sample was collected per site per sampling period using standardized methods (RISC 1997). Water samples were analyzed for general physico-chemical variables, anions, nutrients, total cyanide, total organic carbon (TOC), and total and dissolved metals at the lowest feasible detection limit by ALS Laboratory Group of Vancouver.

For each sample, the scientist stood facing upstream and triple-rinsed the bottle and cap prior to filling. Preservatives were added for total metals (ultra-pure nitric acid), TOC (hydrochloric acid), and total cyanides (NaOH). No air bubbles were left in any of the bottles. A list of all routine chemistry variables is presented along with general method detection limits (MDL) in Table 2.1-2.

All 2008 field data are presented in appendices (listed in Section 3.1). Variables with guidelines and thought to be most relevant to potential water quality issues within the Morrison Project area have been presented graphically. The analyzed data were then summarized for each variable by site. Some variables could not be measured reliably below a specified detection limit and are reported by the analytical laboratory as below that detection limit. When required for the purpose of statistical analyses and graphical presentation, these values (called non-detects) were replaced with half of the detection limit.

2.1.2.1 Monthly Water Quality Data

Where possible, water quality samples were collected on a monthly basis from January to August, 2008. Data for each site were compared to the CCME (CCME, 1999) and BC (BC MOE 2006) water quality guidelines. Results are plotted with sites grouped from south to north as follows: Strm1, Morrison Creek, Strm4, Strm5, Strm6, Strm26, Lower7, Upper7, Strm8 and Strm9. Although the transmission line sites (Strm11.9, Strm17.1, Power Station and TL Wetland) were only sampled once (July) in 2008 they are presented in the same figures with monthly sites to facilitate comparison with the receiving environment.

2.1.2.2 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 deionised water in the lab and remained closed throughout the field trip. This allowed assessment of contamination associated with lab procedures. The field blank bottles were also filled with distilled deionised water, but were opened in the field and preserved as required for various analyses. This allowed assessment of contamination associated with field sampling (airborne contamination,

Table 2.1-2
Water Quality Variables and Method Detection Limits, 2008

Variable	Units	Detection Limit	Variable	Units	Detection Limit
Physical/Dissolved Anions					
Colour	Cu	5	Selenium	mg/L	0.001
Conductivity	uS/cm	2	Silicon	mg/L	0.05
pH	pH	0.01	Silver	mg/L	0.00001
Total Suspended Solids	mg/L	3	Sodium	mg/L	2
Turbidity	NTU	0.1	Strontium	mg/L	0.0001
Total Dissolved Solids	mg/L	1	Thallium	mg/L	0.0001
Hardness	mg/L	0.5	Tin	mg/L	0.0001
Alkalinity, Bicarbonate (as CaCO ₃)	mg/L	1	Titanium	mg/L	0.01
Alkalinity, Carbonate (as CaCO ₃)	mg/L	1	Uranium	mg/L	0.00001
Alkalinity, Hydroxide (as CaCO ₃)	mg/L	1	Vanadium	mg/L	0.001
Total Alkalinity (as CaCO ₃)	mg/L	1	Zinc	mg/L	0.001
Acidity	mg/L	1	Dissolved Metals		
Bromide	mg/L	0.05	Aluminium	mg/L	0.001
Chloride	mg/L	0.5	Antimony	mg/L	0.0001
Fluoride	mg/L	0.02	Arsenic	mg/L	0.0001
Sulphate	mg/L	0.5	Barium	mg/L	0.00005
Nutrients					
Ammonia Nitrogen	mg/L	0.005	Beryllium	mg/L	0.0005
Nitrate	mg/L	0.005	Bismuth	mg/L	0.0005
Nitrite	mg/L	0.001	Boron	mg/L	0.01
Total Kjeldahl Nitrogen	mg/L	0.05	Cadmium	mg/L	0.00005
Total Nitrogen	mg/L	0.02	Calcium	mg/L	0.02
Total Phosphorus	mg/L	0.002	Chromium	mg/L	0.0005
Cyanides					
Total Cyanide	mg/L	0.005	Cobalt	mg/L	0.0001
Total and Dissolved Metals					
Aluminium	mg/L	0.001	Copper	mg/L	0.0001
Antimony	mg/L	0.0001	Iron	mg/L	0.03
Arsenic	mg/L	0.0001	Lead	mg/L	0.00005
Barium	mg/L	0.00005	Lithium	mg/L	0.005
Beryllium	mg/L	0.0005	Magnesium	mg/L	0.005
Bismuth	mg/L	0.0005	Manganese	mg/L	0.00005
Boron	mg/L	0.01	Mercury	mg/L	0.00001
Cadmium	mg/L	0.00002	Molybdenum	mg/L	0.00005
Calcium	mg/L	0.02	Nickel	mg/L	0.0005
Chromium	mg/L	0.0005	Phosphorous	mg/L	0.3
Cobalt	mg/L	0.0001	Potassium	mg/L	0.05
Copper	mg/L	0.0005	Selenium	mg/L	0.001
Iron	mg/L	0.03	Silicon	mg/L	0.05
Lead	mg/L	0.00005	Silver	mg/L	0.00001
Lithium	mg/L	0.005	Sodium	mg/L	2
Magnesium	mg/L	0.005	Strontium	mg/L	0.0001
Manganese	mg/L	0.00005	Thallium	mg/L	0.0001
Mercury	mg/L	0.00001	Tin	mg/L	0.0001
Molybdenum	mg/L	0.00005	Titanium	mg/L	0.01
Nickel	mg/L	0.0005	Uranium	mg/L	0.00001
Phosphorous	mg/L	0.3	Vanadium	mg/L	0.001
Potassium	mg/L	0.05	Zinc	mg/L	0.002
Organic Variables					
			Total Organic Carbon	mg/L	0.5

contamination of the lid/bottle, etc.) and preservation procedures. All data for field and travel QA/QC are reported in appendices. The frequency of any variable concentration above the MDL was noted for both travel and field blanks, indicating possible contamination.

For QA/QC purposes, a minimum of 10% of the water samples were randomly collected in duplicate in order 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,

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). Water quality variables where one or both values were less than five times the MDL were not included in the RPD calculation. This is because variability near the MDL is too high, according to the BC Field Sampling Manual (BC MWLAP 2003). 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 in order to detect patterns of high variation for multiple variables within sample pairs, indicating possible contamination during field sampling.

Analyses were conducted utilizing the lowest possible detection limit. For some samples, detection limits were greater due to interference from high conductivity, high total suspended solids (TSS), or a high metal value. These samples need to be diluted and the result is a higher detection limit.

2.1.3 Sediment Quality

Sediment was collected at eleven stream sites in 2008, 10 of which were also sampled in 2007 (the reference site Strm9 was not sampled in 2007). Three composite samples were collected at each site. Methods for stream sediment sampling were standardized (RISC 1998) and involved the use of a stainless steel bowl and spoon to collect multiple grab samples within stream stations. Sediment was spooned from the top 5 cm at three to four points along the river. Sediment was pooled (excess water drained off) and manually homogenized for one minute in the mixing bowl. Sediment was then carefully spooned into clean, pre-labelled Whirl-Pak bags, sealed (no air bubbles), and kept cool in the dark until analyzed by ALS Laboratory Group of Vancouver. Sampling was done at three distinct depositional areas per site (different braids, or different stretches of the main channel) depending on site width and access, and resulted in three replicates per site.

Whole sediment samples were analyzed for moisture, particle size, nutrients, TOC, and total metals using the lowest feasible detection limit. A list of sediment variables and detection limits is presented in Table 2.1-3. Non-detects were replaced by half of the detection limit during calculations. Data are summarized by site, and compared to CCME (1999) and BC (BC MOE 2006) sediment quality guidelines. BC guidelines include both the Lowest Effect Level (LEL) and Severe Effect Level (SEL), whereas the CCME guidelines include the Interim Sediment

Quality Guideline (ISQG) and the Probable Effect Level (PEL). Whole sediment samples were also analysed for particle size distribution.

Table 2.1-3
Sediment Quality Variables and Detection Limits, 2008

Variable	Units	Detection Limit (mg/kg dry weight)	Variable	Units	Detection Limit (mg/kg dry weight)
Physical Tests					
Moisture	%	0.10%	Lithium	mg/kg	2
Particle Size	%	0.10%	Magnesium	mg/kg	50
Nutrients					
Available Phosphate	mg/kg	1	Manganese	mg/kg	1
Total Nitrogen	%	0.01	Mercury	mg/kg	0.005
Total Metals					
Aluminum	mg/kg	50	Molybdenum	mg/kg	4
Antimony	mg/kg	20	Nickel	mg/kg	5
Arsenic	mg/kg	5	Phosphorus	mg/kg	50
Barium	mg/kg	1	Potassium	mg/kg	200
Beryllium	mg/kg	0.5	Selenium	mg/kg	2
Bismuth	mg/kg	20	Silver	mg/kg	2
Cadmium	mg/kg	0.5	Sodium	mg/kg	200
Calcium	mg/kg	50	Strontium	mg/kg	0.5
Chromium	mg/kg	2	Thallium	mg/kg	1
Cobalt	mg/kg	2	Tin	mg/kg	5
Copper	mg/kg	1	Titanium	mg/kg	1
Iron	mg/kg	50	Vanadium	mg/kg	2
Lead	mg/kg	2	Zinc	mg/kg	1
Organic Variable					
Total Organic Carbon					%
					0.01

2.1.4 Primary and Secondary Producers

2.1.4.1 Periphyton

Periphyton sampling was conducted at the 11 receiving environment stream sites and two transmission line sites in 2008 when sediment and biological surveys were scheduled. Samples were collected from three separate rocks per site using a toothbrush and rinse bottle to gently scrape a known surface area. Three areas were scraped from each rock to accurately characterize the periphyton coverage and community composition.

For each sample, half was used for taxonomic identification and enumeration, and the other half for measurement of biomass as chlorophyll *a*. Taxonomic samples were stored in 250 mL plastic bottles and preserved in Lugol's iodine solution. Taxonomic identification and enumeration were conducted by G3 Consulting Ltd. (Surrey, BC). For each sample, genus richness and diversity (as Simpson and Evenness diversity indices) were calculated and mean and standard error by site was determined and graphed.

Chlorophyll *a* samples were prepared by filtering the sample through a 0.45 µm filter, folding it in half and wrapping it in tinfoil, labelling and freezing it until analysis by ALS Laboratory Group of Vancouver. Biomass as chlorophyll *a* (mean ± SE) was graphed by site.

2.1.4.2 Benthic Invertebrates

Benthic invertebrate (benthos) communities were sampled at 10 receiving environment streams in 2008 and Strm11.9 and 17.1 along the transmission line. Stream benthic samples were collected using a Hess sampler with a surface area of 0.096 m² and a mesh size of 250 µm. Five composite replicates were collected at each site. Each composite was composed of three pooled grab samples taken approximately 10 m apart or located on separate braids of the stream.

For each stream subsample, the Hess sampler was driven at least 10 cm into the sediment of an undisturbed riffle zone, facing upstream with the cod-end trailing downstream. Larger gravel and rocks inside the sampler were carefully cleaned of dirt and debris (washed into the sampler area water) and discarded. The sediment was then stirred, scrubbed, and raised up and dropped inside the Hess sampler for one minute, allowing the stream current to wash benthos into the cod-end. The mesh of the sampler was carefully washed and rinsed into the cod-end to capture all benthos contained in the sampler area. Once the three subsamples were collected, all contents were then carefully transferred to a clean 500 mL, pre-labelled plastic jar which was then filled with 10% buffered formalin. Replicate samples were preserved separately in plastic jars. Taxonomic identification and enumeration were conducted by Biologica Environmental Services (Victoria, BC). Invertebrates were sorted and identified to the lowest possible taxonomic level (usually genus). Genus richness, evenness, Simpson's Diversity and Bray-Curtis Similarity indices were calculated for each sample. Richness of Ephemeroptera/Plecoptera/Trichoptera (EPT), which are three important taxonomic groups usually associated with pristine stream environments, was also calculated for stream sites. Their constant exposure to substrate and potential contaminants make benthic invertebrates important indicators of aquatic impacts and an important feature of aquatic environmental effects monitoring programs (Environment Canada 2003).

2.2 Morrison Lake Sites

2.2.1 Study Design

A total of five Morrison Lake sites (Lake A, B, C, D and E) were sampled in late July of 2008. These sites were also sampled in August of 2006 and were assessed for phytoplankton, benthic invertebrates, sediment quality and water quality (Figure 2.1-1). The objective of the sampling program is to characterize aquatic communities and habitat in the lake since it has the potential to be directly affected by project activities. Table 2.2-1 lists the coordinates for these sites.

2.2.2 Water Quality

Water samples from lake sites were collected once at each site during 2008. Preservation and analyses of water samples was identical to that done for stream water samples. All data are presented in appendices (listed in Section 3.1). Variables subject to guidelines and thought to be most relevant to potential water quality issues within the Project area have been presented

graphically. As with stream water quality samples, field and travel blanks were collected and RPD duplicate samples were analyzed.

Table 2.2-1
Lake Site Coordinates

Station ID	Northing	Easting
A	670691	6118503
B	669055	6120371
C	668699	6122299
D	668155	6123689
E	666664	6126079

2.2.3 Physical Limnology

Physical limnology parameters were measured at all five Morrison Lake sites. These variables included Secchi depth, surface pH, conductivity and depth profiles of dissolved oxygen and temperature measured at the deepest point in the lake (Plate 2.2-1).



Plate 2.2-1. Morrison Lake, 2008.

Secchi depth, a measure of water transparency, was determined using a standard 20 cm black and white Secchi disk. Using a metered line, the weighted Secchi disk was lowered over the shaded

side of the boat until it was no longer visible in the water column. The disk was then slowly raised until it once again became visible, and the depth was recorded to the nearest 10 cm.

Depth profiles were measured using the YSI Model 550A meter and probe to determine the degree and position of stratification, if present. Both before and after conducting a profile, the membrane of the probe was checked for air bubbles. If air bubbles were present, the membrane was replaced and the profile was redone. After initial calibration, measurements were taken just below the surface and at 1 m intervals. The probe was lowered to a depth of 1 m above the sediment-water interface (as indicated by the depth sounder).

2.2.4 Sediment Quality

Sediment was collected at all five lake sites in 2008. An Ekman sampler was used to collect bottom sediment. Three composite samples (composed of three separate grabs collected a minimum of 5 m apart from an inflatable zodiac boat) were collected at each site. Physical appearance (organics, homogeneity, and organisms) of the sediment was noted. Sediment was then spooned off the top 4 cm of the Ekman grab sample and deposited into a clean stainless steel bowl. The top layer contents of three separate grabs were then homogenized using a stainless steel spoon for one minute, and sediment was spooned into clean, pre-labelled Whirl-Pak bags, sealed (no air bubbles), and kept cool in the dark until analysis by ALS Laboratory Group of Vancouver.

Whole lake sediment samples were analyzed for the same variables (nutrients, total metals, TOC, particle size) as stream sediment samples (Table 2.1-2). Procedures for sample handling, transport and comparison of data to guidelines were identical to those described for stream samples (see Section 2.1.1.3).

2.2.5 Primary and Secondary Producers

2.2.5.1 Phytoplankton

In 2008, each lake site phytoplankton communities were sampled for biomass (chlorophyll *a*) as well as taxonomic composition and enumeration. A replicate consisting of a pair of 1 L pre-labelled plastic bottles were filled with surface water. Samples were collected by immersing the pre-labelled 1 L clear plastic sample bottles about 0.5 m below the surface. One bottle from each replicate pair was used for determination of chlorophyll *a* biomass, and the other was used to determine taxonomic composition and enumeration.

The samples were kept cool and dark and transported back to camp. Known volumes of the 1 L samples for biomass determination were filtered onto 47 mm membrane filters using a hand pump and filter apparatus. The filters (with 0.45 µm pore size) were carefully folded in half, wrapped in aluminum foil, labelled with sampling information and frozen. Samples were kept frozen and transported to ALS Laboratory Group in Vancouver for analysis.

Samples for taxonomic identification were preserved with Lugol's iodine solution, kept cool and dark and transported to Biologica Environmental Services (Victoria, BC), for taxonomic identification and enumeration. The taxonomy methodology for 2008 consisted of scanning

phytoplankton samples for identifiable taxa, then taking random subsamples for enumeration. Taxa observed in the initial scan but not counted in the subsamples appear in the data as less than counts (i.e., <2.4) once the cells/mL was calculated. For the purpose of analyses all these counts were converted to 1.0 cell/mL to represent their presence and relative rarity in the sample.

2.2.5.2 Benthic Invertebrates

Benthos communities were sampled at each lake site concurrently with primary producer surveys. Samples were collected with a standard Ekman grab at each zone within the site. Each replicate was composed of three grabs pooled together to form a composite sample. Each Ekman grab was brought to the surface and contents were released into a 500 µm mesh sieve bucket. The bucket was one third submersed in the water while sieving and spinning continued until no silt clouds were produced in surrounding water. Residual contents containing benthos from three successful grabs were rinsed into a clean, pre-labelled 500 mL jar. Procedures for sample handling, preservation, transport and analysis were identical to those described for receiving environment stream samples.

2.2.5.3 Zooplankton

Zooplankton communities were sampled for taxonomic composition and enumeration at each lake site. Each replicate sample was made up of the contents of three separate zooplankton hauls using a 0.3 m diameter (118 µm mesh) net. For each haul, the net was lowered to a known depth, just above the sediment using a metered cable line. The net was then raised to the surface at a constant speed of approximately 0.5 m/s. Each time the net was brought to the surface, the contents of the cod end were transferred into the same pre-labelled, clean, 500 mL wide mouth plastic jar. Buffered formalin was added to a final concentration of 10% by volume. Sample jars were closed, agitated gently, and kept cool and dark during storage and transport to Biologica Environmental Services (Victoria, BC), for taxonomic identification and enumeration. Data were analyzed for density, relative abundance, genus richness, and diversity. Zooplankton densities were normalized to number of organisms/m³ by calculating the volume of water the zooplankton net screened.

2.2.6 Data Analysis

The number of organisms per sample was converted to density (organisms/m² for benthos, organisms/m³ for zooplankton, and cells/L for phytoplankton) by dividing the each sample by the area sampled and calculating the mean of all replicates. All graphically represented data and the calculation of means and standard errors were produced using SigmaPlot software (SYSTAT 2006). Means and standard errors were graphically represented. Genus richness, diversity indices and Bray-Curtis Similarity were calculated were calculated using Primer (Clark and Gorley 2006). The results presented from the Bray-Curtis analysis are similarity values, not dissimilarity values, since similarity is interpreted more intuitively. Richness is defined as the number of separate genera present in a sample. In assessing genus richness multiple species of the same genus were pooled together. For sites where the available data only occurred at higher taxonomic levels (e.g., Family or Order), a single genus was considered to be present in the sample.

Simpson's Index is a dominance-type index and is calculated based on the formula:

$$D_s = \sum_{i=1}^s [n_i(n_i-1)] / [N(N-1)]$$

where n_i is the number of individuals in the i^{th} species and N is the total number of individuals.

2.2.7 Quality Assurance and Quality Control

The same QA/QC measures that were used for stream water sampling were applied to lake samples, including the use of field and travel blanks to monitor for contamination during sampling and transport (see Section 2.1.1.2). In addition to this, an equipment blank was used during lake water sampling to assess potential contamination from the equipment required for deep water sampling.

Triplicate samples for phytoplankton were collected at each lake station, and three replicates (composites) were taken for sediment, zooplankton and benthos sampling. Additionally, at 10% of the sites, one sediment sample was split for QA/QC purposes to ensure that sample homogenization was thorough. The RPD statistic was used to assess the degree of homogenization. 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 (BC MWLAP 2003).

3. Results

3.1 Stream Water Quality

Water quality was assessed at 11 receiving environment streams and four transmission line sites, in 2008. Transmission line sites included three streams (Strm11.9, Strm17.1 and Power Station) and one wetland (TL Wetland) which were sampled once during the July aquatic biology field trip. Receiving environment streams were sampled monthly from January to August. All water quality data are provided in Appendix 3.1-1. Analytical detection limits are provided in Appendix 3.1-2. Water quality variables which had 75% or more samples above their respective detection limits are presented graphically and discussed. Variables of interest and those that have the provincial or federal aquatic life guidelines are also discussed and supported with a figure.

3.1.1 Physical Variables, Nutrients and Cyanide

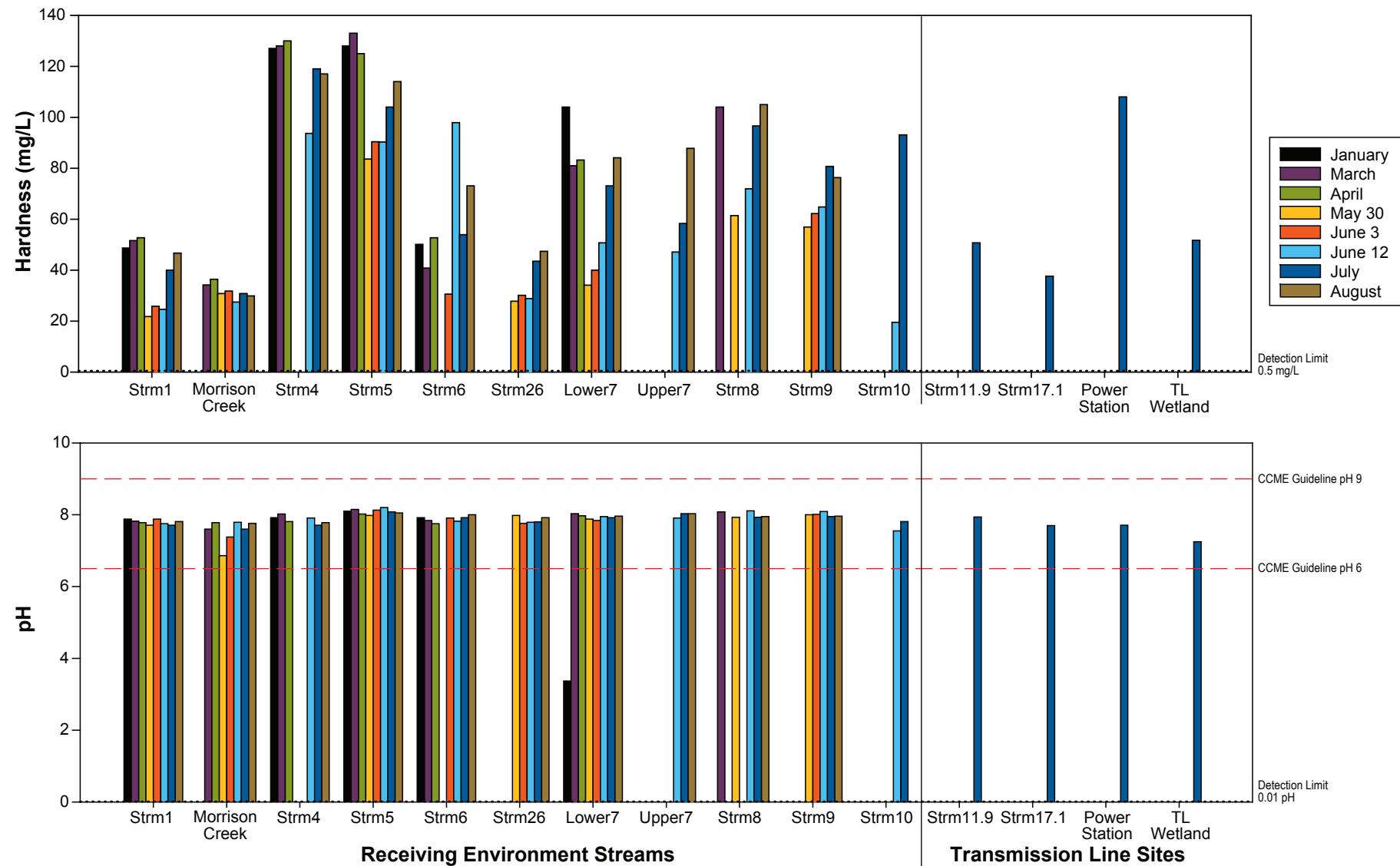
Key variables are presented graphically and discussed below. Most of these variables had similar concentrations to previous years (2004 to 2007). Where available, CCME and BC guidelines are indicated.

Moderate levels of hardness were observed throughout the study area, though concentrations varied considerably between and within sites. Hardness within the receiving environment ranged from 19.5 mg/L (Strm10, June 12) to 133 mg/L (Strm5, March) (Figure 3.1-1). Concentrations tended to be lowest during freshet (May and June). The transmission line site hardness concentrations ranged from 37.6 mg/L (Strm17.1) to 108 mg/L (Power Station) (Figure 3.1-1). No BC or CCME guidelines exist for hardness.

Water pH values were slightly alkaline at most sites, with little variability observed. Water pH in the receiving environment streams ranged from 3.37 (Lower7, Jan.) to 8.2 (Strm5, June 12) (Figure 3.1-1). The acidic condition found at Lower7 (Jan.) is likely a result of acidic contamination (incorrect preservation), since pH values never fell below the CCME guideline of pH 6 in previous years. Transmission line site pH values ranged from 7.25 (Wetland) to 7.94 (Strm11.9) (Figure 3.1-1). These values were all within the CCME minimum and maximum guidelines.

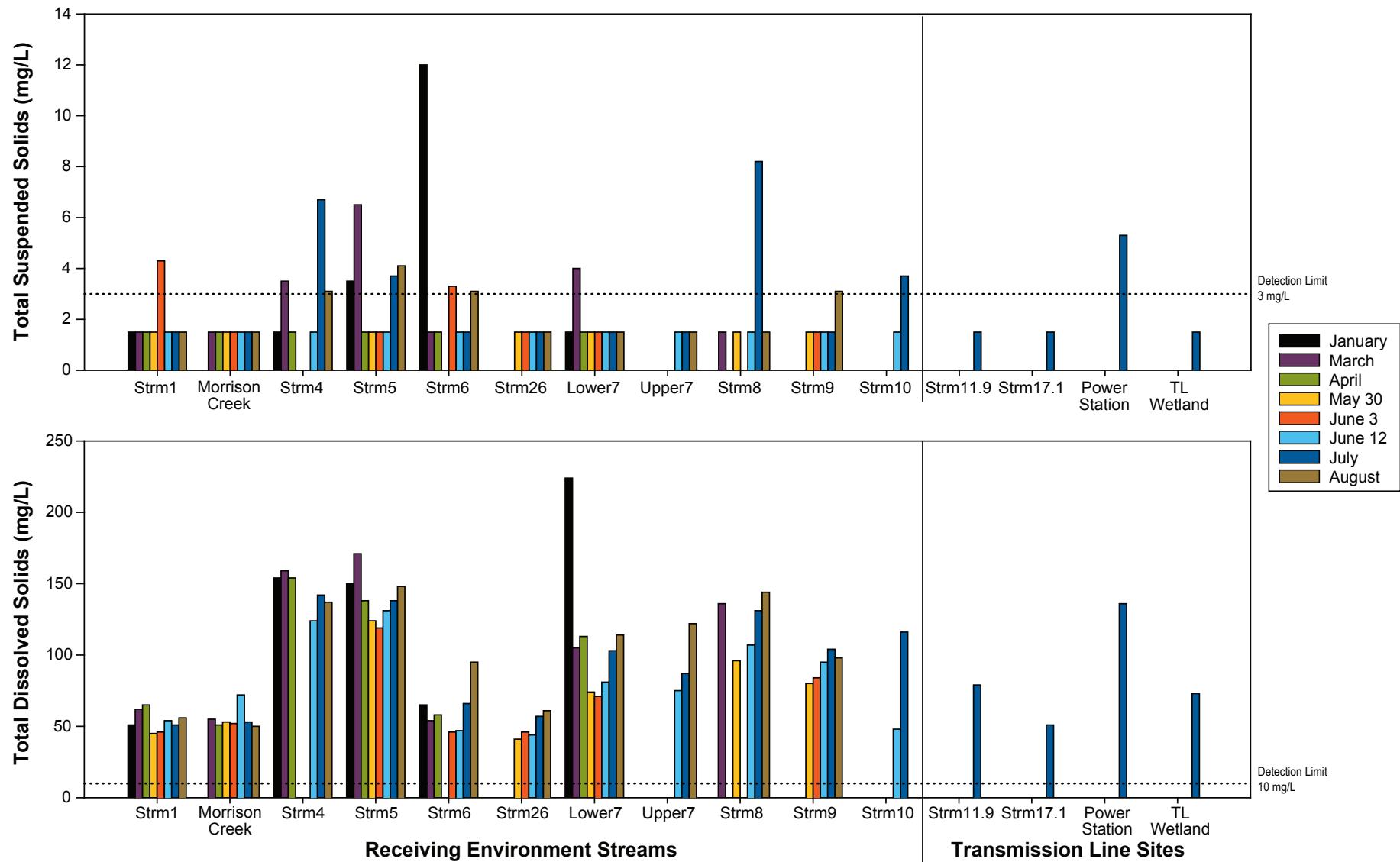
Most TSS concentrations were below the detection limit of 3 mg/L (77% below detection limit for receiving environment streams, and 75% for transmission line sites). TSS concentrations in the receiving environment streams ranged from below the detection limit (all sites) to 12 mg/L (Strm6, Jan.) (Figure 3.1-2). TSS concentrations spiked sporadically throughout the year. At the transmission line sites only Power Station detected TSS with a concentration of 5.3 mg/L (Figure 3.1-2). No guidelines exist for TSS.

Total dissolved solid (TDS) concentrations followed similar trends to hardness concentrations though seasonal variability was not as pronounced. As in previous years, concentrations were highest at Strm4, Strm5 and Lower7. TDS concentrations within the receiving environment



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Hardness Concentrations and pH Values, 2008

FIGURE 3.1-1



Note: No CCME or BC guidelines exist for
Total Suspended Solids or Total Dissolved Solids.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Total Suspended Solid and Total Dissolved Solid Concentrations, 2008

Results

ranged from 41 mg/L (Strm26, May 30) to 224 mg/L (Lower7, Jan.) (Figure 3.1-2). Concentrations within the transmission line sites ranged from 51 mg/L (Strm17.1) to 136 mg/L (Power Station) (Figure 3.1-2). No BC or CCME guidelines exist for total dissolved solids.

Turbidity was low at all sites, with higher values observed during the spring and summer months. Turbidity within the receiving environment streams ranged from 0.20 nephelometric turbidity units (NTU) (Lower7, Aug.) to 4.94 NTU (Strm5, March) (Figure 3.1-3). Turbidity in the transmission line sites had a similar range from 0.30 NTU (Strm17.1) to 3.34 NTU (Power Station) (Figure 3.1-3). No BC or CCME guidelines exist for turbidity.

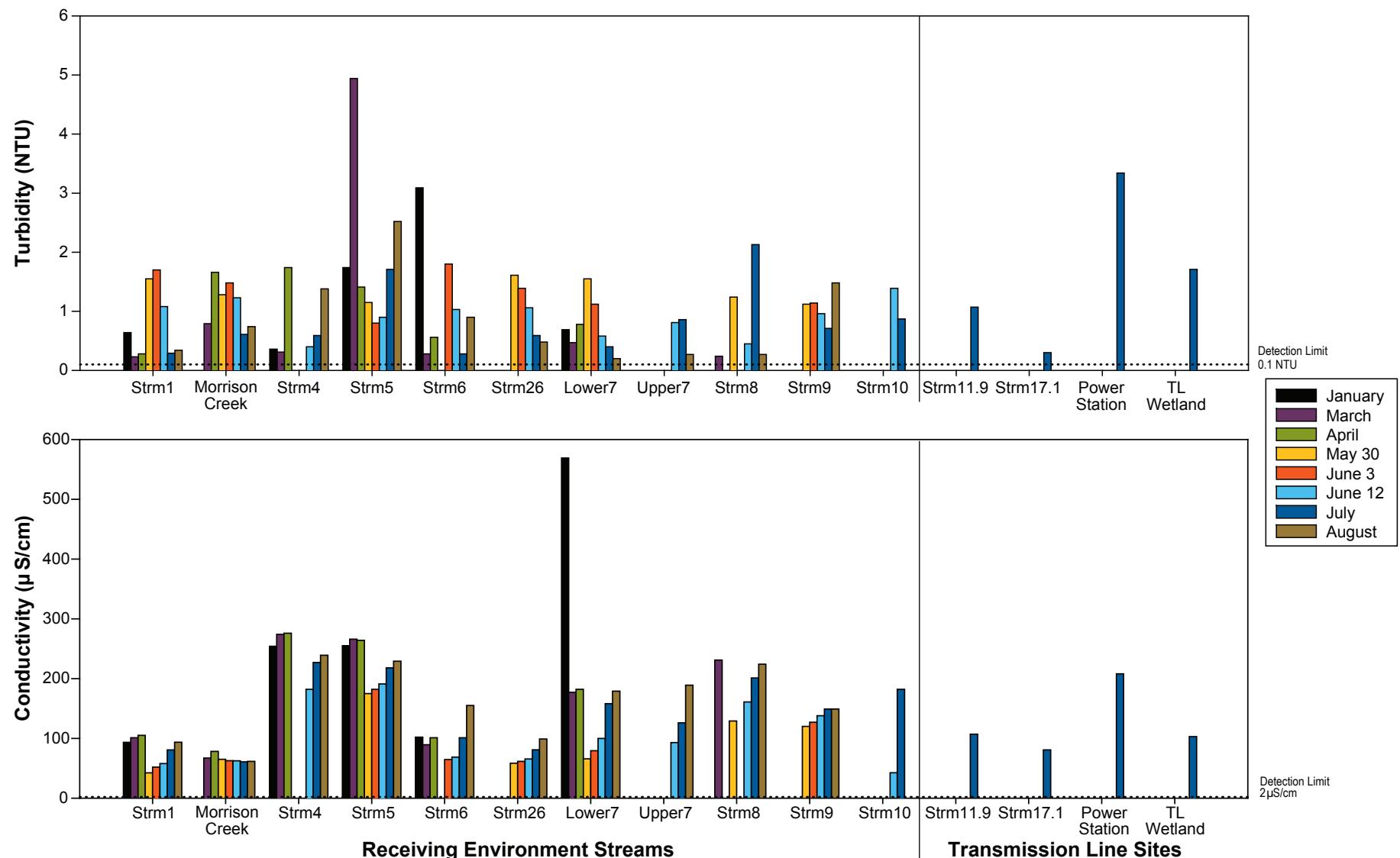
Conductivity had a similar spatial pattern to TDS and hardness. Conductivity in the receiving environment streams ranged from 42.3 µS/cm (Strm1, May 30) to 569 µS/cm (Lower7, Jan.) (Figure 3.1-3). The value at Lower7 (Jan.) was roughly four times higher than the all other sites in the receiving environment (likely as a result of contamination). Values in the transmission line sites ranged from 80.7 µS/cm (Strm17.1) to 208 µS/cm (Power Station) (Figure 3.1-3). No BC or CCME guidelines exist for conductivity.

Fluoride concentrations within the receiving environment streams ranged from 0.02 mg/L (Strm26, June 12) to 0.09 mg/L (Strm9, July), while concentrations at the transmission line sites ranged from 0.03 mg/L (Strm17.1) to 0.07 mg/L (Power Station) (Figure 3.1-4). Fluoride concentrations were lowest during the freshet months. Within the receiving environment fluoride concentrations appear to increase from south to north. The BC and CCME guidelines were not exceeded at any sites.

Sulphate concentrations were roughly four times higher at Strm4 and Strm5 than all other sites (Figure 3.1-4). Within the receiving environment streams sulphate ranged from below the detection limit (<0.50 mg/L, Strm10, June 12) to 23.2 mg/L (Strm5, Jan.). Sulphate concentrations at the transmission line sites ranged from below the detection limit (Power Station) to 1.41 mg/L (Strm17.1) (Figure 3.1-4). All concentrations were below the BC Maximum (BC Max) guideline of 100 mg/L. No CCME or BC 30-day Mean guidelines exist for sulphate.

Seasonal variability was high for nitrate concentrations, with winter and fall months having the highest concentrations. Concentrations in the receiving environment streams ranged from below the detection limit of <0.0050 mg/L (Strm1 and Strm26, freshet months) to 38.7 mg/L (Lower7, Jan.) (Figure 3.1-5). Except for Lower7 (Jan.), all nitrate concentrations in the receiving environment were below 0.30 mg/L. Lower7 (Jan.) exceeded the CCME guideline of 2.90 mg/L by thirteen times, but did not exceed the BC Max or 30-day Mean guidelines (200 and 40 mg/L, respectively). No other sites in the receiving environment exceeded the BC or CCME guidelines. Nitrate concentrations at the transmission line sites ranged from below the detection limit <0.0250 mg/L (Wetland) to 0.0874 mg/L (Strm17.1) (Figure 3.1-5). None of the transmission line sites exceeded the BC or CCME guidelines.

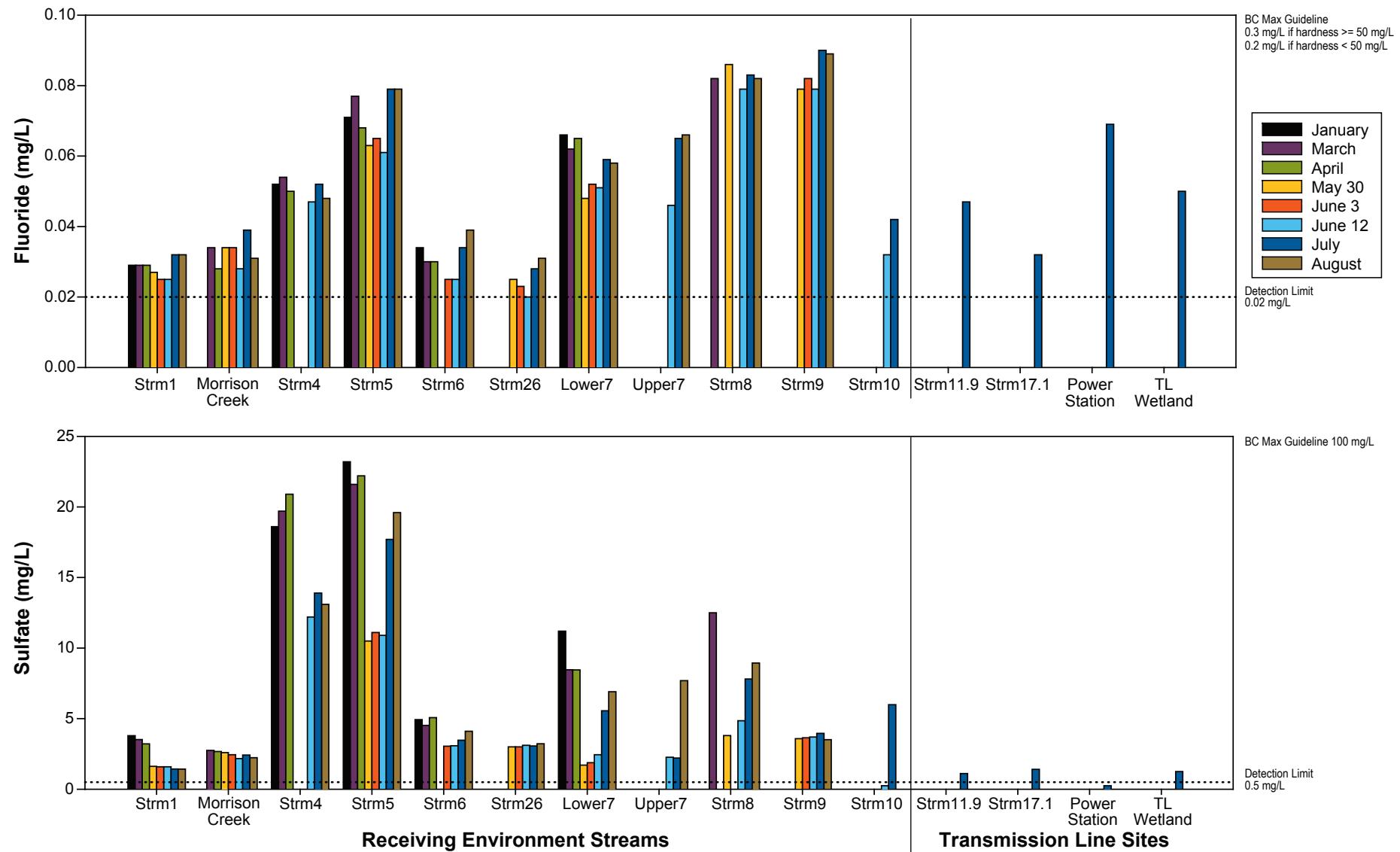
Total kjeldahl nitrogen (TKN) is a measure of organically bound nitrogen, such as ammonia and ammonium. TKN concentrations were often lowest in March and July with higher concentrations observed June 3 and August. TKN in the receiving environment streams ranged



Note: BC guidelines for Turbidity are dependant on background levels. CCME guidelines do not exist.
No CCME or BC guidelines exist for Conductivity.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Turbidity and Conductivity Values, 2008

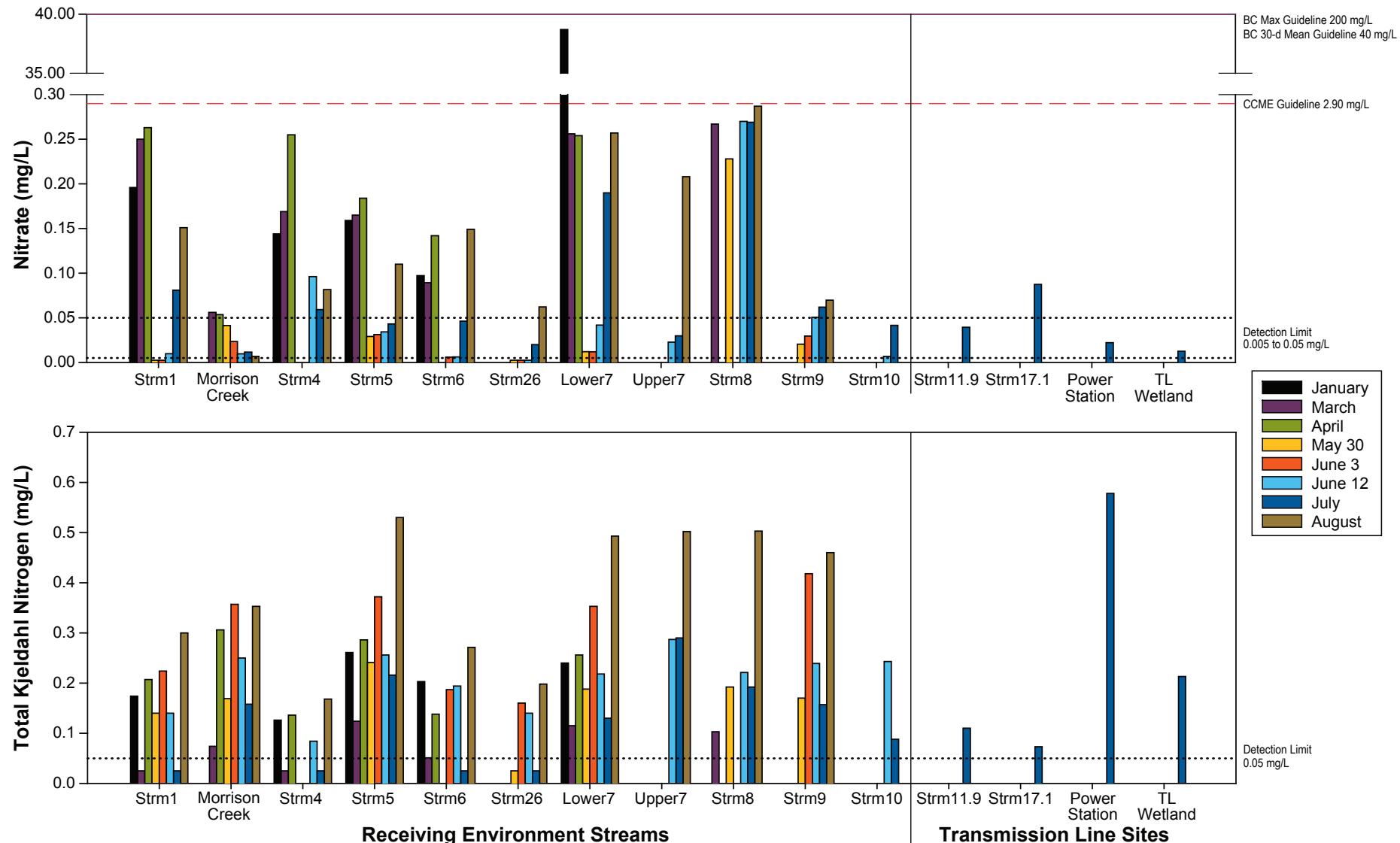


Note: Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Fluoride and Sulphate Concentrations, 2008

FIGURE 3.1-4



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Nitrate and Total Kjeldahl Nitrogen Concentrations, 2008



FIGURE 3.1-5

Results

from below the detection limit (<0.050 mg/L, at several sites) to 0.53 mg/L (Strm5, Aug.) (Figure 3.1-5). At the transmission line sites, TKN ranged from 0.073 mg/L (Strm17.1) to 0.578 mg/L (Power Station). No BC or CCME guidelines for TKN exist (Figure 3.1-5).

Total nitrogen (TN) is the sum of all inorganic and organic nitrogen. Seasonal and spatial patterns and concentrations for TN were similar to TKN indicating that organic nitrogen made up a large proportion of total nitrogen. TN in the receiving environment streams ranged from below the detection limit <0.05 mg/L (Strm26, May) to 0.79 mg/L (Strm8, Aug.) (Figure 3.1-6). In the transmission line sites TN ranged from 0.15 mg/L (Strm11.9) to 0.60 mg/L (Power Station) (Figure 3.1-6). There are no BC or CCME guidelines for total nitrogen.

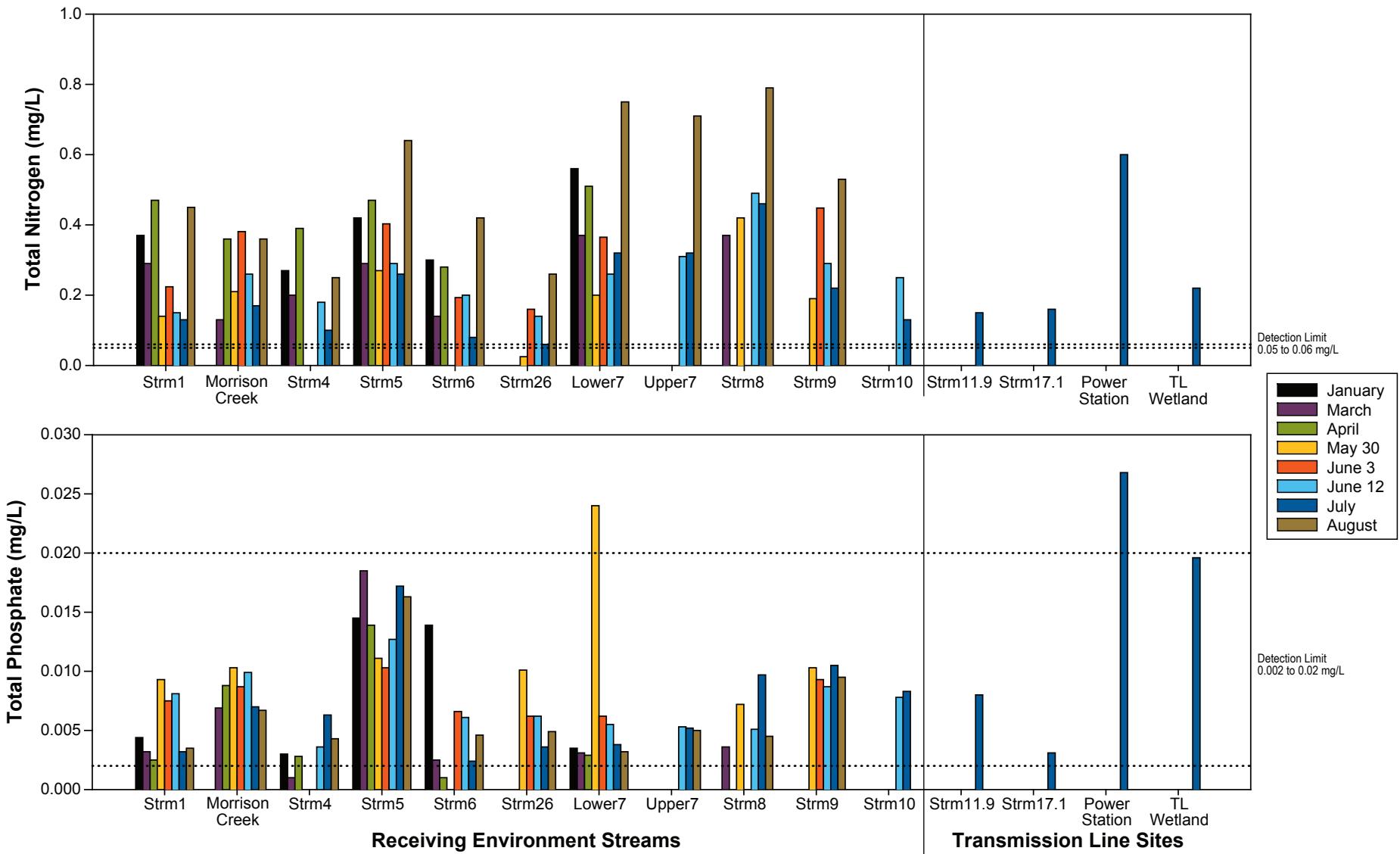
Total phosphate (TP) concentrations in the receiving environment streams ranged from below the detection limit of <0.002 mg/L (Strm4, March, and Strm6, April) to 0.024 mg/L (Lower7, May 30) (Figure 3.1-6). Concentrations were generally higher at Strm5 than all other sites. Concentrations were highest during the spring and summer months at most sites, except for Strm5 which tended to have the lowest concentrations at this time of year. TP concentrations at the transmission line sites ranged from 0.0031 mg/L (Strm17.1) to 0.0268 mg/L (Power Station) (Figure 3.1-6). Concentrations were considerably higher at the Wetland and Power Station sites compared to the other transmission line sites. No BC or CCME guidelines exist for TP.

Total organic carbon (TOC) had high seasonal variability, with concentrations highest during the freshet months. In the receiving environment streams TOC ranged from 2.33 mg/L (Strm4, March) to 15.5 mg/L (Lower7, May 30) (Figure 3.1-7). The TOC concentration at the transmission line sites ranged from 5.11 mg/L (Strm17.1) to 14.9 mg/L (Power Station) (Figure 3.1-7). There are no BC or CCME guidelines for total organic carbon.

Total cyanide (TCN) concentrations were naturally high throughout the entire study area, exceeding the BC 30-day Mean and CCME guideline of 0.005 mg/L at all sites except for Strm17.1. Most sites exceeded this guideline during the freshet months. Lower7, Power Station and Wetland also exceeded the BC Max guideline of 0.010 mg/L. In the receiving environment streams TCN ranged from below the detection limit of 0.0010 mg/L (at several sites) to 0.0126 mg/L (Lower7, May 30) (Figure 3.1-7). Transmission line site TCN concentrations ranged from 0.0042 mg/L (Strm17.1) to 0.0122 mg/L (Power Station) (Figure 3.1-7).

3.1.2 Total and Dissolved Metals

Metals discussed in this report had at least 75% of their values above their respective detection limits or were of interest as they exceeded CCME or BC aquatic life guidelines. Antimony, beryllium, bismuth, boron, chromium, cobalt, lead, lithium, mercury, nickel, selenium, silver, thallium, tin, titanium, uranium, vanadium and zinc had more than 75% of their values below detection limits and did not exceed CCME or BC guidelines, therefore these metals are not discussed further. All data can be found in Appendices 3.1-1 and 3.1-2. The percentage of samples exceeding BC, maximum (Max) and 30-day Mean, and CCME guidelines at each site are presented in Appendix 3.1-3. A summary of these exceedances are at the end of this section in



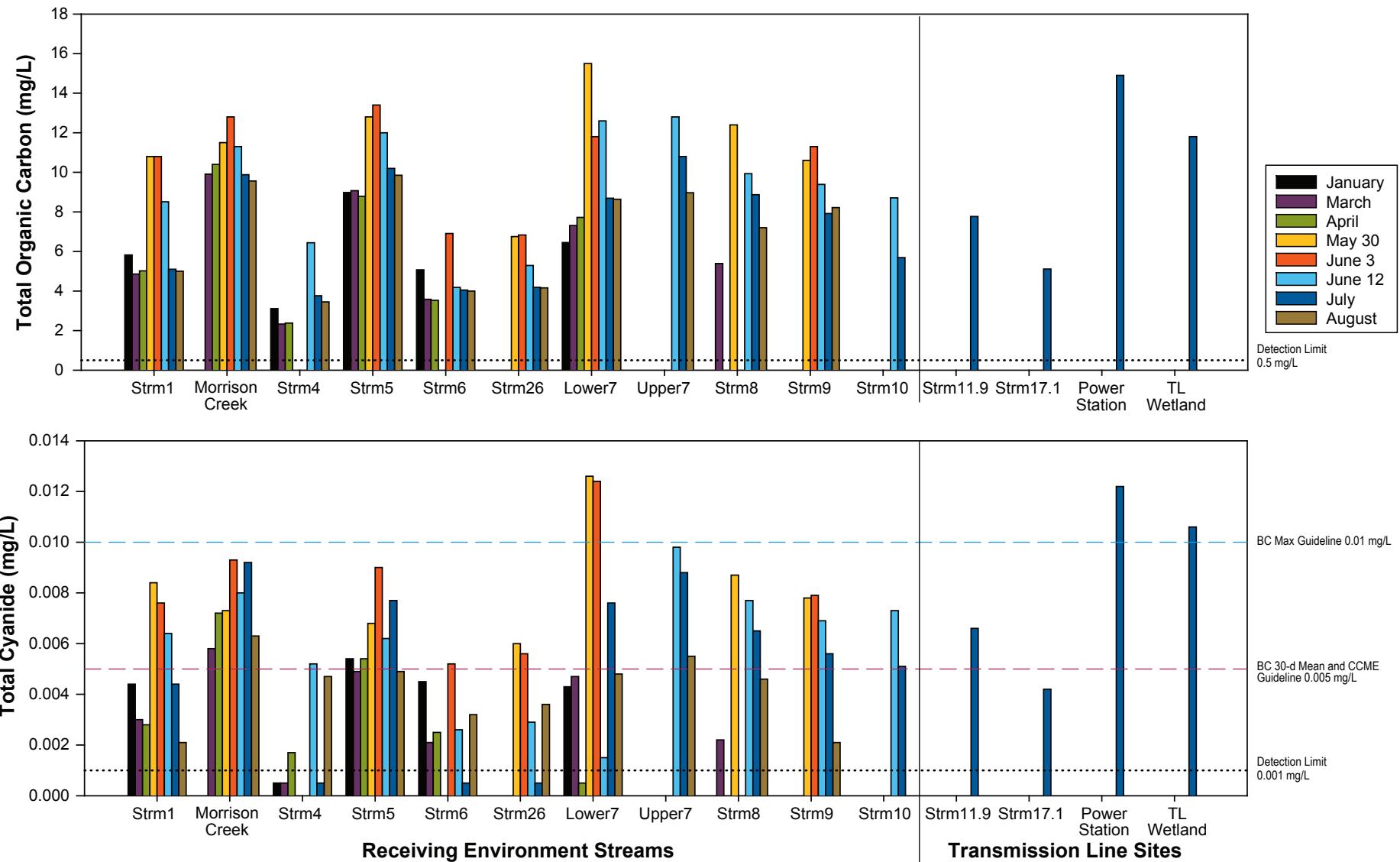
Note: No CCME or BC guidelines exist for Total Nitrogen and Total Phosphate.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Total Nitrogen and Total Phosphate Concentrations, 2008



FIGURE 3.1-6



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Total Organic Carbon and Total Cyanide Concentrations, 2008



FIGURE 3.1-7

Results

Table 3.1-1. CCME and BC guidelines for total metals were used to screen both total and dissolved metal concentrations, with the exception of dissolved aluminum which has specific BC guidelines.

Total aluminum concentrations varied widely throughout the year. Total aluminum concentrations within the receiving environment ranged from 0.0034 mg/L (Strm9, July) to 0.1600 mg/L (Strm10, June 12) (Figure 3.1-8). Dissolved aluminum within the receiving environment ranged from 0.0016 mg/L (Strm4, March) to 0.1400 mg/L (Strm10, June 12) (Figure 3.1-8). Total aluminum exceeded the CCME guideline (0.10 mg/L if pH \geq 6.5) at six sites within the receiving environment. Lower7 (Jan.) also exceeded the CCME guideline (0.005 mg/L if pH $<$ 6.5) due to its lower pH. Lower7 and Strm10 dissolved aluminum concentrations exceeded the BC Max and BC 30-day mean guidelines of 0.10 mg/L and 0.05 mg/L, respectively. Dissolved aluminum also exceeded the BC 30-day Mean guideline at Strm1 and Upper7. Total aluminum concentrations in 2008 were similar to the concentrations observed in 2005 and 2007, though peak concentrations observed this year were not as high as peaks in 2005 and 2007. Dissolved aluminum concentrations were most similar to 2004, with most concentrations below 0.05 mg/L and occasional peaks just over the CCME guideline of 0.10 mg/L.

Total aluminum concentrations at the transmission line sites ranged from 0.0087 mg/L (Wetland) to 0.0199 mg/L (Strm17.1), while dissolved aluminum concentrations ranged from 0.0033 mg/L (Power Station) to 0.0135 mg/L (Strm17.1) (Figure 3.1-8). None of the total or dissolved aluminum concentrations at the transmission line sites exceeded the BC or CCME guidelines.

Total arsenic concentrations in the receiving environment streams ranged from 0.00011 mg/L (Strm1, April) to 0.00345 mg/L (Strm5, Aug.) (Figure 3.1-9). Dissolved arsenic in the receiving environment ranged from 0.00012 mg/L (Strm1 Jan. and March, and Strm26 June 3) to 0.00289 mg/L (Strm5, Aug.) (Figure 3.1-9). Dissolved arsenic concentrations were very similar to total arsenic, indicating that a considerable amount of arsenic was in the dissolved form. Total and dissolved arsenic concentrations at Strm5 were much higher than all other sites as observed in previous years. Total arsenic concentrations at the transmission line sites ranged from 0.00013 mg/L (Strm17.1) to 0.00063 mg/L (Wetland), while dissolved arsenic ranged from 0.00012 mg/L (Strm17.1) to 0.00051 mg/L (Wetland) (Figure 3.1-9). None of the transmission line or receiving environment arsenic concentrations exceeded the BC Max or CCME guidelines.

Total and dissolved barium concentrations in previous years were highest at Strm4 and Strm5. In 2008, barium concentrations were also high at Strm8 and Strm9. Total barium concentrations in the receiving environment streams ranged from 0.0104 mg/L (Strm26, June 12) to 0.0602 mg/L (Strm4, March) (Figure 3.1-10). Dissolved barium had very similar concentrations to total barium in the receiving environment and ranged from 0.00932 mg/L (Strm26, May 30) to 0.0592 mg/L (Strm4, March) (Figure 3.1-10). As in previous years, most of the barium was in the dissolved form. Total barium concentrations at the transmission line sites ranged from 0.0187 mg/L (Strm17.1) to 0.0655 mg/L (Wetland), while dissolved barium ranged from 0.0184 mg/L (Strm17.1) to 0.0621 mg/L (Wetland) (Figure 3.1-10). None of the total or dissolved barium concentrations within the receiving environment or transmission line sites exceeded the BC Max guideline of 5 mg/L or the BC 30-day Mean guideline of 1 mg/L. No CCME guideline exists for barium.

Table 3.1-1
Morrison Copper/Gold Project Guideline Exceedance (%) Summary for Water Quality Stream Sites, 2008

n	BC Max										Power Station	Wetland	Guideline Value
	Strm1	Strm5	Strm6	Strm26	Lower7	Strm10	1	1					
Total Cyanide	-	-	-	-	25%	-	100%	100%			0.01		
Total Cadmium	13%	-	14%	-	-	-	-	-			A,B		
Total Copper	-	25%	-	-	-	-	-	-			C		
Total Iron	-	-	-	-	-	-	-	100%			0.3B		
Dissolved Aluminum	-	-	-	-	14%	50%	-	-			0.1A		
Dissolved Cadmium	13%	-	-	20%	-	-	-	-			A,B		
Dissolved Copper	-	-	-	-	-	-	-	-			C		
Dissolved Iron	-	-	-	-	-	-	-	100%			0.3B		

n	BC 30 day Mean														
	Strm1	Morrison Creek	Strm4	Strm5	Strm6	Strm26	Lower7	Upper7	Strm8	Strm9	Strm10	Strm11.9	Power Station	Wetland	Guideline Value
Total Cyanide	38%	100%	17%	75%	14%	40%	38%	100%	60%	80%	100%	100%	100%	100%	0.005
Total Copper	13%	-	-	100%	-	-	-	-	-	-	-	-	-	-	C
Dissolved Aluminum	25%	-	-	-	-	-	43%	33%	-	-	50%	-	-	-	0.05A
Dissolved Copper	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	C

n	CCME														
	Strm1	Morrison Creek	Strm4	Strm5	Strm6	Strm26	Lower7	Upper7	Strm8	Strm9	Strm10	Strm11.9	Power Station	Wetland	Guideline Value
Total Cyanide	38%	100%	17%	75%	14%	40%	38%	100%	60%	80%	100%	100%	100%	100%	0.005
Total Aluminum	25%	-	-	-	29%	20%	38%	-	20%	-	50%	-	-	-	0.1A
Total Cadmium	25%	14%	17%	25%	14%	-	13%	-	-	-	50%	-	100%	-	A
Total Copper	13%	-	-	100%	-	-	-	-	-	-	-	-	-	-	A
Total Iron	-	14%	-	-	-	-	-	-	-	-	-	100%	-	100%	0.3
Dissolved Cadmium	38%	-	17%	25%	-	20%	-	-	-	-	-	-	-	-	A
Dissolved Copper	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	A
Dissolved Iron	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	0.3

Results are expressed as milligrams per litre.

A: CCME guideline:

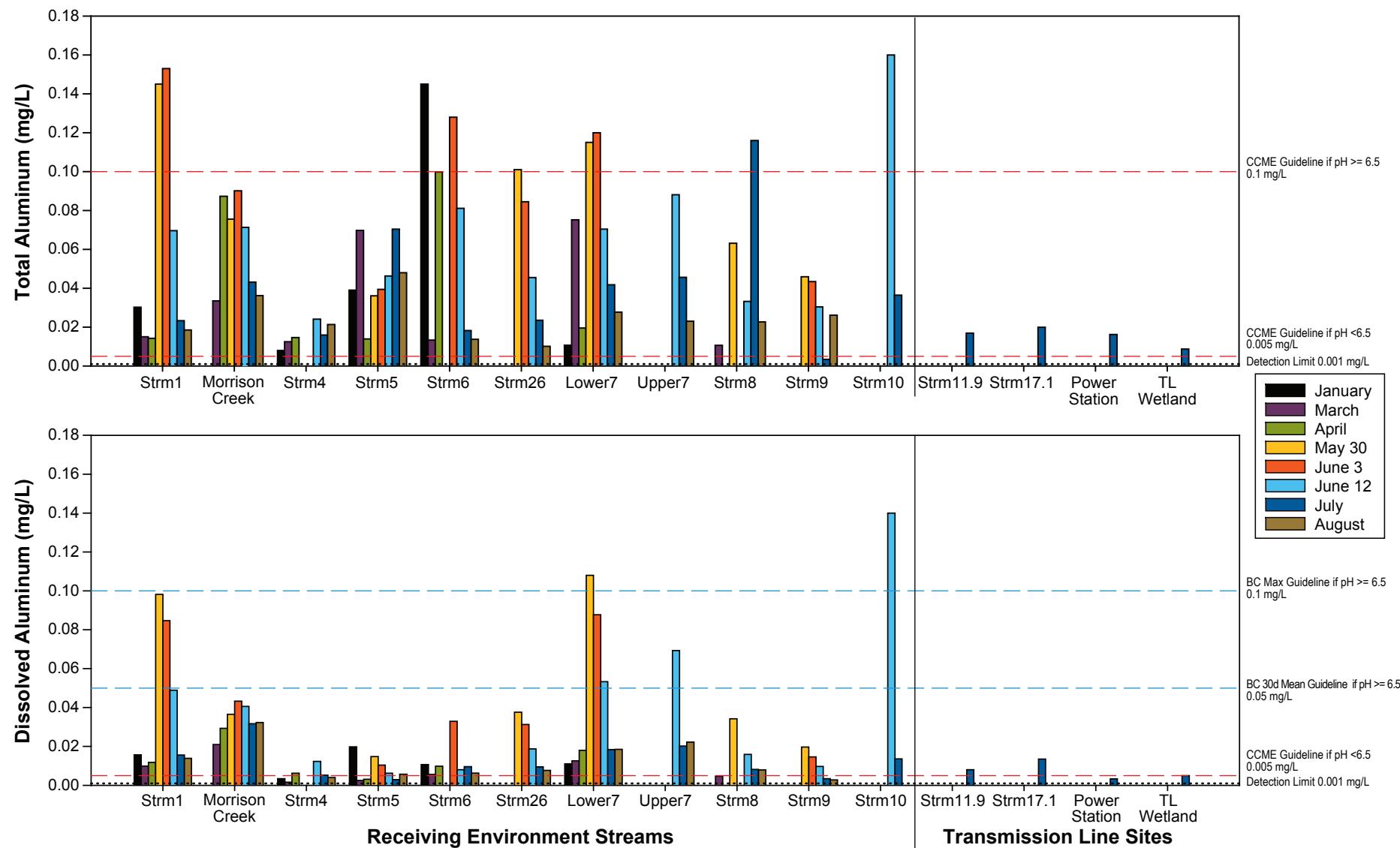
for aluminum: pH>6.5

for cadmium guideline = $0.001 * 10 \{0.86[\log(\text{hardness})] - 3.2\}$ mg/L

for copper: CCME = 0.002 mg/L at 0-120 mg/L [CaCO₃], 0.003mg/L at 120 - 180 mg/L [CaCO₃], 0.004 mg/L at >180 mg/L [CaCO₃]

B: Working BC guideline

C: Max. Cu guideline of $(0.094(\text{hardness})+2)$ µg/L. The 30-d mean Cu guideline is ≤ 2 µg/L for hardness ≤ 50 mg/L, and guideline is $\leq 0.04 * (\text{mean hardness})$ µg/L for hardness > 50 mg/L.



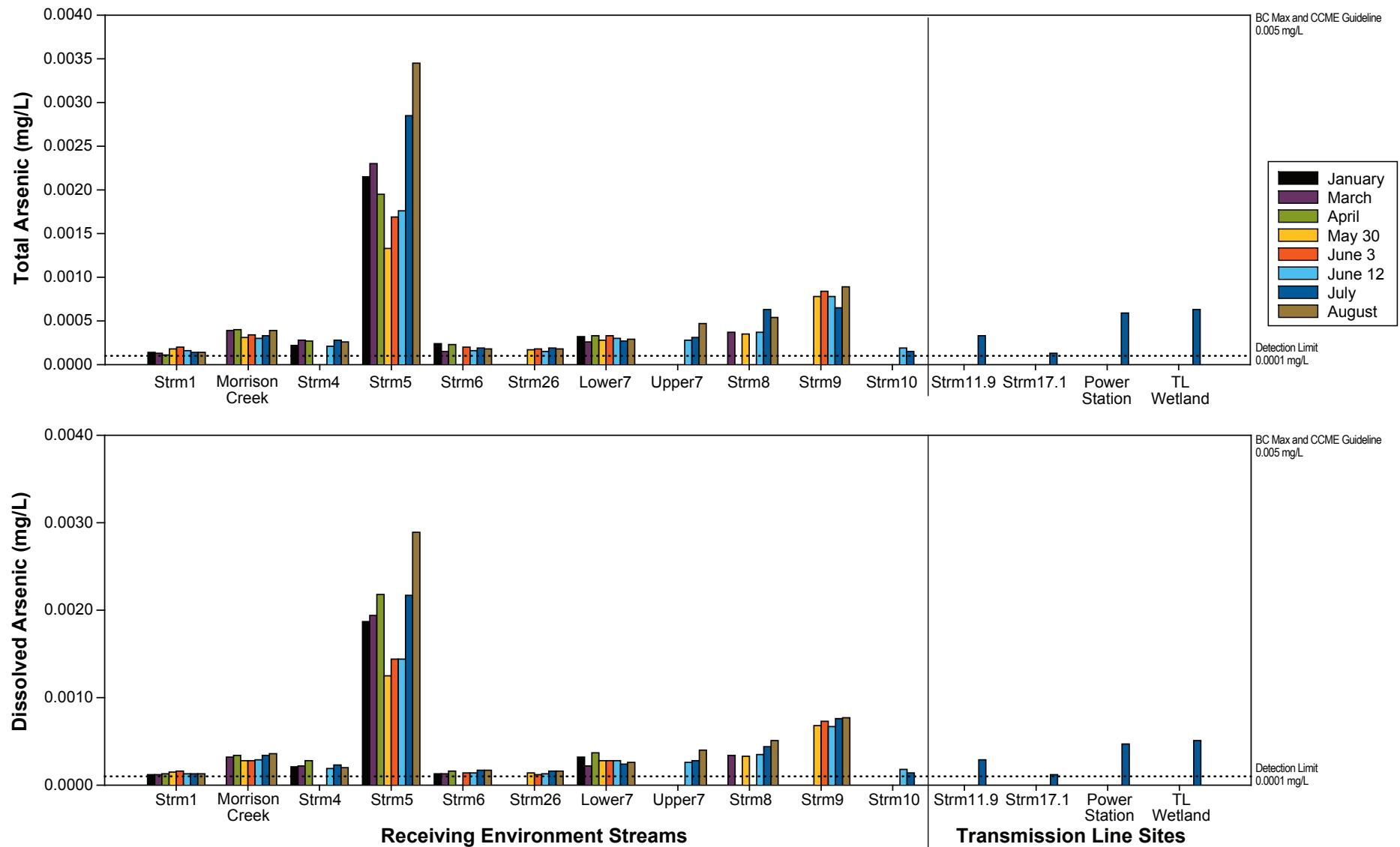
Note: Dashed lines indicate BC and/or CCME Water Quality Guidelines for the Protection of Aquatic Life.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Total and Dissolved Aluminum Concentrations, 2008



FIGURE 3.1-8



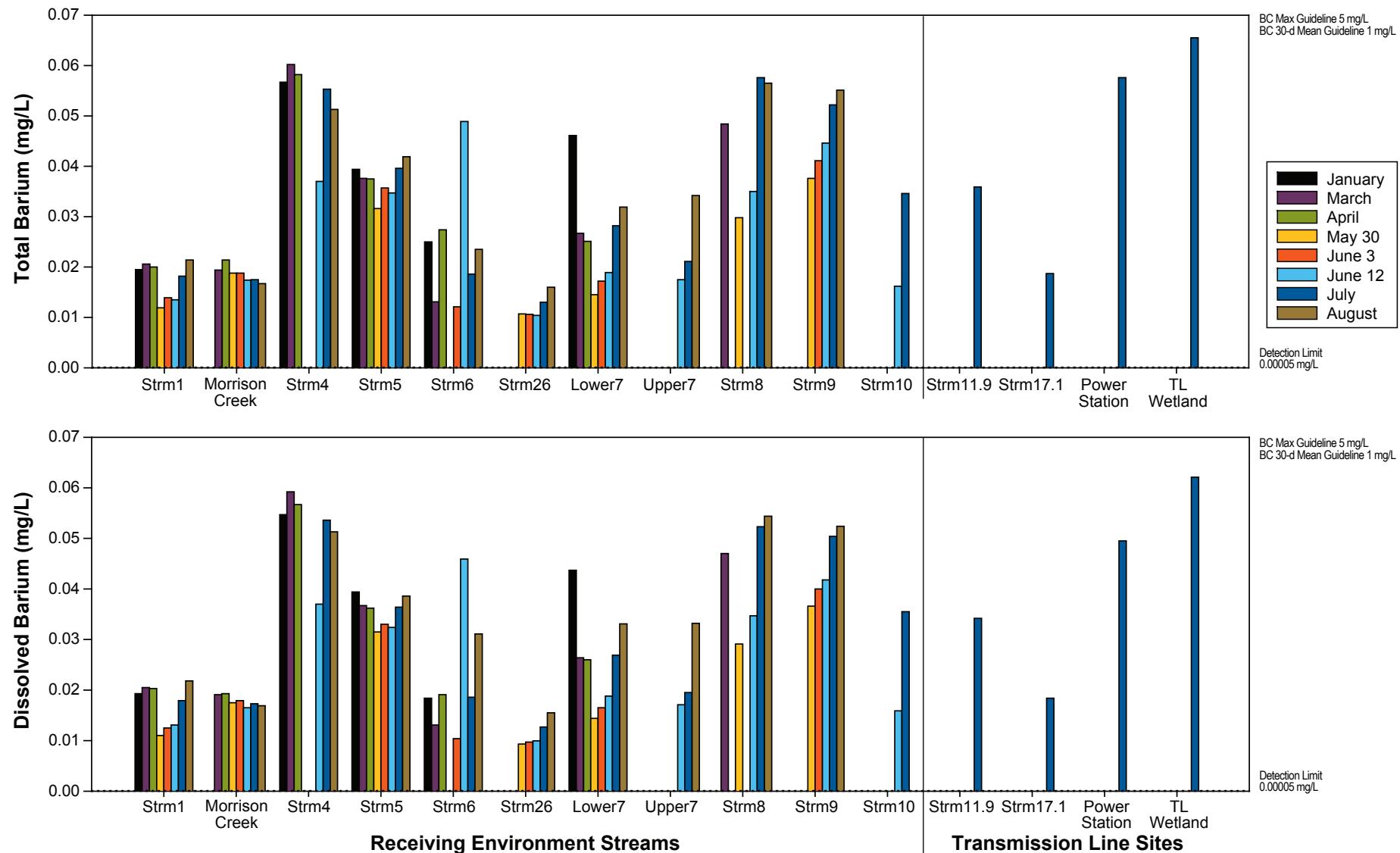
Note: Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Total and Dissolved Arsenic Concentrations, 2008



FIGURE 3.1-9



Note: Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Total and Dissolved Barium Concentrations, 2008



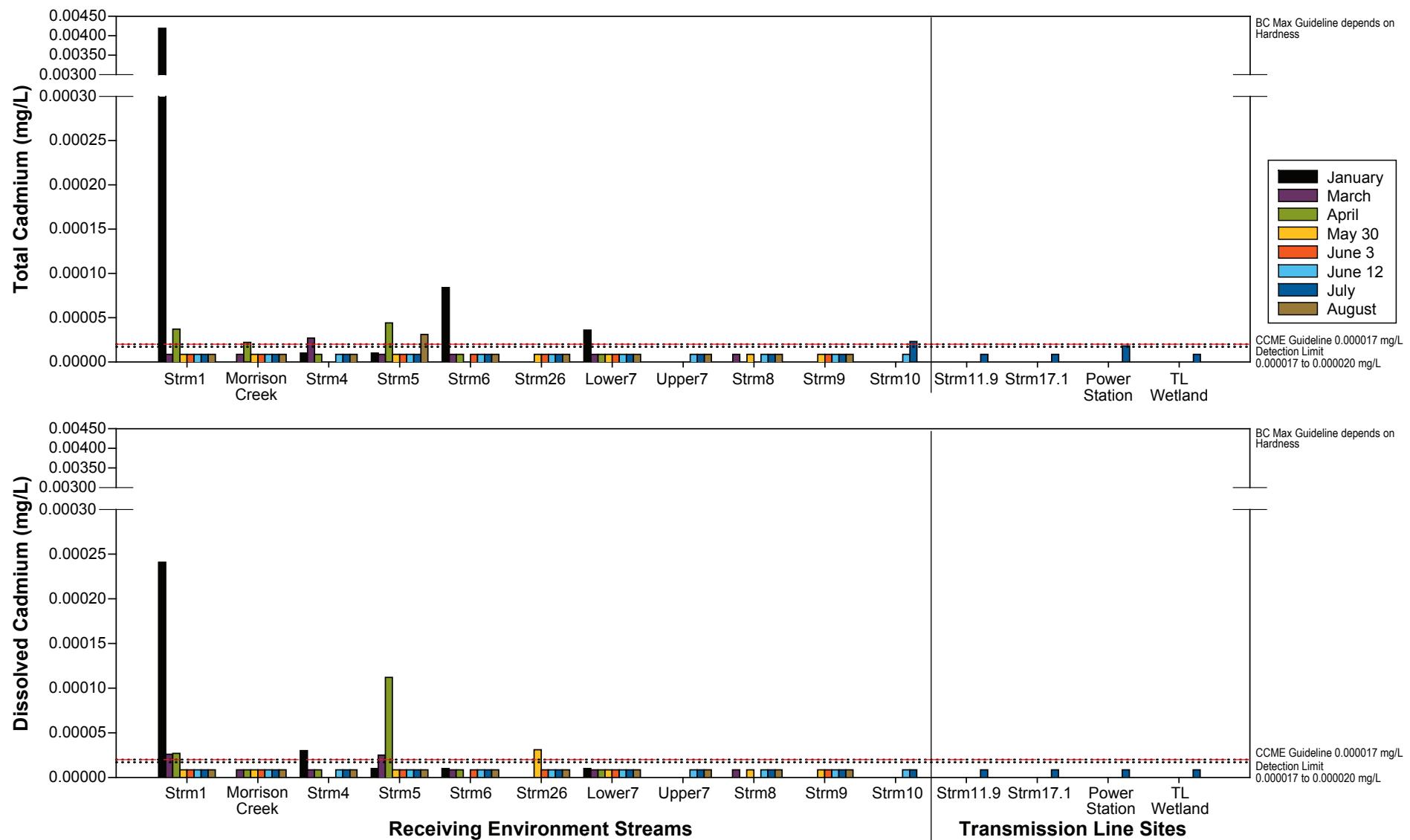
FIGURE 3.1-10

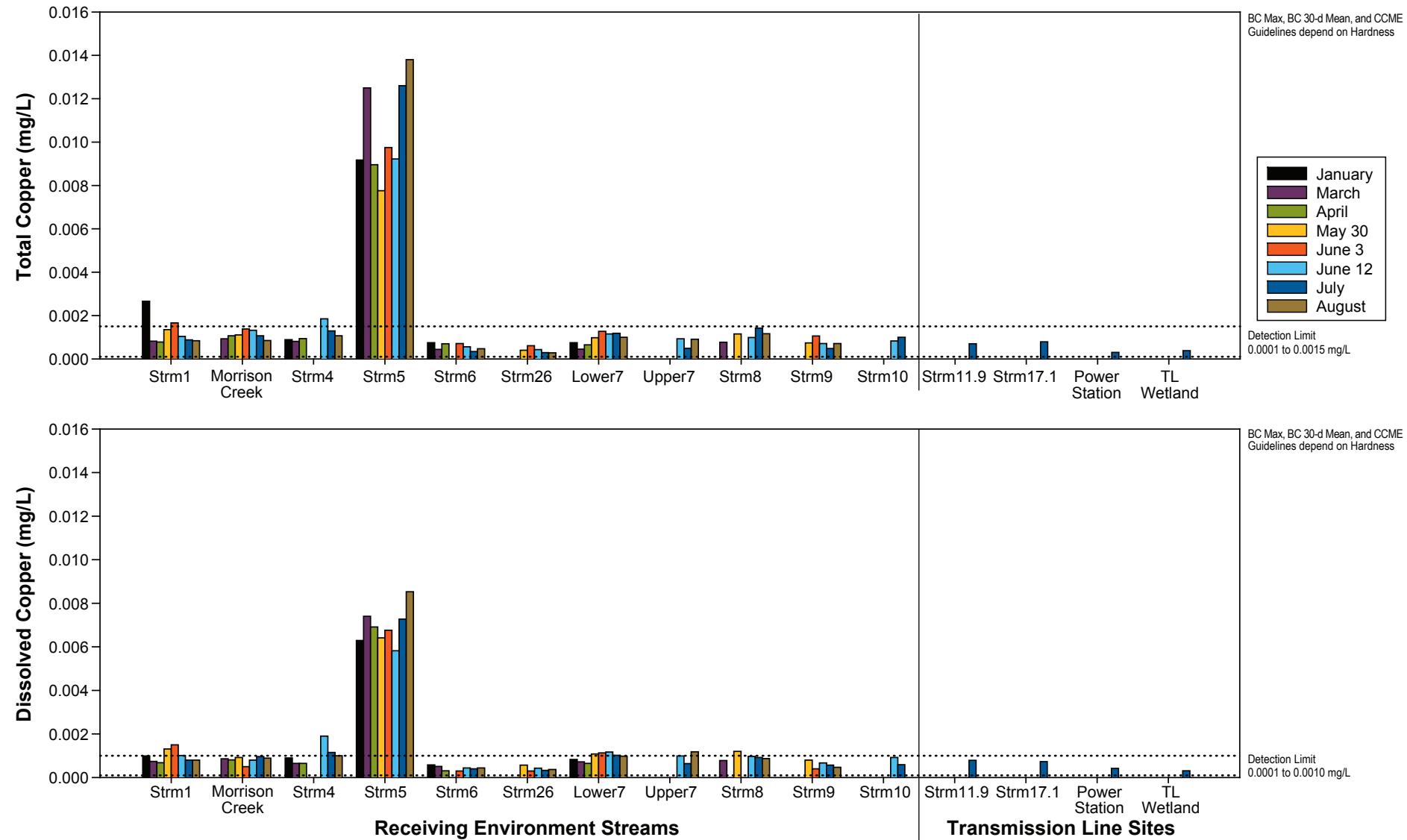
Results

Total and dissolved cadmium concentrations were mostly below detection limits, though due to a number of exceedances it is discussed and supported with a figure. Total cadmium concentrations in the receiving environment ranged from below detection limits (<0.000017 to 0.000020 mg/L, all sites) to 0.00419 mg/L (Strm1, Jan.) (Figure 3.1-11). Dissolved cadmium concentrations in the receiving environment ranged from below the detection limit to 0.000241 mg/L (Strm1, Jan.) (Figure 3.1-11). A significant spike in total and dissolved cadmium occurred at Strm1 in January, exceeding the CCME guideline of 0.000017 mg/L by two hundred and forty six times for total cadmium, and fourteen times for dissolved cadmium. Total cadmium concentrations have never been observed this high in previous years. The CCME guideline for total cadmium was also exceeded by five other sites in the receiving environment. Dissolved cadmium exceeded the CCME guideline at least once at Strm1, Strm4, Strm5 and Strm26. The BC Max guideline, which depends on hardness, was exceeded by total and dissolved cadmium at Strm1 (Jan.). Total cadmium at Strm6 (Jan.) and dissolved cadmium at Strm26 (May 30) also exceeded the BC Max guideline. In the transmission line sites total cadmium was only detected at Power Station with a concentration of 0.000018 mg/L, exceeding the CCME guideline. Dissolved cadmium was not detected in the transmission line sites (Figure 3.1-11).

Copper concentrations were generally quite low throughout the study area except at Strm5. Strm5 is located near the main mine deposit where copper concentrations are expected to be naturally high. Copper concentrations at this site were also high in previous years. Total copper in the receiving environment streams ranged from 0.00028 (Strm26, Aug.) to 0.01380 mg/L (Strm5, Aug.) (Figure 3.1-12). Dissolved copper had similar concentrations to total copper indicating that copper was primarily in the dissolved form. Dissolved copper in the receiving environment streams ranged from below the detection limit <0.0060 mg/L (Strm6 and Strm26, June 3) to 0.00853 mg/L (Strm5, Aug.) (Figure 3.1-12). The BC and CCME guidelines depend on hardness concentrations. The BC Max guideline for total copper was exceeded at Strm5 in July and August. No dissolved copper concentrations exceeded the BC Max guideline. All total and dissolved copper concentrations at Strm5 exceeded the BC 30-day Mean and CCME guidelines, with no other sites exceeding. Total copper concentrations at the transmission line sites ranged from below the detection limit <0.0060 mg/L (Power Station) to 0.00079 mg/L (Strm17.1) (Figure 3.1-12). Dissolved copper at these sites ranged from 0.00031 (Wetland) to 0.00079 mg/L (Strm11.9) (Figure 3.1-12). None of the total or dissolved copper concentrations at the transmission line sites exceeded BC or CCME guidelines.

Total iron concentrations in the receiving environment streams ranged from below the detection limit <0.030 mg/L (most sites) to 0.386 mg/L (Morrison Creek, April) (Figure 3.1-13). Dissolved iron in the receiving environment ranged from below the detection limit (most sites) to 0.265 mg/L (Morrison Creek, April) (Figure 3.1-13). Morrison Creek had slightly higher total and dissolved iron concentrations consistently throughout the year than all other sites. This was also observed in previous baseline years. The BC Max and CCME guideline of 0.3 mg/L was exceeded at Morrison Creek (April) for total iron. No other exceedances occurred in the receiving environment streams. The transmission line site total iron concentrations ranged from below the detection limit (Strm17.1) to 1.3 mg/L (Wetland), while dissolved iron concentrations ranged from below the detection limit (Strm17.1) to 0.64 mg/L (Wetland) (Figure 3.1-13).





Note: BC and CCME guidelines are hardness dependant.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Total and Dissolved Copper Concentrations, 2008



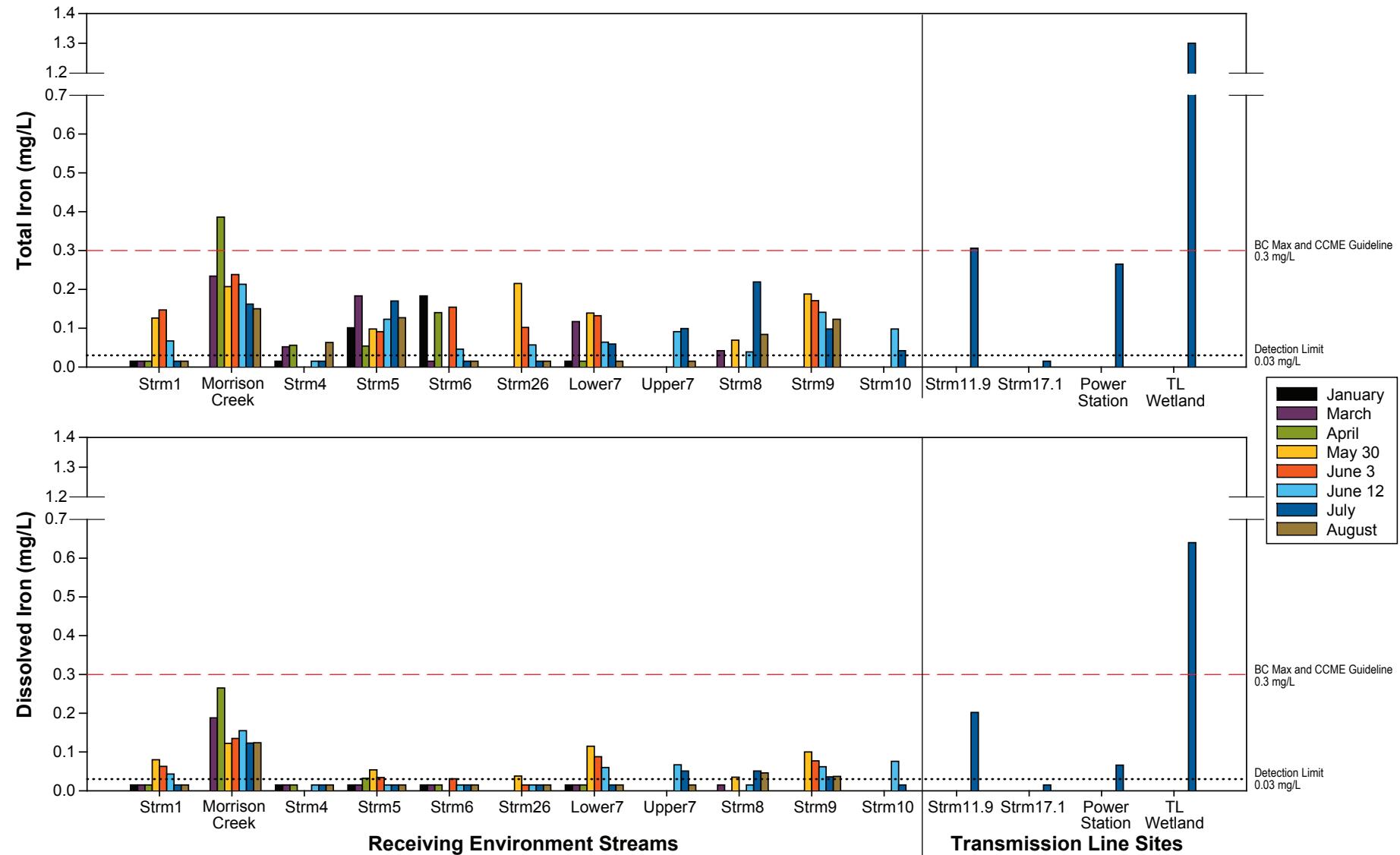
FIGURE 3.1-12

BC Max, BC 30-d Mean, and CCME Guidelines depend on Hardness

BC Max, BC 30-d Mean, and CCME Guidelines depend on Hardness

Detection Limit
0.0001 to 0.0015 mg/L

Detection Limit
0.0001 to 0.0010 mg/L



Note: Dashed lines indicate BC and/or CCME Water Quality Guidelines for the Protection of Aquatic Life.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Total and Dissolved Iron Concentrations, 2008

Concentrations of total and dissolved iron at the wetland site were much higher than all other sites. Total iron concentrations at the wetland site exceeded the BC Max and CCME guideline by four times and by approximately two times for dissolved iron. Total iron concentrations at Strm11.9 also exceeded the BC Max and CCME guideline. No other transmission line sites exceeded guidelines.

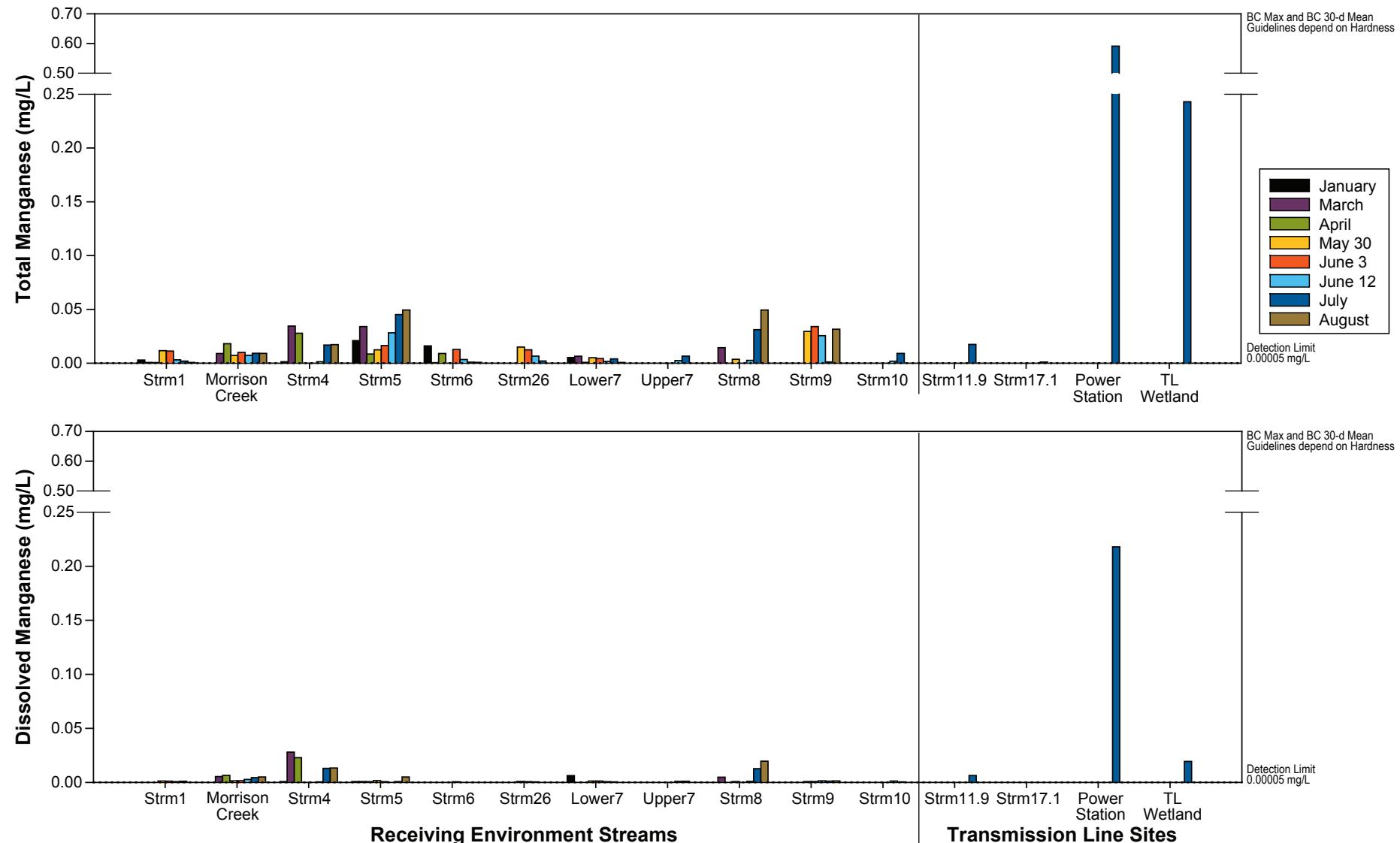
Receiving environment stream total manganese concentrations was similar to previous years. Total manganese concentrations in the receiving environment ranged from 0.000191 (Upper7, Aug.) to 0.049400 mg/L (Strm5 and Strm8, Aug.) (Figure 3.1-14). Dissolved concentrations in the receiving environment streams were considerably lower indicating that manganese was largely particulate bound. Dissolved manganese ranged from below the detection limit <0.000050 mg/L (Strm26, March) to 0.028000 mg/L (Strm4, March) (Figure 3.1-14). Total manganese concentrations at the transmission line sites were very high at Power Station and Wetland and ranged from 0.00101 (Strm17.1) to 0.591 mg/L (Power Station), while dissolved manganese ranged from 0.000379 (Strm17.1) to 0.218 mg/L (Power Station) (Figure 3.1-14). The BC guidelines for manganese are hardness dependent. None of the receiving environment streams or transmission line sites exceeded BC guidelines. No CCME guidelines exist for manganese.

Total and dissolved molybdenum concentrations were similar, indicating the molybdenum was largely in the dissolved form. Total molybdenum concentrations in the receiving environment ranged from below the detection limit <0.000050 mg/L (five sites) to 0.000841 mg/L (Strm5, Aug.), while dissolved molybdenum ranged from below the detection limit (at several sites) to 0.000786 mg/L (Strm5, Aug) (Figure 3.1-15). Concentrations at Strm5 were consistently higher than all other sites. Transmission line site total molybdenum concentrations ranged from below the detection limit (Strm17.1) to 0.000101 mg/L (Power Station), while dissolved concentrations ranged from below the detection limit (Strm17.1 and Wetland) to 0.000090 mg/L (Power Station) (Figure 3.1-15). The BC and CCME guidelines for molybdenum were not exceeded at any sites in the project area.

3.1.3 Quality Assurance and Quality Control (QA/QC)

All field and travel blank data for 2008 are available in Appendix 3.1-1. Field and travel blank data were all below MDL except for ammonia and total selenium. Ammonia occasionally exceeded the MDL, and total selenium was detected in one travel blank (July 2), just slightly above the detection limit of <0.00010 mg/L with 0.00013 mg/L.

RPD calculations between sample duplicates are presented in Appendix 3.1-4. Four duplicate pairs of samples were compared for 90 variables, using the RPD between the replicates as a measure of the variability inherent in field sampling (environmental heterogeneity). Approximately 68% of the analytical results were below MDL. Of the remaining results, approximately 8% (9 out of 115 RPD calculations) were greater than the threshold of 20% indicated by provincial guidelines: turbidity (27%), TDS (29%), total phosphate (25%), TKN (37%), TN (27%), total aluminum (125%), total copper (32%), dissolved copper (42%) and total manganese (171%). Approximately 66% (76 out of 115 RPD calculations) were below 5%.



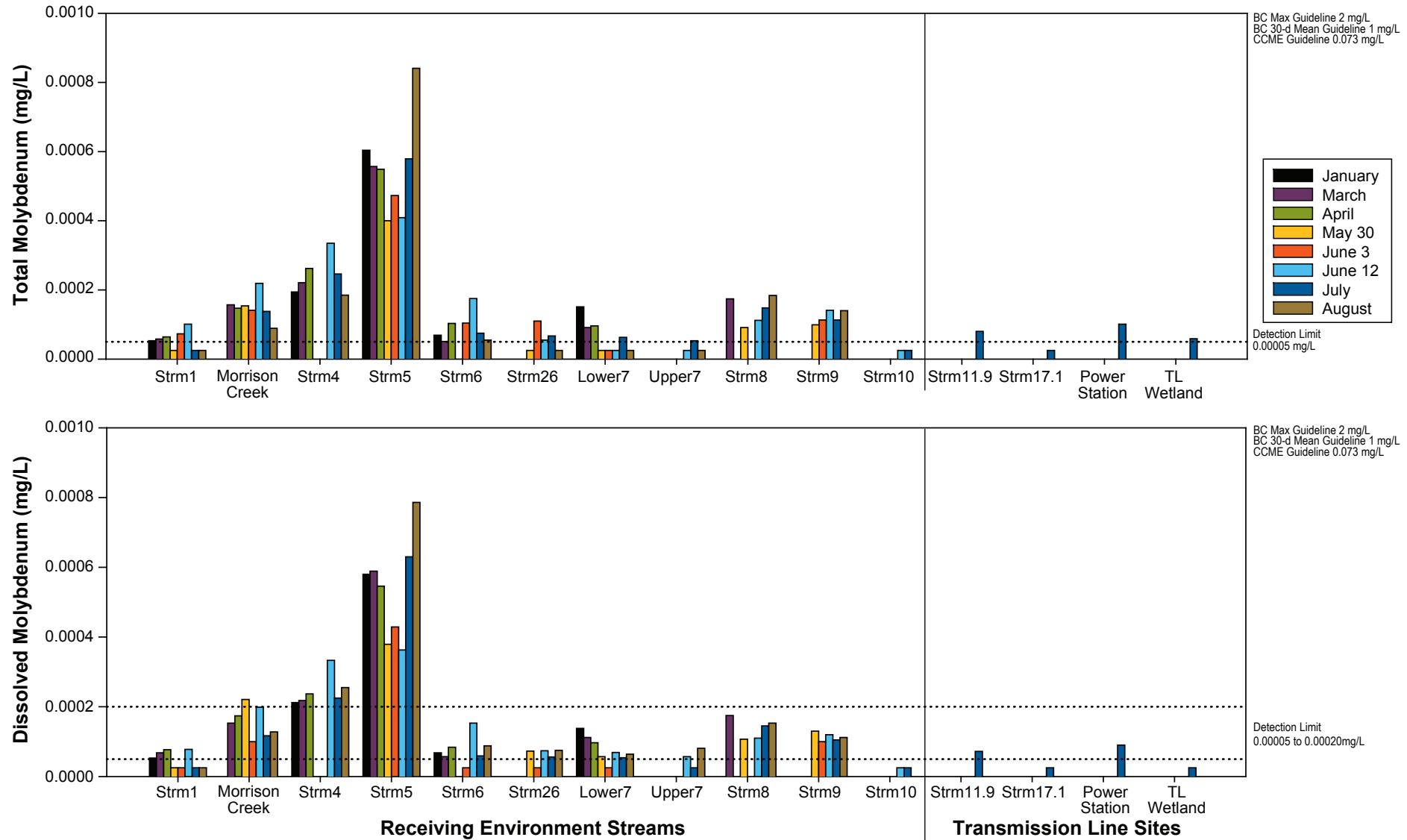
Note: BC Water Quality Guidelines are hardness dependant.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Total and Dissolved Manganese Concentrations, 2008



FIGURE 3.1-14



Note: Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Total and Dissolved Molybdenum Concentrations, 2008



FIGURE 3.1-15

3.2 Stream Sediment Quality

Eleven streams within the receiving environment were assessed for sediment quality in 2008. These streams were also sampled in 2006 and 2007, except for Strm9 which was added this year. Sediment samples were collected in triplicate and were analyzed for general variables, nutrients and metals. All 2008 data are presented in Appendix 3.2-1.

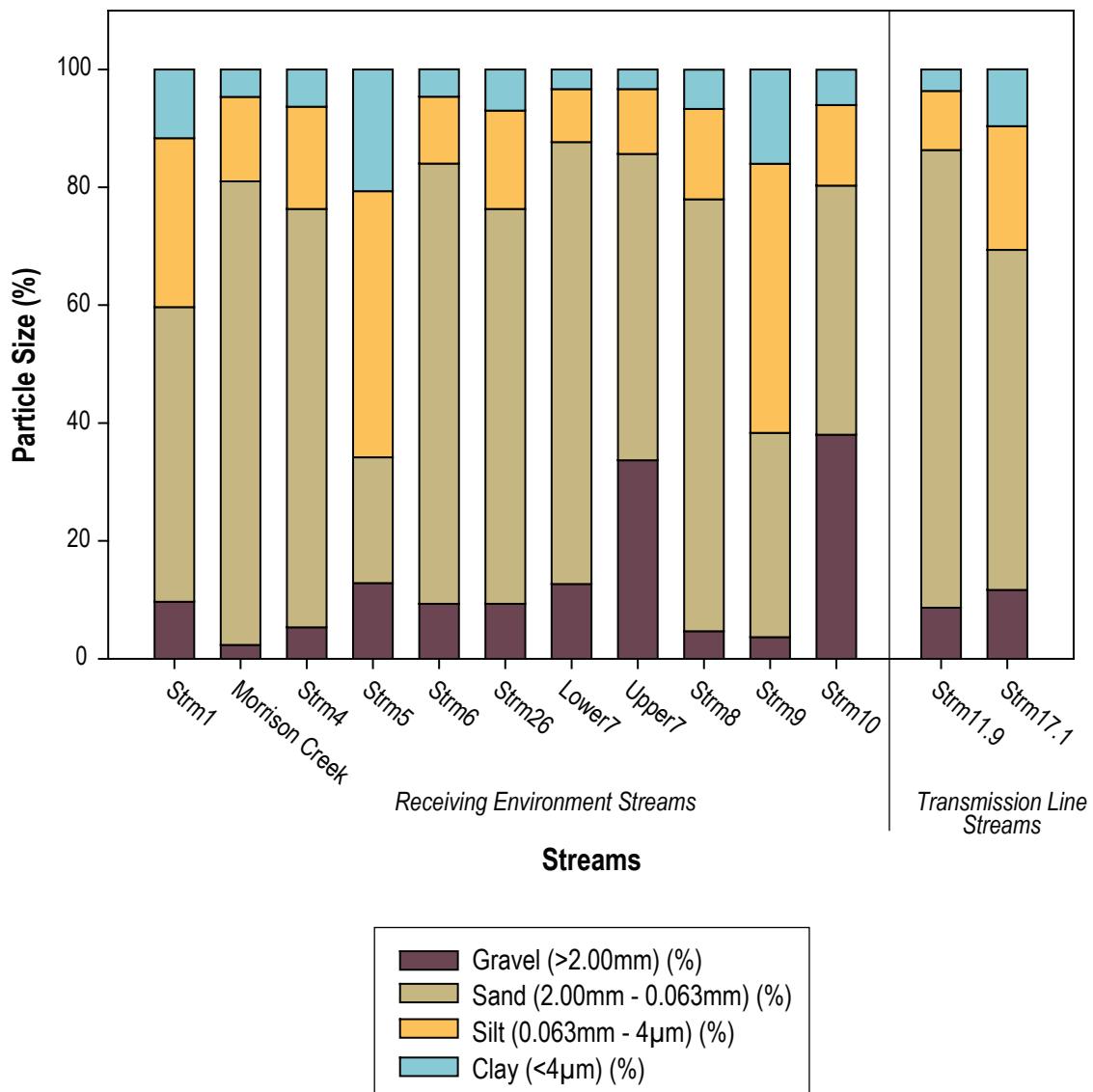
Two streams (Strm11.9 and Strm17.1) that cross the transmission line route were assessed for sediment quality in 2008. Only two streams were sampled because the majority of streams were either dry or inaccessible during the sampling period. Sediment samples are not available for the transmission line wetland (TL Wetland) as a result of difficult site access for sediment sampling (Plate 3.2-1).



Plate 3.2-1. TL Wetland, 2008.

3.2.1 Particle Size

Sand dominated the substrate for most receiving environment stream sites (50 to 79%) except for Strm5 and Strm9, which were dominated by silt (both 46%). Overall, gravel composed between 2 to 38% of the substrate, sand 21 to 79%, silt 9 to 46% and clay 3 to 21% (Figure 3.2-1). This is similar to the 2006 and 2007 particle size distributions (Rescan 2008). Higher proportions of silt and clay at Strm5 and Strm9 likely contributed to the higher metal concentrations observed at these sites.



**Morrison Copper/Gold Project
Average Stream Sediment
Particle Size Distribution, 2008**

pbm

FIGURE 3.2-1

Rescan™

Both Strm11.9 and Strm17.1 were dominated by sand (78 and 58%, respectively) followed by silt (10 and 21%, respectively), gravel (9 and 12% respectively), and clay (4 and 10%, respectively).

3.2.2 Nutrients, TOC and Cyanides

Nutrient concentrations in 2008 were similar to those in 2006 and 2007. Average total phosphorus concentrations ranged from 558 (Strm26) to 1,150 mg/kg (Strm5), though most sites averaged close to 600 mg/kg (Figure 3.2-2). Average total nitrogen concentrations ranged from 0.07 (Upper7) to 0.89 % (Strm5), with most concentrations ranging from 0.1 to 0.2% (Figure 3.2-2). Both nitrogen and phosphorus concentrations at Strm5 and Strm9 increased in 2008.

As in 2006 and 2007, TOC concentrations were variable between sites but generally remained below 3% (Figure 3.2-3). TOC concentrations ranged from 0.4 (Upper7) to 12.8% (Strm5). Peak TOC concentrations were observed at Strm5 and Strm9 with large variability within these sites. Average cyanide concentrations were below the detection limit of 3 mg/kg at all stream sites except for Strm4 (2.5 mg/kg), Strm5 (3.8 mg/kg), and Strm9 (6.7 mg/kg). The high variability observed at Strm9 is due to one replicate measuring 13 mg/kg, while the remainder were just above the detection limit.

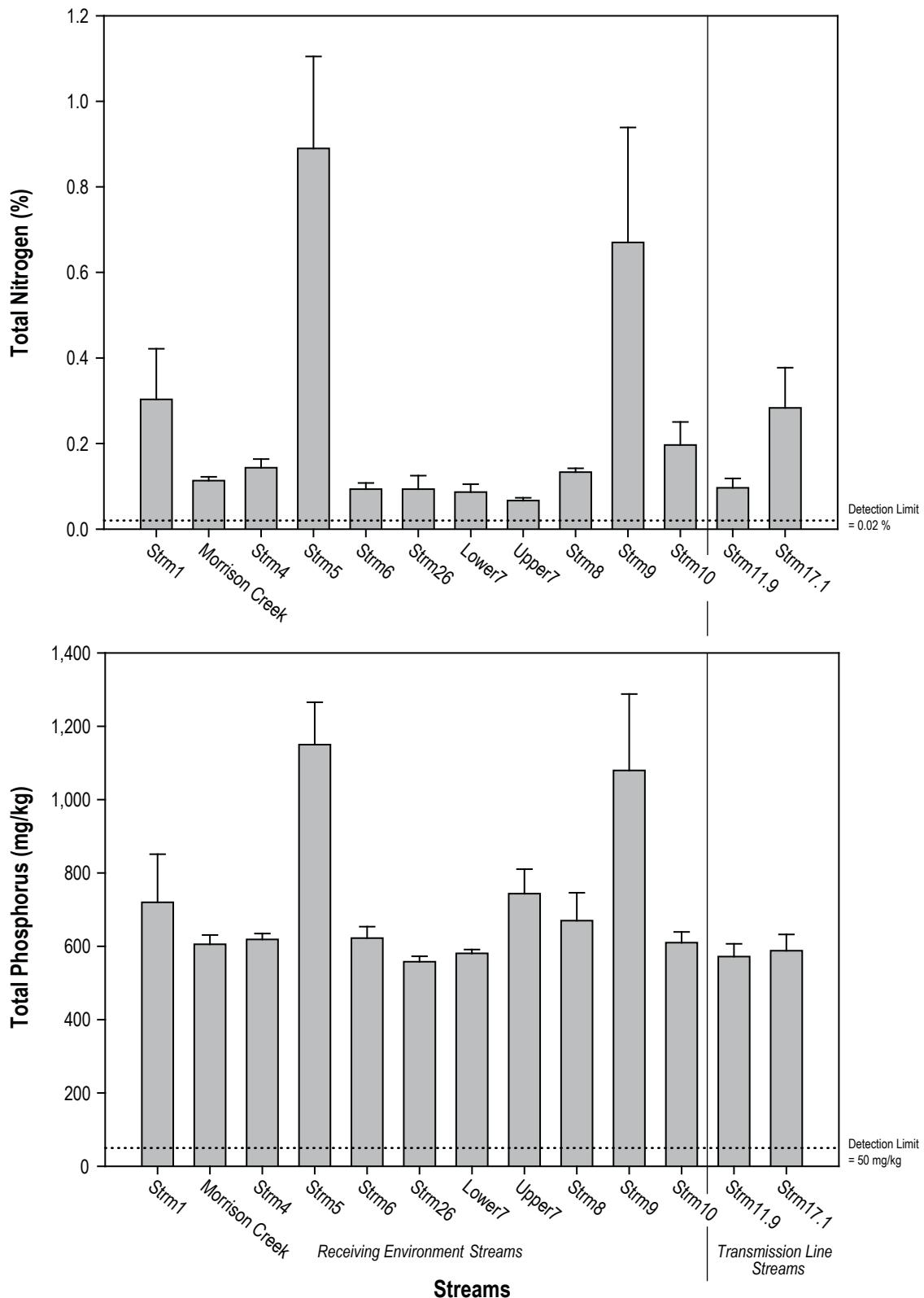
Sediment nutrient, TOC, and cyanide concentrations in the transmission line streams were consistent with the receiving environment streams. However, Strm17.1 had high nitrogen and TOC concentrations relative to most other sites. Average cyanide concentrations were below the detection limit (3 mg/kg) at both transmission line streams.

3.2.3 Total Metals

Of the metals analyzed, antimony, beryllium, bismuth, selenium, silver, thallium and tin were not detected in more than 80% of the samples and are therefore not discussed. Lead, molybdenum and cadmium (in the case of the transmission line streams) were also not detected in 80% or more of the samples; however, since they are metals of particular interest they are discussed.

Metals without provincial or federal guidelines are not graphed but briefly discussed. Aluminum, barium, manganese, magnesium and titanium had the lowest concentrations at Morrison Creek, Strm5 and Strm9. Cobalt, lithium, and vanadium had the lowest concentrations at Morrison Creek with higher concentrations found mostly in Strm1, Strm26 and Upper7. Strontium concentrations were highest at Strm5 and Strm9; roughly double the concentrations of all the other sites. Molybdenum, had concentrations below the detection limit (4.0 mg/kg) at all sites except for Strm5 (located near the mine deposit) which had an average concentration of 4.5 mg/kg. All metal concentrations in the two transmission line streams were similar to those found in the receiving environment streams.

Nine metals have provincial or federal sediment quality guidelines; these metals are presented graphically and discussed in detail. The BC sediment guideline consists of the LEL and SEL (BC MOE 2006). The federal CCME guideline consists of the ISQG and the PEL (CCME 1999). Of the nine metals with guidelines, eight naturally exceeded guidelines at one or more sites.



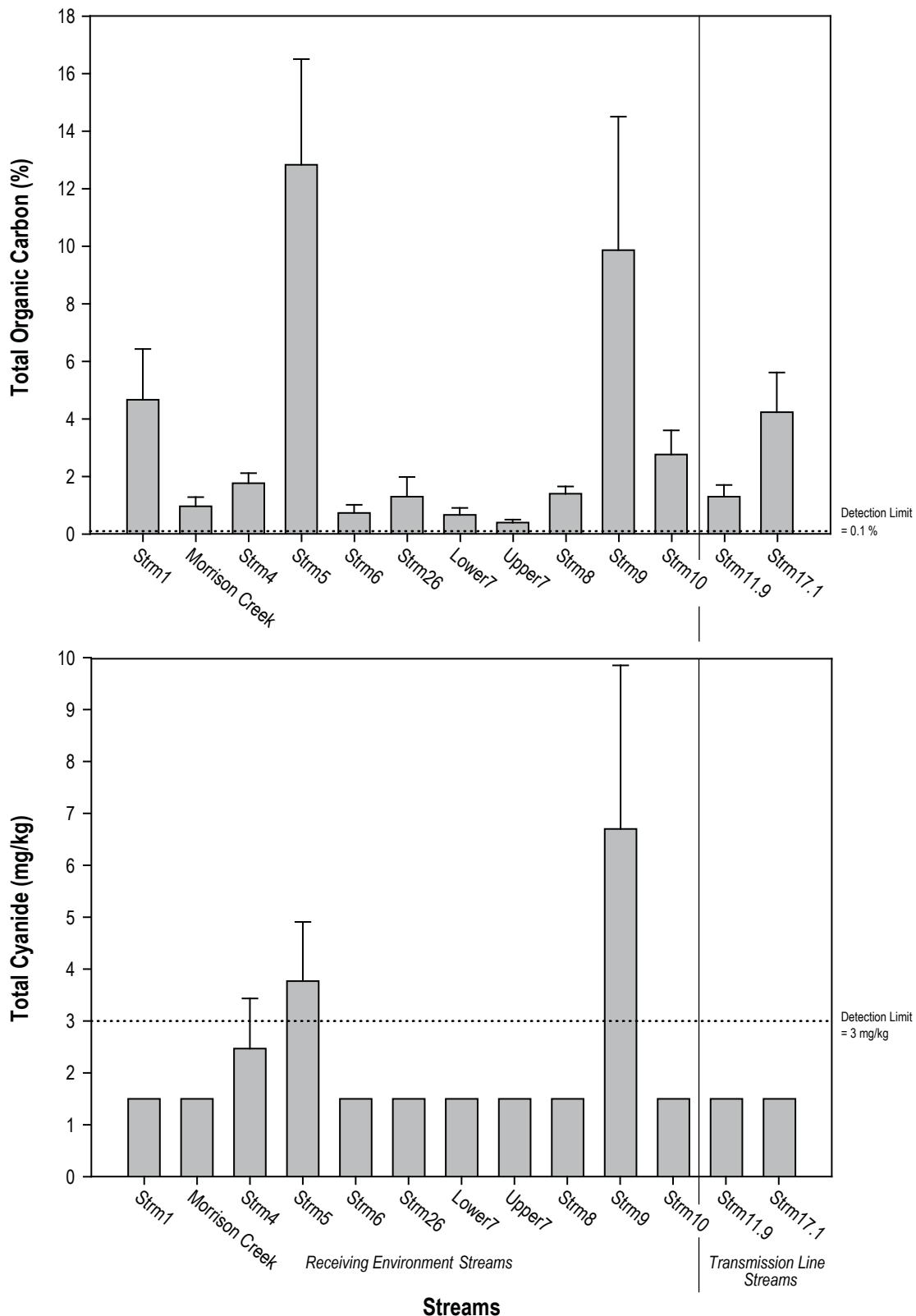
Note: Error bars represent standard error of the mean.
Dotted line represents detection limits.

Morrison Copper/Gold Project Average Total Nitrogen and Phosphorus Stream Sediment Concentrations, 2008



FIGURE 3.2-2





**Morrison Copper/Gold Project Average
Total Organic Carbon and Cyanide
Stream Sediment Concentrations, 2008**

Results

Average arsenic concentrations naturally ranged from 9.8 (Morrison Creek) to 122.6 mg/kg (Strm5) (Figure 3.2-4). Concentrations of most sites fell between 10 and 30 mg/kg. Strm9 also had high levels of arsenic with an average concentration of 53 mg/kg. As in 2006 and 2007, all sites exceeded the CCME ISQG and BC LEL guideline of 5.9 and 6.0 mg/kg, respectively. Ten stream sites exceeded the CCME PEL guideline of 17 mg/kg including one replicate sample from Strm6 and Lower7. Strm9 and Strm5 exceeded the BC SEL guideline (33 mg/kg) by roughly two and four times, respectively. Both transmission line sites exceeded the CCME ISQG and BC LEL guidelines and Strm17.1 exceeded the CCME PEL guideline.

Average cadmium concentrations naturally ranged from 0.07 mg/kg (Morrison Creek) to 1.2 mg/kg (Strm5) (Figure 3.2-4). Five of the eleven receiving environment sites and Strm11.9 had concentrations below the detection limit of 0.5 mg/kg. Exceedances of the BC LEL and CCME ISQG guideline (both 0.6 mg/kg) occurred at Strm9, Strm10, and Strm5. Strm5 exceeded this guideline by two times.

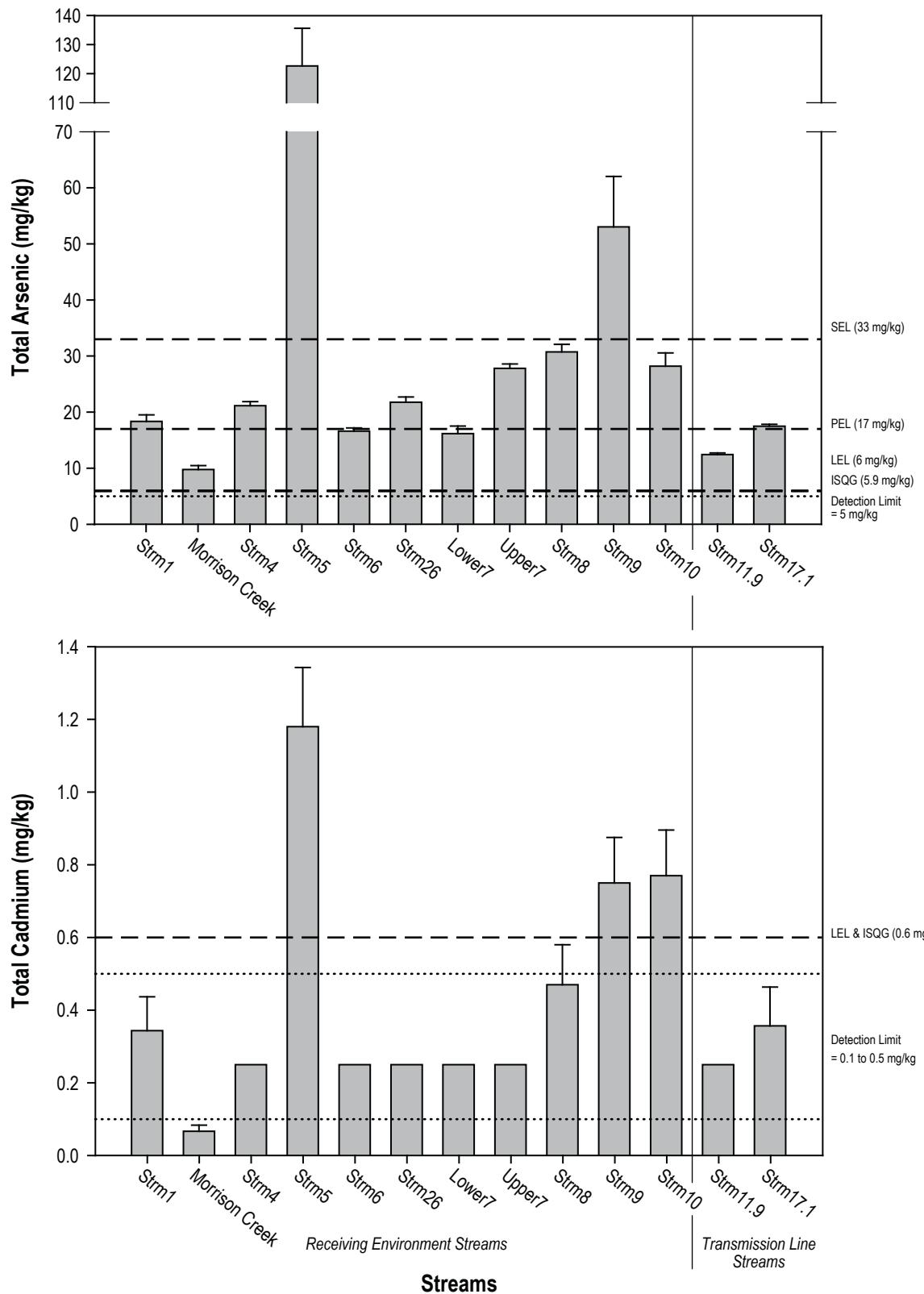
Average chromium concentrations naturally ranged from 16.2 (Morrison Creek) to 56.1 mg/kg (Upper7) (Figure 3.2-5). The BC LEL guideline of 26 mg/kg was exceeded at Strm1, Strm26, and Upper7. Strm26 and Upper7 also exceeded the CCME ISQG guideline of 37.3 mg/kg. Overall, chromium concentrations were fairly consistent between sites and were similar to the 2006 and 2007 concentrations.

With the exception of Strm5, total copper ranged from 12.5 to 48.2 mg/kg (Figure 3.2-5). The average copper concentration at Strm5 was 990 mg/kg. All sites except for Morrison Creek exceeded the BC LEL guideline of 16 mg/kg, while five receiving environment sites and Strm17.1 exceeded the CCME ISQG guideline of 35.7 mg/kg. Strm5 was the only site to exceed the BC SEL guideline (110 mg/kg) and the CCME PEL guideline (197 mg/kg) by nine and five times, respectively. Copper concentrations in 2006 and 2007 were also highest at Strm5 with 1,174 mg/kg in 2006 and 1,102 mg/kg in 2007. The high concentration observed at Strm5 is likely due to its location near the mine deposit, where concentrations of copper may be naturally high.

Average iron concentrations naturally ranged from 23,800 (Morrison Creek) to 49,167 mg/kg (Upper7) (Figure 3.2-6). Most sites exceeded the BC LEL guideline of 21,200 mg/kg by roughly two times. Upper7, Strm26, Strm5 and Strm17.1 exceed the BC SEL guideline of 43,766 mg/kg. Concentrations were similar to 2006 and 2007.

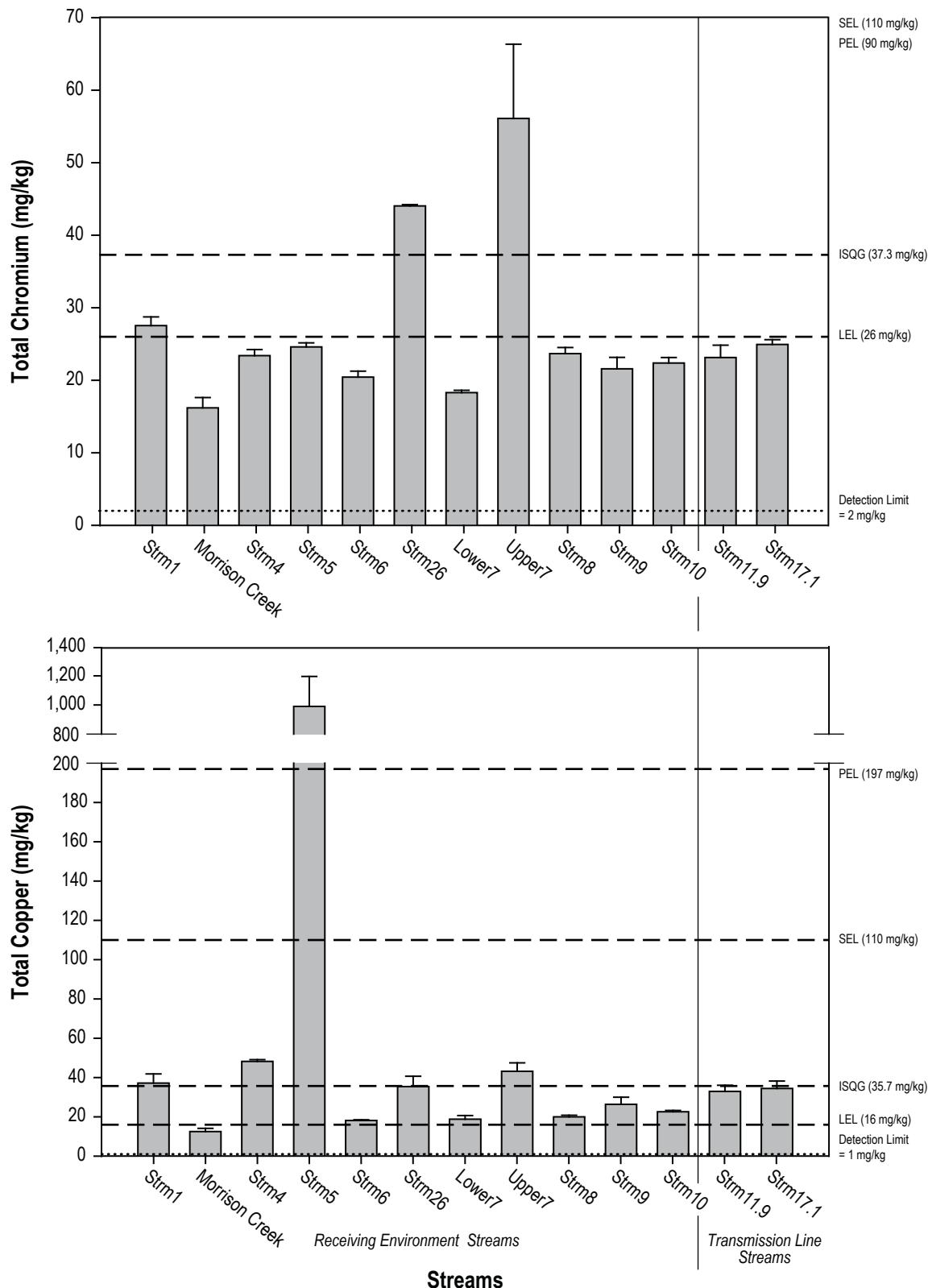
Average lead concentrations were below the detection limit of 30 mg/kg at all sites, except for Morrison Creek, which had an average concentration of 4.3 mg/kg (note: also below 30 mg/kg but the detection limit at this site was 2 mg/kg). No lead concentrations exceeded published guidelines.

Average mercury concentrations naturally ranged from 0.04 (Lower7) to 0.64 mg/kg (Upper7) (Figure 3.2-6). Except for Strm5 and Upper7, mercury concentrations generally ranged from 0.05 to 0.15 mg/kg. Strm5, Upper7, and one replicate of Strm9 exceeded the CCME ISQG guideline of 0.17 mg/kg. The BC LEL guideline (0.2 mg/kg) was exceeded by both Strm5 and Upper7. Upper7 was the only stream to exceed the CCME PEL guideline of 0.486 mg/kg.



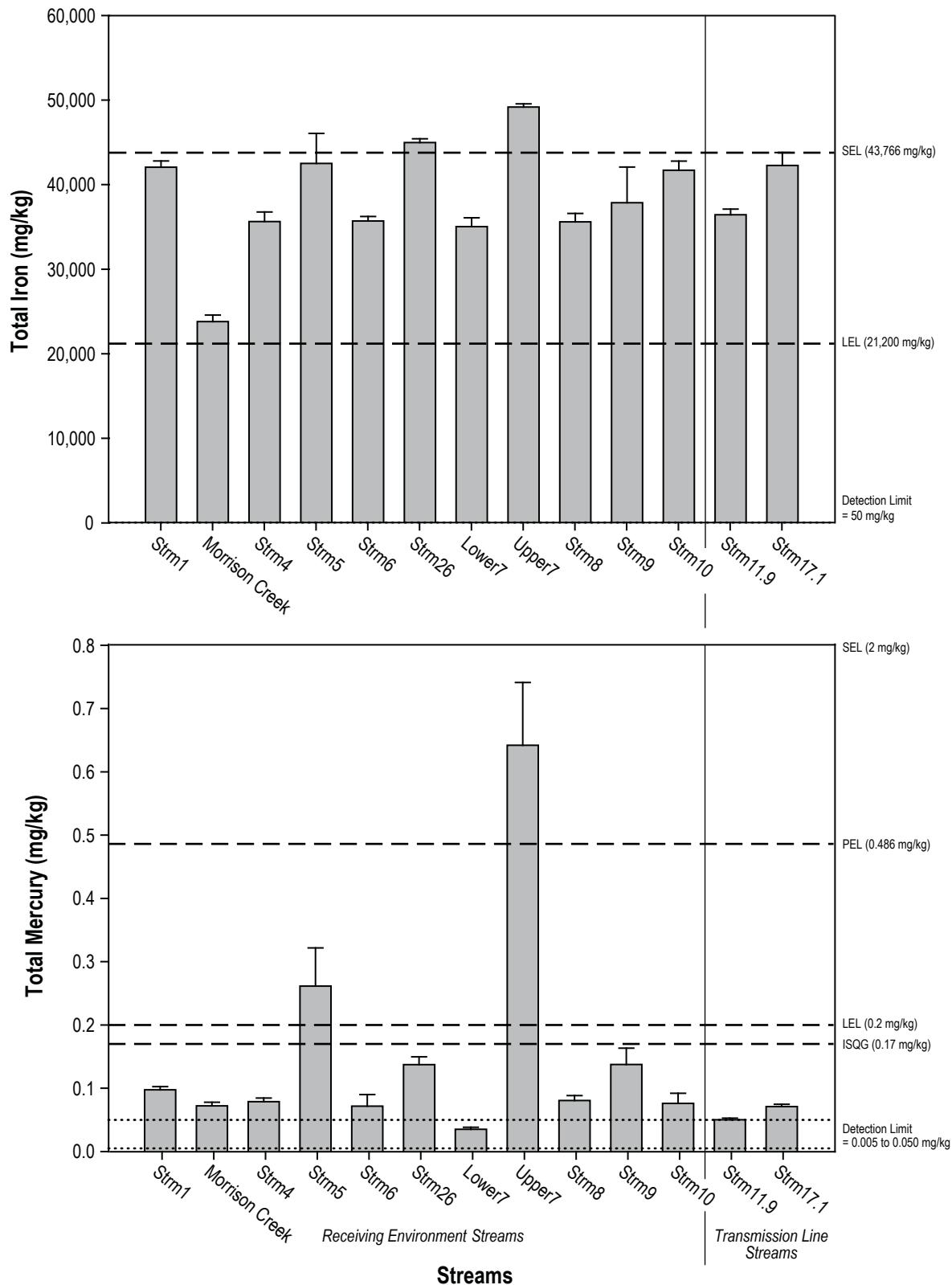
Note: Error bars represent standard error of the mean.
Dotted line represents detection limits.
Dashed lines represent guidelines.

Morrison Copper/Gold Project Average Total Arsenic and Cadmium Stream Sediment Concentrations, 2008



Note: Error bars represent standard error of the mean.
Dotted line represents detection limits.
Dashed lines represent guidelines.

Morrison Copper/Gold Project Average Total Chromium and Copper Stream Sediment Concentrations, 2008



**Morrison Copper/Gold Project
Average Total Iron and Mercury
Stream Sediment Concentrations, 2008**

Generally mercury concentrations in 2008 were similar to those in 2006 and 2007, except for Upper7 which saw an increase of five times the 2007 concentration and nine times the 2006 concentration.

Average nickel concentrations naturally ranged from 17.1 (Morrison Creek) to 60.2 mg/kg (Strm5) (Figure 3.2-7). Similar to 2006 and 2007, all sites exceeded the BC LEL guideline of 16 mg/kg. No sites exceeded the BC SEL guideline of 75 mg/kg.

Average zinc concentrations naturally ranged from 52 (Morrison Creek) to 207 mg/kg (Strm5) (Figure 3.2-7). Zinc concentrations generally ranged between 85 and 106 mg/kg. Only Strm5 exceeded the CCME ISQG guideline (123 mg/kg) and BC LEL guideline (120 mg/kg) by almost two times. No sites exceeded the CCME PEL (315 mg/kg) or the BC SEL (820 mg/kg) guideline.

3.2.4 Stream Sediment QA/QC

RPD calculations of the QA/QC field duplicates are presented in Appendix 3.2-2. Three duplicate pairs of samples were used to compare between thirty variables (which had concentrations above their respective detection limits). The RPD calculations are used as a measure of variability inherent in field sampling or sample heterogeneity. From these results, only 6% (5 of the 90 RPD calculations) were greater than the RPD threshold of 20% indicated by provincial guidelines.

3.3 Stream Primary and Secondary Producers

3.3.1 Periphyton

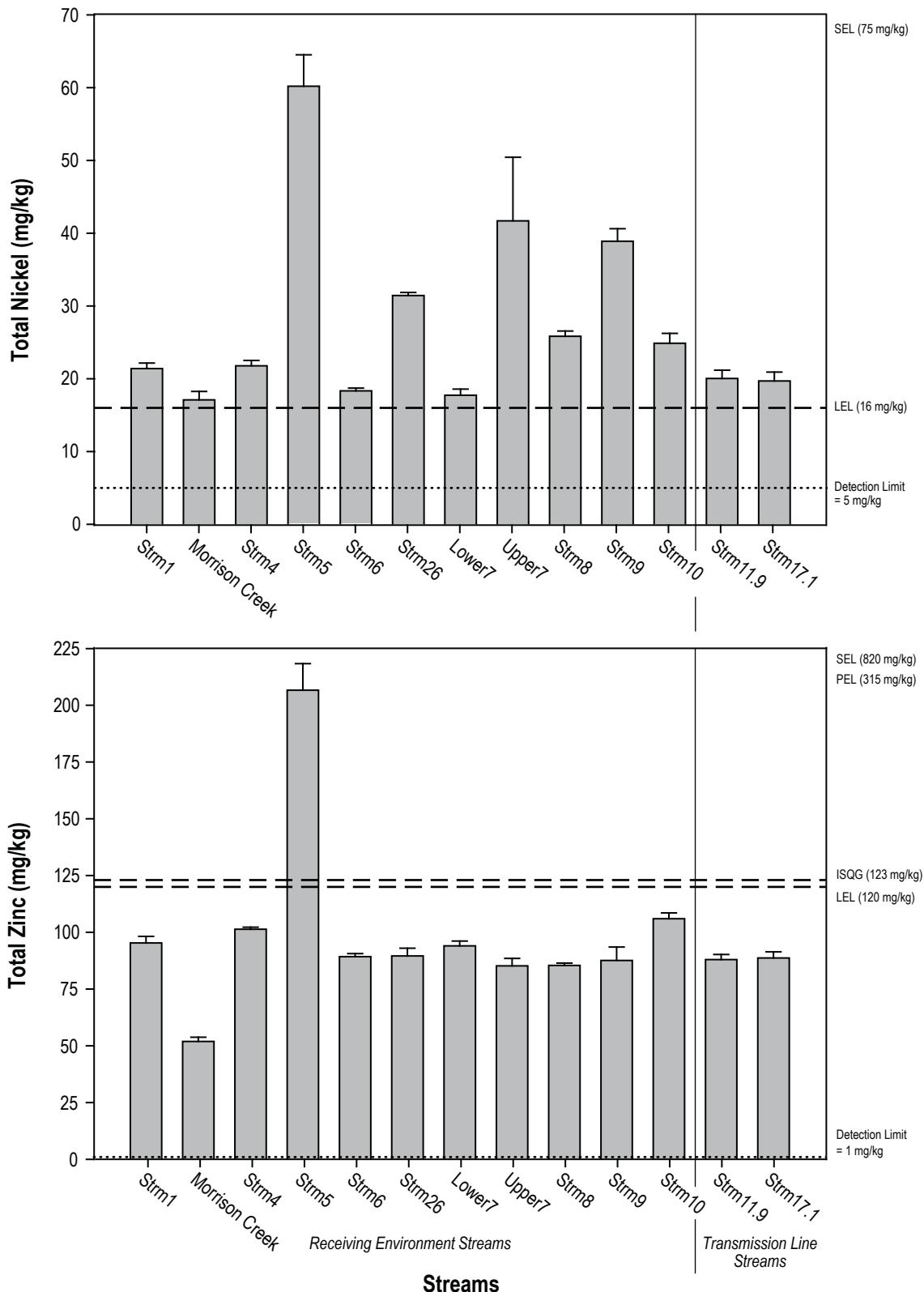
Periphyton samples were collected at eleven receiving environment and two transmission line streams. Stream periphyton taxonomic data can be found in Appendix 3.3-1. Biomass data is presented in Appendix 3.3-2.

3.3.1.1 Biomass

Lower7 and Stream26 had the highest productivity (as chlorophyll *a*) with 5.1 µg/cm² and 9.2 µg/cm², respectively. The average productivity for all other sites ranged from 0.2 (Strm8) to 1.4 µg/cm² (Strm1) (Figure 3.3-1). Most sites showed similar values to those reported in 2006 and 2007. However, the high biomass value found at Morrison Creek (1.5 µg/cm²) in 2006 was not repeated in 2008. Further, Strm26 and Lower7 had much higher productivity in 2008 than reported in previous years. Receiving environment streams and transmission line streams showed similar values.

3.3.1.2 Density and Richness

The greatest contribution to cell densities at several sites came from *Oscillartoria sp.* High variability was observed between sites for periphyton density, similar to previous years. Average periphyton density ranged from 5 (Strm8) to 1,151 cells x 10⁶/m² (Strm11.9) (Figure 3.3-2).



Note: Error bars represent standard error of the mean.

Dotted line represents detection limits.

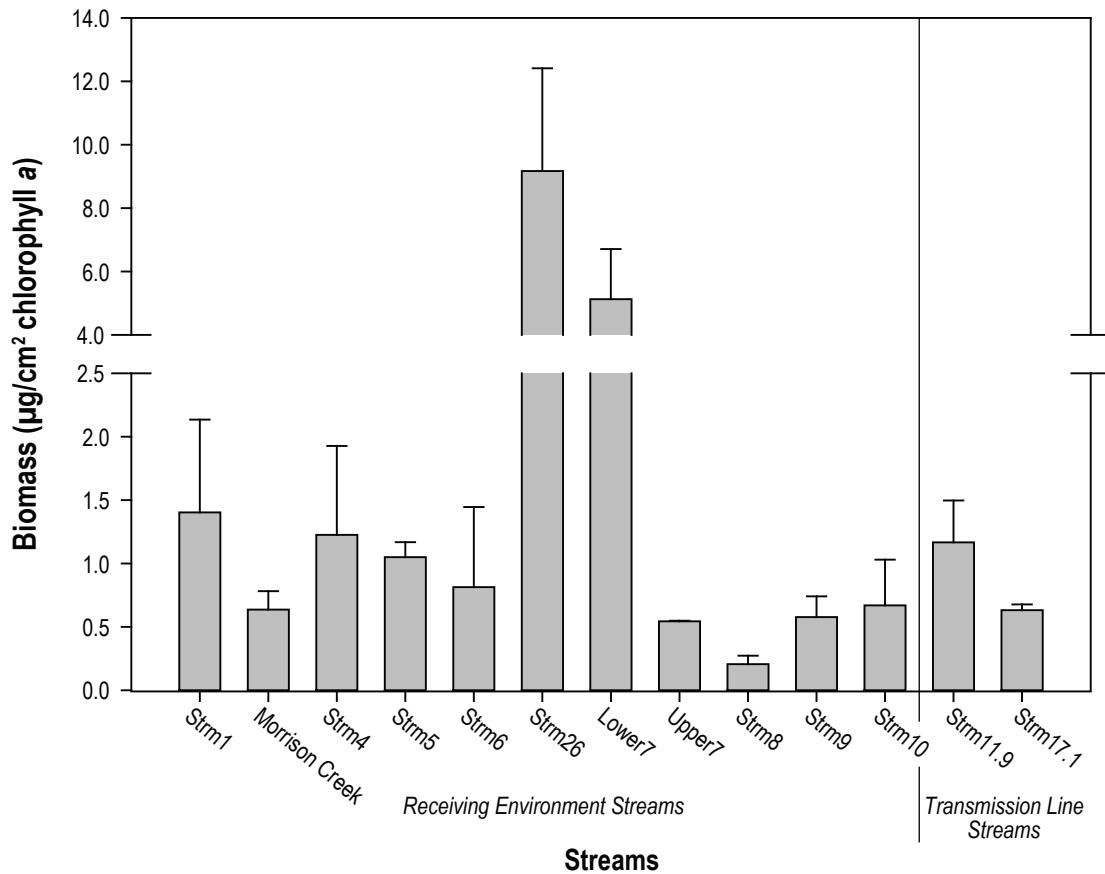
Dashed lines represent guidelines.

Morrison Copper/Gold Project Average Total Nickel and Zinc Stream Sediment Concentrations, 2008

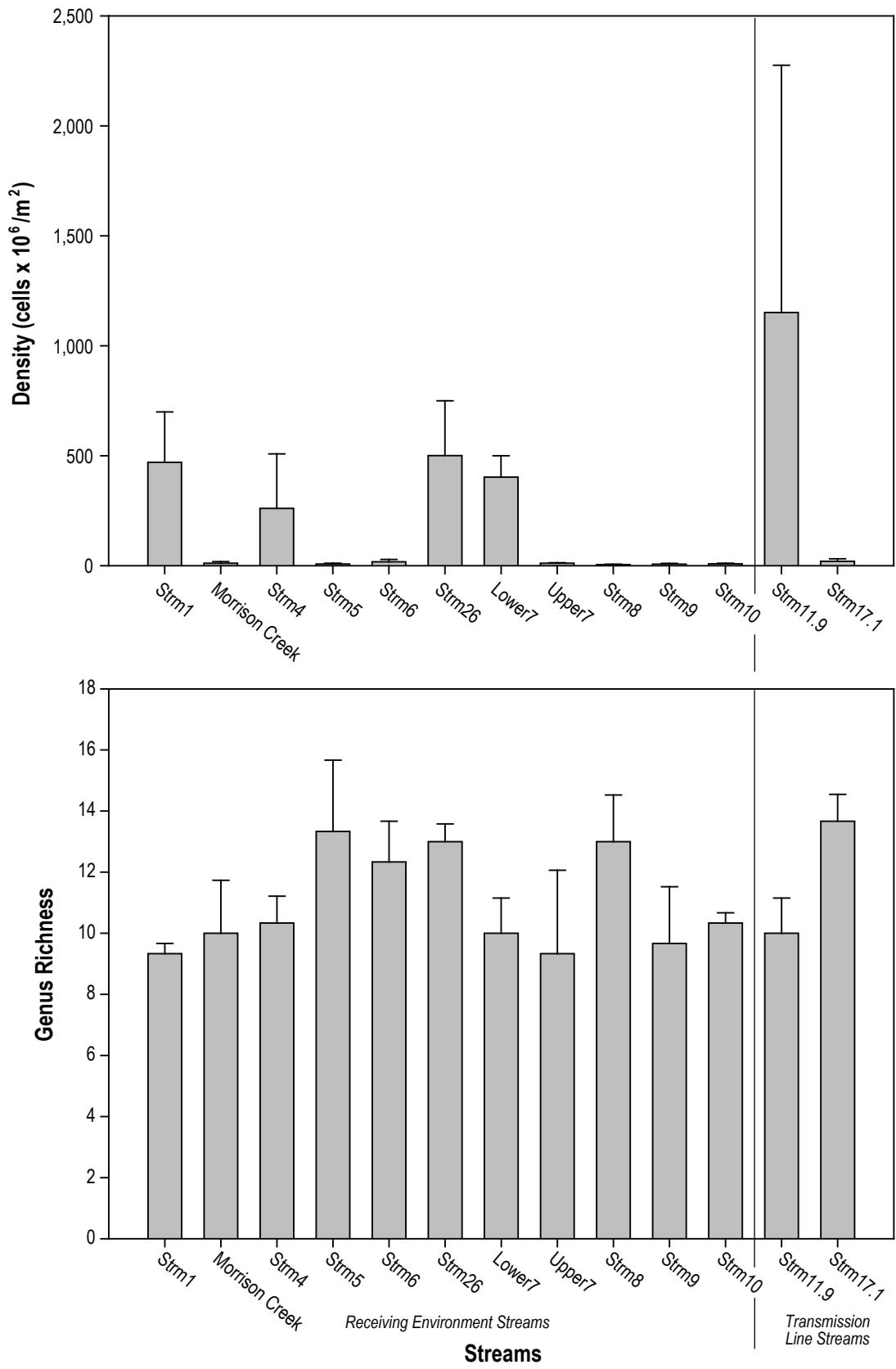


FIGURE 3.2-7





Note: Error bars represent standard error of the mean.



Morrison Copper/Gold Project Stream Periphyton Density and Genus Richness, 2008



FIGURE 3.3-2

Several sites had densities less than 10 cells $\times 10^6/m^2$. In 2008, the transmission line site, Strm11.9, had the highest within site variability. This was primarily a result of one replicate having greater than 3000 cells $\times 10^6/m^2$.

Genus richness ranged from 9 (Strm1 and Upper7) to 14 genera (Strm17.1), having similar ranges to 2006 and 2007 (Figure 3.3-2). A total of 39 genera were identified in 2008, seventeen of which were not observed in previous years.

3.3.1.3 Relative Abundance

Cyanophyta taxa dominated half the sites (0 to 99%) while the other half were dominated by Chrysophyta (1 to 92%) (Figure 3.3-3 a and b; Figure 3.3-4). Chlorophyta (0 to 9%) and Cryptophyta (0 to <1%) composed the remainder of the communities, when present. *Oscillartoria* sp. composed 99% of the Cyanophyta taxa, while *Achnanthidium minutissimum* composed 55% of the Chrysophyta taxa. In 2006 and 2007 *Achnanthidium minutissimum* composed roughly 40% of all periphyton density. In 2008, *Achnanthidium minutissimum* made up only 2% of the total periphyton density, while *Oscillartoria* sp. made up 95%.

3.3.1.4 Diversity and Evenness Indices

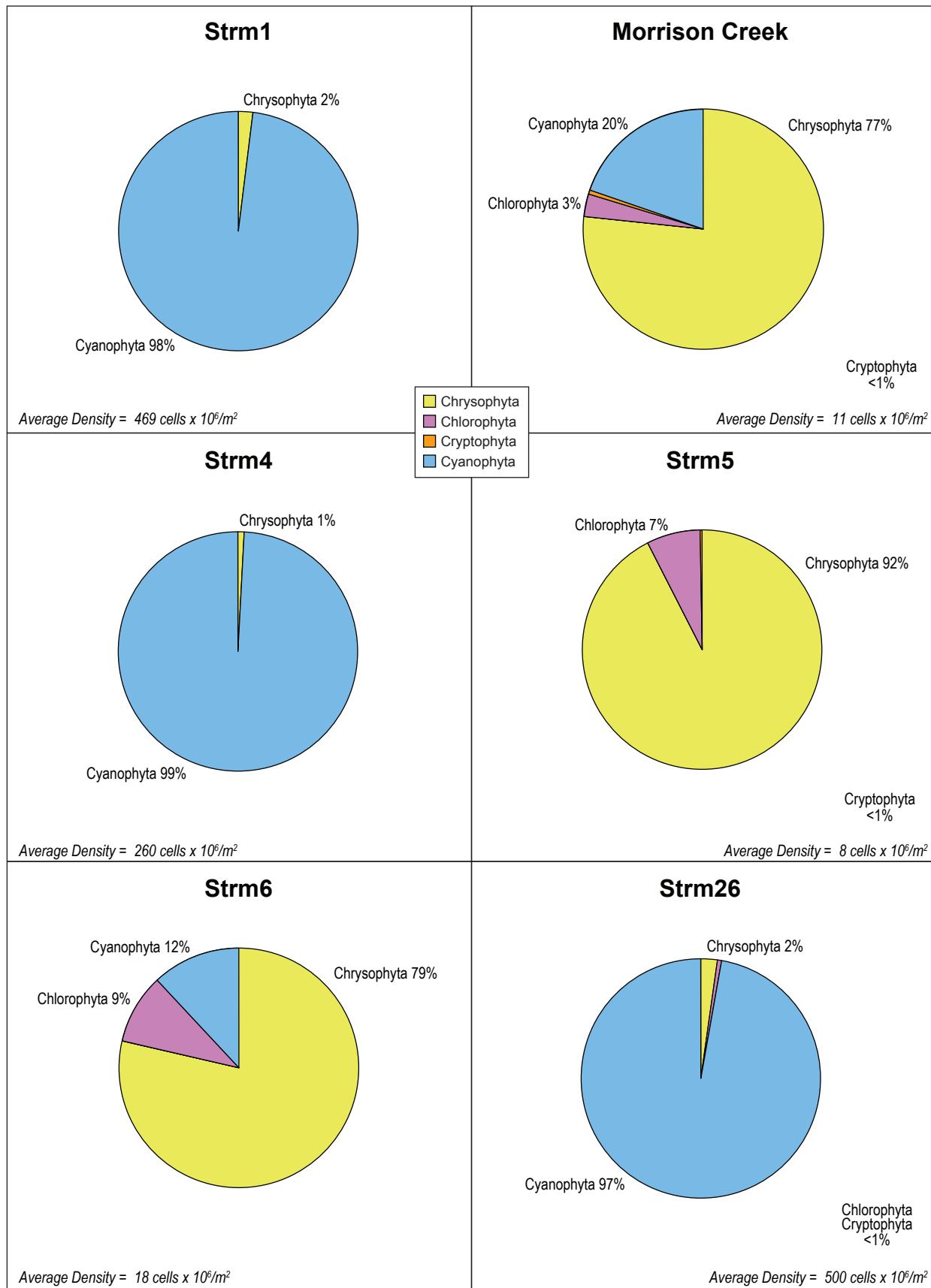
The Simpson Diversity Index ranged from 0.05 (Lower7) to 0.71 (Strm6 and Strm8) (Figure 3.3-5). Evenness ranged from 0.06 (Lower7) to 0.68 (Strm8) (Figure 3.3-5). In 2006 and 2007 diversity and evenness values were variable, though ranges were not as broad as seen in 2008. The presence of *Oscillatoria* sp. at a site strongly influenced its diversity and evenness since this taxonomic group was present in high numbers. Sites with the lowest diversity and evenness values (Strm1, Strm4, Strm26, Lower7 and Strm11.9) were composed 92 to 99% by *Oscillatoria* sp.

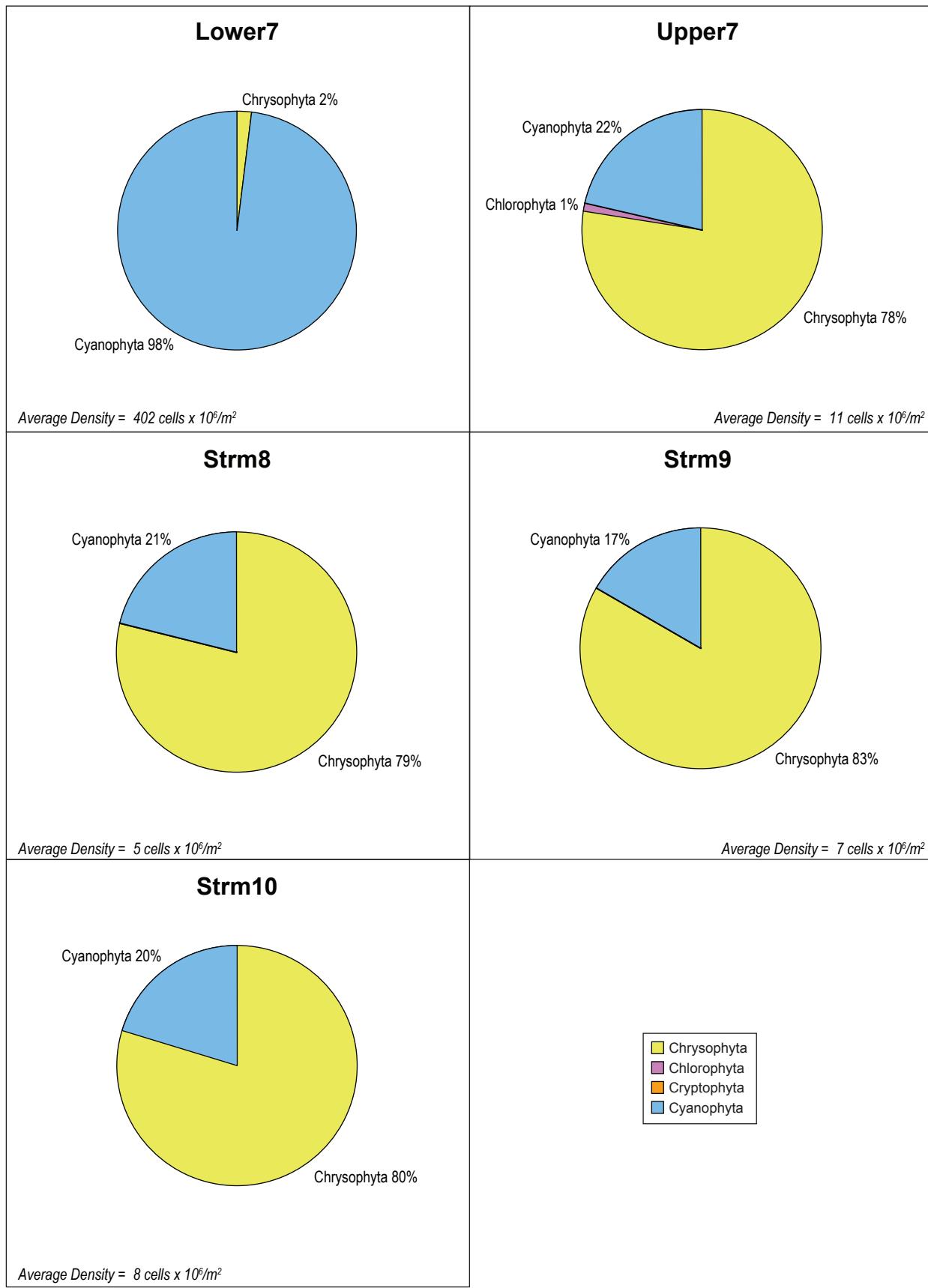
3.3.2 Benthic Invertebrates

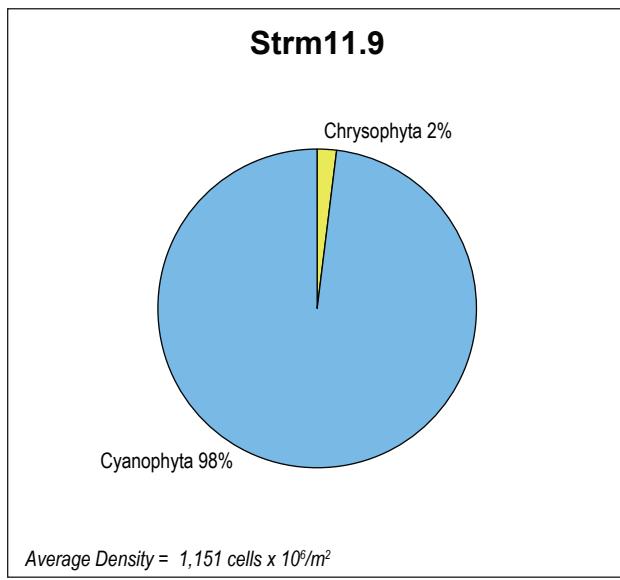
Benthic invertebrate (benthos) communities were sampled in mid to late July at 10 receiving environment streams and two transmission line streams in 2008. Strm10 in the receiving environment was not sampled as the volume of water in the stream was very low, with mostly sub-surface flow and several dry channels along the stream (Plate 3.3-1). However, several individuals (ephemeroptera and trichoptera; larvae and emergent adults) were observed at this site. Only Strm17.1 and 11.9 of the transmission line sites was suitable for sampling benthic invertebrates. Other sites were either difficult to access or dry. All stream benthos taxonomic data can be found in Appendix 3.3-3.

3.3.2.1 Density

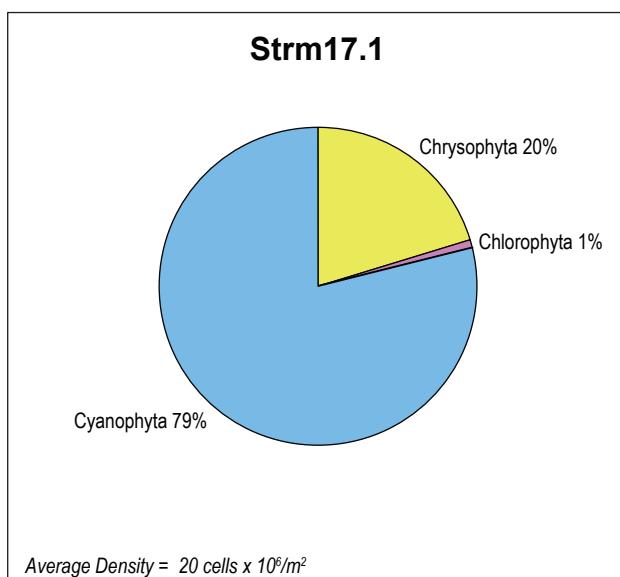
Density of stream benthos was generally greater in 2008 than 2007. Most sites had densities between 8,000 and 16,000 organisms/ m^2 in 2008 (Figure 3.3-6) compared to 1,000 to 4,000 organisms/ m^2 in 2007. Strm4 had the greatest density in all sample years, including 2006. Average density across 2008 sites ranged from 8,220 at Strm8 to 26,600 organisms/ m^2 at Strm4. The transmission line streams were within this range.







Chrysophyta
Chlorophyta
Cryptophyta
Cyanophyta



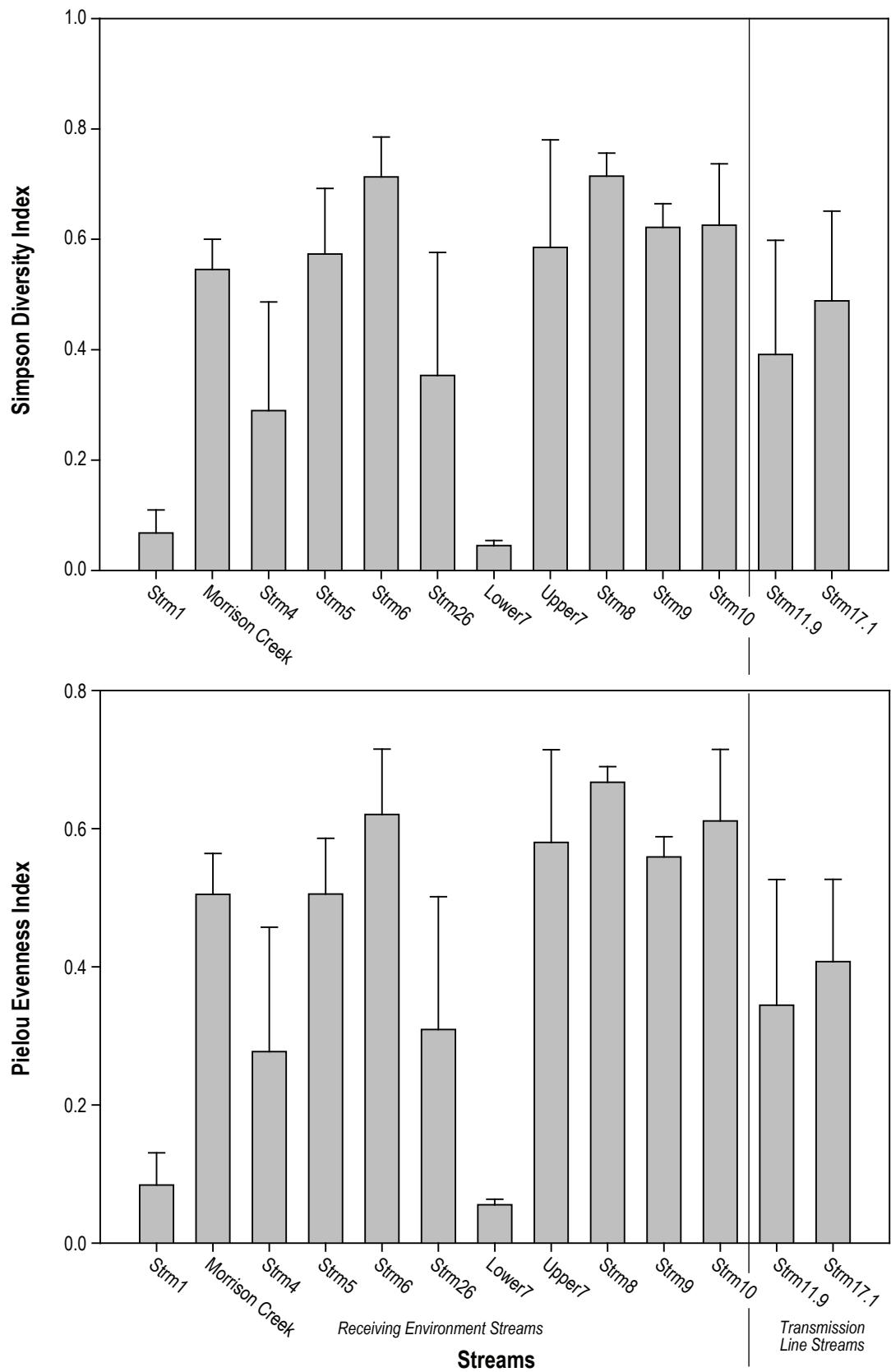




Plate 3.3-1. Dry channel (left) and small pool (right) at Strm10.

3.3.2.2 Relative Abundance

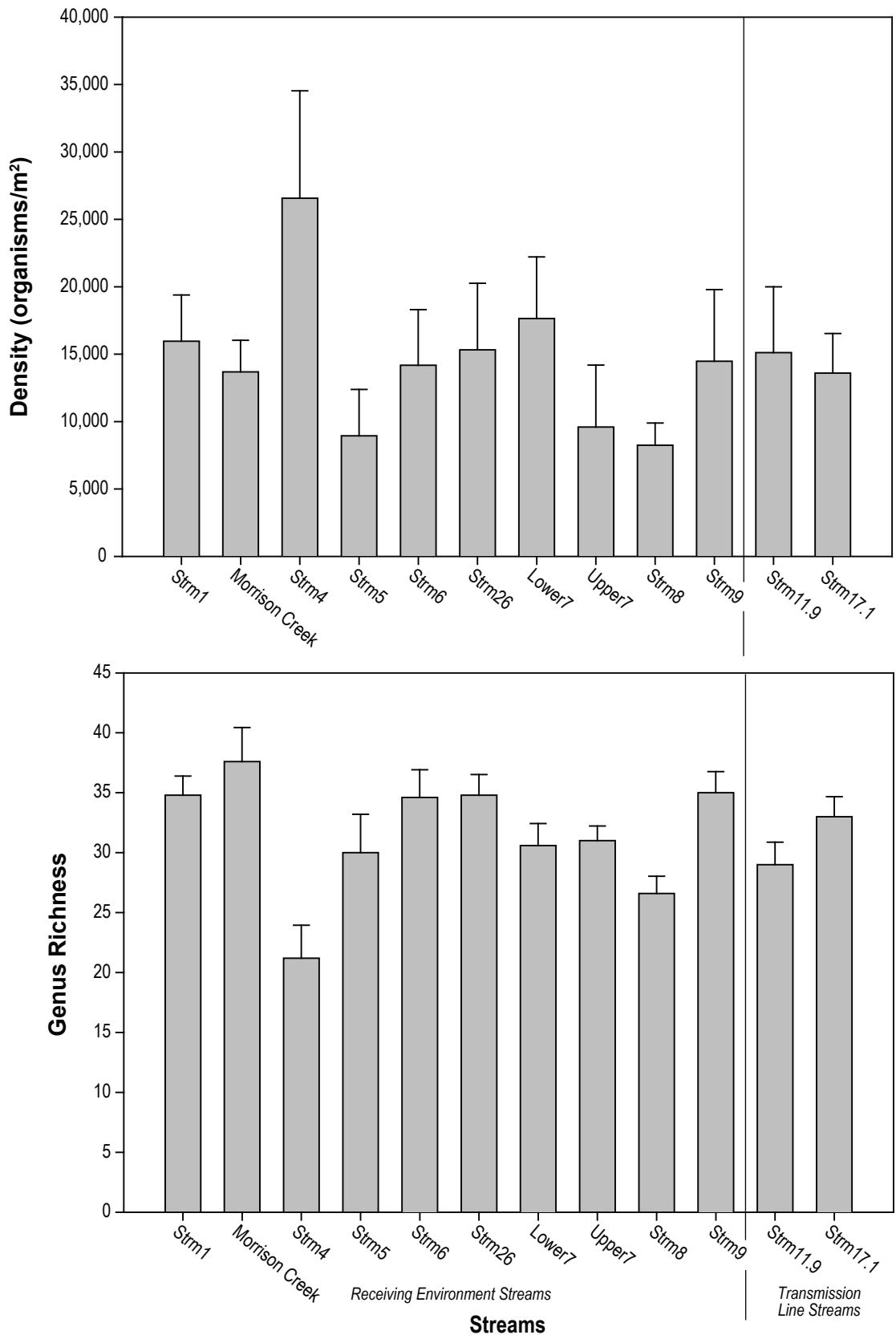
Dipterans were the dominant taxa at most stream sites in 2008 (Figures 3.3-7 a and b). The obvious exception to this was Strm4, which was composed primarily of ostracods (88%) and dipterans (8%). This is similar to the composition of the Strm4 community in previous years. Dipterans composed 8 to 78% of the stream sites sampled (including the two transmission line sites). Considerable proportions of ostracods (< 1 to 88%) in Strm4, 5 and 8; and arachnids (<1 to 18%) in Strm9 were also found.

EPT are taxa known to be sensitive to environmental stresses. For this reason having a high proportion of these groups indicates relatively healthy environmental conditions. The proportion of the community composed of these taxa will likely decrease with a reduction in habitat quality. Since these organisms generally require high concentrations of dissolved oxygen, their absence in the riffle zones of streams can indicate site impairment resulting from low dissolved oxygen or siltation. Average percent EPT ranged from 3% (Strm4) to 51% (Strm17.1) in 2008. Half of the stream benthic communities were composed of more than 30% EPT and considerable proportions of all sites except Strm4, 5 and 9 were composed of this group of taxa.

The remaining proportions of the benthic communities include individuals from Oligochaeta, Nematoda, Mollusca, Coleoptera, Copepoda and Collembola.

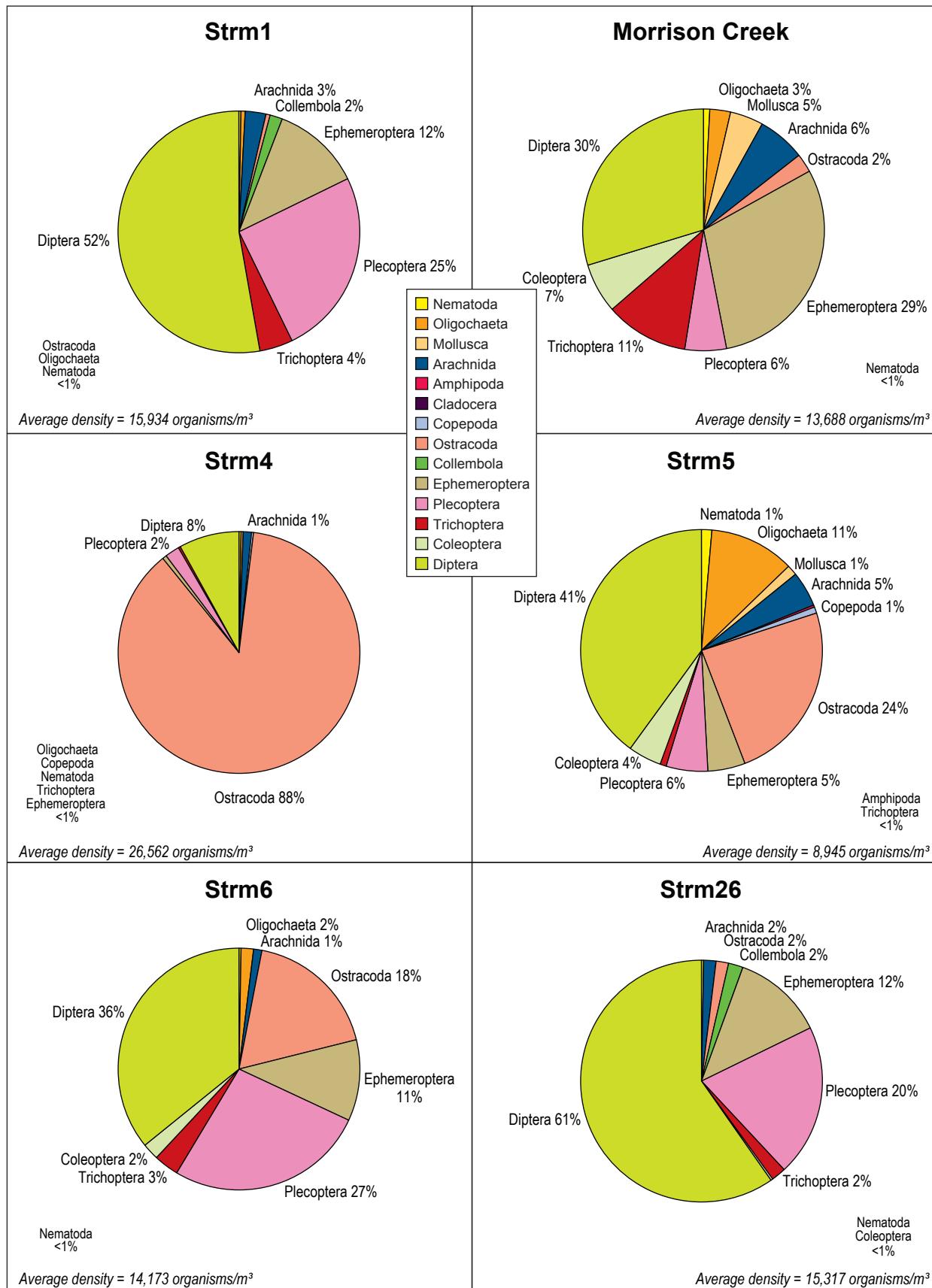
3.3.2.3 Bray-Curtis Similarity

Bray-Curtis is a similarity coefficient useful in determining site similarities based on the type and relative abundance of organisms present. The coefficient ranges from 0 to 100 with 0 being least similar, and 100 being most similar. The resulting similarity matrix of the stream sites shows the degree to which the benthic communities are similar. A similarity matrix showing the similarities for all site combinations is presented in Appendix 3.3-4. Benthic invertebrate communities of each stream were compared to the reference site median (Strm1 and Strm9) to determine percent similarity (Environment Canada 2003).



Note: Error bars represent standard error of the mean.

Morrison Copper/Gold Project Average Density and Genus Richness for Stream Benthic Invertebrates, 2008



Morrison Copper/Gold Project
Taxonomic Composition of Stream Benthos, 2008



FIGURE 3.3-7a

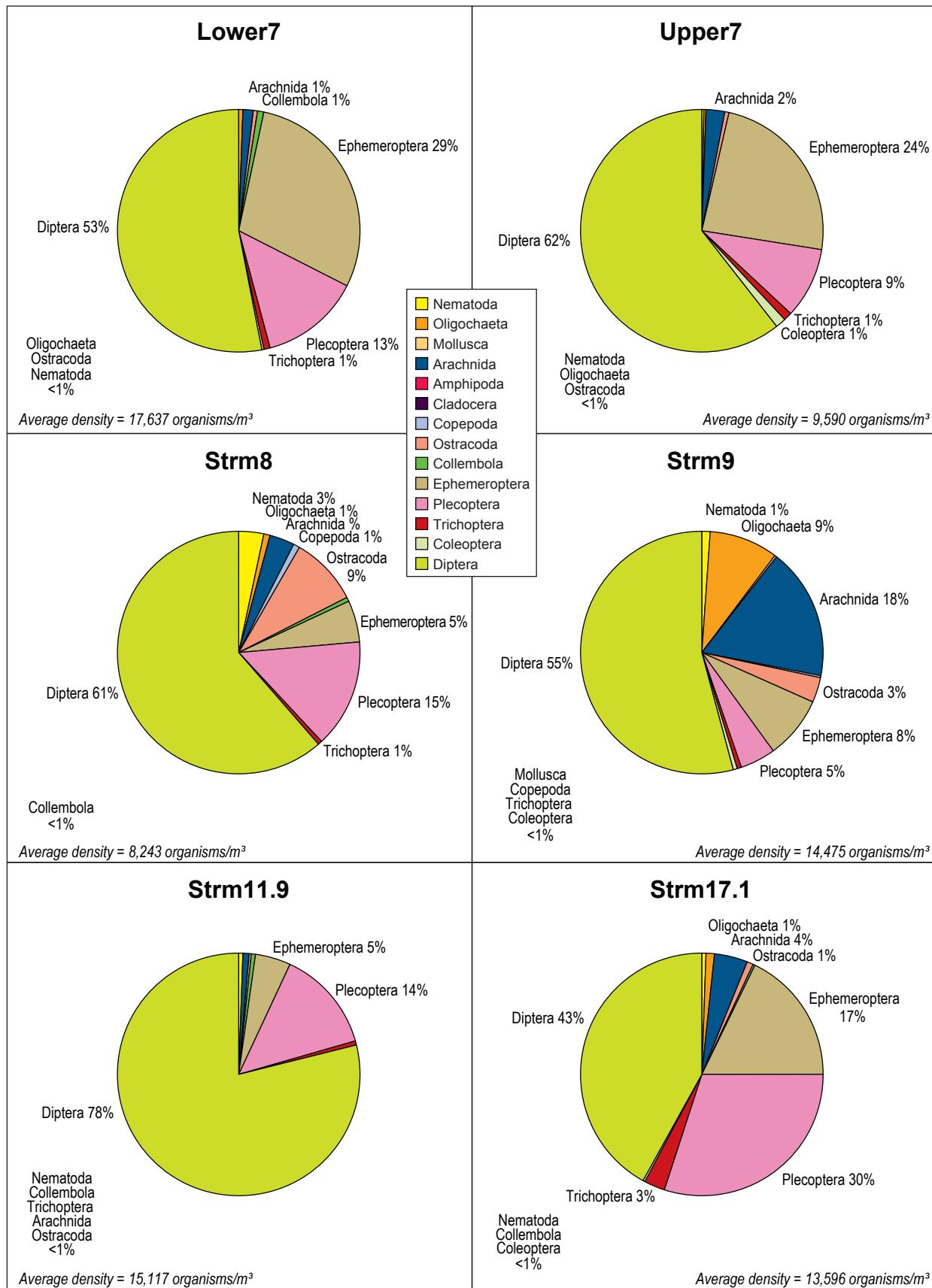


Figure 3.3-8 illustrates site comparisons to each reference site along with the mean percent similarity of all sites. On average the stream sites showed a greater similarity to Strm9 (51.6%) than to Strm1 (35.6%). In 2007 the average similarity of all sites to Strm1 was 47.6%. The benthic community in Strm9 was not sampled in 2007. Seven of the 12 streams had average similarity values above the group average for Strm1, while 5 sites had average similarity values were above the group average for Strm9. The two transmission line sites were above the group average for both reference streams, although only slightly for Strm1.

3.3.2.4 Richness and Diversity Indices

A number of streams had similar richness values to those found in 2007 (Strm4, 5, 6, 26, Lower7 and Upper7). In contrast to 2007, Morrison Creek showed the greatest average richness in 2006 (52 taxa) and 2008 (38 taxa). Average genus richness across stream sites ranged from 21 (Strm4) to 38 taxa (Figure 3.3-6).

Simpson Diversity Index and evenness values were similar in all sample years. Average index values in 2008 ranged from 0.28 at Strm4 to 0.90 at Strm6 (Figure 3.3-9). Strm4 was the only site with an index value below 0.6. Evenness, which ranges from 0 to 1 with 1 representing complete evenness, measures how evenly distributed abundance is among the genera within a community. Average evenness values in 2008 ranged from 0.26 at Strm4 to 0.79 at Strm6 (Figure 3.3-9). All streams had an average evenness value greater than 0.60, except for Strm4.

3.4 Lake Water Quality

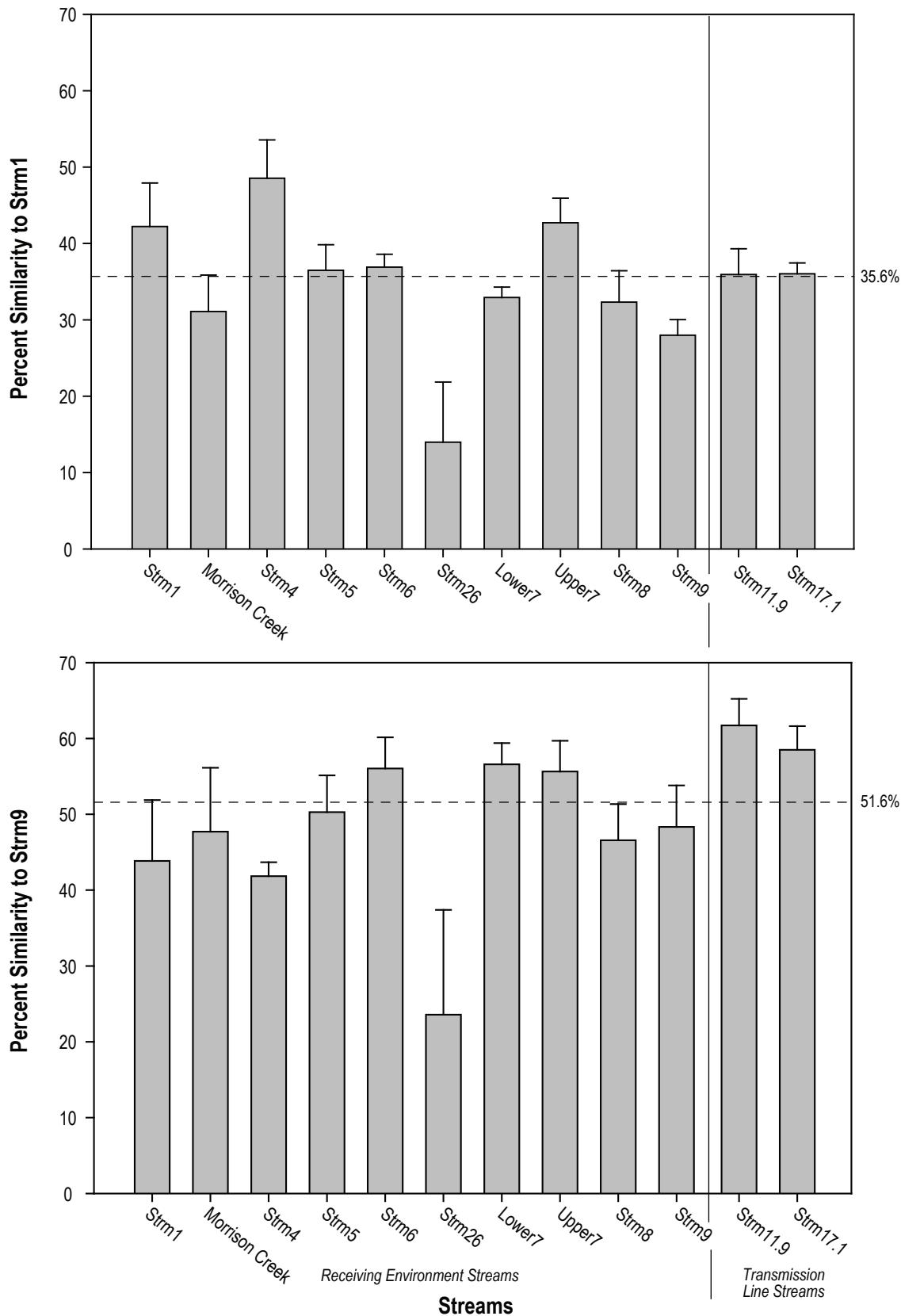
In 2008, water quality was assessed at five lake stations in Morrison Lake (Lake A, B, C, D and E). For each station a shallow and deep depth sample was taken. These five stations were also sampled in 2006. 2008 water quality data are presented in Appendix 3.4-1 and analytical detection limits for each sample are provided in Appendix 3.4-2. Variables with more than 75% of the samples were below detection are not presented graphically or discussed, unless they are variables of interest or have samples that exceeded provincial or federal aquatic life guidelines. A summary of samples exceeding CCME (CCME 1999) and BC (BC MOE 2006) guidelines is presented in Appendix 3.4-3.

3.4.1 Physical Parameters, Nutrients and Cyanide

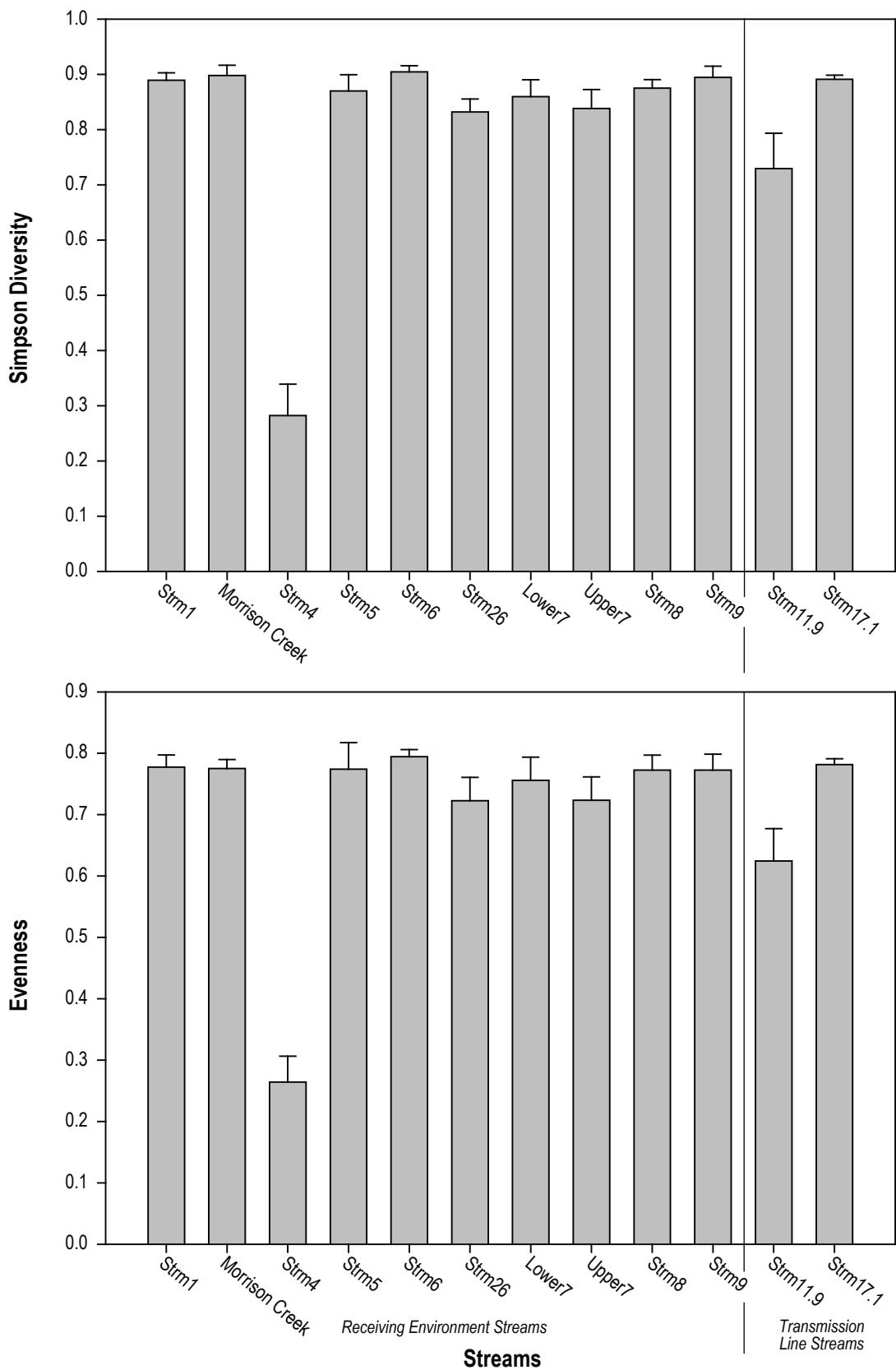
Key physical variables are presented graphically and discussed below. Where available, CCME and BC guidelines are indicated. Most of these variables had similar concentrations to samples collected in 2006.

Hardness was relatively low throughout Morrison Lake, with concentrations ranging from 28.2 (LakeE - Deep) to 30.9 mg/L (LakeB - Deep) (Figure 3.4-1). Concentrations were consistent at each site. No BC or CCME guidelines exist for hardness.

Water pH values were slightly alkaline at all lake sites with low variability observed. Water pH values ranged from 7.23 (LakeB - Deep) to 7.65 (LakeA - Deep) (Figure 3.4-1). All pH values stayed within the CCME minimum and maximum guidelines.

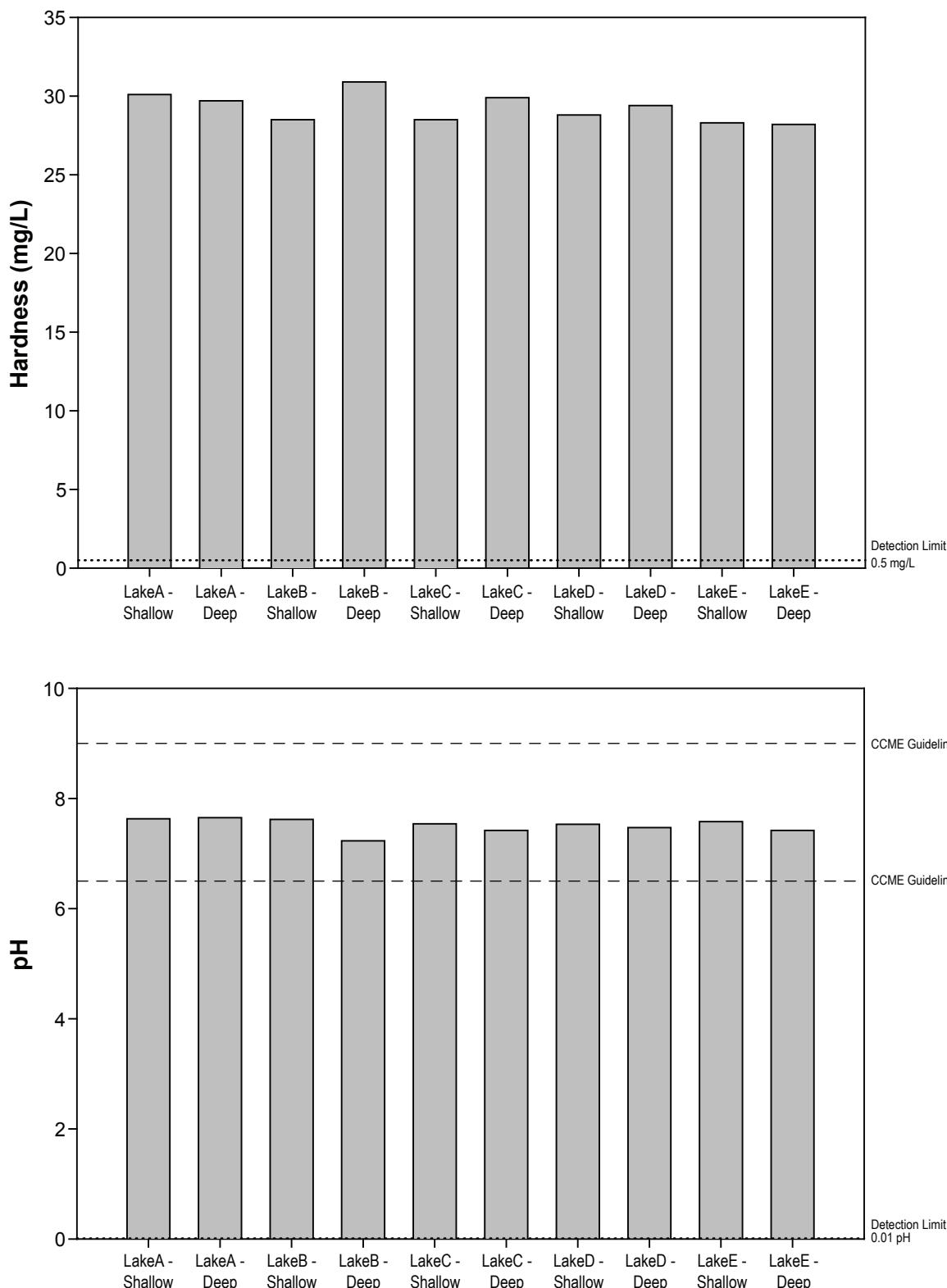


**Morrison Copper/Gold Project
Average Bray-Curtis Percent Similarity
for Stream Benthic Invertebrates, 2008**



Note: Error bars represent standard error of the mean.

Morrison Copper/Gold Project
Average Simpson Diversity and Evenness
for Stream Benthic Invertebrates, 2008



Note: No CCME or BC guidelines exist for hardness.
 CCME Water Quality Guidelines for pH are indicated by blue dashed lines.
 Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Hardness Concentrations and pH Values, 2008



FIGURE 3.4-1

Results

Water clarity was high at all lake sites with turbidity ranging from 0.43 (LakeA - Shallow) to 0.85 NTU (LakeE - Shallow) (Figure 3.4-2). Slight variability was observed between sites. LakeE - Shallow was slightly more turbid than all other sites. No BC or CCME guidelines exist for turbidity.

Conductivity in Morrison Lake ranged from 57.5 (LakeC - Shallow) to 65 $\mu\text{S}/\text{cm}$ (LakeB - Deep) (Figure 3.4-2). No BC or CCME guidelines exist for conductivity.

Like hardness, total dissolved solids (TDS) concentrations were similar across sites. TDS concentrations ranged from 54 (LakeB and LakeE - Shallow, and LakeD - Deep) to 59 mg/L (LakeA - Shallow) (Figure 3.4-3). Average TDS concentrations were slightly higher in 2008 (56.3 mg/L) than in 2006 (47 mg/L). No BC or CCME guidelines exist for total dissolved solids.

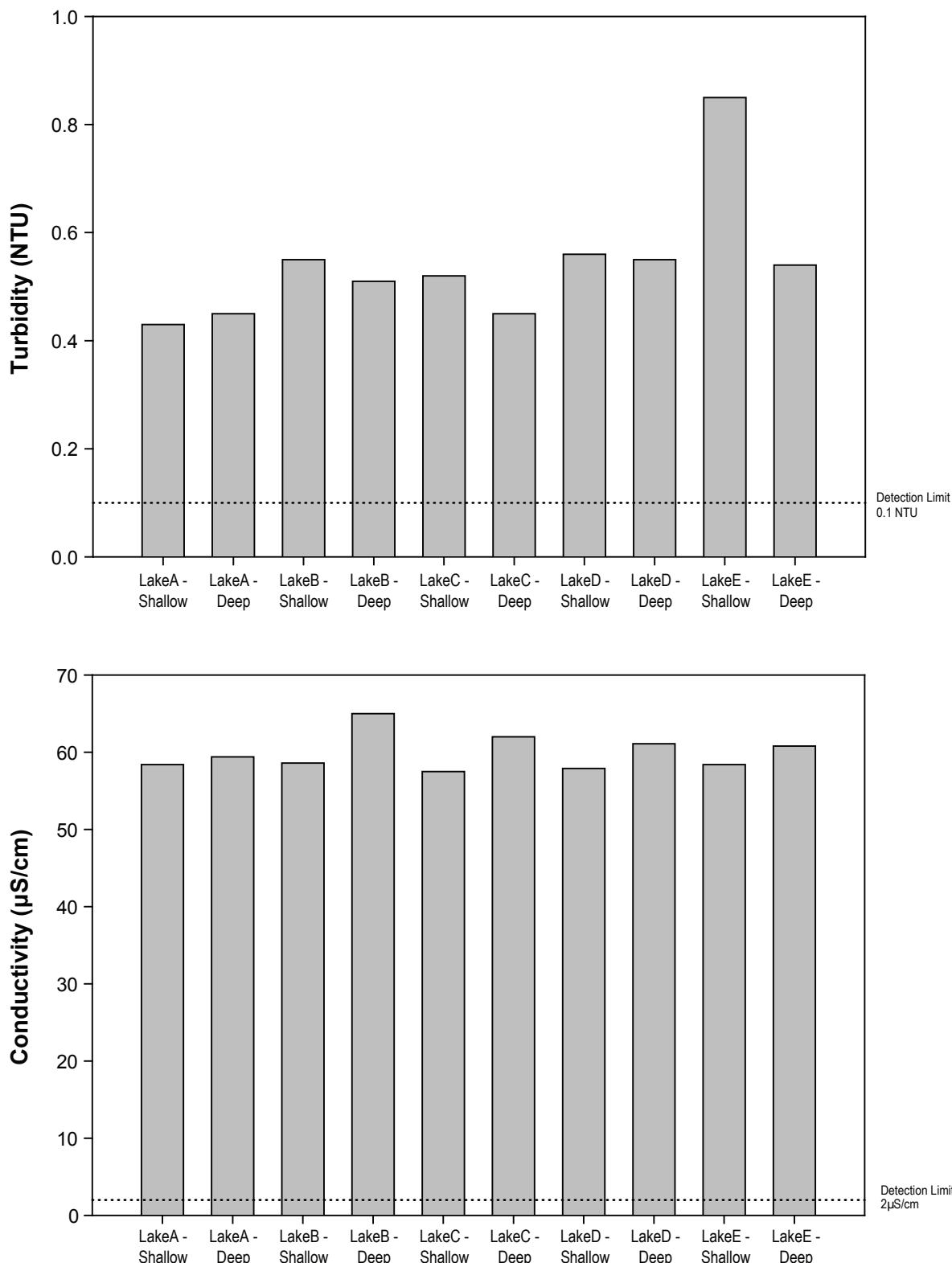
Total phosphate concentrations varied widely between sites. Total phosphate ranged from 0.0058 (LakeB - Deep) to 0.0124 mg/L (LakeE - Shallow) (Figure 3.4-3). In 2006, total phosphate concentrations stayed below 0.0080 mg/L, while in 2008 two peak concentrations above 0.0080 mg/L were observed at LakeB and LakeE. No BC or CCME guidelines exist for total phosphate.

Fluoride concentrations ranged from 0.022 (LakeD - Deep) to 0.036 mg/L (LakeE and LakeD, Shallow) (Figure 3.4-4). Concentrations were very similar at each site except for at LakeD - Deep which had a considerably lower concentration than the shallow sample. The BC Max guideline (which depends on hardness) was not exceeded by any site. No CCME guidelines exist for fluoride.

Sulphate concentrations, like TDS and hardness, had similar concentrations across sites. Sulphate concentrations ranged from 2.34 (LakeC - Shallow) to 2.61 mg/L (Lake D - Deep) (Figure 3.4-4). Sulphate concentrations stayed well below the BC Max guideline of 100 mg/L. No CCME guidelines exist for sulphate.

Thirty percent of the ammonia concentrations were below detection limits (<0.005 to 0.050 mg/L), but ammonia is discussed and graphed due to it being a variable of interest. Ammonia ranged from below the detection limits (at several sites) to 0.113 mg/L (LakeB - Deep) (Figure 3.4-5). Concentrations of ammonia generally stayed below 0.002 mg/L except for at LakeB -Deep which was ten times higher than all other sites. This high concentration at LakeB may be due to equipment contamination (discussed in Section 3.4.3). Overall, concentrations in 2006 were slightly higher than 2008. Concentrations of ammonia did not exceed the CCME guideline which depends on pH and temperature.

High variability was observed for nitrate concentrations in Morrison Lake. Concentrations ranged from below the detection limit <0.0050 mg/L (LakeC - Shallow) to 0.0644 mg/L (LakeC - Deep) (Figure 3.4-5). Concentrations were much higher in deep depths at LakeB, C, D, and E than in their shallow depths. In 2006, nitrate was only detected at LakeA (0.0101 mg/L). Though concentrations were considerably higher at deeper depths, these concentrations never exceeded the BC or CCME guidelines.



Note: BC guidelines for Turbidity are dependant on background levels. CCME guidelines do not exist.

No CCME or BC guidelines exist for Conductivity.

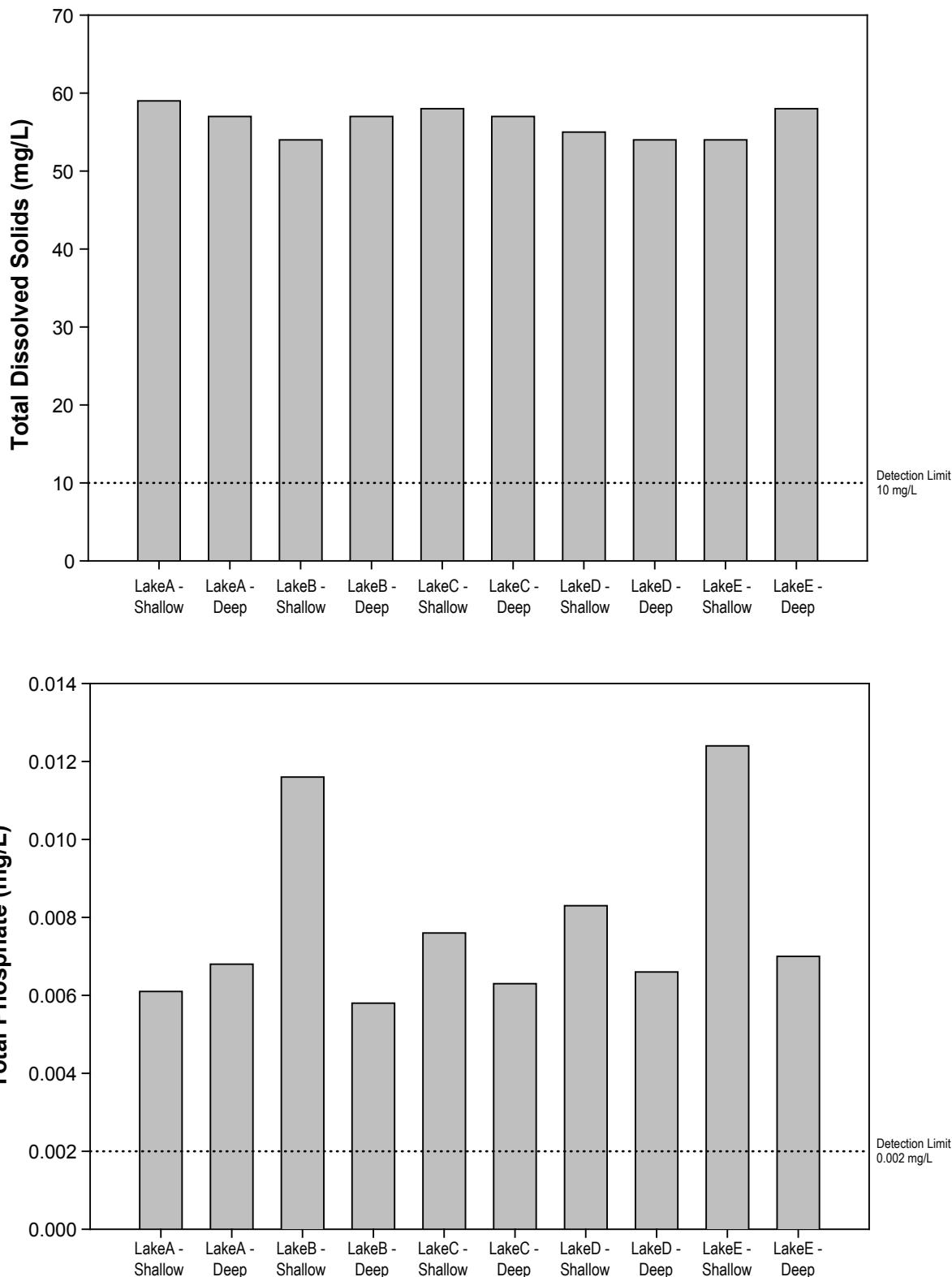
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Turbidity and Conductivity Values, 2008

FIGURE 3.4-2





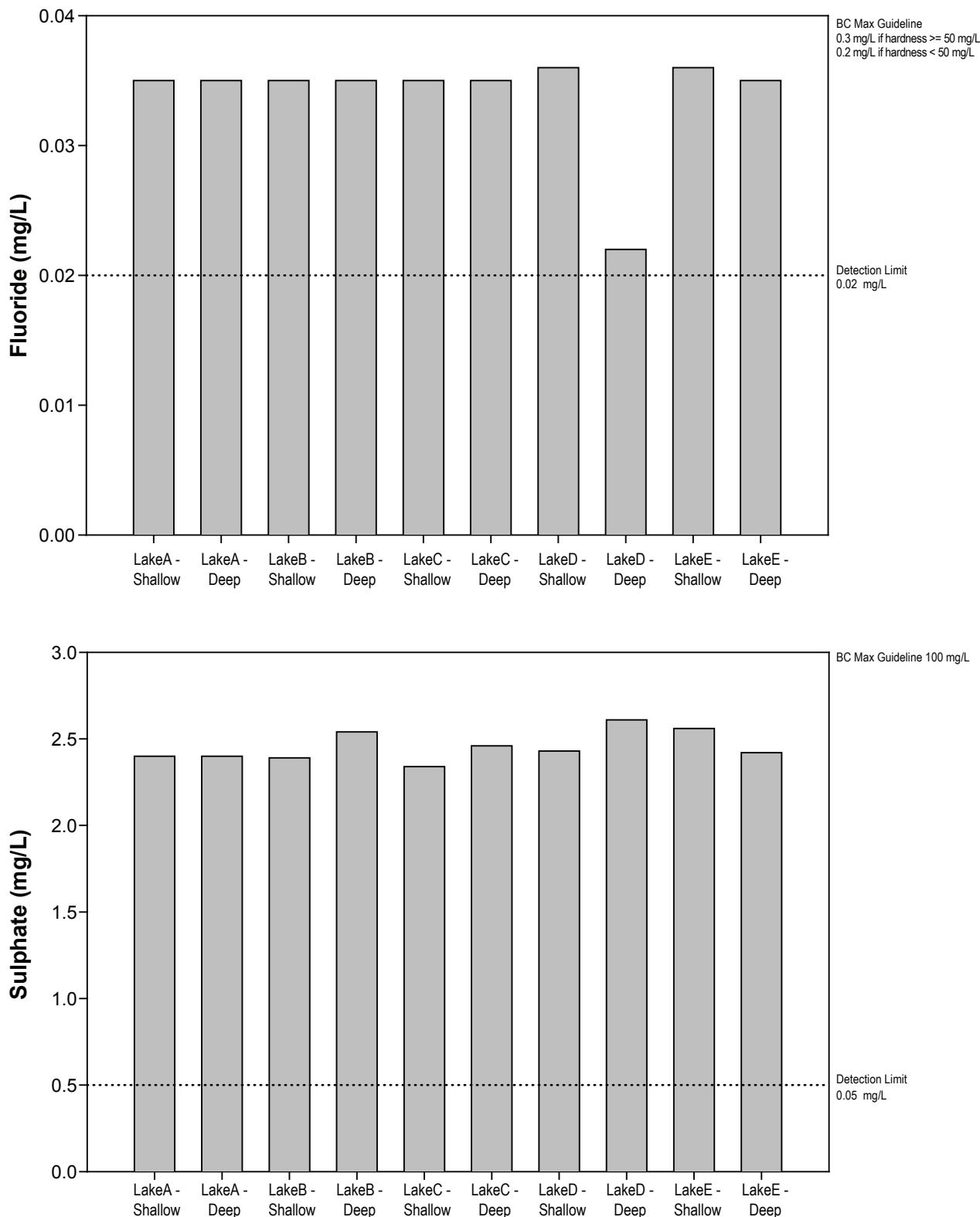
Note: No CCME or BC guidelines exist for Total Dissolved Solids or Total Phosphate.
 Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total Dissolved Solid and Total Phosphate Concentrations, 2008



FIGURE 3.4-3



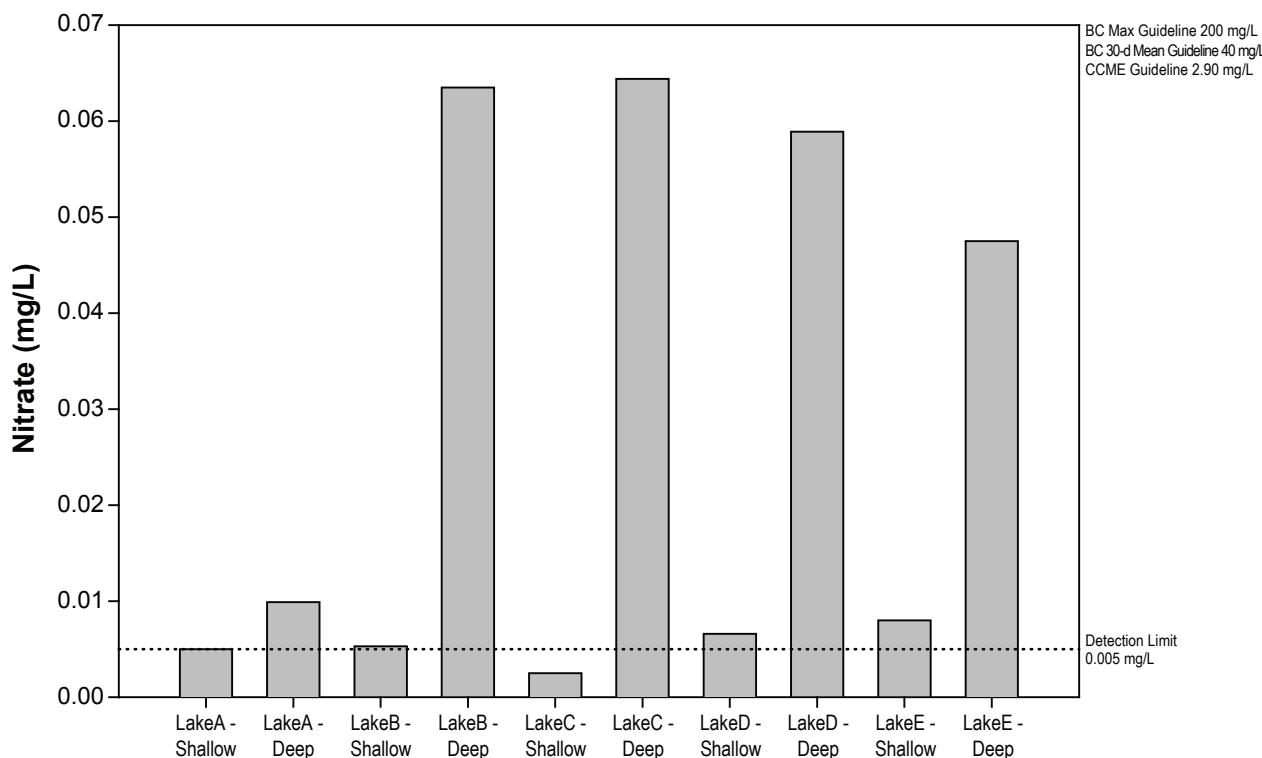
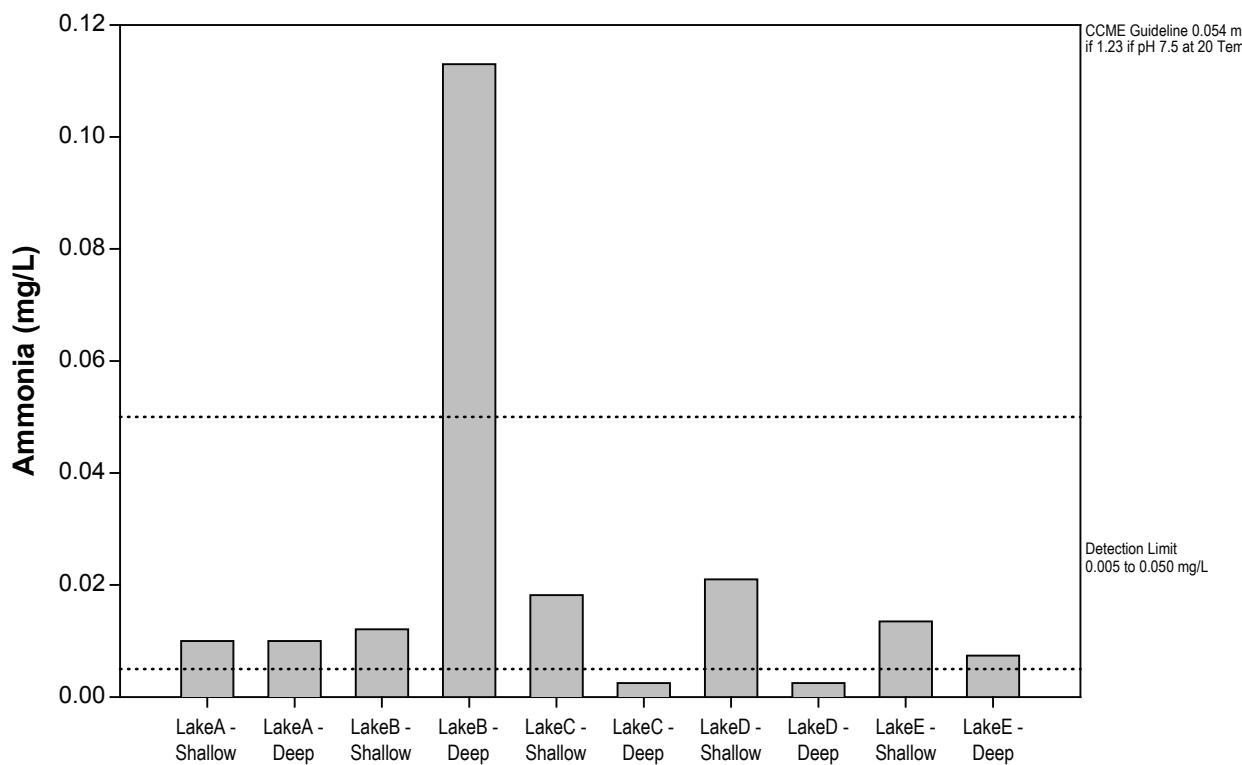
Note: Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Fluoride and Sulphate Concentrations, 2008

FIGURE 3.4-4





Note: BC and CCME guidelines for Ammonia are dependant on pH and Temperature.

No CCME or BC guidelines exist for Nitrate.

Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Ammonia and Nitrate Concentrations, 2008

FIGURE 3.4-5



Total Kjeldahl nitrogen (TKN) ranged from 0.085 (LakeA - Shallow) to 0.161 mg/L (LakeD - Deep) (Figure 3.4-6). TKN varied considerably between sites. In 2008, TKN concentrations were approximately half the concentrations of 2006. No BC or CCME guidelines exist for TKN.

Total nitrogen concentrations ranged from 0.09 (LakeA - Shallow) to 0.22 mg/L (LakeD - Deep) (Figure 3.4-6). High variability was observed between sites. Total nitrogen concentrations were lower than in 2006, the average concentration in 2008 was 0.156 mg/L while in 2006 it was 0.298 mg/L. No BC or CCME guidelines exist for total nitrogen.

TOC concentrations were similar to 2006, though concentrations at LakeA - Shallow were roughly half the concentration normally observed previously. Except for this site, concentrations were consistent throughout Morrison Lake in 2008. TOC concentrations ranged from 5.61 (LakeA - Shallow) to 10.3 mg/L (LakeE - Deep) (Figure 3.4-7). No BC or CCME guidelines exist for TOC.

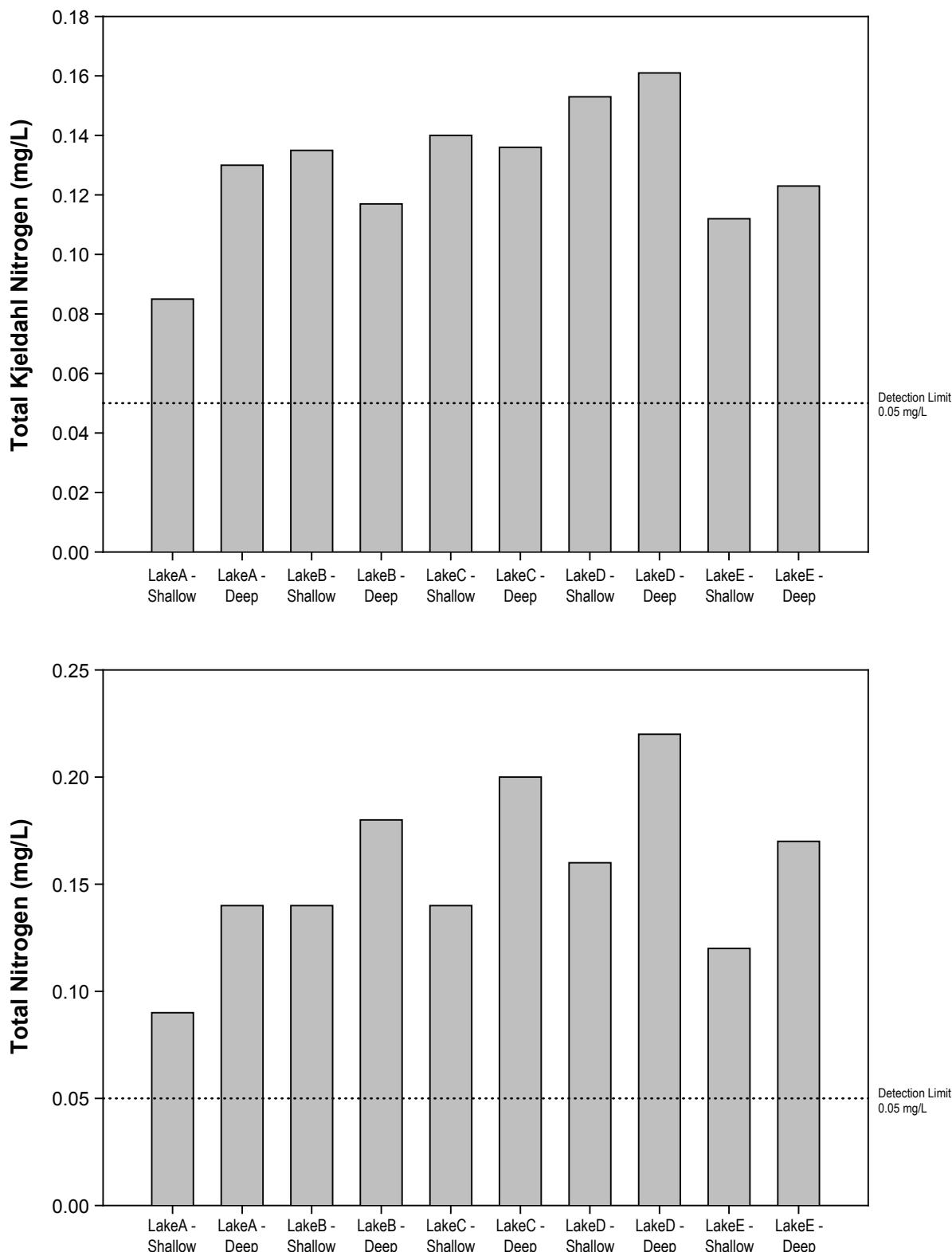
Total cyanide concentrations nearly doubled from 2006 values. Total cyanide ranged from 0.0063 (LakeB - Deep) to 0.0086 mg/L (LakeD - Shallow) (Figure 3.4-7). The highest concentration in 2006 was 0.0051 mg/L at Lake A and Lake D. All sites in 2008 exceeded the BC 30-day Mean guideline of 0.005 mg/L. None exceeded the BC Max guideline of 0.01 mg/L. In 2006 LakeA and LakeD (surface concentrations) exceeded the BC 30-day Mean guideline by 0.0001 mg/L.

3.4.2 Total and Dissolved Metals

Metals discussed in this report had greater than 75% of their values above their respective detection limits. Metals supported with a figure are total and dissolved aluminum, arsenic, barium, copper, iron, manganese, molybdenum, nickel and selenium. Metals discussed due to exceedances but are not supported with a figure are total and dissolved cadmium, chromium and mercury. All data can be found in Appendix 3.2-1 along with detection limits in Appendix 3.2-2. CCME and BC guidelines for total metals were used to screen both total and dissolved metal concentrations, with the exception of dissolved aluminum which has specific BC guidelines. Metal concentrations in 2008 were similar to 2006, unless otherwise noted.

Total and dissolved aluminum concentrations in 2008 were approximately double the concentrations observed in 2006. In 2008, total aluminum ranged from 0.0388 (LakeC - Shallow) to 0.0483 mg/L (LakeE - Deep) (Figure 3.4-8). Dissolved aluminum ranged from 0.0336 (LakeD - Deep) to 0.0372 mg/L (LakeE - Deep) (Figure 3.4-8). Aluminum concentrations were primarily in the dissolved form, and varied little between sites and depths. The CCME, BC Max and BC 30-day Mean guidelines for total and dissolved aluminum were not exceeded at any site.

Total arsenic concentrations ranged from 0.00026 (LakeC - Deep) to 0.00029 mg/L (LakeA, B, and D, Deep) (Figure 3.4-9). Dissolved arsenic concentrations were very similar to total arsenic, indicating that arsenic in Morrison Lake is primarily dissolved. Dissolved arsenic ranged from 0.00024 mg/L (LakeE - Deep) to 0.00034 mg/L (LakeC - Deep) (Figure 3.4-9). For both total and dissolved arsenic, concentrations varied little between sites and depths. The BC Max and CCME guidelines for arsenic (0.005 mg/L) were not exceeded at any sites.



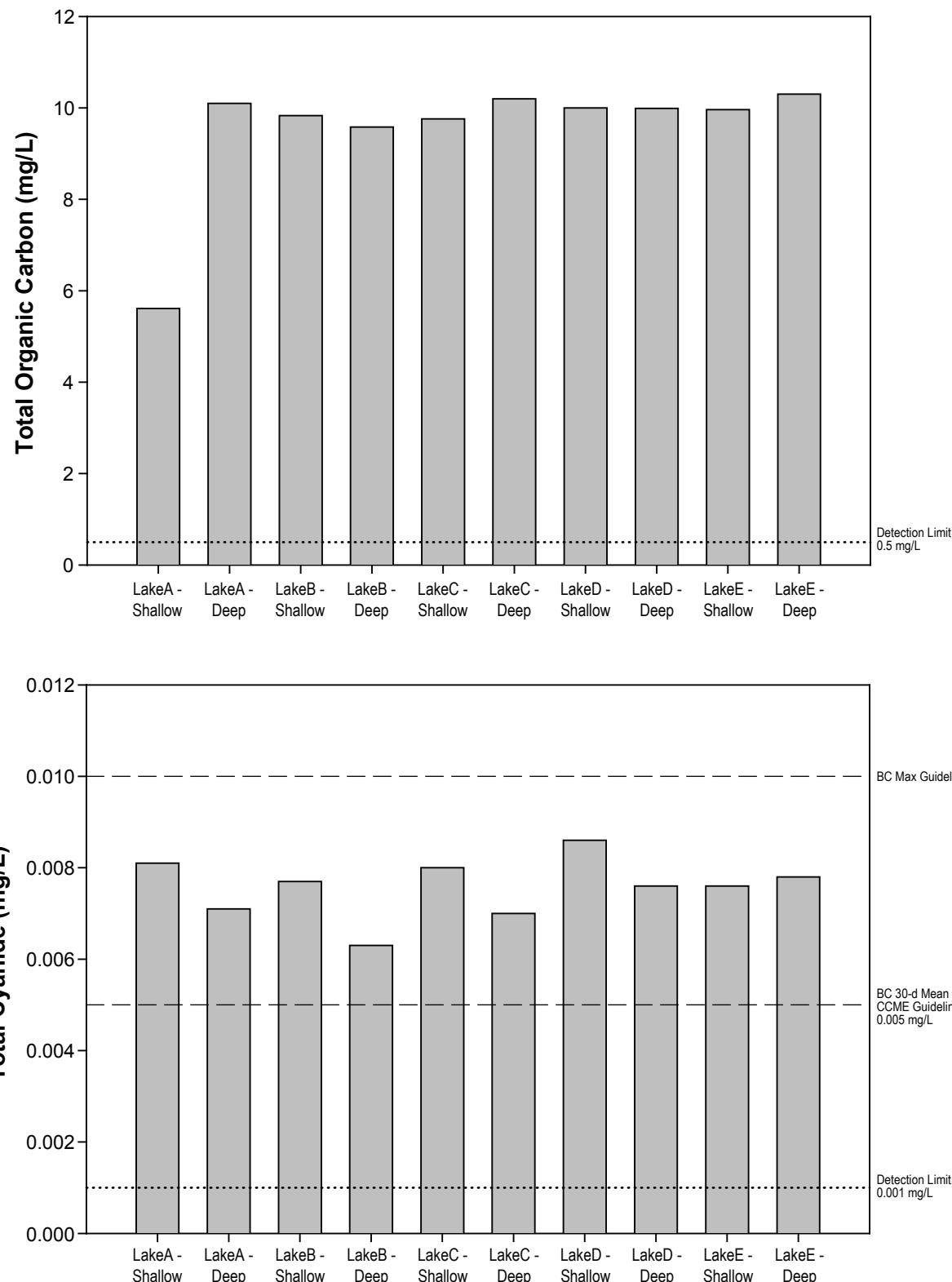
Note: No CCME or BC guidelines exist for Total Kjeldahl Nitrogen or Total Nitrogen.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total Kjeldahl Nitrogen and Total Nitrogen Concentrations, 2008



FIGURE 3.4-6



Note: No CCME or BC guidelines exist for Total Organic Carbon.

Dashed lines for total cyanide indicate BC and/or CCME

Water Quality Guidelines for the Protection of Aquatic Life.

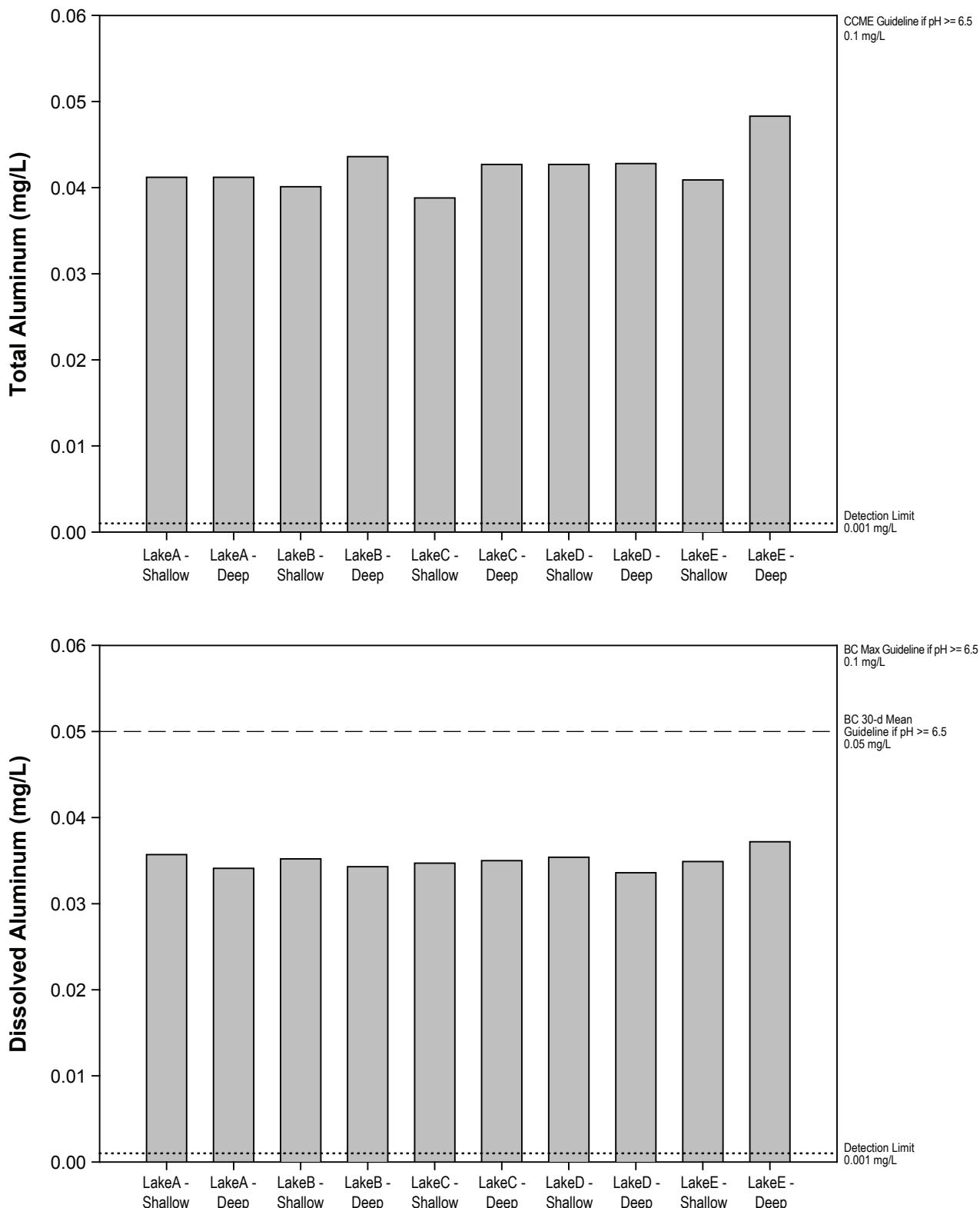
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total Organic Carbon and Total Cyanide Concentrations, 2008

FIGURE 3.4-7



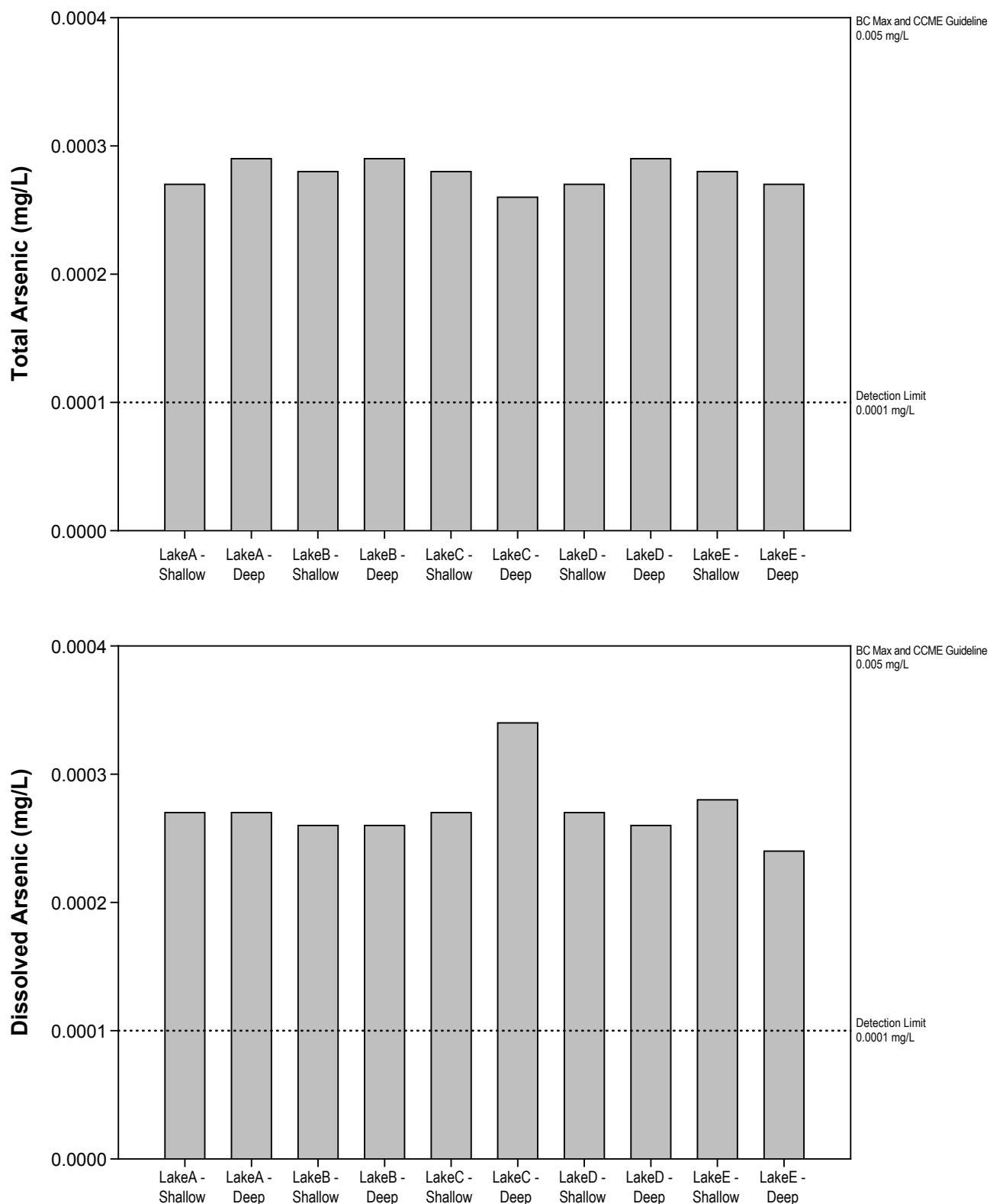


Note: Dashed lines indicate BC and/or CCME Water Quality Guidelines for the Protection of Aquatic Life
Dotted lines indicate analytical detection limits.

Morrison Copper/Gold Project Lake Total and Dissolved Aluminum Concentrations, 2008



FIGURE 3.4-8



Note: Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total and Dissolved Arsenic Concentrations, 2008

FIGURE 3.4-9



Results

Total barium concentrations ranged from 0.015 (LakeA - Shallow) to 0.0254 mg/L (LakeE - Deep) (Figure 3.4-10). Barium was primarily in the dissolved form, having a similar range to total barium with 0.0155 (LakeE - Shallow) to 0.025 mg/L (LakeE - Deep) (Figure 3.4-10). Concentrations varied little between sites for total and dissolved barium. The BC Max and 30-day Mean guidelines were not exceeded at any sites. No CCME guideline exists for barium.

All total and dissolved cadmium concentrations were below the detection limit of <0.000017 mg/L except for total cadmium at LakeA - Shallow (0.000031 mg/L). In 2006, cadmium concentrations were all below the detection limit. This unexpected spike in total cadmium at LakeA may be due to contamination. LakeA - Shallow exceeded the CCME guideline of 0.000017 mg/L by almost two times. The BC Max guideline for cadmium (which depends on hardness) was not exceeded at this site.

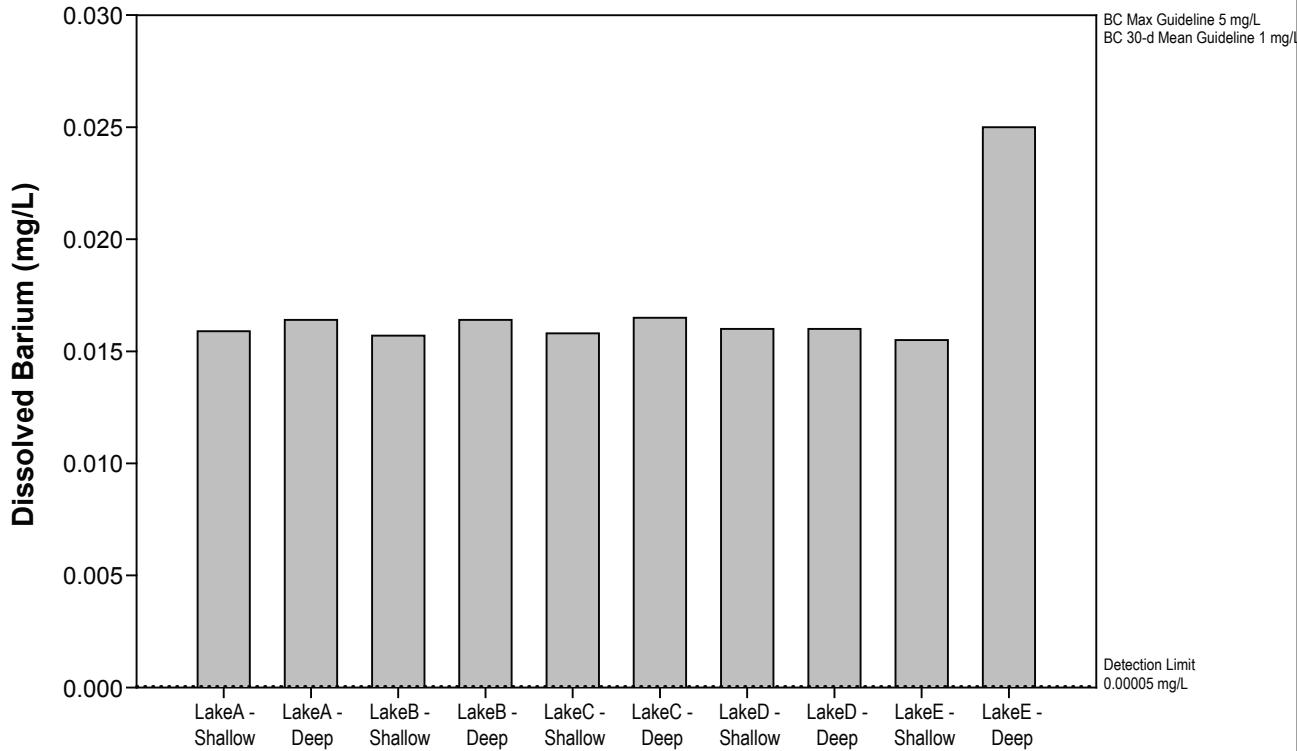
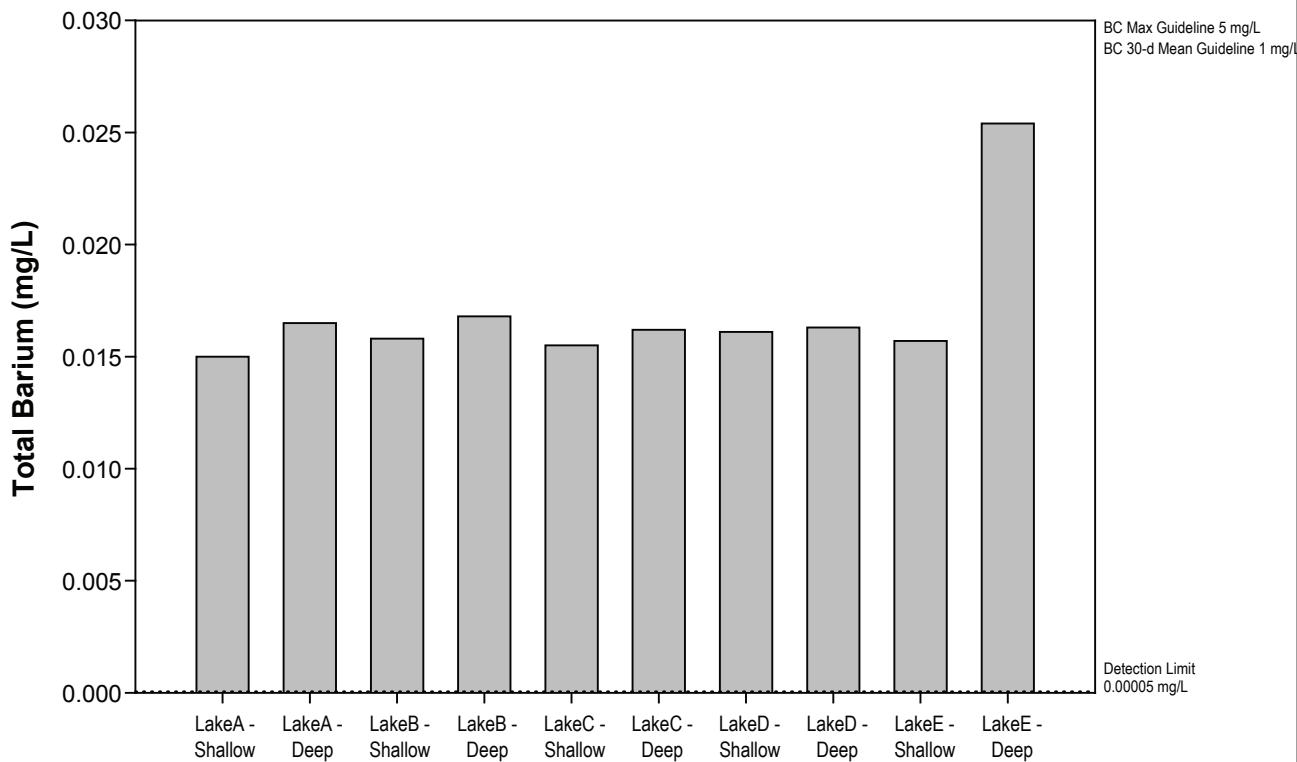
Total and dissolved chromium concentrations were all below the detection limit (<0.0005 mg/L) except for LakeE - Deep. Total and dissolved chromium concentrations at this site were 0.00254 and 0.00165 mg/L, respectively. The BC Max and CCME guideline of 0.001 mg/L was exceeded by both total and dissolved chromium at this site. All chromium concentrations in 2006 were below detection limits.

Total copper concentrations ranged from 0.00083 (LakeC - Shallow) to 0.00181 mg/L (LakeE - Deep) (Figure 3.4-11). Dissolved copper had similar concentrations ranging from 0.00087 (LakeE - Shallow) to 0.00147 mg/L (LakeE - Deep), indicating the copper was largely in the dissolved form in Morrison Lake (Figure 3.4-11). Total copper concentrations slightly varied between sites and depths, with two spikes occurring at LakeA - Shallow and LakeE - Deep. Dissolved copper concentrations were more consistent between sites and depths than total copper, though LakeE - Deep had a corresponding spike to the total copper concentration. The BC and CCME guidelines (which depend on hardness) were not exceeded by any site for total or dissolved copper.

Total iron concentrations ranged from 0.111 (LakeA - Shallow) to 0.153 mg/L (LakeE Deep) (Figure 3.4-12). Dissolved iron had a similar range of 0.101 (LakeB - Shallow) to 0.115 mg/L (LakeE - Deep) (Figure 3.4-12). Total iron concentrations were more varied than dissolved iron. The BC Max and CCME guideline of 0.3 mg/L was not exceeded at any lake station.

Unlike most metals in Morrison Lake, manganese was largely particulate bound with total concentrations roughly four times higher than dissolved concentrations. In 2006, concentrations of total manganese were approximately ten times higher than dissolved manganese. Total manganese concentrations in 2008 ranged from 0.00248 (LakeC - Shallow) to 0.00493 mg/L (LakeE Deep) (Figure 3.4-13). Dissolved manganese ranged from 0.000511 (LakeB - Shallow) to 0.00147 mg/L (LakeE - Deep) (Figure 3.4-13). The BC Max and BC 30-day Mean guidelines (which depend on hardness) were not exceeded at any lake station.

All total and dissolved mercury concentrations were below detection limits except for LakeD and LakeA, Shallow. LakeD - Shallow had a total mercury concentration of 0.000013 mg/L and dissolved mercury concentration of 0.000011 mg/L. LakeA - Shallow had a dissolved mercury concentration of 0.000011 mg/L. None of these mercury concentrations exceeded the BC or CCME guidelines. At LakeE the dissolved mercury detection limit (<0.00010 mg/L) was higher



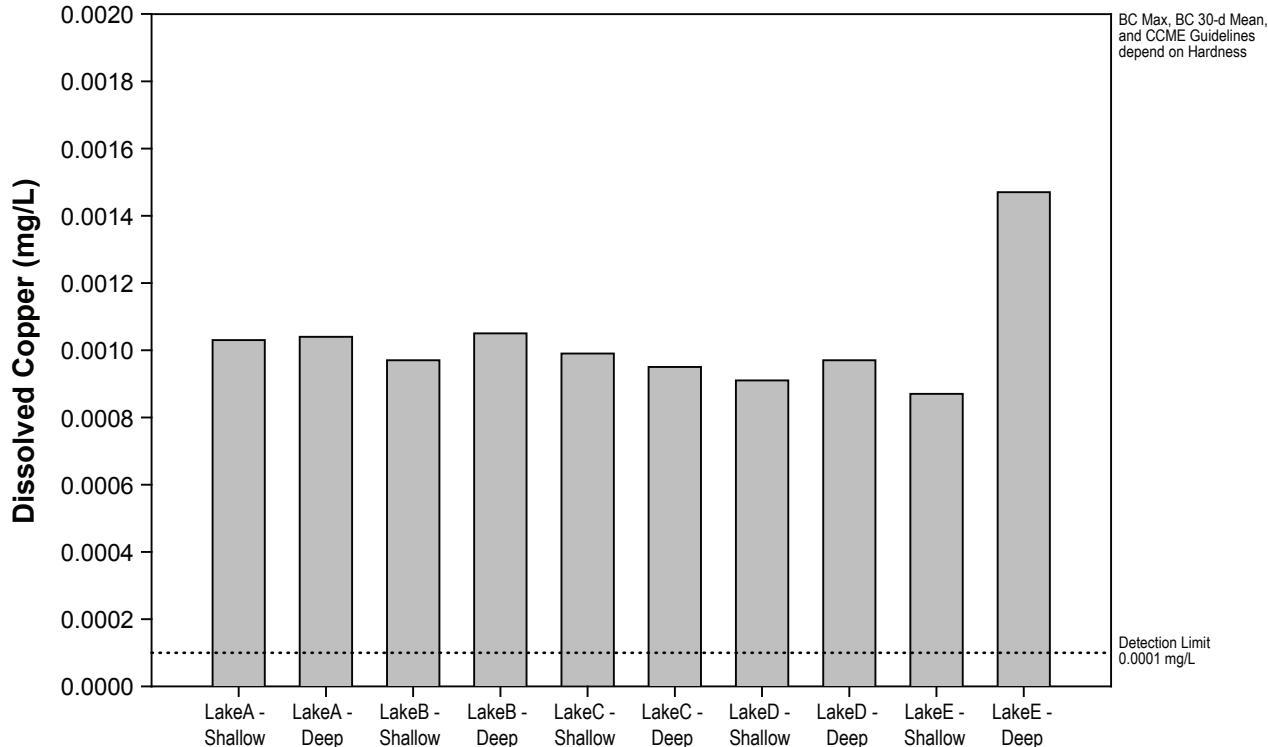
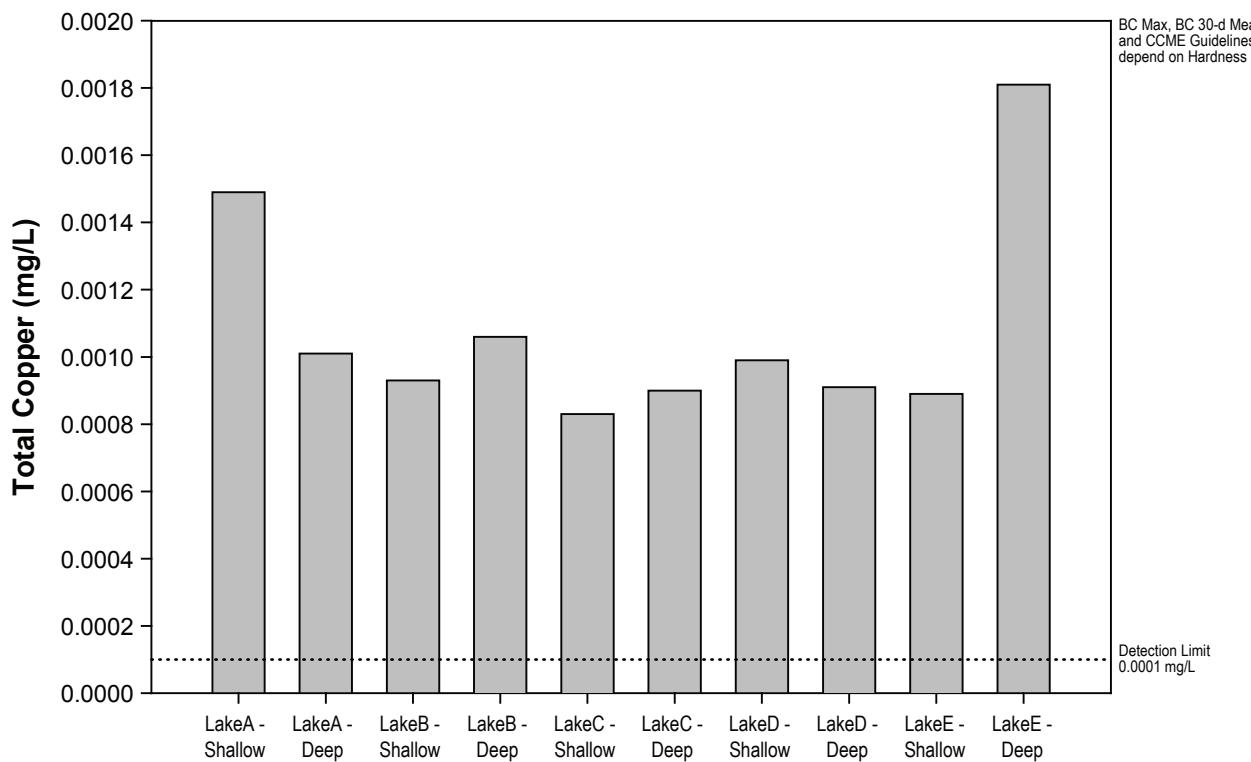
Note: Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total and Dissolved Barium Concentrations, 2008

FIGURE 3.4-10





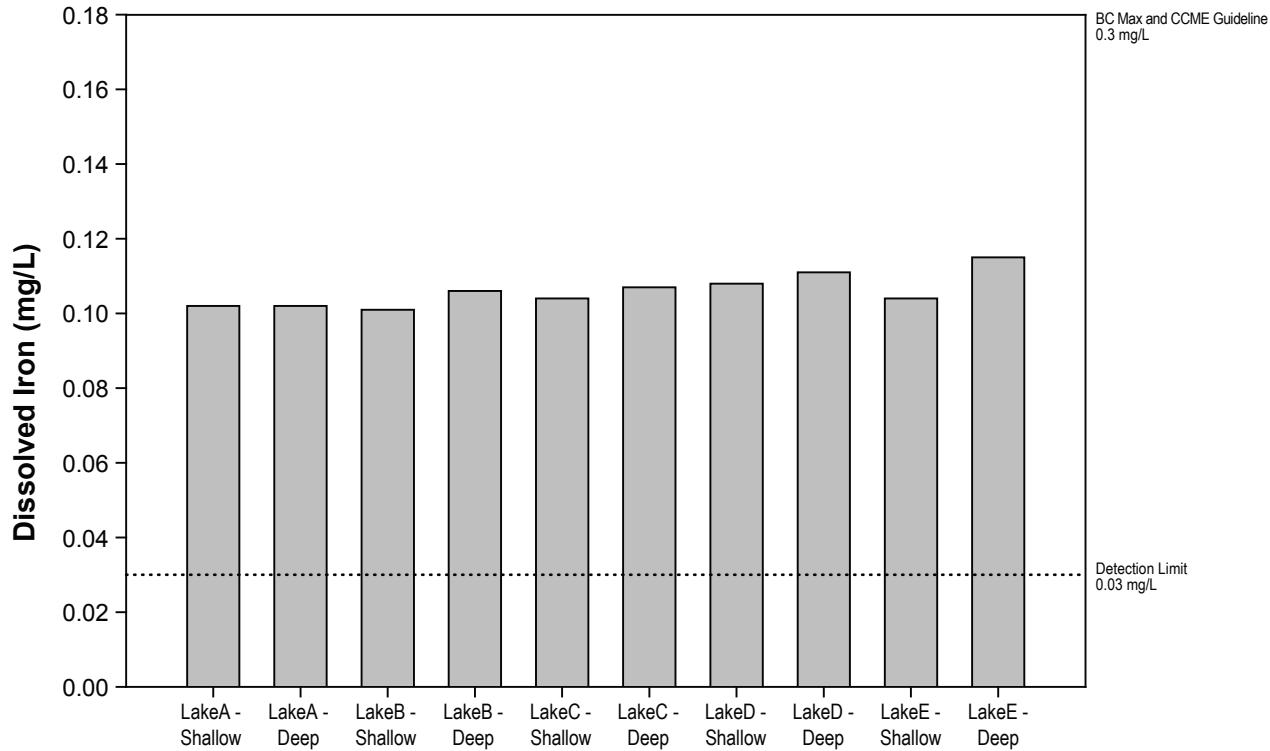
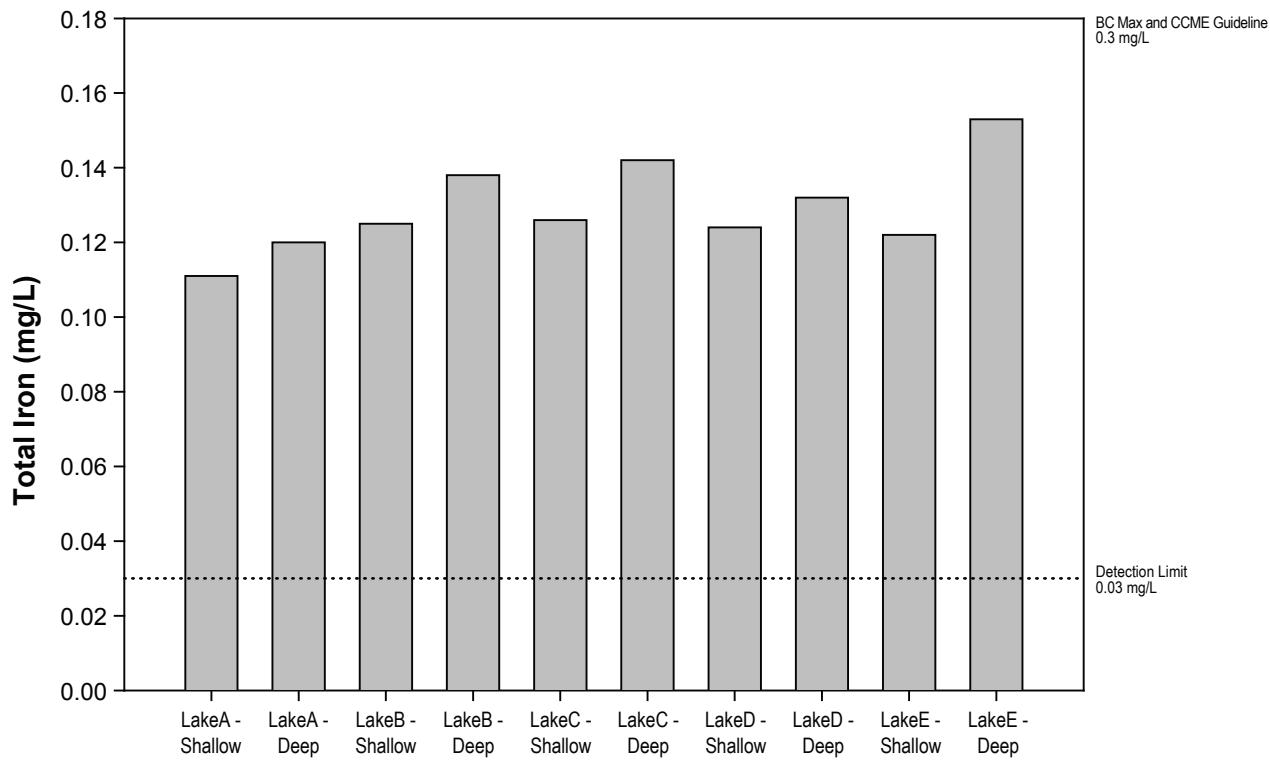
Note: BC and CCME guidelines are hardness dependant.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total and Dissolved Copper Concentrations, 2008

FIGURE 3.4-11





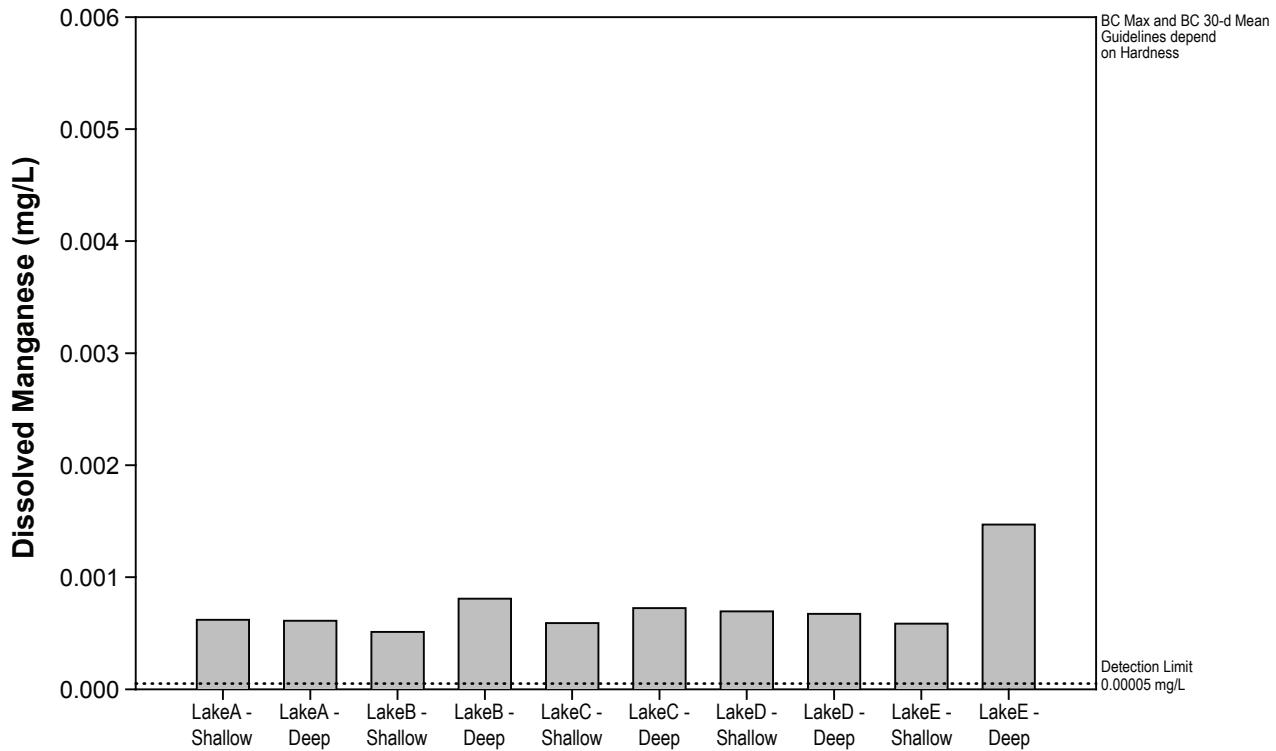
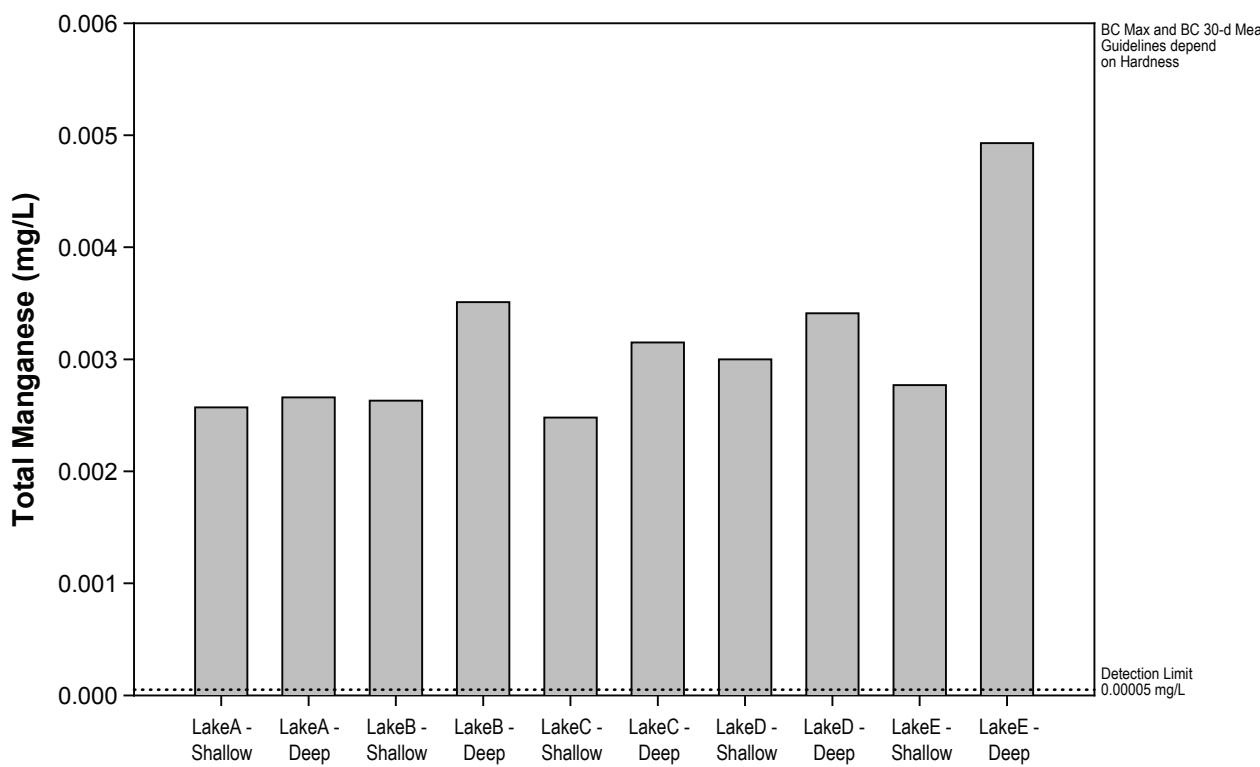
Note: Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total and Dissolved Iron Concentrations, 2008

FIGURE 3.4-12





Note: BC Water Quality Guidelines are hardness dependant.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total and Dissolved Manganese Concentrations, 2008

FIGURE 3.4-13



than the CCME and BC 30-day Mean guidelines. Since analyses of these samples involved increasing the detection limit, the apparent guideline exceedances are misleading. All mercury concentrations in 2006 were below detection limits.

Total molybdenum concentrations ranged from 0.000094 (LakeD - Deep) to 0.000126 mg/L (LakeD - Shallow) (Figure 3.4-14). Dissolved molybdenum concentrations ranged from 0.000108 (LakeE - Shallow) to 0.000130 mg/L (LakeE - Deep) (Figure 3.4-14). Concentrations for total and dissolved molybdenum were similar indicating that molybdenum was primarily in the dissolved form. Concentrations varied little between lake stations and depths. Total and dissolved molybdenum concentrations were well below BC or CCME guidelines.

Nickel was primarily in the dissolved form in Morrison Lake. Total nickel ranged from 0.00062 (LakeC - Shallow) to 0.0551 mg/L (LakeE - Deep) (Figure 3.4-15). Dissolved nickel ranged from 0.00066 (LakeC - Shallow) to 0.0534 mg/L (LakeE - Deep) (Figure 3.4-15). Total and dissolved nickel concentrations at LakeE - Deep were sixty times higher than all other sites, likely due to equipment contamination. In 2006, LakeE concentrations were below detection limits for both total and dissolved nickel. The BC Max and CCME guidelines for nickel depend on hardness. Total and dissolved nickel concentrations at LakeE - Deep exceeded both these guidelines. No other sites exceeded nickel guidelines.

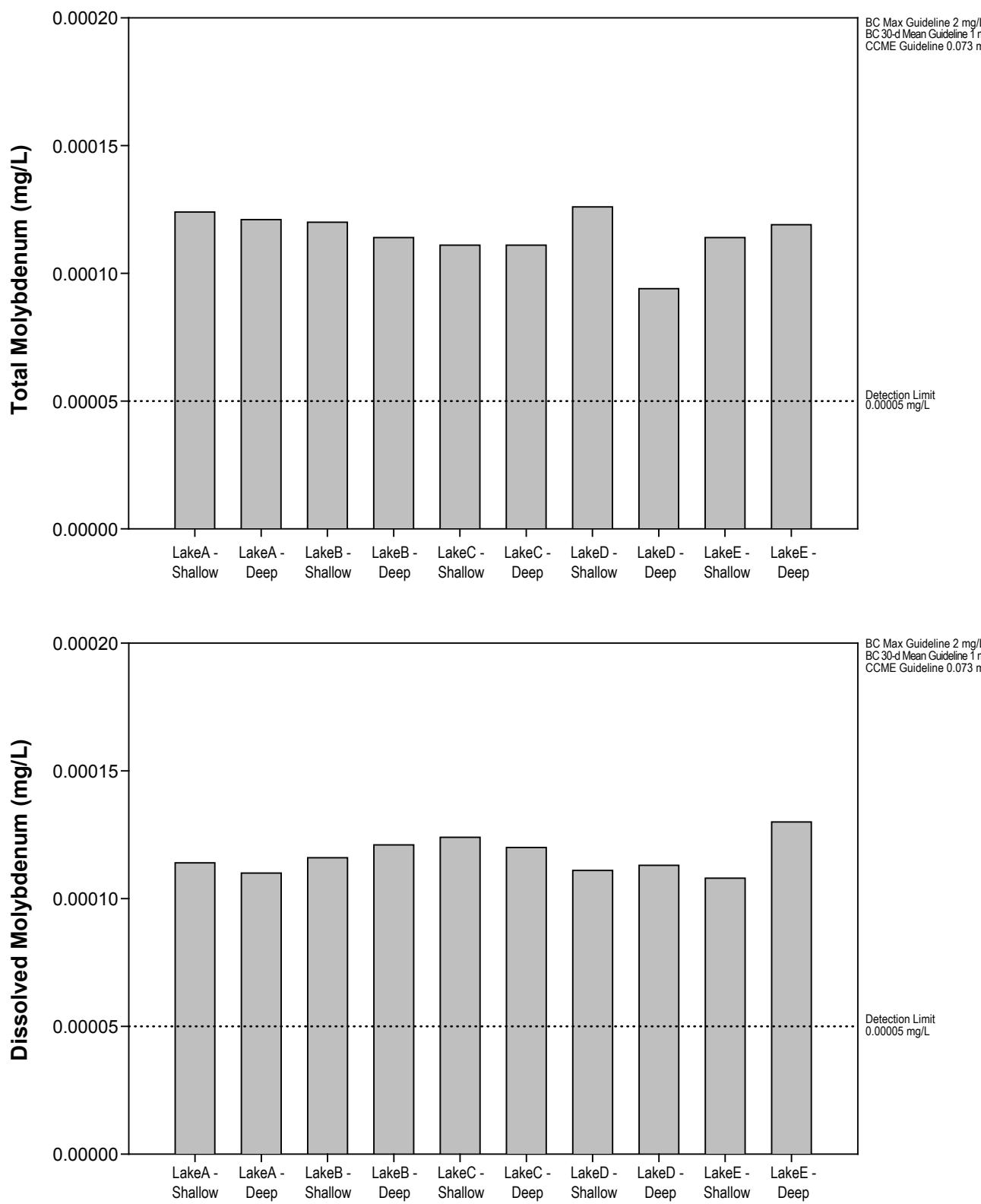
Total and dissolved selenium concentrations were highly varied between stations and depths. Selenium was primarily in the dissolved form, with total selenium ranging from 0.00011 (LakeC - Shallow) to 0.00045 mg/L (LakeD - Shallow) and dissolved selenium ranging from 0.00012 mg/L (LakeE - Deep) to 0.00047 mg/L (LakeB - Deep) (Figure 3.4-16). In 2006, only LakeA detected total selenium, but in 2008 all stations detected total and dissolved selenium. Dissolved selenium was not detected in 2006. Total and dissolved selenium never exceeded the BC 30-day Mean or CCME guideline.

3.4.3 Quality Assurance and Quality Control (QA/QC)

All field and travel blank data are summarized in Section 3.1.3 of this report. Field and travel blank data were all below MDL except for ammonia and total selenium. An equipment blank was also collected from the Go-Flo apparatus (Appendix 3.4-1). This equipment blank showed contamination for several variables, including many metals. The apparatus likely contributed to the elevated concentrations seen at most deep lake sites (especially LakeE – Deep). Hardness, conductivity, pH, ammonia, acidity, chloride, total cyanide, and total and dissolved aluminum, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, selenium, silicon, strontium, tin, and zinc were all detected in this blank.

3.5 Physical Limnology

Standard physical limnology parameters were measured at five stations within Morrison Lake, in 2008. All limnology data are shown in Appendix 3.5-1. Surface pH, surface conductivity, secchi depth readings and depth profiles of temperature and dissolved oxygen were measured at each station and are summarized in Table 3.5-1. Surface pH and conductivity showed little to no variation between lake stations. The maximum sample depth ranged from 8 (LakeA) to 29 m



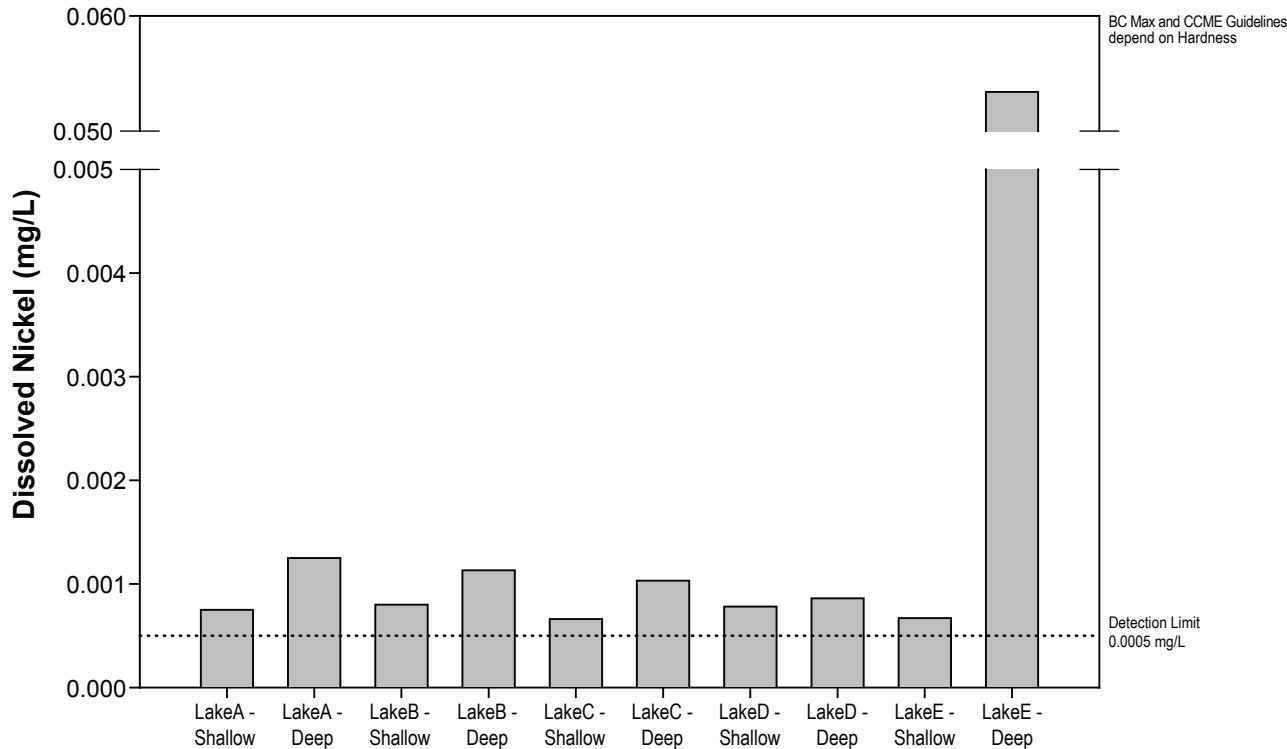
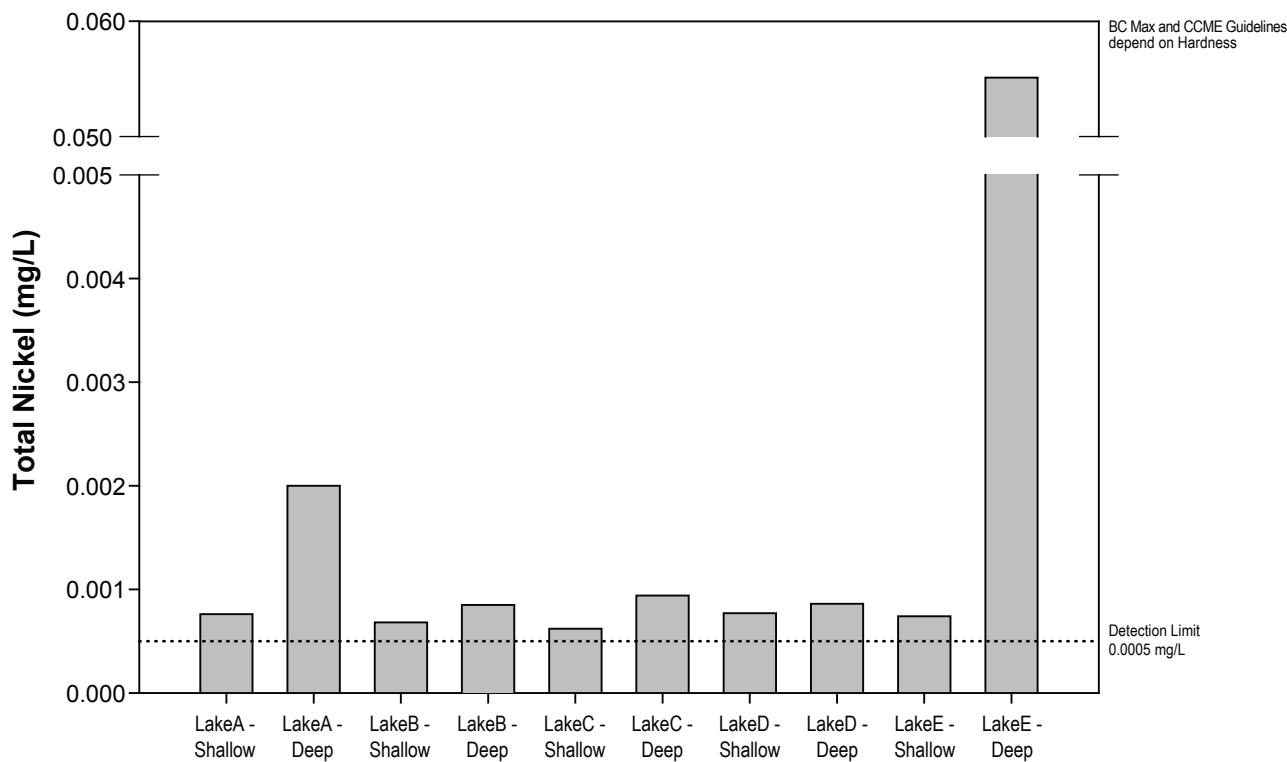
Note: Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total and Dissolved Molybdenum Concentrations, 2008

FIGURE 3.4-14





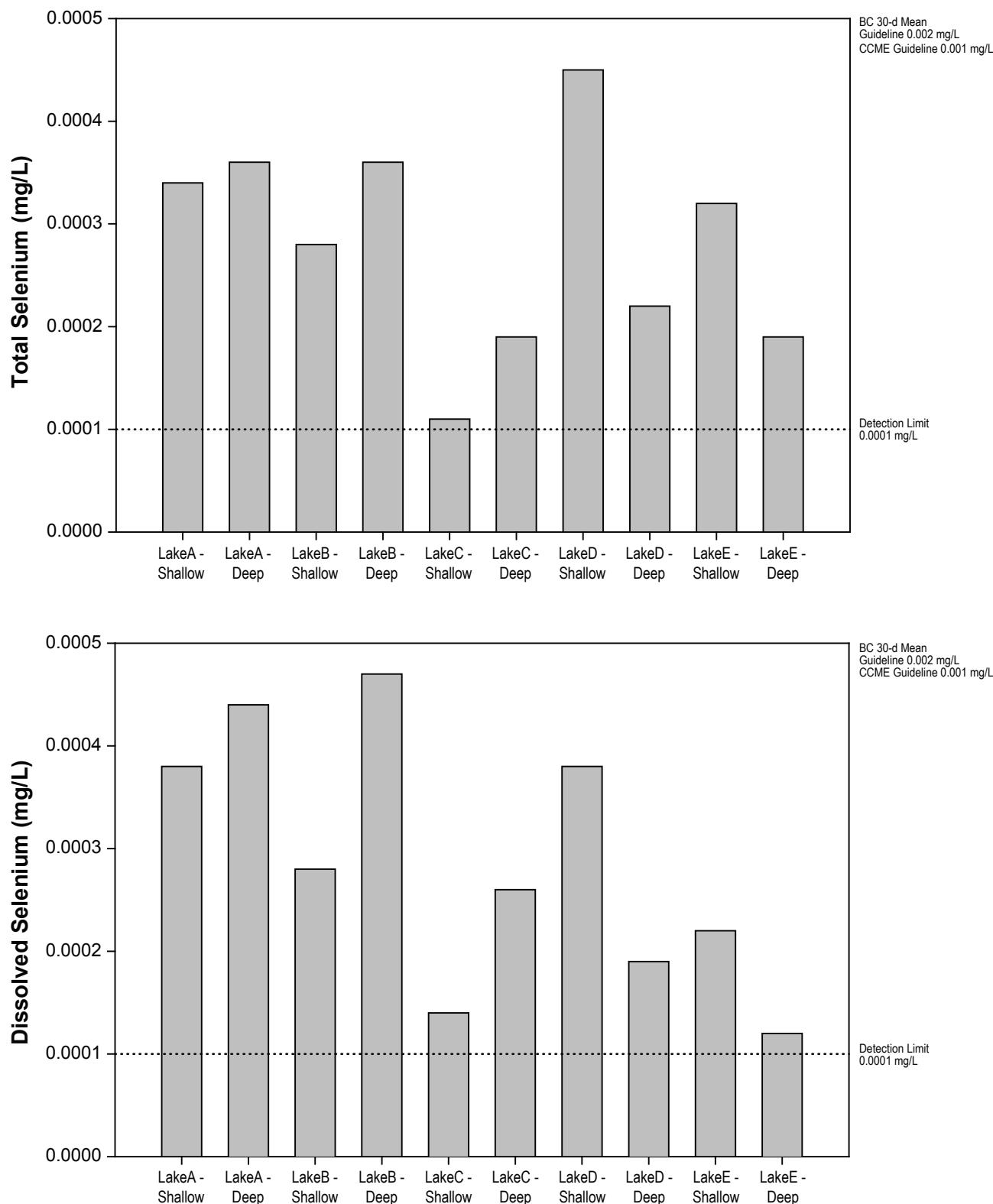
Note: BC and CCME guidelines are hardness dependant.
Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total and Dissolved Nickel Concentrations, 2008

FIGURE 3.4-15





Note: Dotted lines indicate analytical detection limits.



Morrison Copper/Gold Project Lake Total and Dissolved Selenium Concentrations, 2008

FIGURE 3.4-16



Results

(LakeE) and the secchi depth (a measure of surface water transparency) ranged from 4.1 (LakeC) to 4.5 m (LakeD and LakeB). The average temperature in Morrison Lake ranged from 8.0 (LakeE) to 11.3 °C (LakeA). The slightly warmer temperature found at station LakeA was due to the shallow depth (8 m) at this station. Average dissolved oxygen concentrations ranged from 8.8 (Lake A) to 9.4 mg/L (LakeD and LakeC).

Table 3.5-1
Limnology data from Morrison Lake Stations, 2008

Site	Surface pH	Surface Conductivity (μS)	Max Sample Depth (m)	Secchi Depth (m)	n	Mean Temp. (°C)	SE	Mean Dissolved Oxygen (mg/L)	SE
LakeE	7.8	60	29	4.2	30	8.0	0.72	9.2	0.08
LakeD	7.8	60	26	4.5	27	8.6	0.81	9.4	0.04
LakeC	7.9	60	24	4.1	25	8.9	0.88	9.4	0.03
LakeB	7.8	60	18	4.5	19	9.4	0.80	8.9	0.06
LakeA	-	-	8	4.2	9	11.3	0.82	8.8	0.14

SE = standard error

3.6 Lake Sediment Quality

In 2008, sediment quality was assessed at five stations within Morrison Lake by collecting triplicate sediment samples at each station. These five stations were also sampled in 2006. Sediment samples were analyzed for general variables, nutrients, and metals. The 2008 data are presented in Appendix 3.2-1. Sediment samples are not available for the transmission line wetland (TL Wetland) as a result of difficult site access.

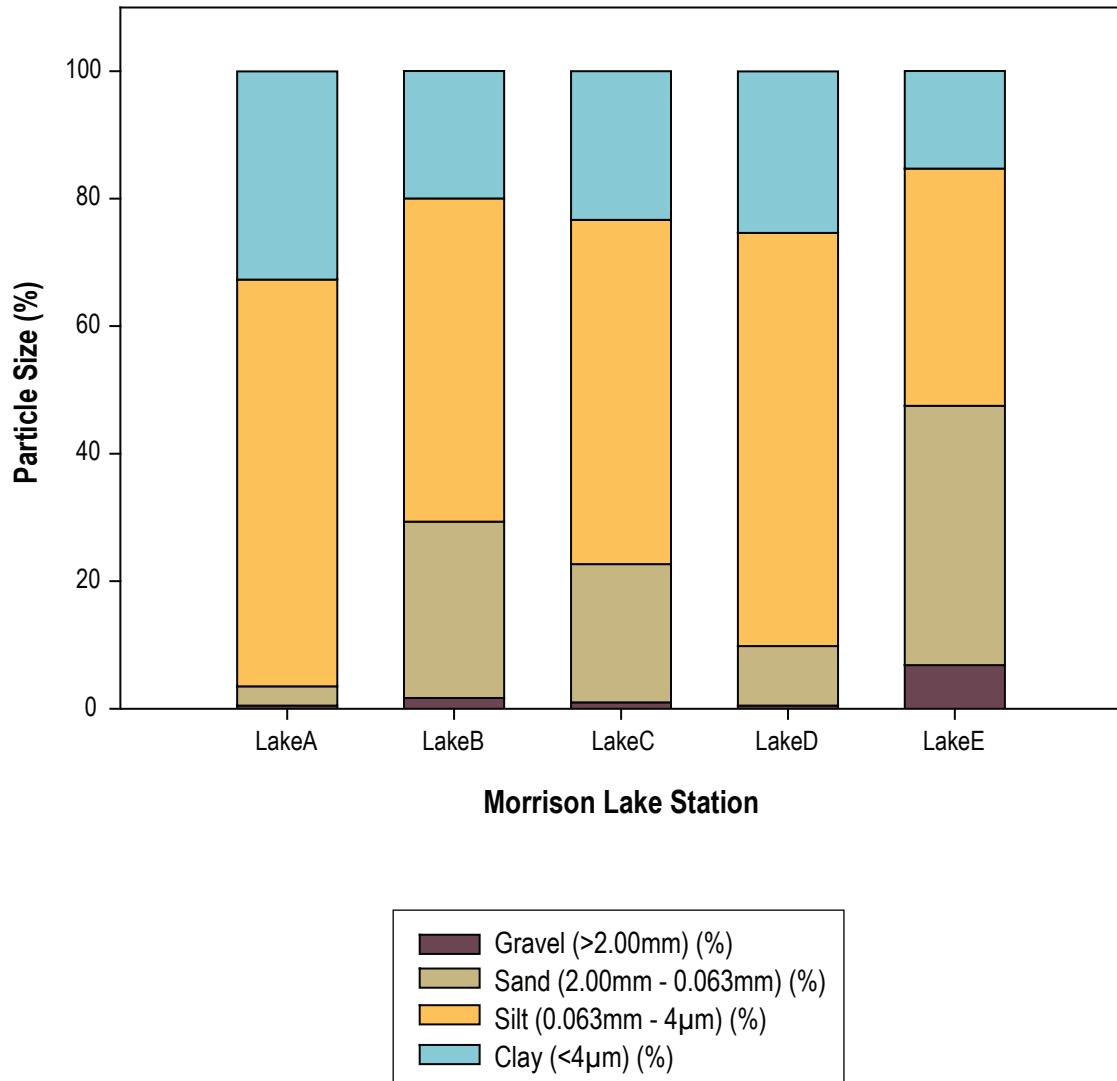
3.6.1 Particle Size

Sediment in Morrison Lake was dominated by silt (37 to 65%) followed by either sand (3 to 41%) or clay (15 to 33%), depending on the site (Figure 3.6-1). Trace amounts of gravel (<1 to 7%) were also present at each site. Similar size class proportions were observed in 2006, though clay was more dominant.

3.6.2 Nutrients, TOC and Cyanides

Nutrient concentrations within Morrison Lake sediment were similar to those samples collected in 2006. Average nitrogen concentrations ranged from 0.38% (LakeE) to 0.83% (LakeA) (Figure 3.6-2). Total nitrogen concentrations for both years were highest at LakeA. Average phosphorus concentrations were more variable among lake stations, ranging from 858 (LakeE) to 2,392 mg/kg (LakeA). Most total phosphorus concentrations were similar to 2006, except station LakeE (3,033 mg/kg in 2006 and 858 mg/kg in 2008).

Average TOC concentrations ranged from 6% (LakeE) to 10% (LakeA), similar to 2006 (Figure 3.6-3). Average cyanide concentrations were much lower this year than in 2006 with all lake stations below the detection limit of 3 mg/kg except for LakeD which had an average concentration of 3.53 mg/kg. In 2006 all lake stations detected levels of cyanide between 1.9 and 5.5 mg/kg.

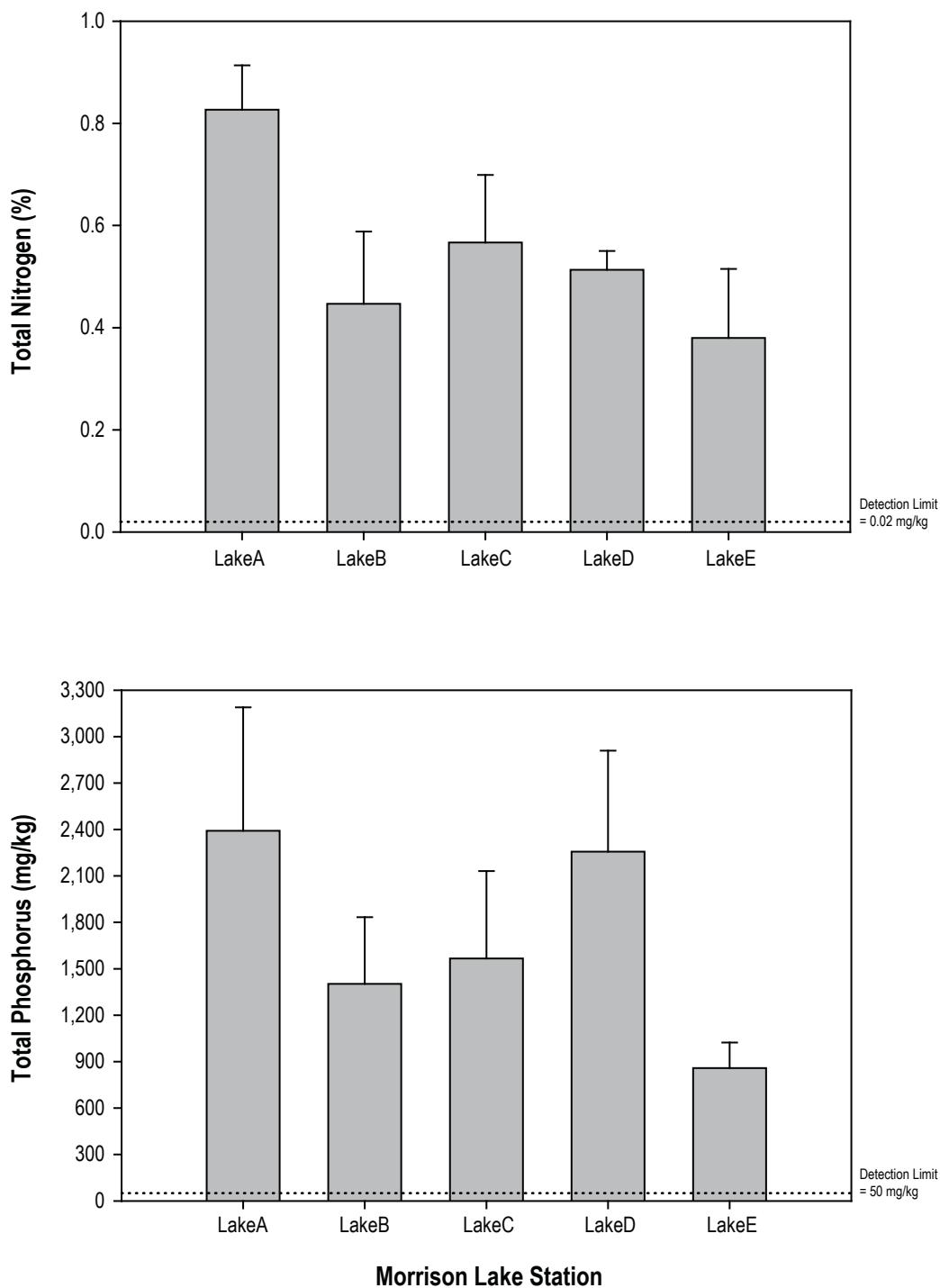


**Morrison Copper/Gold Project
Average Sediment Particle Size
Distribution for Morrison Lake, 2008**

pbm

FIGURE 3.6-1

Rescan™



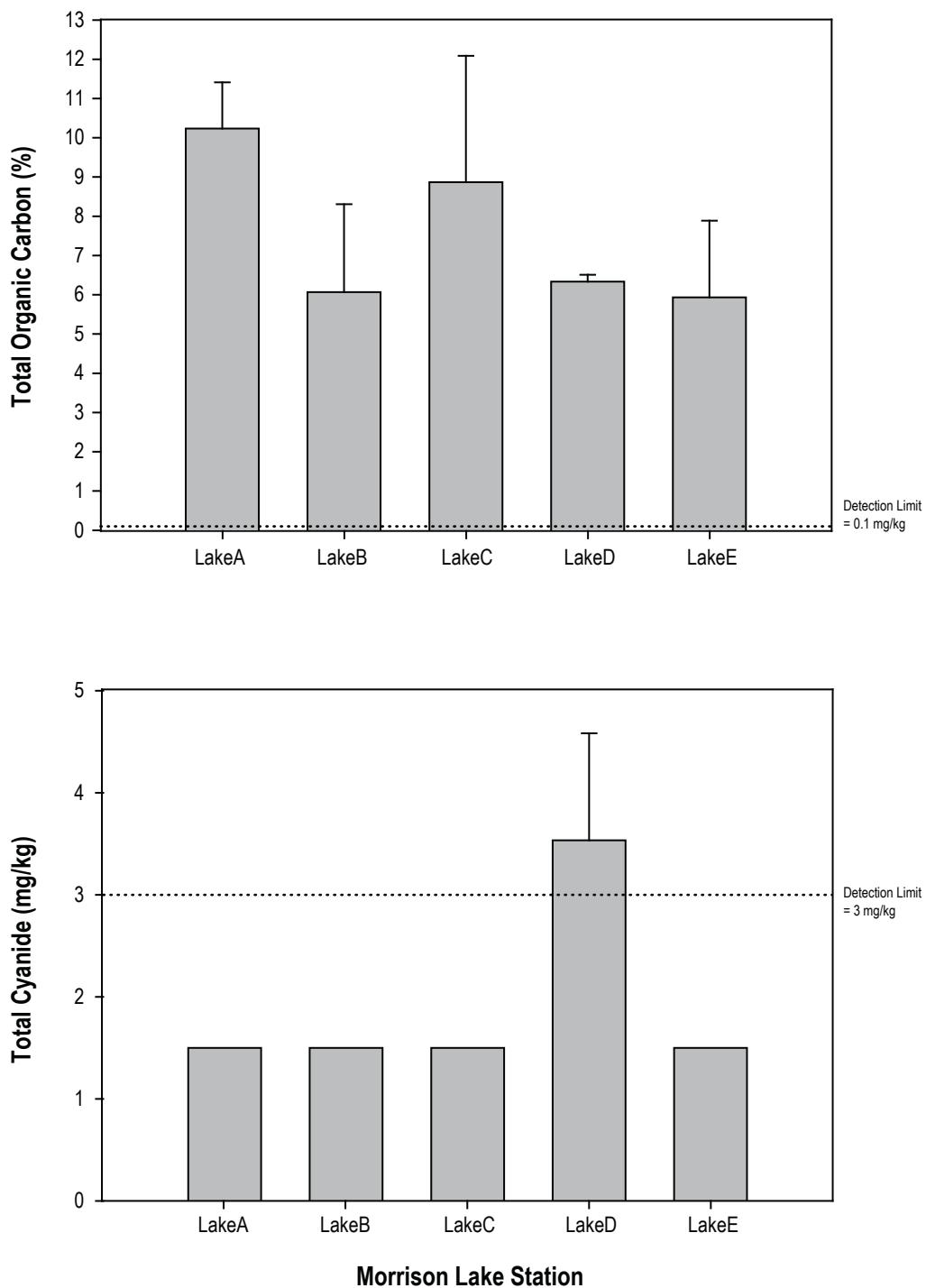
Note: Error bars represent standard error of the mean.
Dotted line represents detection limits.

**Morrison Copper/Gold Project Average
Total Nitrogen and Phosphorus Sediment
Concentrations for Morrison Lake, 2008**

pbm

FIGURE 3.6-2

Rescan™



Note: Error bars represent standard error of the mean.
Dotted line represents detection limits.

Morrison Copper/Gold Project Average Total Organic Carbon and Cyanide Sediment Concentrations for Morrison Lake, 2008

3.6.3 Total Metals

All data are presented in Appendix 3.2-1. Of the metals analyzed, antimony, bismuth, silver, thallium and tin were not detected in more than 80% of samples and are therefore not discussed. Metals without provincial or federal guidelines are discussed briefly. Station LakeE had slightly lower concentrations of aluminum, barium, and potassium compared to the other stations. Cobalt, lithium and vanadium were highest at LakeC and LakeD, while titanium was highest at LakeB and LakeC. LakeC had the highest magnesium concentration, and selenium, strontium, and beryllium were slightly higher at LakeA and LakeD.

Of the nine metals with provincial (BC LEL and SEL) or federal (CCME ISQG and PEL) guidelines (below), eight exceeded guideline concentrations in one or more lake stations.

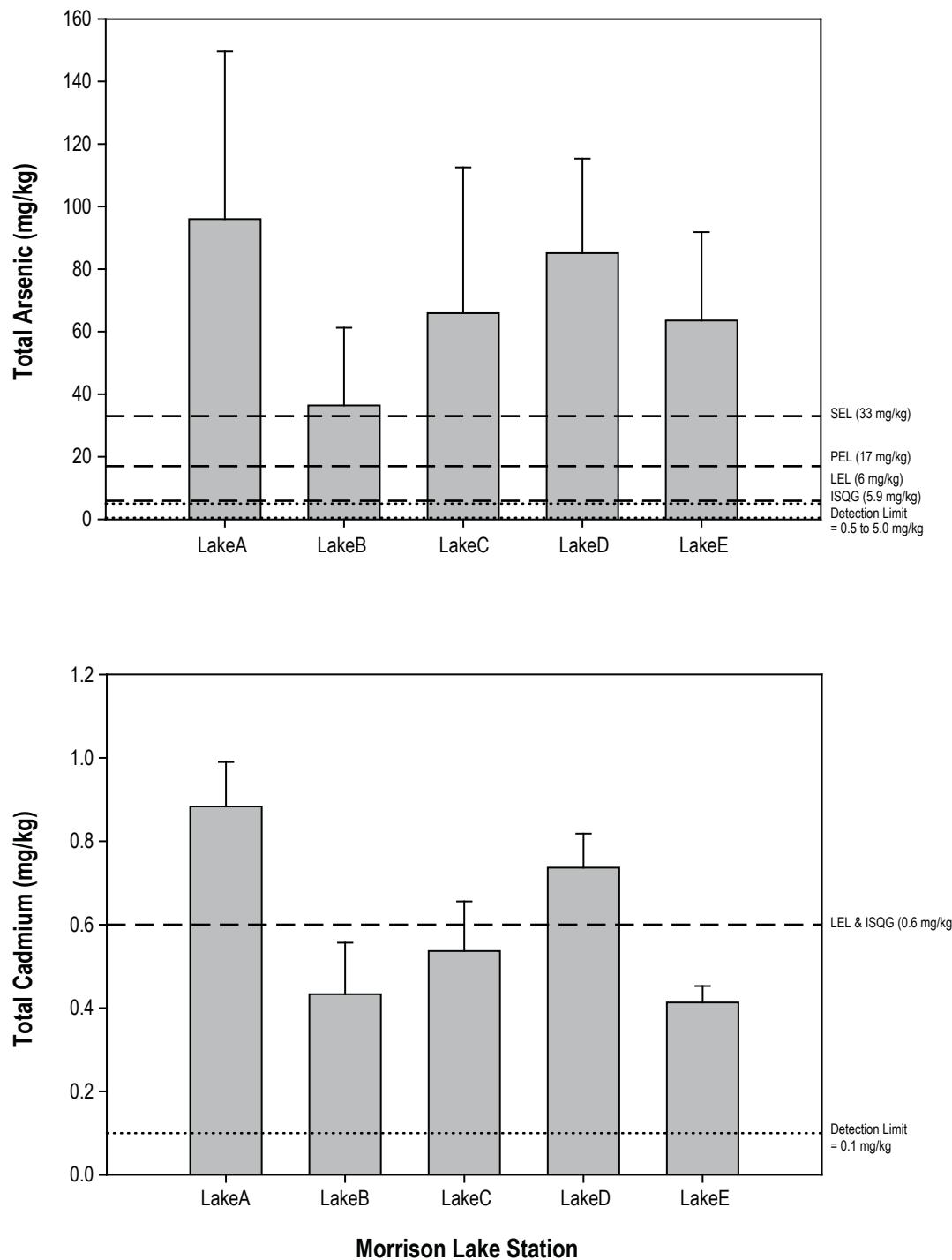
Average arsenic concentrations ranged from 36.4 (LakeB) to 96.0 mg/kg (LakeA), with relatively high variability observed among and within sites (Figure 3.6-4). Concentrations were similar to 2006 though LakeE concentrations were approximately a fifth of the concentration recorded two years ago. Arsenic concentrations were high enough in the lake sediments to exceed the BC LEL and SEL guidelines (6 and 33 mg/kg, respectively), and CCME ISQG and PEL guidelines (5.9 and 33 mg/kg, respectively), at all sites. All sites also exceeded these guidelines in 2006.

Average cadmium concentrations ranged from 0.41 (LakeE) to 0.88 mg/kg (LakeA) (Figure 3.6-4). Concentrations were similar to 2006, but like arsenic, cadmium concentrations were much lower in 2008 at LakeE than in 2006. LakeA, LakeD, and two replicates of LakeC exceeded the BC LEL and CCME ISQG guidelines (both 0.6 mg/kg).

Average chromium concentrations ranged from 20.0 (LakeE) to 36.7 mg/kg (LakeC), with slightly lower concentrations in 2008 than in 2006 (Figure 3.6-5). Average concentrations exceeded the BC LEL guideline of 26 mg/kg at LakeC and LakeD. Two replicates from LakeA, and one replicate from LakeB also exceeded this guideline. One replicate at LakeC exceeded the CCME ISQG guideline of 37.3 mg/kg.

Average copper concentrations ranged from 22 (LakeE) to 108 mg/kg (LakeA) with similar concentrations to 2006 (Figure 3.6-5). LakeA copper concentration was three times higher than all other stations. This high copper concentration at LakeA is likely due to its close proximity to the outflow of Booker Lake and Ore Pond which lie within the highly mineralized area of the Morrison Creek Project. Copper concentrations exceeded the BC LEL guideline (16 mg/kg) at all lake stations. The CCME ISQG guideline of 35.7 mg/kg was exceeded by LakeA, LakeD, LakeC, and two replicates of LakeB. Though concentrations were high at LakeA, only one replicate exceeded the BC SEL guideline of 110 mg/kg.

Average iron concentrations were slightly lower in 2008 than in 2006, and ranged from 35,667 (LakeE) to 67,633 mg/kg (LakeD) (Figure 3.6-6). Like arsenic and cadmium, concentrations dropped considerably at station LakeE within the last two years. As in 2006, all stations exceeded the BC LEL guideline of 21,200 mg/kg. LakeA, LakeC, LakeD, one replicate from LakeB, and two replicates from LakeE exceeded the BC SEL guideline of 43,766 mg/kg.



Note: Error bars represent standard error of the mean.

Dotted line represents detection limits.

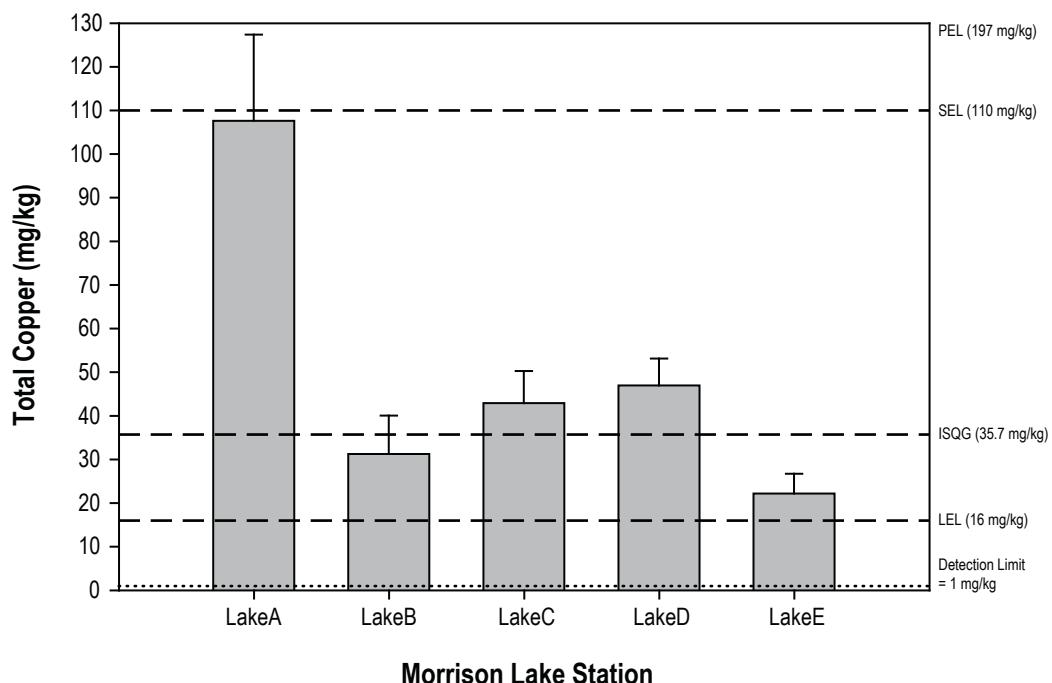
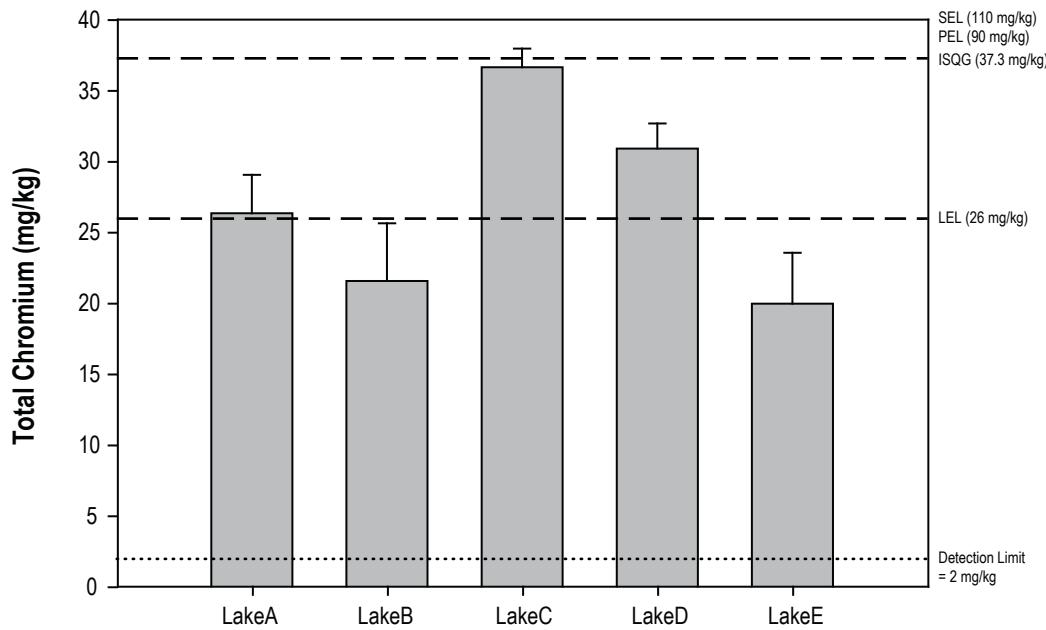
Dashed lines represent guidelines.

Morrison Copper/Gold Project Average Total Arsenic and Cadmium Sediment Concentrations for Morrison Lake, 2008



FIGURE 3.6-4





Morrison Lake Station

Note: Error bars represent standard error of the mean.

Dotted line represents detection limits.

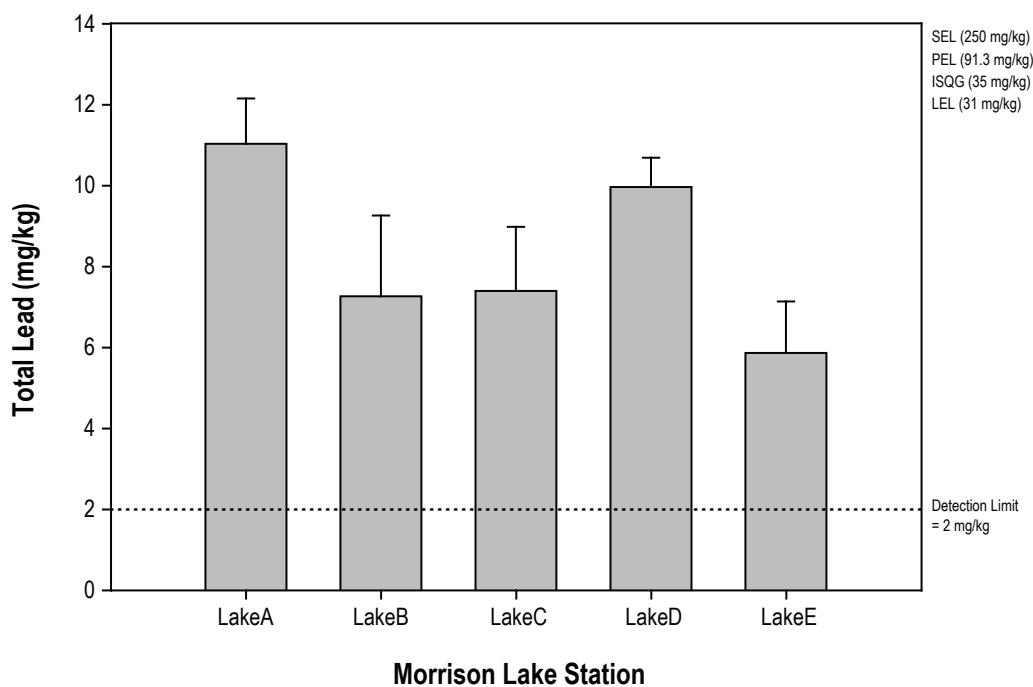
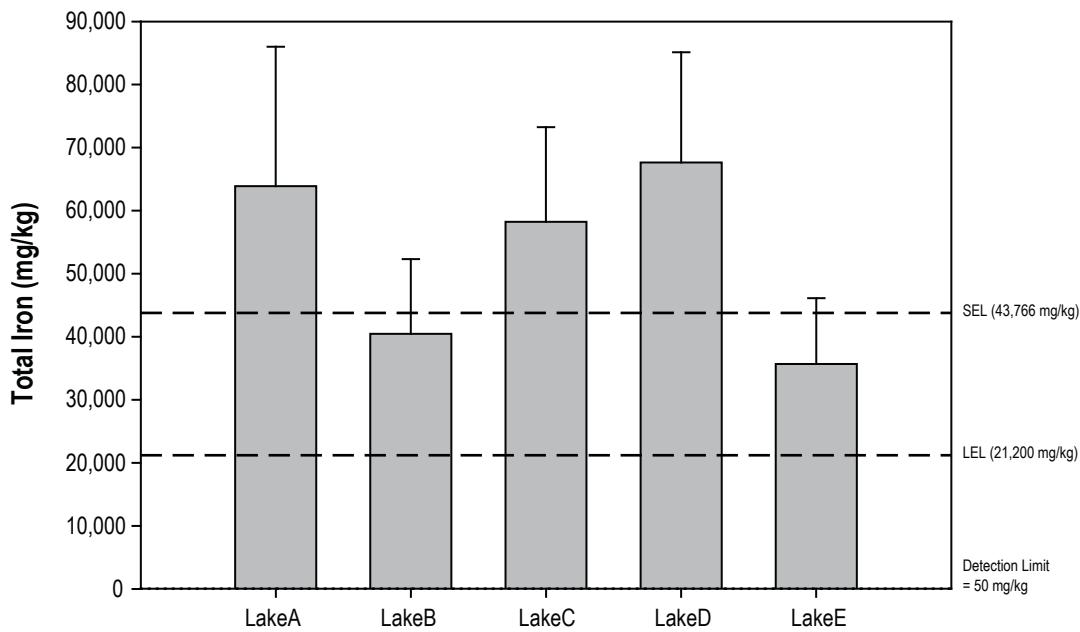
Dashed lines represent guidelines.

**Morrison Copper/Gold Project Average
Total Chromium and Copper Sediment
Concentrations for Morrison Lake, 2008**



FIGURE 3.6-5





Note: Error bars represent standard error of the mean.

Dotted line represents detection limits.

Dashed lines represent guidelines.

**Morrison Copper/Gold Project
Average Total Iron and Lead Sediment
Concentrations for Morrison Lake, 2008**



FIGURE 3.6-6



Average lead concentrations ranged from 6 (LakeE) to 11 mg/kg (LakeA) (Figure 3.6-6). No provincial or federal guidelines were exceeded.

Average mercury concentrations ranged from 0.16 (LakeE) to 0.34 mg/kg (LakeC) (Figure 3.6-7). Average concentrations at all stations except for LakeE exceeded the BC LEL guideline (0.2 mg/kg) and CCME ISQG guideline (0.17 mg/kg).

Average nickel concentrations ranged from 20.8 (LakeB) to 34.6 mg/kg (LakeD), with all sites exceeding the BC LEL guideline of 16 mg/kg (Figure 3.6-7). Most stations exceeded this guideline by approximately two times. The BC SEL guideline of 75 mg/kg was never exceeded.

Average zinc concentrations were similar to that of 2006 and ranged from 67.0 (LakeE) to 125.2 mg/kg (LakeA) (Figure 3.6-8). Average zinc concentrations exceeded the CCME ISQG and BC LEL guidelines (123 and 120 mg/kg, respectively), at LakeA and LakeD.

3.6.4 Lake Sediment QA/QC

RPD calculations of the QA/QC field duplicates are presented in Appendix 3.2-2. Three duplicate pairs of samples were used to compare thirty four variables (which had concentrations above their respective detection limits). From these results, only 4% (4 of the 102 RPD calculations) were greater than the RPD threshold of 20% indicated by provincial guidelines.

3.7 Lake Primary and Secondary Producers

Although freshwater sponges (Spongillidae) were not specifically sampled at the Morrison Lake sites, it is worth noting that they were abundant at LakeE (Plate 3.7-1). Most sponges are sensitive to enrichment and pollution and their presence usually indicates good water quality (Mackie 2001).

3.7.1 Phytoplankton

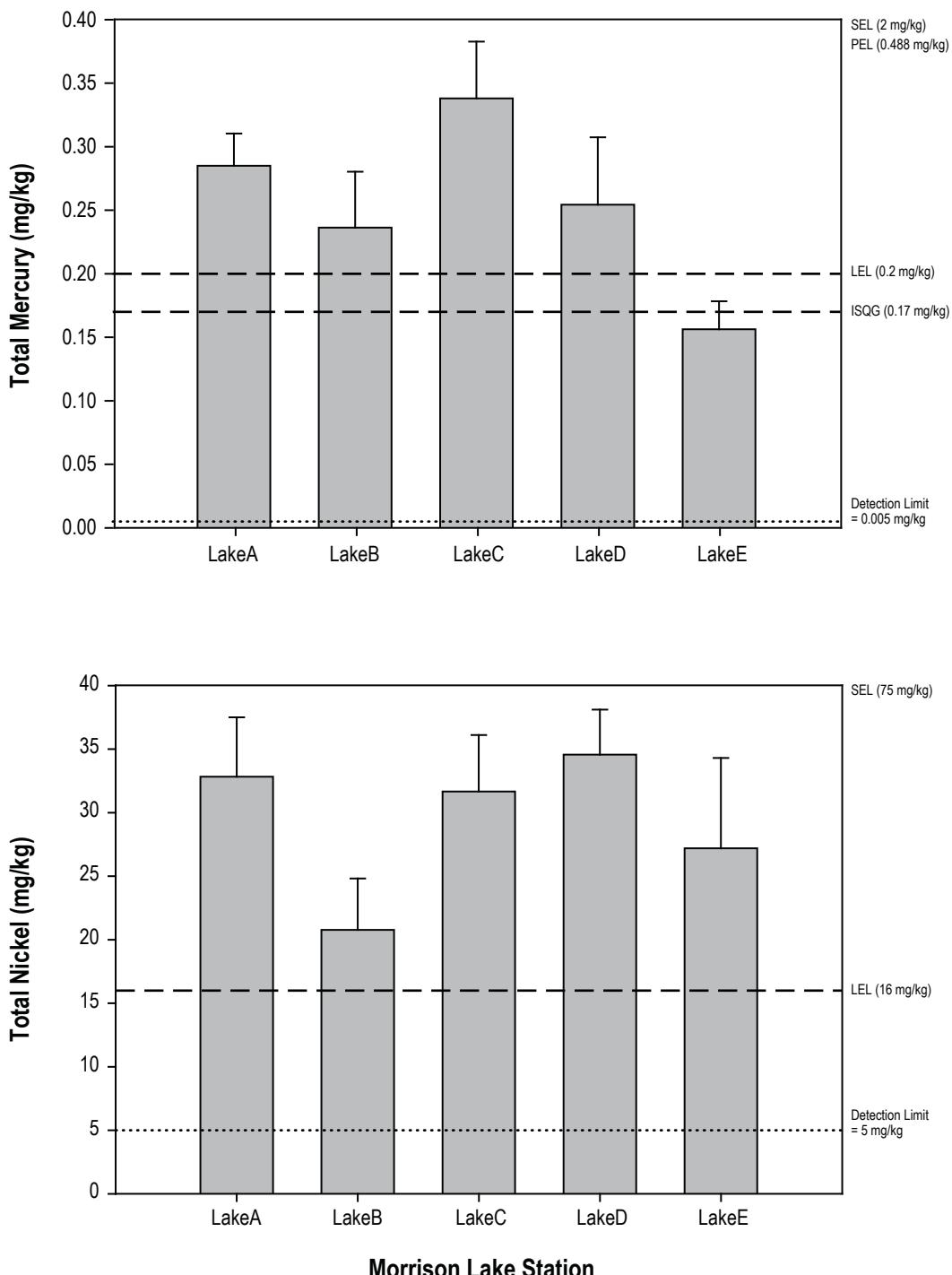
In 2008, five lake stations in Morrison Lake were sampled for phytoplankton. These five stations were also sampled in 2006. All phytoplankton taxonomic data can be found in Appendix 3.7-1.

3.7.1.1 Biomass

Productivity at the five lake stations ranged from 1.25 (LakeA) to 2.50 µg/L (LakeE) of chlorophyll *a* (Figure 3.7-1). LakeA productivity was considerably lower than the other lake stations. Productivity was slightly higher than in 2006 with reported levels between 0.5 and 1 µg/L. Phytoplankton biomass data can be found in Appendix 3.3-2.

3.7.1.2 Density and Richness

Phytoplankton densities were slightly higher in 2008 than in 2006. The overall average density in Morrison Lake in 2008 was 1,312 cells/mL, but in 2006 was 881 cells/mL. Average density in 2008 ranged from 1,104 (LakeA) to 1,503 cells x 10³/L (LakeB) (Figure 3.7-2). Variability among and within sites was lower in 2008 than in 2006.

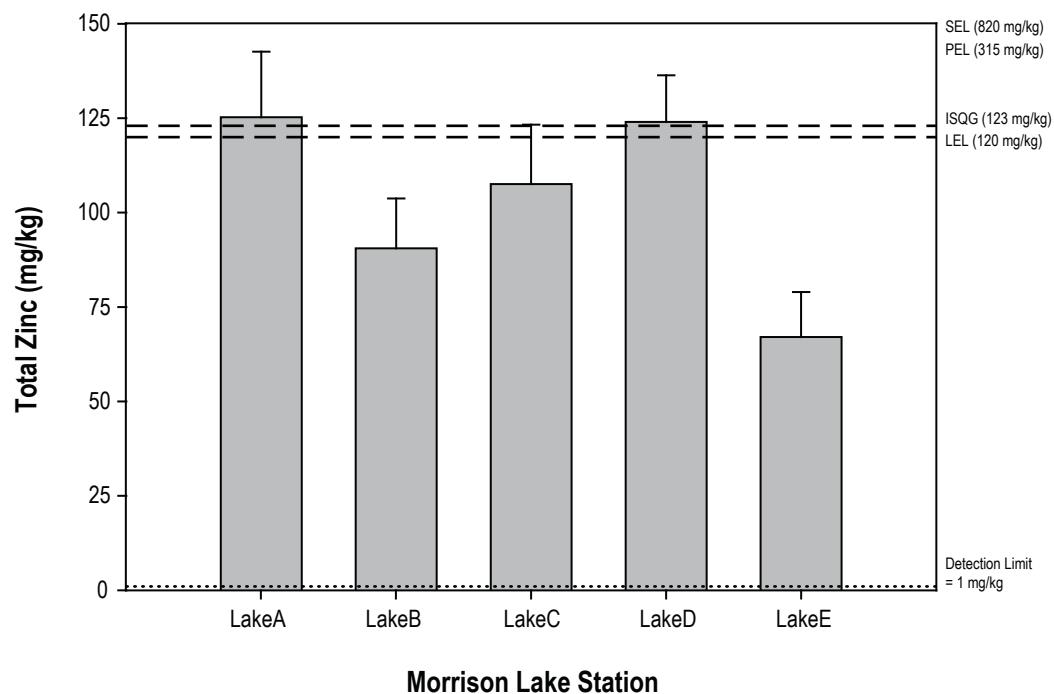


Note: Error bars represent standard error of the mean.

Dotted line represents detection limits.

Dashed lines represent guidelines.

Morrison Copper/Gold Project Average Total Mercury and Nickel Sediment Concentrations for Morrison Lake, 2008



Note: Error bars represent standard error of the mean.
Dotted line represents detection limits.
Dashed lines represent guidelines.



Morrison Copper/Gold Project Average Total Zinc
Sediment Concentrations for Morrison Lake, 2008



FIGURE 3.6-8

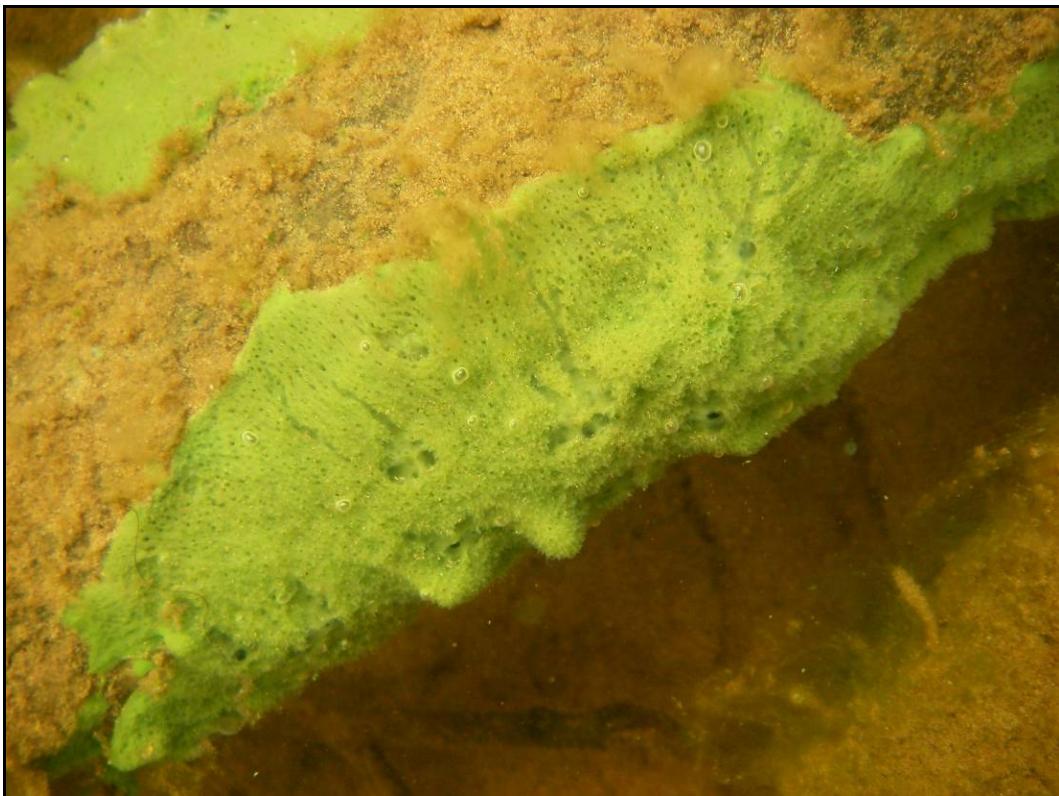


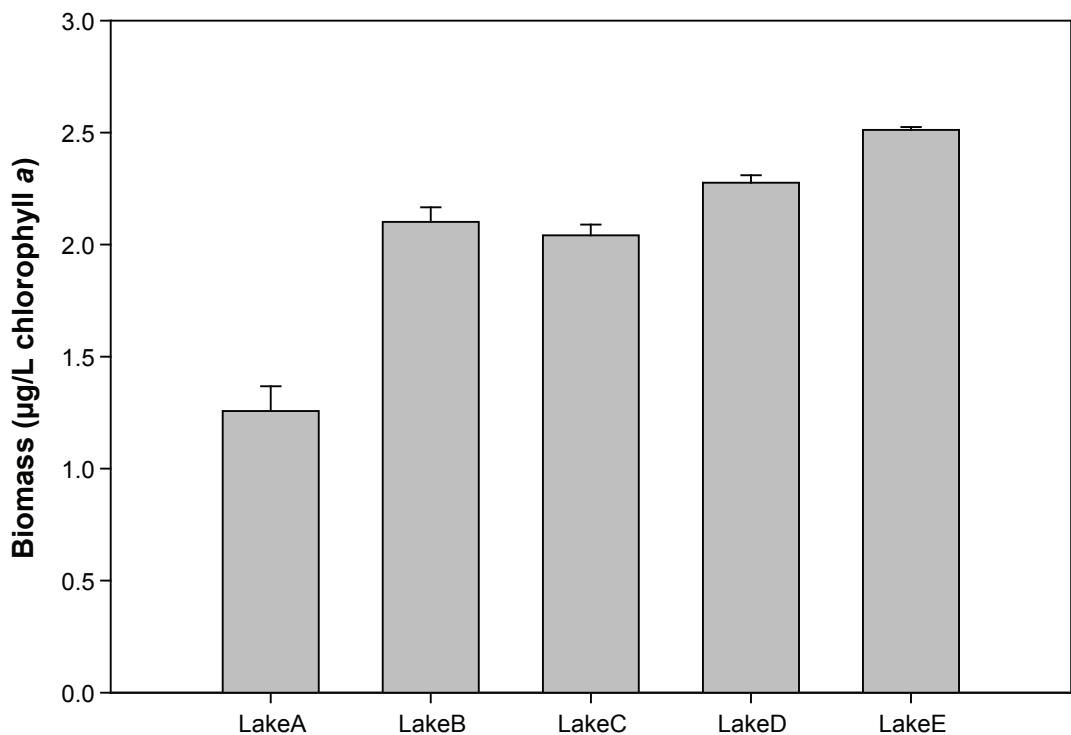
Plate 3.7-1. Freshwater sponge was abundant at LakeE, 2008.

Genus richness was much higher in 2008 than in 2006. A total of 94 genera were observed in 2008, while only 31 were observed in 2006. In 2008, average genus richness ranged from 53 (LakeE) to 58 genera (LakeA and LakeC) (Figure 3.7-2). In 2006, average genus richness ranged from 11 (LakeA) to 18 genera (LakeB). Except for *Gloeotheca* sp. and *Onchromonas* sp. all genera found in 2006 were observed in 2008. Genus richness was higher in 2008 than 2006 due to the inclusion of taxa observed (in low numbers) during the initial scanning of samples. More than half (54%) of the 65 new genera were observed in low numbers in the initial scan.

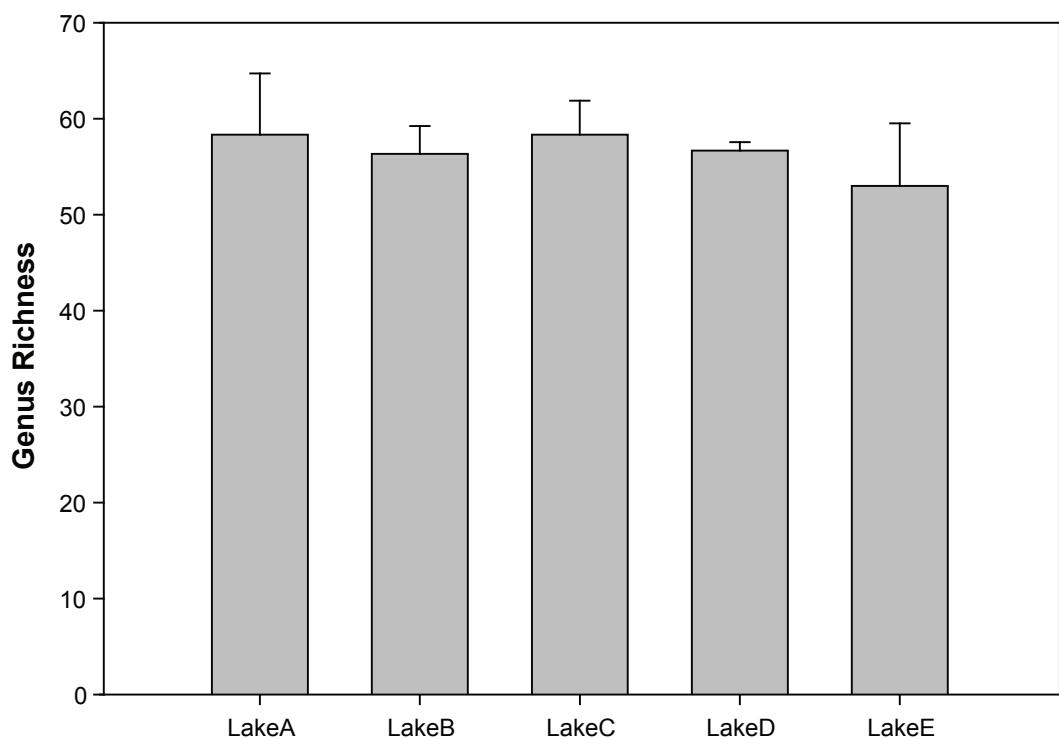
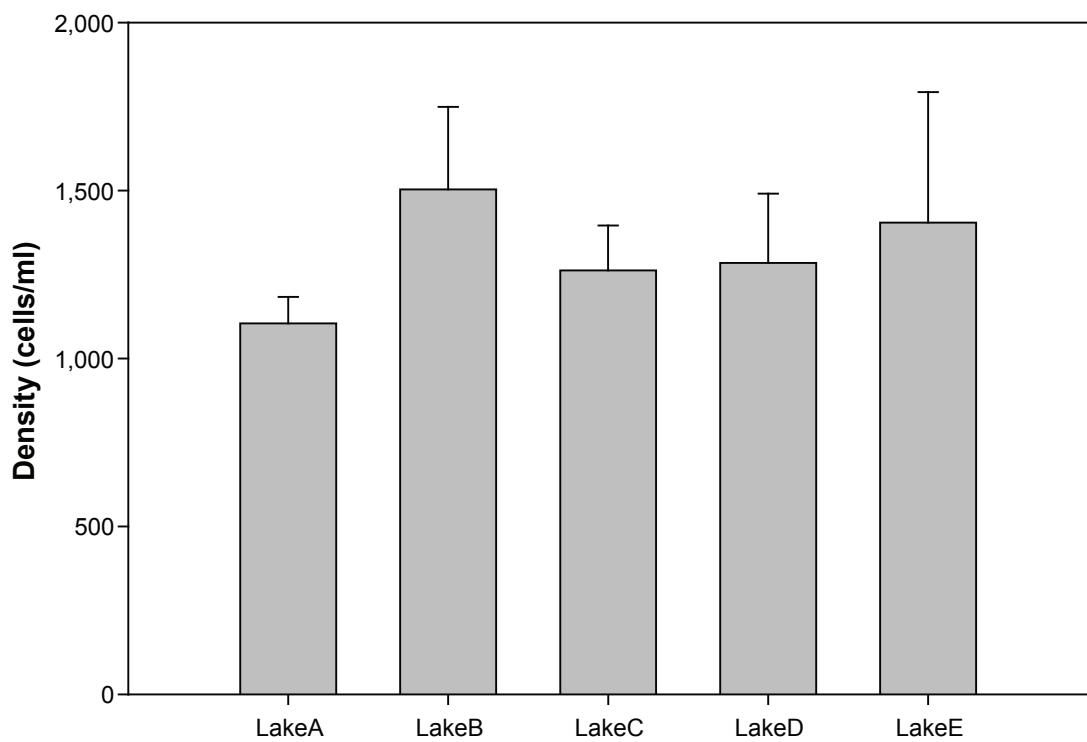
3.7.1.3 Relative Abundance

In 2006, most lake stations were dominated by Cyanophyta. In 2008, community structures shifted towards shared dominance of Chlorophyta (21 to 45%), Cryptophyta (17 to 33%), Chrysophyta Diatoms (9 to 29%) and Cyanophyta (10 to 21%) (Figure 3.7-3).

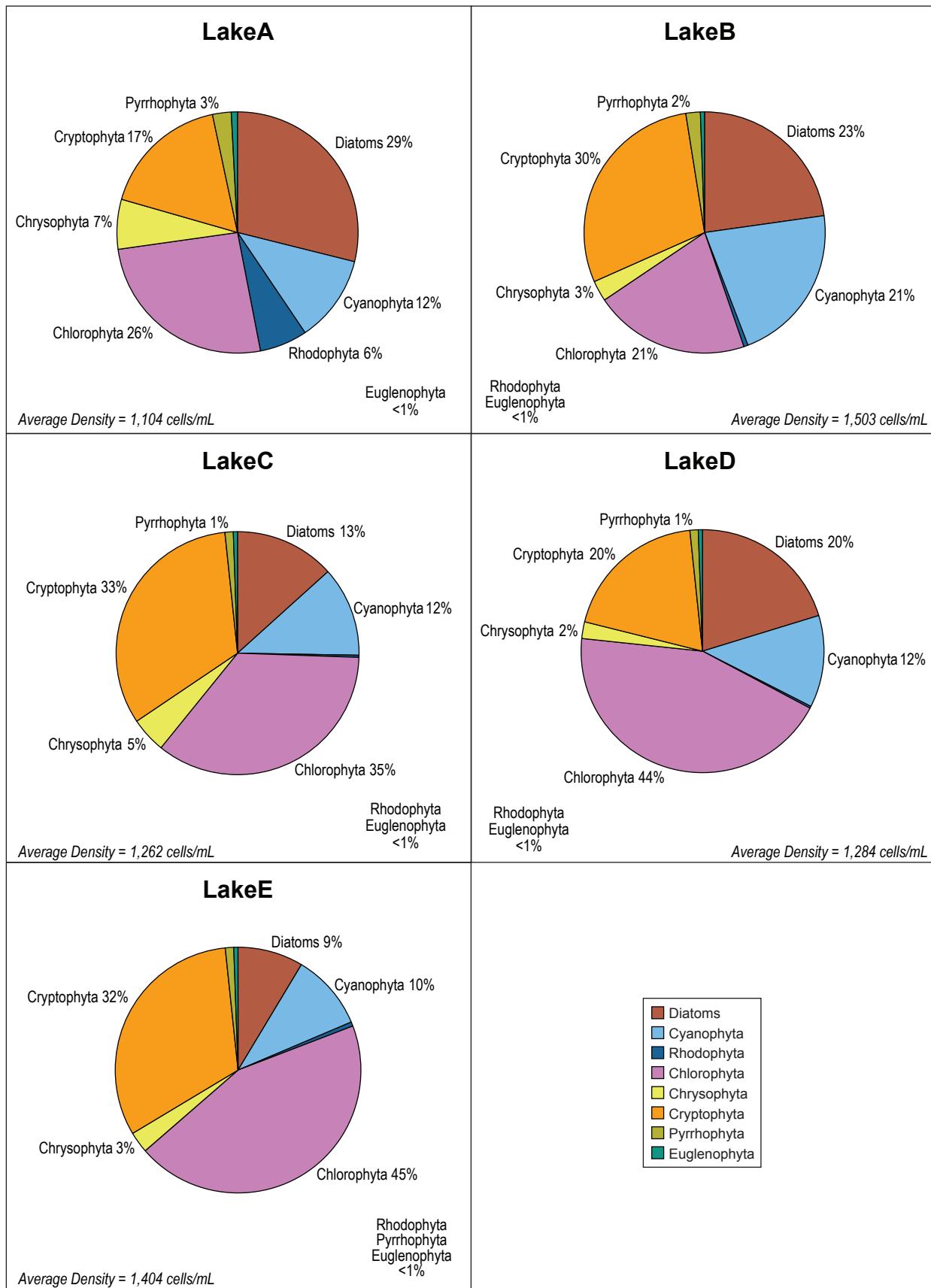
Non-diatom Chrysophyta (2 to 7%), Pyrrhophyta (<1 to 3%), Rhodophyta (<1 to 6%) and Euglenophyta (<1%, all stations) composed the remainder of the community. Rhodophyta and Euglenophyta were not detected in 2006. Three species dominated the phytoplankton community: *Chroomonas acuta* (23%), *Selenastrum minutum* (22%) and *Melosira italica* (11%). *Selenastrum minutum* was not observed in 2006. 84% of all genera observed in 2008 comprised <1% of the community density indicating their rarity in the community.



Note: Error bars represent standard error of the mean.



Note: Error bars represent standard error of the mean.



Morrison Copper/Gold Project Taxonomic Composition of Phytoplankton in Morrison Lake, 2008



FIGURE 3.7-3

3.7.1.4 Diversity and Evenness

Phytoplakton genus diversity was high in Morrison Lake. The Simpson Diversity Index values were similar across lake stations ranging from 0.80 (LakeE) to 0.88 (LakeA) (Figure 3.7-4). Diversity was slightly higher than in 2006, with less variability observed among and within sites. Evenness values ranged from 0.56 (LakeE) to 0.65 (LakeA) (Figure 3.7-4). Evenness values were similar to 2006, though values were more consistent among sites in 2008.

3.7.2 Benthic Invertebrates

Benthos samples were collected from each of the five Morrison Lake sites (LakeA, B, C, D and E), as in 2006. All lake benthos taxonomy data are provided in Appendix 3.7-2. Benthic community data were analysed in terms of density, genus richness, relative abundance, Simpson's Diversity Index and evenness.

3.7.2.1 Density, Richness and Relative Abundance

The average density of benthos among the five sites along Morrison Lake ranged from 385 to 1,892 organisms/m² (Figure 3.7-5). Density was lowest at site LakeA and highest at LakeE. This is a much higher range than that seen in 2006 (237 to 557 organisms/m²), indicating significant variation in benthic density of Morrison Lake (Rescan 2008).

Average genus richness of benthic communities in Morrison Lake ranged from 5 to 8 genera; values similar to those observed previously. LakeA, which had 15 taxa in 2006, is the exception (Figure 3.7-5).

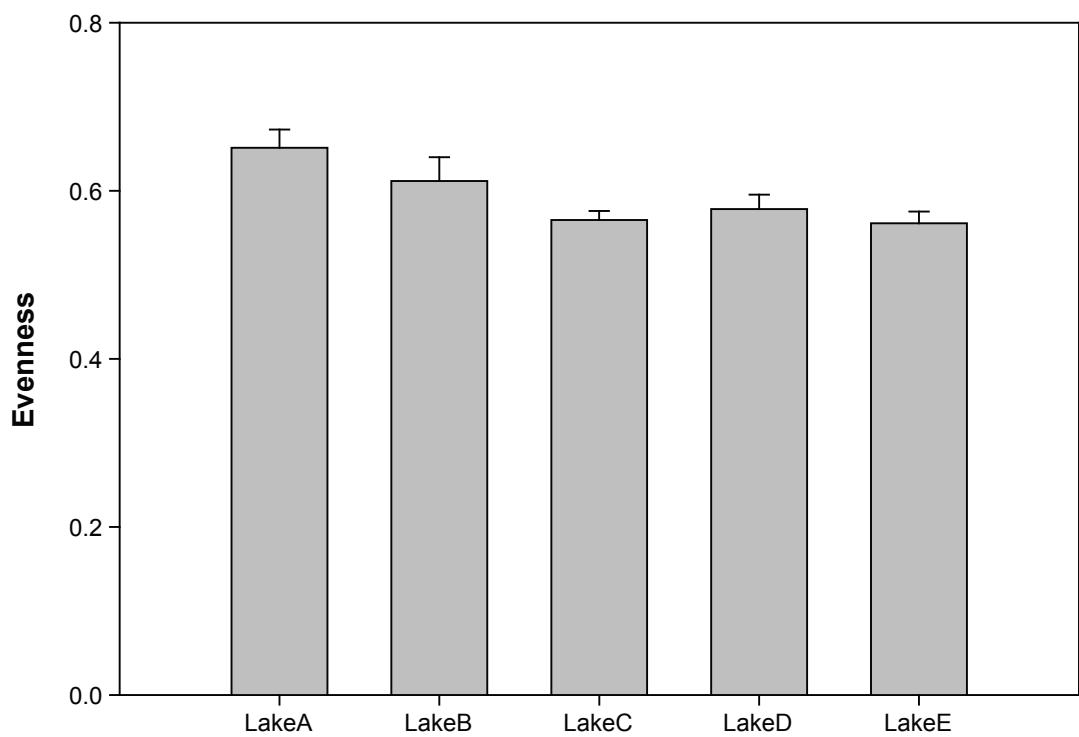
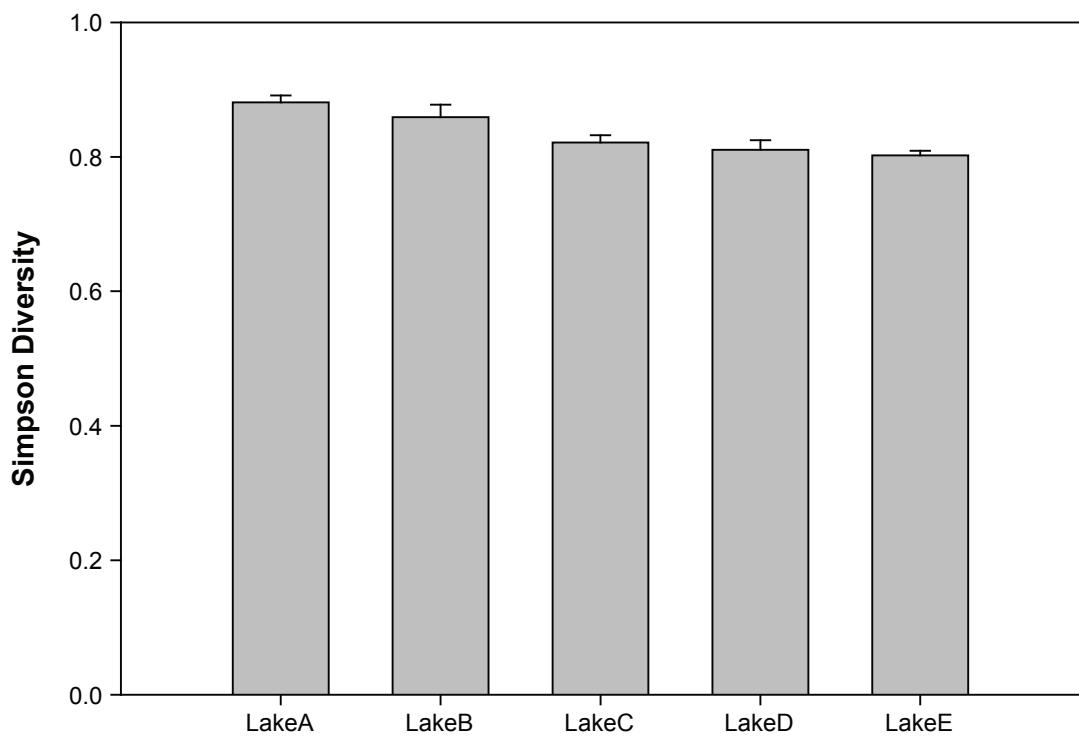
Dipterans (flies) were the predominant taxonomic group (46 to 55%) at LakeC, LakeD and LakeE, and were subdominant (23 to 28%) at the remaining two Morrison Lake sites (Figure 3.7-6). Copepods were the next most dominant group, being the most common (57 to 64%) at LakeA and LakeB and subdominant at the other sites. Oligochaetes and molluscs were both well represented (10 to 30%) at LakeD and LakeE sites (Plate 3.7-2). Small numbers of nematodes, arachnids, cladocerans, ostracods and megalopterans were also observed at the various sites. Similar distributions of these taxa were seen in the 2006 benthic survey (Rescan 2008).

3.7.2.2 Diversity and Evenness

Simpson's Diversity index values ranged from 0.63 to 0.80. Values were slightly lower in sites LakeA, LakeD and LakeE, and higher in LakeB and LakeC sites (Figure 3.7-7). This range is similar to that seen in 2006 (0.67 to 0.84), although there is some variability in diversity among years (e.g., LakeB had the lowest diversity in 2006 but highest in 2008). Pielou's evenness ranged from 0.69 at site LakeD to 0.94 at site LakeC. In 2006, evenness was fairly similar, ranging from 0.73 to 0.83.

3.7.3 Zooplankton

Zooplankton samples were collected in triplicate at five sites (same locations as phytoplankton and benthos) in Morrison Lake in July, 2008. Zooplankton taxonomy data are presented in Appendix 3.7-3 and sampling data are presented in Appendix 3.7-4.



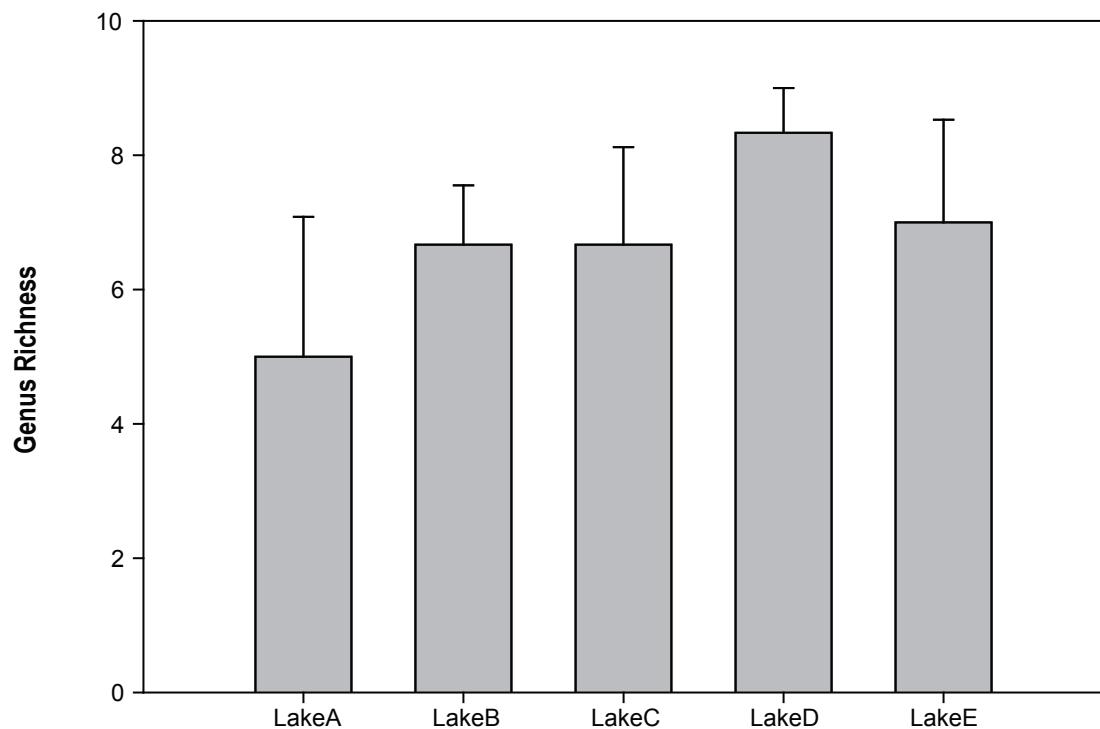
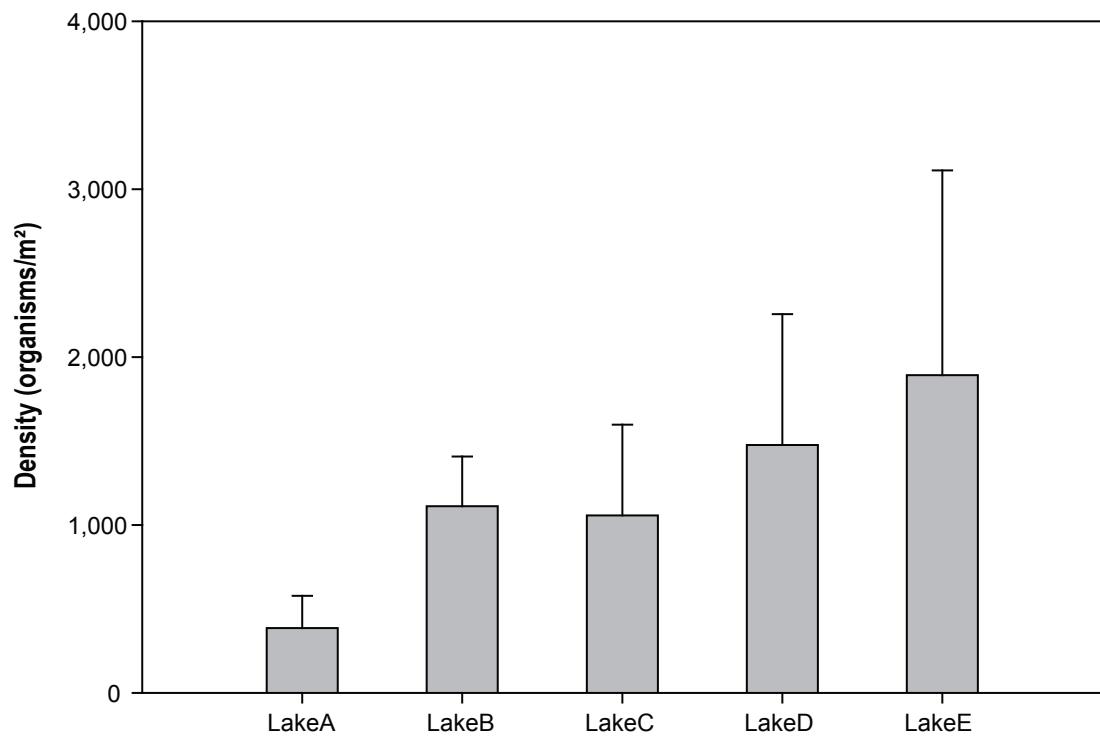
Note: Error bars represent standard error of the mean.



Morrison Copper/Gold Project Lake Phytoplankton Simpson Diversity Index Values and Evenness, 2008



FIGURE 3.7-4



Note: Error bars represent standard error of the mean.

**Morrison Copper/Gold Project
Average Lake Benthic Invertbrate
Density and Genus Richness, 2008**

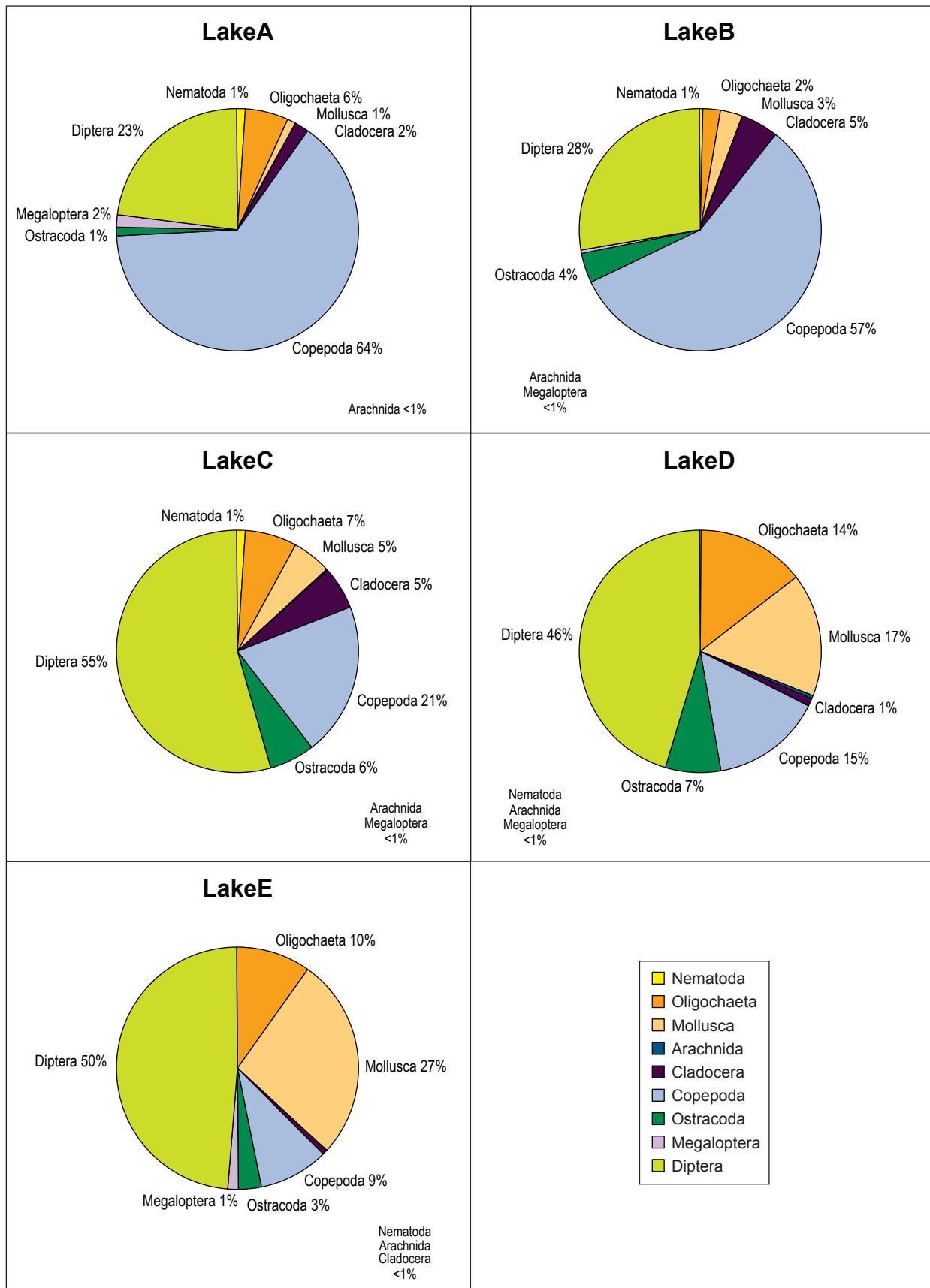




Plate 3.7-2. Snails found in Morrison Lake (LakeE), 2008.

3.7.3.1 Density and Relative Abundance

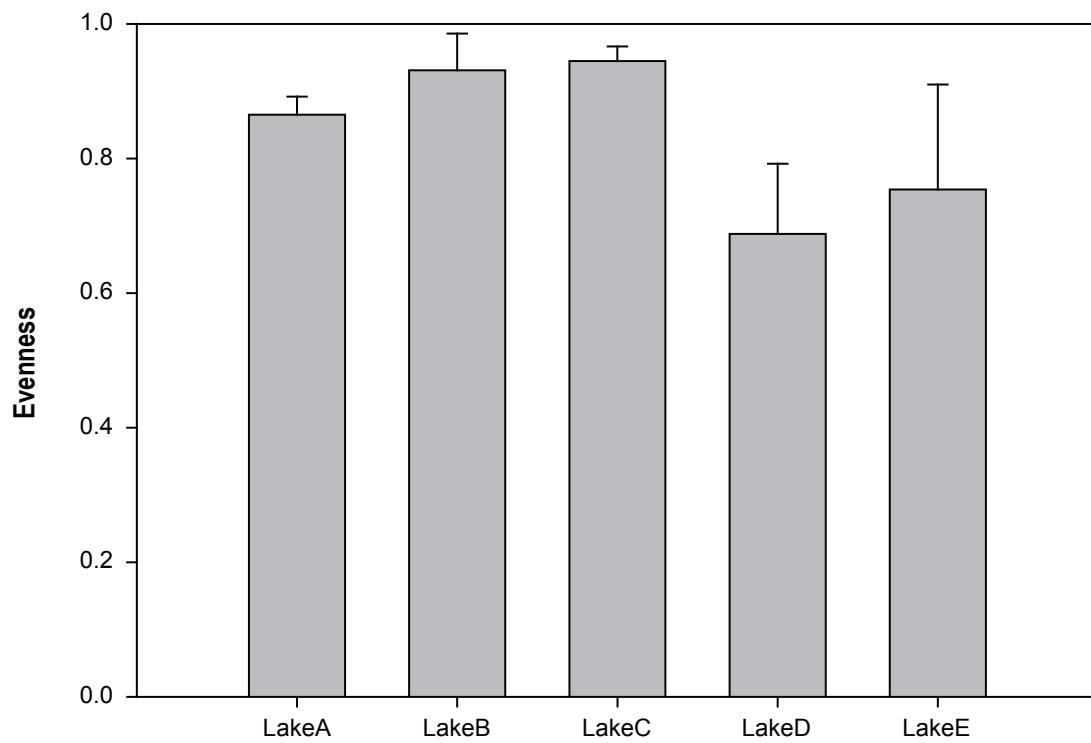
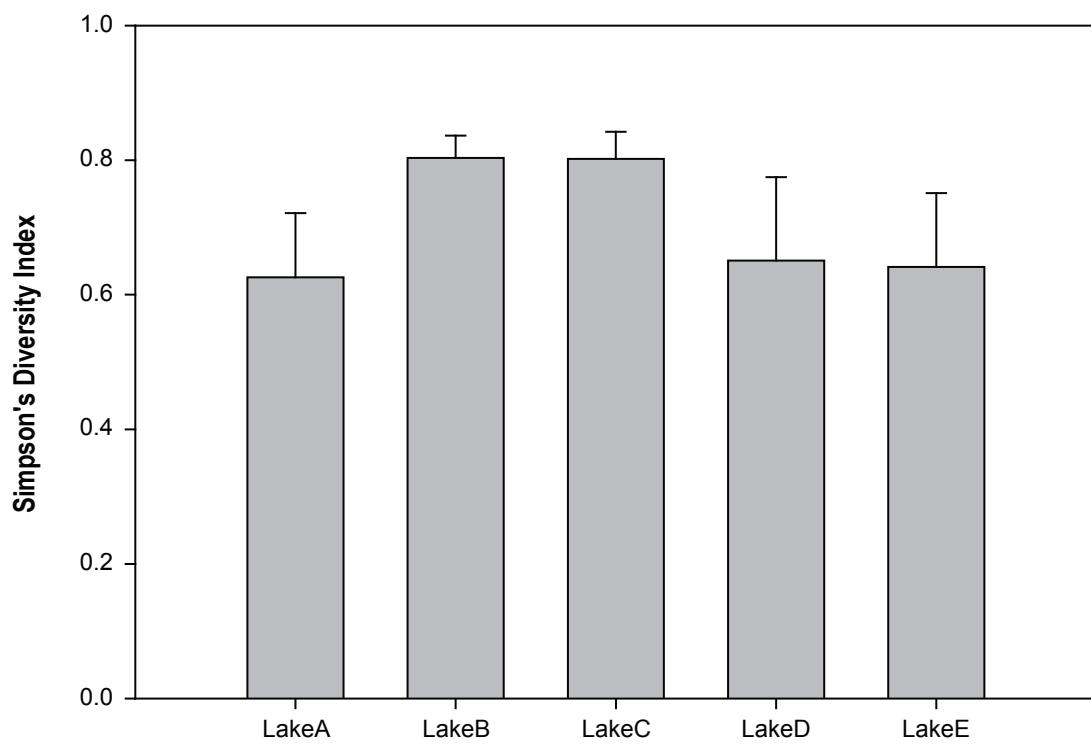
Mean zooplankton densities ranged from 15,318 organisms/m³ at LakeC to 46,447 organisms/m³ at LakeE (Figure 3.7-8). Densities were generally similar across all sites except for LakeE which contained almost 20,000 more organisms/m³ than the other four lake sites. This was primarily due to high numbers of juvenile calanoid copepods in all replicates collected at LakeE. In 2006, densities were only calculated at three of the five Morrison lake sites due to missing haul data (not noted in the field). Densities of those three sites were similar to 2008 values, ranging from approximately 20,000 to 50,000 organisms/m³.

Zooplankton communities at the five Morrison Lake sites were primarily dominated by calanoid copepods (62 to 21%), with cyclopoid copepods (16 to 30%) and rotifers (56 to 18%) being sub-dominant (Figure 3.7-9). LakeA was an exception as it was dominated by rotifers. Lesser amounts (<0.1%) of Chydoridae, Holopedidae, Leptodoridae, and Polyphemidae were also present at several sites. Community composition was similar in 2006, with high proportions of calanoid and cyclopoid copepods, however, rotifers were less prevalent and *Bosminidae* occurred in higher numbers.

3.7.3.2 Richness and Diversity Indices

Average zooplankton genus richness ranged from 10 taxa at LakeE to 13 taxa at LakeA (Figure 3.7-8). Zooplankton richness results were greater in 2008 than 2006, on average having one to two more taxa per site.

Diversity calculations using the Simpson diversity index showed LakeA as the most diverse site and LakeE as the least diverse site, with values ranging from 0.47 to 0.63 (Figure 3.7-10). Evenness calculations showed the same pattern as the Simpson diversity index with site LakeA the most even site and site LakeE the least even (Figure 3.7-10). Evenness values ranged from 0.37 to 0.51. Diversity values in 2006 showed a similar pattern with LakeA having the highest values and LakeE the lowest values, however the range of values was smaller. Evenness also showed the same pattern, although the values were higher in 2006, indicating greater evenness.



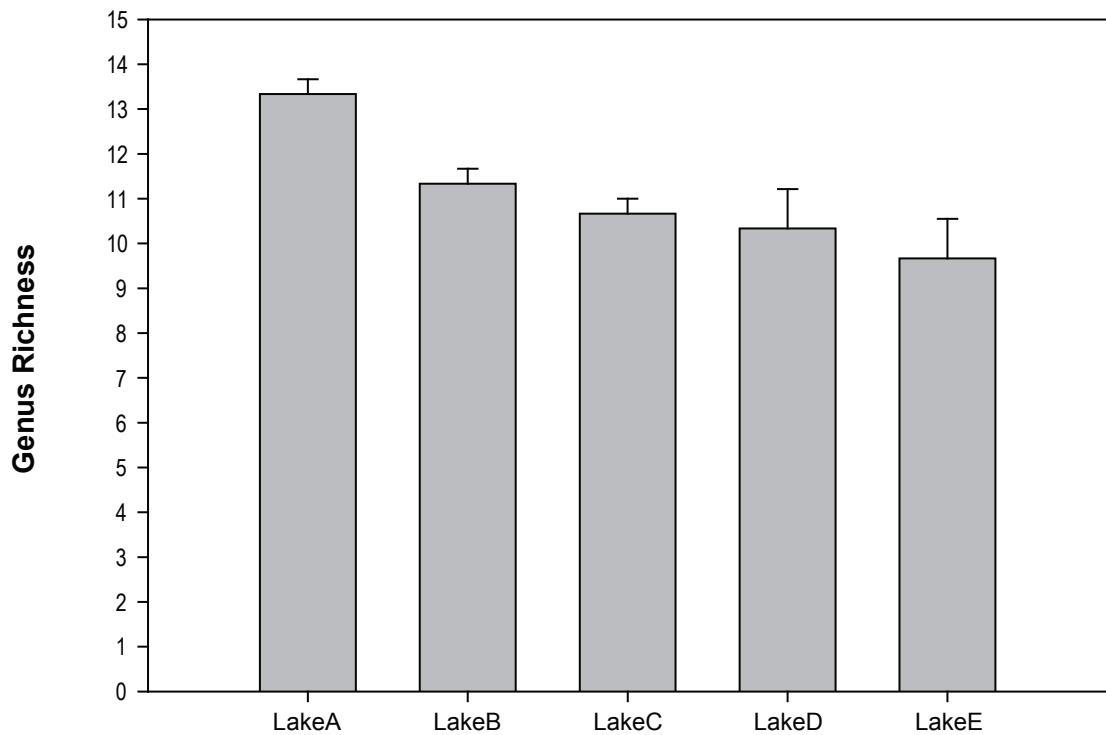
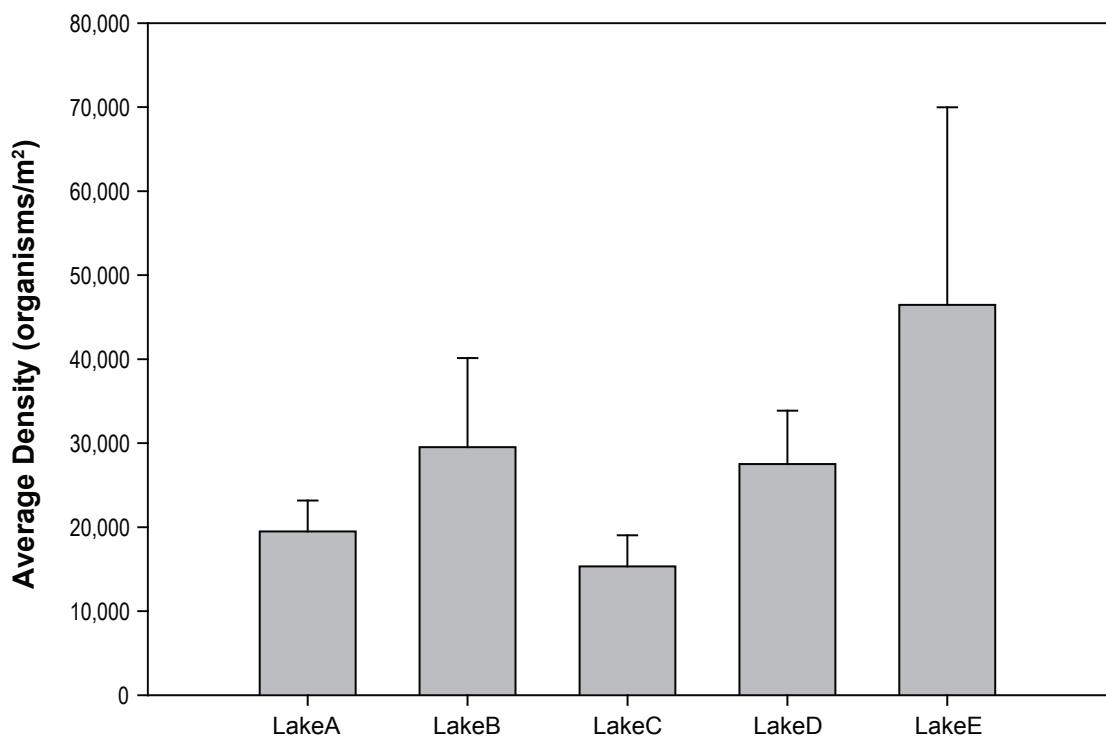
Note: Error bars represent standard error of the mean.

**Morrison Copper/Gold Project
Average Lake Benthic Invertebrate
Simpson's Diversity and Evenness, 2008**



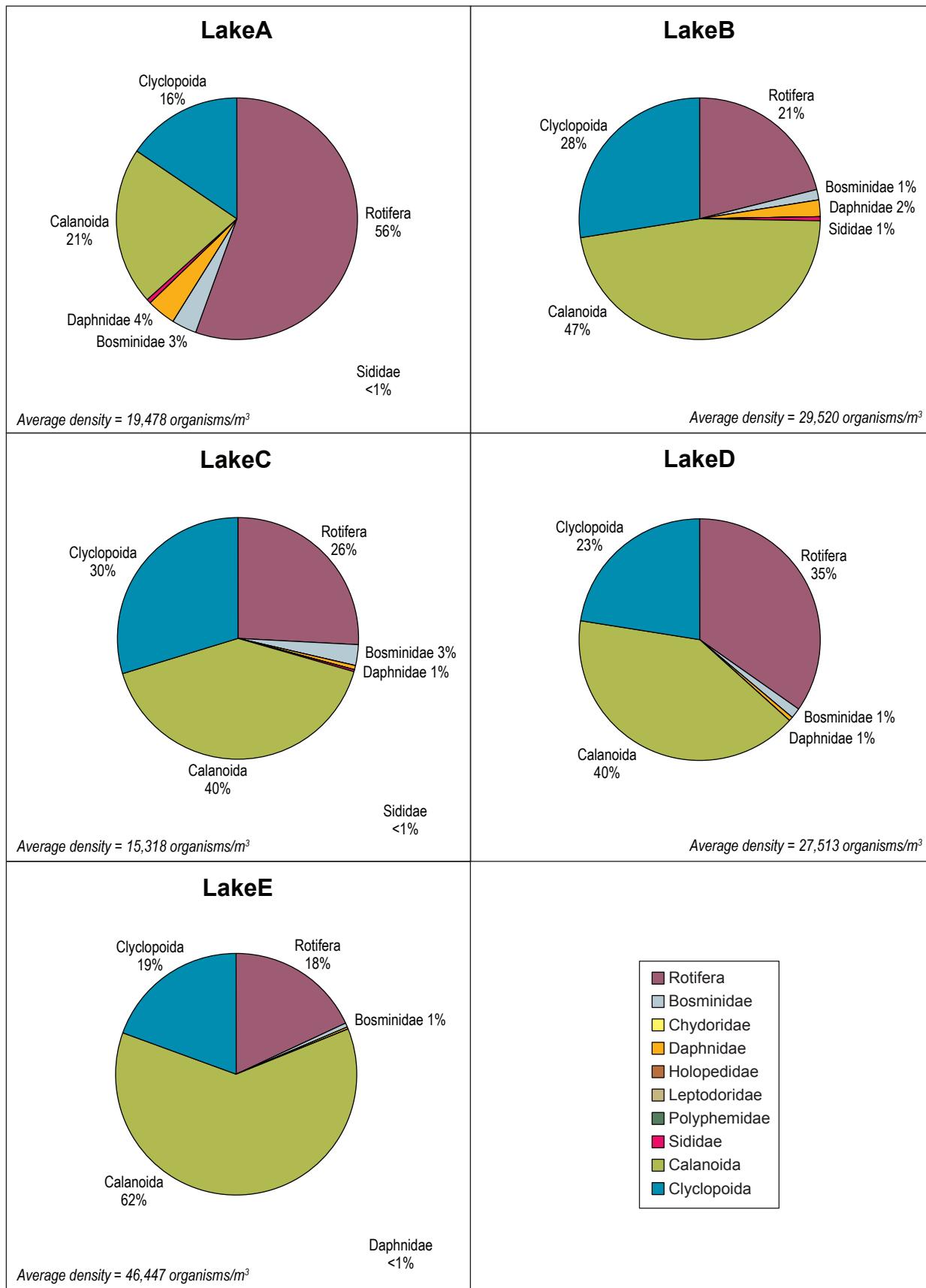
FIGURE 3.7-7

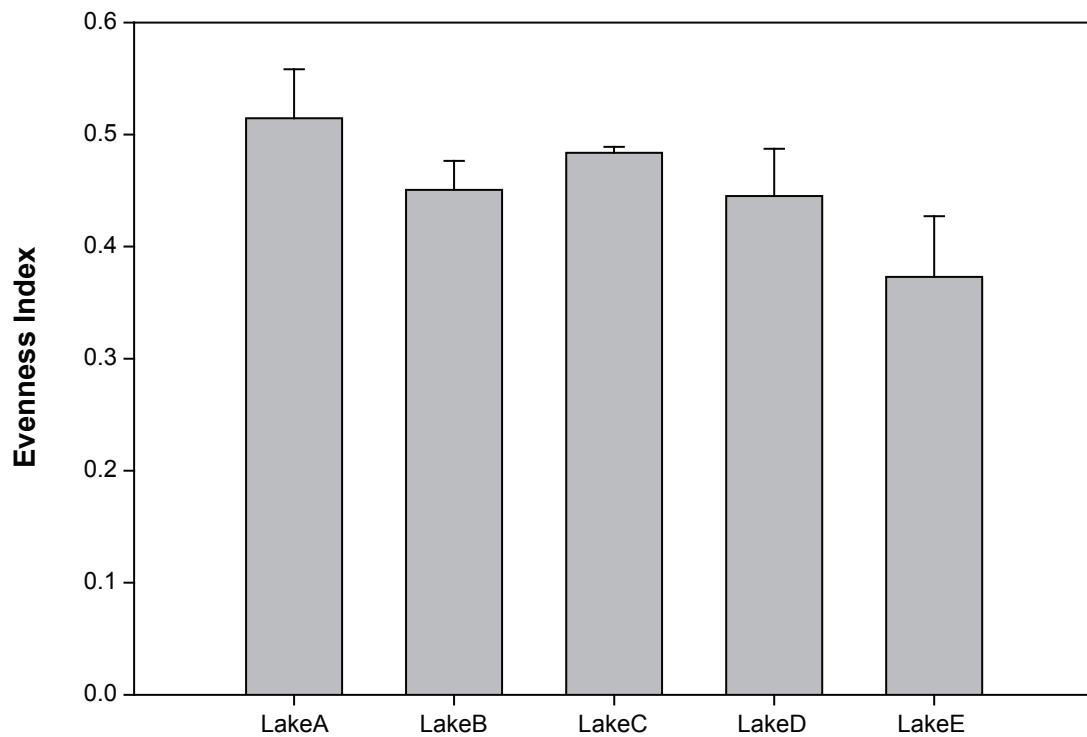
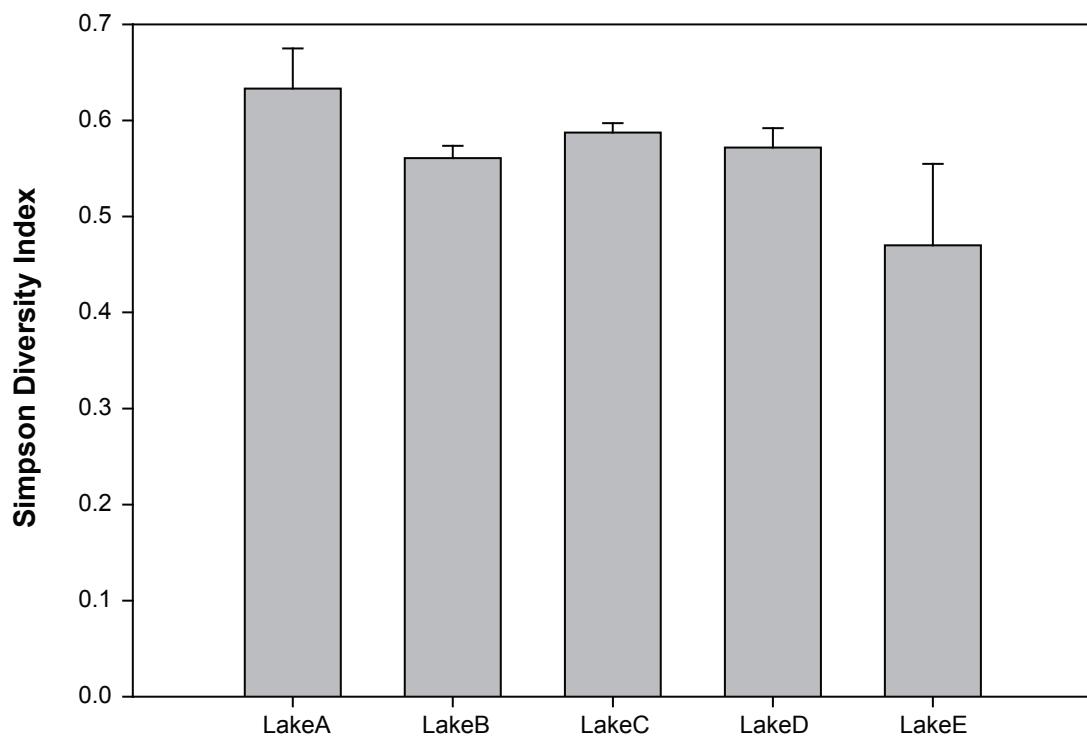




Note: error bars represent standard error of the mean.

**Morrison Copper/Gold Project
Average Lake Zooplankton Density
and Genus Richness, 2008**





Note: error bars represent standard error of the mean



Morrison Copper/Gold Project
Average Lake Zooplankton Simpson
Diversity and Evenness Indices, 2008

FIGURE 3.7-10



4. Summary

4.1 Stream Water Quality

Total dissolved solids, conductivity and sulphate had similar spatial and seasonal trends as hardness. All four variables (hardness, TDS, conductivity and sulphate) tended to be highest in Strm4, Strm5 and Lower7 as in previous years. Numerous variables had the lowest concentrations during the freshet months (May and June) except for some nutrients. Concentrations of both total nitrogen and TKN were similar indicating that organic nitrogen comprised much of the nitrogen in the study area. Total nitrogen and nitrate concentrations were similar to previous years, though this year a spike in nitrate at Lower7 exceeded the CCME guideline by thirteen times. Total phosphate concentrations were low throughout the entire project area. Total cyanide concentrations exceeded the BC 30-day Mean guideline at most sites. This was similar to concentrations found in 2004, 2005, and 2007. The BC Max guideline for total cyanide was occasionally exceeded. Total and dissolved arsenic, copper and molybdenum were highest at Strm5.

These high concentrations at Strm5 are a reflection of the high mineralization in the area due to the proximity to the main mine deposit. Many water quality variables had their maximum concentrations either at Strm5 or Lower7, with minimum concentrations often occurring at Strm26. Metal concentrations in 2008 were very similar to previous baseline years. Metals that exceeded the BC and CCME aquatic life guidelines include total and dissolved aluminum, cadmium, copper, and iron. Total aluminum had the highest occurrence of exceedances in the receiving environment streams, exceeding at six of the eleven sites. Only total and dissolved iron at the transmission line sites exceeded guidelines (Strm11.9 and Wetland).

4.2 Stream Sediment Quality

As in 2006 and 2007, the receiving environment stream sediment was dominated by sand in 2008. Higher proportions of silt and clay were observed at Strm5 and Strm9 which was correlated to higher concentrations of nutrients, TOC, cyanide and numerous metals at these two sites. Nutrient concentrations were similar to previous years. Cyanide concentrations were below the detection limit of 3 mg/kg at most sites.

Metal concentrations in the receiving environment streams were consistent with previous results. In 2008, Strm5, Strm9, and Upper7 generally had the highest metal concentrations. Most metal concentrations were lowest at Morrison Creek. Of the nine metals with provincial or federal guidelines, all except for lead exceeded guidelines at one site at least. All sites exceeded the lowest guidelines for arsenic, iron, and nickel, while copper exceeded guidelines at all sites except at Morrison Creek. Copper concentrations have been relatively high in all sample years at Strm5 compared to all other sites. Cadmium, chromium, and mercury exceeded guidelines at three stream sites, while zinc only exceeded guidelines at Strm5.

All variables measured at the two streams located on the potential transmission line route were consistent with the concentrations and substrates found in the receiving environment streams. Most metal concentrations were slightly higher at Strm17.1 than at Strm11.9. Arsenic, copper,

iron and nickel, which frequently exceeded guidelines within the receiving environment streams, also exceed the provincial or federal guidelines at both of these sites.

4.3 Stream Primary and Secondary Producers

4.3.1 Periphyton

Lower7 and Strm26 had the highest productivity, as measured by chlorophyll *a*, in 2008. Most sites showed similar values to those reported in 2006 and 2007. Receiving environment streams and transmission line streams had similar periphyton biomass values.

The greatest contribution to the cell density at several sites came from *Oscillartoria sp.* Several sites had densities less than 10 cells x $10^6/m^2$. The transmission line site, Strm11.9, had the highest density with one replicate having greater than 3000 cells x $10^6/m^2$.

Periphyton genus richness was greatest (14 genera) at Strm17.1. A total of 39 genera were identified in 2008, seventeen of which were not observed in previous years. Cyanophyta taxa (mostly *Oscillartoria sp.* at several sites) dominated half the sites while the other half were dominated by Chrysophyta. The Simpson Diversity Index was greatest at Strm6 and Strm8 while evenness was greatest at Strm8.

4.3.2 Benthic Invertebrates

Stream benthos density was generally greater in 2008 than 2007. Strm4 had the greatest density in all sample years. Average density across 2008 sites ranged from 8,220 to 26,600 organisms/m². The transmission line streams were within this range.

Dipterans were the predominant taxa at most stream sites in 2008. The exception to this was Strm4, which was composed primarily of ostracods. This is similar to the composition of the Strm4 community in previous years. Both transmission line communities were dominated by dipterans. Ephemeroptera and Plecoptera were also well represented at Strm17.1. Average percent EPT taxa ranged from 3% to 51% (Strm17.1) in 2008. Half of the stream benthic communities were composed of more than 30% EPT.

When compared to each reference community the Bray-Curtis similarity coefficient showed that stream sites were more similar to the Strm9 median value (51.6%) than to the Strm1 median value (35.6%). In 2007 the average similarity of all sites to the Strm1 median was greater (47.6%).

A number of streams had similar richness values to those found in 2007. Although it was not the case in 2007, Morrison Creek showed the greatest average richness in 2006 (52 taxa) and 2008 (38 taxa). Simpson Diversity Index and evenness values were also very similar in all sample years. Strm6 showed the greatest diversity and evenness.

4.4 Lake Water Quality

Water quality variables in Morrison Lake had similar concentrations to 2006. Hardness, total dissolved solids, fluoride and sulphate concentrations were low with little variability among stations and between depths. Water pH values were slightly alkaline throughout Morrison Lake.

Slight variability was observed among sites for turbidity, total phosphate, TKN, total and dissolved copper, iron and nickel. High variability was observed for ammonia, nitrate and total and dissolved selenium. A number of variables had higher concentrations in deep depths than shallow depths.

Nutrient concentrations were generally similar to those reported in 2006, but total nitrogen in 2008 was 50% of the 2006 values. Total phosphate concentrations were low in Morrison Lake with fairly high variability between stations. Total organic carbon concentrations averaged around 10 mg/L throughout the lake with little variability. Total cyanide concentrations were nearly double the concentrations of 2006.

Metals were primarily in the dissolved form in Morrison Lake. Total manganese was the only metal discussed to be largely particulate bound. Only a few metals exceeded BC or CCME guidelines. These included total and dissolved chromium and nickel, and total cadmium.

4.5 Physical Limnology

Physical limnology parameters were measured at five stations within Morrison Lake in 2008. Surface pH and conductivity showed little to no variation among lake stations. The sample depth ranged from 8 to 29 m and the secchi depth ranged from 4.1 to 4.5 m. The average temperature in Morrison Lake ranged from 8.0 to 11.3 °C. Average dissolved oxygen concentrations ranged from 8.8 to 9.4 mg/L.

4.6 Lake Sediment Quality

In 2008, five stations in Morrison Lake were sampled for sediment quality. Morrison Lake substrate was dominated by silt, followed by sand, clay and trace amounts of gravel. Nutrient and TOC concentrations were similar to 2006, with all three (total nitrogen, total phosphorus, and TOC) concentrations highest at LakeA and lowest at LakeE. Cyanide concentrations were lower this year than in 2006, with concentrations below the detection limit at all sites except for LakeD (3.53 mg/kg).

No consistent patterns occurred for metal concentrations across the five lake stations. All metals (except for lead) with provincial or federal guidelines were exceeded at three or more stations in Morrison Lake (this includes sites where only a certain number of replicates exceeded). Arsenic, copper, iron, nickel and mercury exceeded guidelines at all lake stations. For arsenic this included exceeding the highest guideline (SEL, 33 mg/kg), while the rest of the metals exceeded the lowest guideline for all sites. Cadmium and zinc exceeded at three stations, and chromium exceeded at four stations.

4.7 Lake Primary and Secondary Producers

4.7.1 Phytoplankton

Phytoplankton biomass, density, genus richness and diversity were all higher in 2008 than in 2006. Variability among and within stations was lower in 2008 than 2006. Genus diversity and richness was high in Morrison Lake. Sixty five new genera were identified this year although

this may be due to variation in enumeration methods. Community evenness stayed relatively the same as in 2006, though the community shifted from being predominated by Cyanophyta in 2006 to co-dominance of Chlorophyta, Cryptophyta, Diatoms and Cyanophyta in 2008. The Morrison Lake phytoplankton community was primarily composed of *Chroomonas acuta*, *Selenastrum minutum* and *Melosira italica* in 2008. In 2006, Cyanophyta *Aphanocapsa* sp. composed 67% of the phytoplankton community.

4.7.2 Benthic Invertebrates

Benthos samples were collected from each of the five Morrison Lake sites (LakeA, B, C, D and E), as in 2006. Density was lowest at site LakeA and highest at LakeE. Average genus richness of benthic communities in Morrison Lake ranged from 5 to 8 genera, similar to previous values. Dipterans (flies) were the dominant taxonomic group (46 to 55%) at most sites. LakeC had the highest Simpson's Diversity index and Pielou's evenness values. In 2006, evenness and diversity showed similar ranges.

In general, the results of the baseline benthic surveys provide evidence that the Morrison Lake benthic community is healthy with typical community structure and moderate diversity and productivity.

4.7.3 Zooplankton

Zooplankton communities in 2008 were mainly composed of copepods and rotifers with calanoid copepods being the predominant taxa at four of the five Morrison Lake sites. Average richness was highest at site LakeE and lowest at LakeA. Simpson diversity and evenness indices showed an opposite pattern with the highest values at LakeA and lowest at LakeE. Zooplankton community composition was similar to that sampled in 2006. However, in 2008 Morrison Lake sites showed slightly higher genus richness.

References

- BC MOE, Environmental Protection Branch, 2006. *A Compendium of Working Water Quality Guidelines for British Columbia*. N. K. Nagpal, L. W. Pommern, L. G. Swain. Ministry of the Environment. August, 2006. Refer to <http://www.env.gov.bc.ca/wat/wq/BCguidelines/working>.
- BC MWLAP, 2003. *British Columbia Field Sampling Manual – For Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples*. Queens Printer, Victoria, BC.
- CCME, 1999. *Canadian Environmental Quality Guidelines*. Canadian Council of Ministers of the Environment, Winnipeg. Update 7.0 (Sept. 2007).
- Clark, K.R., Gorley, R.N., 2006. *PRIMER v6: User Manual/Tutorial*. PRIMER-E, Plymouth, UK.
- Environment Canada, 2003. *Metal Mining Guidance Document for Aquatic Environmental Effects Monitoring*. Environment Canada, Ottawa. July 2003. Refer to <http://www.ec.gc.ca/eem/English/MetalMining/Guidance/default.cfm>
- Mackie, G.L., 2001. *Applied Aquatic Ecosystem Concepts*. Kendall/Hunt Publishing Company, Iowa USA.
- Rescan. 2008. Morrison Project Aquatics Baseline Report, 2006/2007. Produced by Rescan Environmental Services Ltd for Pacific Booker Minerals Inc.
- RISC. 1997. *Freshwater Biological Sampling Manual*. Province of British Columbia, Resources Information Standards Committee. Victoria, BC.
- RISC. 1998. *Lake and Stream Bottom Sediment Sampling Manual*. Province of British Columbia, Resources Information Standards Committee. Victoria, BC.
- SYSTAT. 2006. SigmaPlot for Windows Version 10.0. Systat Software Inc.

APPENDIX 3.1-1
MORRISON COPPER/GOLD PROJECT
RECEIVING ENVIRONMENT STREAMS AND
TRANSMISSION LINE SITE WATER QUALITY DATA, 2008



Appendix 3.1-1
Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008

Sample ID	Strm1	Lower7	Strm5	Strm4	Strm6	Morrison Creek	Strm1	Strm4	Strm5	Strm6
Date Sampled	25-Jan-08	26-Jan-08	26-Jan-08	27-Jan-08	27-Jan-08	19-Mar-08	18-Mar-08	19-Mar-08	18-Mar-08	18-Mar-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L597874-1	L597874-2	L597874-3	L597874-5	L597874-6	L613077-1	L613077-2	L613077-3	L613077-4	L613077-5
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests										
Hardness (as CaCO ₃)	48.7	104	128	127	50.1	34.2	51.6	128	133	40.8
Colour, True (CU)	10.2	8.5	14.8	<5.0	5.9	36.1	11.2	<5.0	16.5	7.8
Conductivity (µS/cm)	93.3	569	255	254	102	67	101	274	266	89.3
pH	7.88	3.37	8.1	7.92	7.92	7.6	7.82	8.02	8.15	7.84
Total Dissolved Solids	51	224	150	154	65	55	62	159	171	54
Total Suspended Solids	<3.0	<3.0	3.5	<3.0	12	<3.0	<3.0	3.5	6.5	<3.0
Turbidity (NTU)	0.64	0.69	1.74	0.36	3.09	0.79	0.23	0.31	4.94	0.28
Anions and Nutrients										
Ammonia as N	0.0353	0.0064	0.0113	<0.0050	0.0057	<0.0050	0.0057	<0.0050	<0.0050	<0.0050
Acidity (as CaCO ₃)	1	39.4	1.2	2.3	<1.0	1.8	1.6	2.3	1.4	1.4
Alkalinity, Bicarbonate (as CaCO ₃)	43.5	<2.0	112	115	46.2	32.1	49.5	114	113	39
Alkalinity, Carbonate (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO ₃)	43.5	<2.0	112	115	46.2	32.1	49.5	114	113	39
Bromide (Br)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	0.029	0.066	0.071	0.052	0.034	0.034	0.029	0.054	0.077	0.03
Sulfate (SO ₄)	3.79	11.2	23.2	18.6	4.93	2.75	3.52	19.7	21.6	4.52
Nitrate (as N)	0.196	38.7	0.159	0.144	0.0972	0.0561	0.25	0.169	0.165	0.0893
Nitrite (as N)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001	<0.0010	0.0011	<0.0010
Total Kjeldahl Nitrogen	0.174	0.24	0.261	0.126	0.203	0.074	<0.050	<0.050	0.124	0.051
Total Nitrogen	0.37	0.56	0.42	0.27	0.3	0.13	0.29	0.2	0.29	0.14
Total Phosphate as P	0.0044	0.0035	0.0145	0.003	0.0139	0.0069	0.0032	<0.0020	0.0185	0.0025
Cyanides										
Cyanide, Total	0.0044	0.0043	0.0054	<0.0010	0.0045	0.0058	0.003	<0.0010	0.0049	0.0021
Total Metals										
Aluminum (Al)-Total	0.0302	0.0107	0.039	0.008	0.145	0.0335	0.015	0.0125	0.0697	0.0133
Antimony (Sb)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	0.00014	0.00032	0.00215	0.00022	0.00024	0.00039	0.00013	0.00028	0.0023	0.00015
Barium (Ba)-Total	0.0195	0.0461	0.0394	0.0567	0.025	0.0194	0.0206	0.0602	0.0376	0.0131
Beryllium (Be)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total	0.00419	0.000036	<0.000020	<0.000020	0.000084	<0.000017	<0.000017	0.000027	<0.000017	<0.000017
Calcium (Ca)-Total	14.6	32.4	37.9	39	16.9	11.1	15.5	45.2	34.8	14.6
Chromium (Cr)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total	0.00266	<0.0015	0.00917	0.00089	<0.0015	0.00093	0.00082	0.00081	0.0125	0.00044
Iron (Fe)-Total	<0.030	<0.030	0.101	<0.030	0.183	0.234	<0.030	0.052	0.183	<0.030
Lead (Pb)-Total	0.000251	<0.000050	<0.000050	<0.000050	0.00015	<0.000050	<0.000050	<0.000050	0.000126	<0.000050
Lithium (Li)-Total	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Total	3.24	6	9.14	6.92	2.36	2.58	3.48	8.11	8.44	2.27
Manganese (Mn)-Total	0.00294	0.00529	0.0209	0.00135	0.016	0.00902	0.000637	0.0345	0.034	0.000474
Mercury (Hg)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	0.000053	0.000151	0.000604	0.000194	0.000069	0.000157	0.000058	0.000221	0.000557	0.000051
Nickel (Ni)-Total	0.00263	<0.00050	<0.0010	<0.00050	<0.00050	0.0005	<0.00050	<0.00050	0.00104	<0.00050
Phosphorus (P)-Total	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30

(continued)

Appendix 3.1-1
Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Strm1	Lower7	Strm5	Strm4	Strm6	Morrison Creek	Strm1	Strm4	Strm5	Strm6
Date Sampled	25-Jan-08	26-Jan-08	26-Jan-08	27-Jan-08	27-Jan-08	19-Mar-08	18-Mar-08	19-Mar-08	18-Mar-08	18-Mar-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L597874-1	L597874-2	L597874-3	L597874-5	L597874-6	L613077-1	L613077-2	L613077-3	L613077-4	L613077-5
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Potassium (K)-Total	0.392	0.346	0.78	0.342	0.442	0.389	0.262	0.408	0.673	0.198
Selenium (Se)-Total	<0.00050	<0.00050	0.00051	<0.00050	0.00073	<0.00010	<0.00010	0.00012	<0.00010	<0.00010
Silicon (Si)-Total	3.35	3.63	3.06	4.32	2.28	2.57	3.22	4.21	3.05	2
Silver (Ag)-Total	<0.000010	<0.000010	0.000014	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	<2.0	5.3	3.1	2.3	<2.0	2.1	<2.0	2.2	3	<2.0
Strontium (Sr)-Total	0.0362	0.101	0.176	0.119	0.0346	0.0569	0.0391	0.146	0.158	0.0309
Thallium (Tl)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	0.000011	0.000032	0.000047	0.000044	0.000014	<0.000010	<0.000010	0.000051	0.000061	<0.000010
Vanadium (V)-Total	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total	<0.0070	<0.0030	0.0019	0.0011	0.0046	<0.0010	<0.0010	<0.0010	<0.0040	<0.0010
Dissolved Metals										
Aluminum (Al)-Dissolved	0.0157	0.011	0.0198	0.0034	0.0107	0.021	0.0099	0.0016	0.0025	0.0056
Antimony (Sb)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved	0.00012	0.00032	0.00187	0.00021	0.00013	0.00032	0.00012	0.00022	0.00194	0.00013
Barium (Ba)-Dissolved	0.0193	0.0437	0.0394	0.0547	0.0184	0.0191	0.0205	0.0592	0.0367	0.0131
Beryllium (Be)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved	0.000241	<0.000020	<0.000020	0.00003	<0.000020	<0.000017	0.000026	<0.000017	0.000025	<0.000017
Calcium (Ca)-Dissolved	14.2	31.8	36.8	39.5	16.3	9.85	15.2	39.5	38.2	13
Chromium (Cr)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved	0.00099	0.00083	0.00629	0.0009	0.00058	0.00086	0.00074	0.00065	0.0074	0.00051
Iron (Fe)-Dissolved	<0.030	<0.030	<0.030	<0.030	<0.030	0.188	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Dissolved	0.000134	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved	3.19	5.91	8.76	7.01	2.27	2.32	3.34	7.11	9.24	2.01
Manganese (Mn)-Dissolved	0.000203	0.00628	0.000766	0.000725	0.000378	0.00539	0.000065	0.028	0.000758	<0.000050
Mercury (Hg)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved	0.000053	0.000138	0.00058	0.000212	0.000068	0.000153	0.000068	0.000218	0.000589	0.000057
Nickel (Ni)-Dissolved	<0.00050	<0.00050	0.00061	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0007	<0.00050
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	0.253	0.302	0.746	0.359	0.262	0.328	0.248	0.331	0.752	0.188
Selenium (Se)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	0.00013	<0.00010	<0.00010
Silicon (Si)-Dissolved	3.33	3.6	3.08	4.22	2.16	2.57	3.14	4.15	3.01	1.96
Silver (Ag)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	<2.0	5.3	3.1	2.2	<2.0	2.1	<2.0	2.2	3	<2.0
Strontium (Sr)-Dissolved	0.0354	0.0987	0.174	0.118	0.0337	0.0527	0.0385	0.133	0.169	0.0288
Thallium (Tl)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved	<0.000010	0.00003	0.000048	0.000042	<0.000010	<0.000010	<0.000010	0.000057	0.000061	<0.000010
Vanadium (V)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Dissolved	0.0016	0.0015	0.0011	0.0015	0.0012	<0.0010	<0.0010	<0.0010	0.0013	<0.0010
Organic Parameters										
Total Organic Carbon	5.82	6.45	8.98	3.11	5.07	9.91	4.86	2.33	9.07	3.58

(continued)

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Strm7	Strm8	Strm4	Strm6	Strm5	Morrison Creek	Strm1	Strm7	Strm1	Strm5
Date Sampled	18-Mar-08	18-Mar-08	11-Apr-08	8-Apr-08	11-Apr-08	8-Apr-08	8-Apr-08	8-Apr-08	30-May-08	30-May-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	16:00	14:30
ALS Sample ID	L613077-6	L613077-7	L619038-1	L619038-2	L619038-3	L619039-1	L619039-2	L619039-3	L636783-1	L636783-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests										
Hardness (as CaCO ₃)	81	104	130	52.7	125	36.4	52.7	83.2	21.8	83.6
Colour, True (CU)	16.4	11.6	<5.0	9.4	15.4	37.7	10.3	18.3	42.8	38
Conductivity (µS/cm)	177	231	276	101	264	78.2	105	182	42.3	175
pH	8.03	8.08	7.81	7.75	8.02	7.78	7.78	7.97	7.71	7.98
Total Dissolved Solids	105	136	154	58	138	51	65	113	45	124
Total Suspended Solids	4	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Turbidity (NTU)	0.47	0.24	1.74	0.56	1.41	1.66	0.28	0.78	1.55	1.15
Anions and Nutrients										
Ammonia as N	<0.0050	0.0135	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050	0.0077
Acidity (as CaCO ₃)	1.5	1.6	3.5	1.6	1.9	1.4	1.7	1.6	4.7	4.4
Alkalinity, Bicarbonate (as CaCO ₃)	87.5	119	112	44.8	110	33.5	46.8	80.5	19.4	76.8
Alkalinity, Carbonate (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO ₃)	87.5	119	112	44.8	110	33.5	46.8	80.5	19.4	76.8
Bromide (Br)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	0.062	0.082	0.05	0.03	0.068	0.028	0.029	0.065	0.027	0.063
Sulfate (SO ₄)	8.46	12.5	20.9	5.07	22.2	2.67	3.21	8.45	1.62	10.5
Nitrate (as N)	0.256	0.267	0.255	0.142	0.184	0.0536	0.263	0.254	<0.0050	0.0291
Nitrite (as N)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	0.115	0.103	0.136	0.138	0.286	0.306	0.207	0.256	0.14	0.241
Total Nitrogen	0.37	0.37	0.39	0.28	0.47	0.36	0.47	0.51	0.14	0.27
Total Phosphate as P	0.0031	0.0036	0.0028	<0.0020	0.0139	0.0088	0.0025	0.0029	0.0093	0.0111
Cyanides										
Cyanide, Total	0.0047	0.0022	0.0017	0.0025	0.0054	0.0072	0.0028	<0.0010	0.0084	0.0068
Total Metals										
Aluminum (Al)-Total	0.0752	0.0106	0.0146	0.0998	0.0139	0.0873	0.0142	0.0195	0.145	0.0361
Antimony (Sb)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	0.00026	0.00037	0.00027	0.00023	0.00195	0.0004	0.00011	0.00033	0.00018	0.00133
Barium (Ba)-Total	0.0267	0.0484	0.0582	0.0274	0.0375	0.0214	0.02	0.0251	0.0119	0.0316
Beryllium (Be)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total	<0.010	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	0.013	<0.010	<0.010
Cadmium (Cd)-Total	<0.000017	<0.000017	<0.000017	<0.000017	0.000044	0.000022	0.000037	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Total	21.4	34.6	42.3	22.2	38.8	10.9	14.1	22.1	6.49	25.9
Chromium (Cr)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total	<0.00090	0.00077	0.00094	0.0007	0.00896	0.00107	0.00078	0.00065	0.00135	0.00776
Iron (Fe)-Total	0.117	0.042	0.056	0.14	0.054	0.386	<0.030	<0.030	0.126	0.098
Lead (Pb)-Total	<0.000050	<0.000050	<0.000050	0.000064	<0.000050	0.000064	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Total	4.61	6.73	6.74	2.46	8.27	2.23	2.81	4.36	1.29	4.78
Manganese (Mn)-Total	0.00643	0.0144	0.0278	0.009	0.00844	0.0181	0.00056	0.000688	0.0116	0.0124
Mercury (Hg)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000012	<0.000010
Molybdenum (Mo)-Total	0.000091	0.000174	0.000262	0.000103	0.000549	0.000147	0.000064	0.000096	<0.000050	0.0004
Nickel (Ni)-Total	<0.00050	<0.00050	<0.00050	<0.00050	0.00074	0.00067	<0.00050	<0.00050	<0.00050	0.00091
Phosphorus (P)-Total	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30

(continued)

Appendix 3.1-1
Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Strm7	Strm8	Strm4	Strm6	Strm5	Morrison Creek	Strm1	Strm7	Strm1	Strm5
Date Sampled	18-Mar-08	18-Mar-08	11-Apr-08	8-Apr-08	11-Apr-08	8-Apr-08	8-Apr-08	8-Apr-08	30-May-08	30-May-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	16:00	14:30
ALS Sample ID	L613077-6	L613077-7	L619038-1	L619038-2	L619038-3	L619039-1	L619039-2	L619039-3	L636783-1	L636783-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Potassium (K)-Total	0.242	0.341	0.389	0.256	0.802	0.372	0.238	0.247	0.155	0.502
Selenium (Se)-Total	<0.00010	<0.00010	0.00011	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Total	2.67	3.66	4.17	2.51	3.08	2.62	3.32	2.89	2.93	2.18
Silver (Ag)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium (Na)-Total	5.7	5.8	2.6	2.2	3.4	2.3	<2.0	7.2	<2.0	2.2
Strontium (Sr)-Total	0.073	0.117	0.128	0.0405	0.147	0.0549	0.0354	0.0663	0.0167	0.0715
Thallium (Tl)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	0.000027	0.000041	0.000064	0.00002	0.00006	0.000011	<0.000010	0.000028	<0.000010	0.00002
Vanadium (V)-Total	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total	<0.0030	<0.0010	<0.0030	<0.0030	<0.0040	0.0038	0.0047	<0.0010	<0.0010	<0.0030
Dissolved Metals										
Aluminum (Al)-Dissolved	0.0126	0.0047	0.0062	0.0098	0.0031	0.0293	0.0118	0.018	0.0982	0.0148
Antimony (Sb)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved	0.00022	0.00034	0.00028	0.00016	0.00218	0.00034	0.00013	0.00037	0.00015	0.00125
Barium (Ba)-Dissolved	0.0264	0.047	0.0567	0.0191	0.0362	0.0193	0.0203	0.026	0.011	0.0315
Beryllium (Be)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved	<0.000017	<0.000017	<0.000017	<0.000017	0.000112	<0.000017	0.000027	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Dissolved	23.9	31.6	41.2	17.5	37.1	9.62	14.4	22.8	6.61	25.7
Chromium (Cr)-Dissolved	<0.00050	<0.00050	<0.00070	<0.00050	<0.00070	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved	0.00072	0.00078	0.00065	0.00031	0.00691	0.00081	0.00068	0.00065	0.00131	0.00641
Iron (Fe)-Dissolved	<0.030	<0.030	<0.030	<0.030	0.032	0.265	<0.030	<0.030	0.08	0.054
Lead (Pb)-Dissolved	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved	5.15	6.11	6.59	2.15	7.88	1.99	2.85	4.49	1.28	4.72
Manganese (Mn)-Dissolved	0.000093	0.00475	0.0229	0.000171	0.000668	0.00644	0.000094	0.000209	0.00127	0.00159
Mercury (Hg)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000017	0.000011
Molybdenum (Mo)-Dissolved	0.000112	0.000175	0.000237	0.000084	0.000546	0.000174	0.000077	0.000097	<0.000050	0.000379
Nickel (Ni)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	<0.00050	<0.00050	<0.00050	<0.00050	0.00067
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	0.273	0.296	0.369	0.211	0.769	0.337	0.241	0.254	0.153	0.503
Selenium (Se)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Dissolved	2.65	3.52	4.37	2.33	3.23	2.8	3.42	2.94	2.85	2.25
Silver (Ag)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	5.6	6.3	2.6	2	3.3	2.3	<2.0	7.1	<2.0	2.3
Strontium (Sr)-Dissolved	0.0788	0.11	0.124	0.0345	0.142	0.0495	0.0356	0.0682	0.0165	0.0727
Thallium (Tl)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved	0.000025	0.000045	0.000057	<0.000010	0.000059	<0.000010	<0.000010	<0.000010	0.000023	<0.000010
Vanadium (V)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Dissolved	0.0026	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic Parameters										
Total Organic Carbon	7.31	5.39	2.38	3.53	8.79	10.4	5.02	7.72	10.8	12.8

(continued)

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Morrison Creek	Morrison Creek - REP	Strm7	Strm8	Strm9	Field Blank	Travel Blank	Strm26	Strm1	Strm1 - REP
Date Sampled	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	03-Jun-08	03-Jun-08
Time Sampled	15:30	15:30	13:30	12:40	12:00	16:00	16:00	00:00	00:00	00:00
ALS Sample ID	L636783-3	L636783-4	L636783-5	L636783-6	L636783-7	L636783-8	L636783-9	L636783-10	L639717-1	L639717-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests										
Hardness (as CaCO ₃)	30.8	30.2	34.1	61.4	56.9	<0.50	<0.50	27.8	25.8	25.8
Colour, True (CU)	42	41.1	64.9	42.4	39	<5.0	<5.0	23.7	39.8	42.9
Conductivity (μS/cm)	64.9	65.2	65.8	129	120	<2.0	<2.0	58.4	51.9	51.7
pH	6.86	7.81	7.88	7.93	8	5.54	5.5	7.98	7.88	7.84
Total Dissolved Solids	53	55	74	96	80	<10	<10	41	46	45
Total Suspended Solids	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	4.3	<3.0
Turbidity (NTU)	1.28	1.15	1.55	1.24	1.12	<0.10	<0.10	1.61	1.7	1.3
Anions and Nutrients										
Ammonia as N	0.0128	0.0084	<0.0050	0.0119	<0.0050	0.0053	0.0086	<0.0050	<0.0050	0.0133
Acidity (as CaCO ₃)	5.6	4.8	4.7	4.5	4.1	2.8	2.9	4	1.6	1.7
Alkalinity, Bicarbonate (as CaCO ₃)	31.8	29.6	33.5	72.1	54.1	<2.0	<2.0	24.6	20.9	21.3
Alkalinity, Carbonate (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO ₃)	31.8	29.6	33.5	72.1	54.1	<2.0	<2.0	24.6	20.9	21.3
Bromide (Br)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	0.034	0.034	0.048	0.086	0.079	<0.020	<0.020	0.025	0.025	0.024
Sulfate (SO ₄)	2.59	2.59	1.71	3.8	3.58	<0.50	<0.50	3	1.59	1.59
Nitrate (as N)	0.0413	0.0353	0.0121	0.228	0.0205	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrite (as N)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	0.169	0.125	0.188	0.192	0.17	<0.050	<0.050	<0.050	0.224	0.408
Total Nitrogen	0.21	0.16	0.2	0.42	0.19	<0.05	<0.05	<0.05	0.224	0.408
Total Phosphate as P	0.0103	0.0133	0.024	0.0072	0.0103	<0.0020	<0.0020	0.0101	0.0075	0.0069
Cyanides										
Cyanide, Total	0.0073	0.0074	0.0126	0.0087	0.0078	<0.0010	<0.0010	0.006	0.0076	0.0083
Total Metals										
Aluminum (Al)-Total	0.0755	0.0638	0.115	0.0631	0.0459	<0.0010	<0.0010	0.101	0.153	0.152
Antimony (Sb)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	0.00031	0.00031	0.00028	0.00035	0.00078	<0.00010	<0.00010	0.00017	0.0002	0.0002
Barium (Ba)-Total	0.0188	0.0184	0.0145	0.0298	0.0376	<0.000050	<0.000050	0.0107	0.0139	0.0133
Beryllium (Be)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total	<0.010	<0.010	<0.010	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Total	9.31	9.23	9.97	19.4	17.3	<0.20	<0.20	9.67	8.13	7.83
Chromium (Cr)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total	0.00111	0.00118	0.00098	0.00115	0.00074	<0.00010	<0.00010	<0.00080	0.00166	0.00177
Iron (Fe)-Total	0.207	0.186	0.139	0.069	0.188	<0.030	<0.030	0.215	0.147	0.151
Lead (Pb)-Total	0.000051	0.000132	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050
Lithium (Li)-Total	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Total	1.94	1.89	1.82	2.96	2.99	<0.050	<0.050	1.13	1.56	1.51
Manganese (Mn)-Total	0.00719	0.00674	0.00501	0.00357	0.0295	<0.000050	<0.000050	0.015	0.0112	0.0104
Mercury (Hg)-Total	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000011	0.00001
Molybdenum (Mo)-Total	0.000154	0.000117	<0.000050	0.000091	0.000099	<0.000050	<0.000050	<0.000050	0.000073	<0.000050
Nickel (Ni)-Total	0.00054	<0.00050	<0.00050	<0.00050	0.00055	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Total	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30

(continued)

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Morrison Creek	Morrison Creek - REP	Strm7	Strm8	Strm9	Field Blank	Travel Blank	Strm26	Strm1	Strm1 - REP
Date Sampled	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	03-Jun-08	03-Jun-08
Time Sampled	15:30	15:30	13:30	12:40	12:00	16:00	16:00	00:00	00:00	00:00
ALS Sample ID	L636783-3	L636783-4	L636783-5	L636783-6	L636783-7	L636783-8	L636783-9	L636783-10	L639717-1	L639717-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Potassium (K)-Total	0.345	0.343	0.201	0.255	0.315	<0.050	<0.050	0.173	0.192	0.184
Selenium (Se)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00034	0.00022
Silicon (Si)-Total	2.63	2.57	2.56	3.81	2.63	<0.050	<0.050	2.08	2.93	2.9
Silver (Ag)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	<2.0	<2.0	<2.0	2.9	2.4	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)-Total	0.0471	0.0458	0.0328	0.0564	0.057	<0.00010	<0.00010	0.0185	0.0217	0.0212
Thallium (Tl)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	<0.000010	<0.000010	<0.000010	0.000011	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Vanadium (V)-Total	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total	<0.0030	<0.0030	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	<0.0040
Dissolved Metals										
Aluminum (Al)-Dissolved	0.0365	0.037	0.108	0.0342	0.0197	-	-	0.0376	0.0847	0.0805
Antimony (Sb)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved	0.00028	0.00027	0.00028	0.00033	0.00068	-	-	0.00014	0.00016	0.00015
Barium (Ba)-Dissolved	0.0175	0.0174	0.0144	0.0291	0.0366	-	-	0.00932	0.0125	0.0124
Beryllium (Be)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved	<0.010	<0.010	<0.010	0.011	<0.010	-	-	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	-	-	0.000031	<0.000017	<0.000017
Calcium (Ca)-Dissolved	9.19	9.01	10.6	19.7	17.8	-	-	9.31	7.85	7.86
Chromium (Cr)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved	0.00092	0.00094	0.00108	0.0012	0.0008	-	-	0.00057	0.0015	0.00126
Iron (Fe)-Dissolved	0.122	0.119	0.115	0.035	0.1	-	-	0.038	0.063	0.063
Lead (Pb)-Dissolved	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	-	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved	1.91	1.88	1.87	2.95	3.03	-	-	1.1	1.5	1.49
Manganese (Mn)-Dissolved	0.00145	0.0013	0.00126	0.000736	0.000695	-	-	0.000854	0.00109	0.000948
Mercury (Hg)-Dissolved	0.000012	0.000011	0.000011	<0.000010	<0.000010	-	-	<0.000010	0.000013	<0.000010
Molybdenum (Mo)-Dissolved	0.000221	0.000108	0.000057	0.000107	0.00013	-	-	0.000073	<0.000050	<0.000050
Nickel (Ni)-Dissolved	<0.00050	<0.00050	0.00062	0.00053	<0.00050	-	-	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.30	<0.30	-	-	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	0.338	0.342	0.214	0.263	0.327	-	-	0.166	0.183	0.187
Selenium (Se)-Dissolved	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	-	-	<0.00010	0.00023	0.00016
Silicon (Si)-Dissolved	2.68	2.64	2.53	3.72	2.57	-	-	2.08	2.9	2.91
Silver (Ag)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	<2.0	<2.0	<2.0	3	2.4	-	-	<2.0	<2.0	<2.0
Strontium (Sr)-Dissolved	0.0465	0.0464	0.0329	0.0569	0.0574	-	-	0.0184	0.021	0.0211
Thallium (Tl)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	<0.010	<0.010	<0.010
Uranium (U)-Dissolved	<0.000010	<0.000010	<0.000010	0.00001	0.000011	-	-	<0.000010	<0.000010	<0.000010
Vanadium (V)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	<0.0010	<0.0010	0.0013
Organic Parameters										
Total Organic Carbon	11.5	11.3	15.5	12.4	10.6	<0.50	<0.50	6.75	10.8	11

(continued)

Appendix 3.1-1
Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Strm5	Strm6	Lower7	Strm9	Strm26	Morrison Creek	Travel Blank	Field Blank	Morrison Creek	Strm1
Date Sampled	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	12-Jun-08	12-Jun-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L639717-3	L639717-4	L639717-5	L639717-6	L639717-7	L639717-8	L639717-9	L639717-10	L642675-1	L642675-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests										
Hardness (as CaCO ₃)	90.4	30.6	40	62.2	30.1	31.8	<0.50	-	27.5	24.6
Colour, True (CU)	34.8	23	61.2	36.2	22.4	44.9	<5.0	<5.0	44.9	28.2
Conductivity (µS/cm)	182	64.5	79.3	127	61.6	62.6	<2.0	<2.0	62.5	57.9
pH	8.13	7.91	7.84	8.01	7.76	7.38	5.55	5.52	7.79	7.75
Total Dissolved Solids	119	46	71	84	46	52	<10	<10	72	54
Total Suspended Solids	<3.0	3.3	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Turbidity (NTU)	0.8	1.8	1.12	1.14	1.39	1.48	<0.10	<0.10	1.23	1.08
Anions and Nutrients										
Ammonia as N	0.0091	<0.0050	<0.0050	<0.0050	<0.0050	0.0218	0.0069	<0.0050	0.0149	<0.0050
Acidity (as CaCO ₃)	1.4	1.5	1.9	1.7	1.7	2.8	1.5	1.5	1.1	1.1
Alkalinity, Bicarbonate (as CaCO ₃)	77.4	27.5	37.3	57.3	26.8	29.1	<2.0	<2.0	28.1	27.1
Alkalinity, Carbonate (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO ₃)	77.4	27.5	37.3	57.3	26.8	29.1	<2.0	<2.0	28.1	27.1
Bromide (Br)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	0.065	0.025	0.052	0.082	0.023	0.034	<0.020	<0.020	0.028	0.025
Sulfate (SO ₄)	11.1	3.05	1.88	3.64	3	2.44	<0.50	<0.50	2.17	1.59
Nitrate (as N)	0.0312	0.0059	0.0119	0.0296	<0.0050	0.0235	<0.0050	<0.0050	0.0096	0.0098
Nitrite (as N)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	0.372	0.187	0.353	0.418	0.16	0.357	<0.050	<0.050	0.25	0.14
Total Nitrogen	0.403	0.193	0.365	0.448	0.16	0.381	<0.060	<0.060	0.26	0.15
Total Phosphate as P	0.0103	0.0066	0.0062	0.0093	0.0062	0.0087	<0.0020	<0.0020	0.0099	0.0081
Cyanides										
Cyanide, Total	0.009	0.0052	0.0124	0.0079	0.0056	0.0093	<0.0010	<0.0010	0.008	0.0064
Total Metals										
Aluminum (Al)-Total	0.0394	0.128	0.12	0.0434	0.0845	0.0901	<0.0010	-	0.0713	0.0696
Antimony (Sb)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010
Arsenic (As)-Total	0.00169	0.0002	0.00033	0.00084	0.00018	0.00034	<0.00010	-	0.0003	0.00016
Barium (Ba)-Total	0.0357	0.0121	0.0172	0.0411	0.0106	0.0188	<0.000050	-	0.0174	0.0135
Beryllium (Be)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050
Bismuth (Bi)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050
Boron (B)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010
Cadmium (Cd)-Total	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	-	<0.000017	<0.000017
Calcium (Ca)-Total	29.8	10.4	13.1	19.2	10	9.46	<0.020	-	8.56	7.75
Chromium (Cr)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050
Cobalt (Co)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010
Copper (Cu)-Total	0.00975	0.00071	0.00127	0.00106	0.00061	0.00138	<0.00010	-	0.00132	0.00104
Iron (Fe)-Total	0.091	0.154	0.132	0.171	0.102	0.238	<0.030	-	0.213	0.067
Lead (Pb)-Total	<0.000050	0.000058	0.000078	<0.000050	<0.000050	0.000063	<0.000050	-	0.000061	<0.000050
Lithium (Li)-Total	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	<0.0050	<0.0050
Magnesium (Mg)-Total	5.51	1.34	2.3	3.35	1.24	1.96	<0.0050	-	1.92	1.65
Manganese (Mn)-Total	0.0163	0.0127	0.00422	0.034	0.0124	0.00998	<0.000050	-	0.00727	0.00305
Mercury (Hg)-Total	0.000012	<0.000010	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	-	<0.000010	<0.000010
Molybdenum (Mo)-Total	0.000473	0.000104	<0.000050	0.000113	0.00011	0.000141	<0.000050	-	0.000219	0.000101
Nickel (Ni)-Total	0.00105	<0.00050	0.00056	0.0007	<0.00050	0.00065	<0.00050	-	0.00066	<0.00050
Phosphorus (P)-Total	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	-	<0.30	<0.30

(continued)

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Strm5	Strm6	Lower7	Strm9	Strm26	Morrison Creek	Travel Blank	Field Blank	Morrison Creek	Strm1
Date Sampled	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	12-Jun-08	12-Jun-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L639717-3	L639717-4	L639717-5	L639717-6	L639717-7	L639717-8	L639717-9	L639717-10	L642675-1	L642675-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Potassium (K)-Total	0.566	0.207	0.256	0.362	0.214	0.376	<0.050	-	0.347	0.177
Selenium (Se)-Total	0.00025	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	-	0.00011	<0.00010
Silicon (Si)-Total	2.11	2.22	2.58	2.44	2.05	2.71	<0.050	-	2.51	3.06
Silver (Ag)-Total	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	<0.000010	<0.000010
Sodium (Na)-Total	2.4	<2.0	2.2	2.6	<2.0	<2.0	<2.0	-	<2.0	<2.0
Strontium (Sr)-Total	0.0973	0.0218	0.0421	0.0669	0.02	0.0482	<0.00010	-	0.0475	0.0223
Thallium (Tl)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010
Tin (Sn)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010
Titanium (Ti)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010
Uranium (U)-Total	0.000021	<0.000010	<0.000010	0.000013	<0.000010	<0.000010	<0.000010	-	0.00001	<0.000010
Vanadium (V)-Total	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010
Zinc (Zn)-Total	<0.0030	<0.0030	<0.0040	<0.0030	<0.0030	<0.0030	<0.0010	-	<0.0020	<0.0010
Dissolved Metals										
Aluminum (Al)-Dissolved	0.0104	0.0329	0.0877	0.0146	0.0313	0.0433	-	-	0.0406	0.0489
Antimony (Sb)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010
Arsenic (As)-Dissolved	0.00144	0.00014	0.00028	0.00073	0.00012	0.00028	-	-	0.00029	0.00013
Barium (Ba)-Dissolved	0.033	0.0104	0.0165	0.04	0.00972	0.0179	-	-	0.0165	0.0131
Beryllium (Be)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050
Bismuth (Bi)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050
Boron (B)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	<0.010	<0.010
Cadmium (Cd)-Dissolved	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	-	-	<0.000017	<0.000017
Calcium (Ca)-Dissolved	27.5	10.1	12.3	19.3	10	9.48	-	-	7.99	7.11
Chromium (Cr)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050
Cobalt (Co)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010
Copper (Cu)-Dissolved	0.00676	<0.00060	0.00113	<0.00080	<0.00060	<0.0010	-	-	0.0008	0.00101
Iron (Fe)-Dissolved	0.034	0.031	0.088	0.077	<0.030	0.135	-	-	0.155	0.043
Lead (Pb)-Dissolved	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	-	<0.000050	<0.000050
Lithium (Li)-Dissolved	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	<0.0050	<0.0050
Magnesium (Mg)-Dissolved	5.3	1.3	2.3	3.37	1.23	1.97	-	-	1.84	1.65
Manganese (Mn)-Dissolved	0.000659	0.000579	0.00123	0.000744	0.000614	0.00157	-	-	0.00271	0.000626
Mercury (Hg)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	<0.000010	0.000012
Molybdenum (Mo)-Dissolved	0.000429	<0.000050	<0.000050	<0.00020	<0.000050	<0.00020	-	-	0.000199	0.000078
Nickel (Ni)-Dissolved	0.00077	<0.00050	<0.00060	0.00052	<0.00050	0.00053	-	-	<0.00050	<0.00050
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	-	-	<0.30	<0.30
Potassium (K)-Dissolved	0.524	0.194	0.258	0.36	0.192	0.374	-	-	0.327	0.163
Selenium (Se)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	-	-	<0.00010	<0.00010
Silicon (Si)-Dissolved	2.13	2.12	2.65	2.49	2.04	2.68	-	-	2.57	2.99
Silver (Ag)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	<0.000010	<0.000010
Sodium (Na)-Dissolved	2.4	<2.0	2.2	2.7	<2.0	<2.0	-	-	<2.0	<2.0
Strontium (Sr)-Dissolved	0.0876	0.0209	0.0393	0.0671	0.0199	0.0486	-	-	0.0457	0.0203
Thallium (Tl)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010
Tin (Sn)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010
Titanium (Ti)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	<0.010	<0.010
Uranium (U)-Dissolved	0.000022	<0.000010	<0.000010	0.000011	<0.000010	<0.000010	-	-	<0.000010	<0.000010
Vanadium (V)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	<0.0010	<0.0010
Zinc (Zn)-Dissolved	0.0011	<0.0010	0.0019	<0.0010	<0.0010	<0.0010	-	-	<0.0010	<0.0010
Organic Parameters										
Total Organic Carbon	13.4	6.91	11.8	11.3	6.83	12.8	<0.50	<0.50	11.3	8.51

(continued)

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Strm4	Strm6	Strm26	Upper7	Lower7	Strm10	Strm9	Strm8	Strm5	Field Blank
Date Sampled	12-Jun-08	12-Jun-08	12-Jun-08							
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L642675-3	L642675-4	L642675-5	L642675-6	L642675-7	L642675-8	L642675-9	L642675-10	L642675-11	L642675-12
Nature	Water	Water	Water							
Physical Tests										
Hardness (as CaCO ₃)	93.7	97.9	28.8	47.1	50.7	19.5	64.8	71.9	90.3	<0.50
Colour, True (CU)	14.2	15.9	15.8	48.2	45	31.8	30.5	28.6	31.5	<5.0
Conductivity (μS/cm)	182	68.6	65.5	92.9	100	42.6	138	161	191	<2.0
pH	7.91	7.82	7.79	7.91	7.95	7.55	8.09	8.11	8.2	5.69
Total Dissolved Solids	124	47	44	75	81	48	95	107	131	<10
Total Suspended Solids	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Turbidity (NTU)	0.4	1.03	1.06	0.81	0.58	1.39	0.96	0.45	0.9	<0.10
Anions and Nutrients										
Ammonia as N	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acidity (as CaCO ₃)	1.6	1.1	1.1	1.2	1.1	1.4	<1.0	<1.0	<1.0	1.4
Alkalinity, Bicarbonate (as CaCO ₃)	78.1	30.4	29.3	47.4	48.7	20.4	61.8	79.3	83	<2.0
Alkalinity, Carbonate (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO ₃)	78.1	30.4	29.3	47.4	48.7	20.4	61.8	79.3	83	<2.0
Bromide (Br)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	0.047	0.025	0.02	0.046	0.051	0.032	0.079	0.079	0.061	<0.020
Sulfate (SO ₄)	12.2	3.08	3.11	2.26	2.44	<0.50	3.7	4.85	10.9	<0.50
Nitrate (as N)	0.0962	0.0062	<0.0050	0.0227	0.0418	0.0068	0.0506	0.27	0.0342	<0.0050
Nitrite (as N)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	0.084	0.194	0.14	0.287	0.218	0.243	0.239	0.221	0.256	<0.050
Total Nitrogen	0.18	0.2	0.14	0.31	0.26	0.25	0.29	0.49	0.29	<0.05
Total Phosphate as P	0.0036	0.0061	0.0062	0.0053	0.0055	0.0078	0.0087	0.0051	0.0127	<0.0020
Cyanides										
Cyanide, Total	0.0052	0.0026	0.0029	0.0098	0.0015	0.0073	0.0069	0.0077	0.0062	<0.0010
Total Metals										
Aluminum (Al)-Total	0.0241	0.0811	0.0455	0.0881	0.0704	0.16	0.0304	0.0332	0.0463	<0.0010
Antimony (Sb)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	0.00021	0.00016	0.00015	0.00028	0.0003	0.00019	0.00078	0.00037	0.00176	<0.00010
Barium (Ba)-Total	0.037	0.0489	0.0104	0.0175	0.0189	0.0162	0.0446	0.035	0.0347	<0.00050
Beryllium (Be)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	0.012	<0.010	<0.010
Cadmium (Cd)-Total	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Total	27.6	38.4	9.4	13.9	14.9	5.62	20.6	21.9	29	<0.20
Chromium (Cr)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total	0.00185	0.00056	0.00043	0.00093	0.00115	0.00083	0.00071	0.00099	0.00922	<0.00010
Iron (Fe)-Total	<0.030	0.046	0.057	0.091	0.064	0.098	0.141	0.039	0.123	<0.030
Lead (Pb)-Total	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Total	5.13	3.5	1.37	2.84	3.03	1.26	3.96	3.9	6.05	<0.0050
Manganese (Mn)-Total	0.00132	0.00338	0.00656	0.00245	0.00163	0.00186	0.0256	0.00256	0.0282	<0.000050
Mercury (Hg)-Total	<0.000010	<0.000010	0.00001	<0.000010	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	0.000335	0.000175	0.000055	<0.000050	<0.000050	<0.000050	0.000141	0.000112	0.000409	<0.000050
Nickel (Ni)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00059	<0.00050	0.00095	<0.00050
Phosphorus (P)-Total	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30

(continued)

Appendix 3.1-1
Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Strm4	Strm6	Strm26	Upper7	Lower7	Strm10	Strm9	Strm8	Strm5	Field Blank
Date Sampled	12-Jun-08	12-Jun-08	12-Jun-08							
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L642675-3	L642675-4	L642675-5	L642675-6	L642675-7	L642675-8	L642675-9	L642675-10	L642675-11	L642675-12
Nature	Water	Water	Water							
Potassium (K)-Total	0.32	0.407	0.172	0.248	0.27	0.109	0.351	0.278	0.519	<0.050
Selenium (Se)-Total	0.00033	0.00046	0.0002	0.00042	0.00044	0.00024	0.00027	0.00024	0.00032	<0.00010
Silicon (Si)-Total	3.94	3.48	1.95	2.56	2.66	4.11	2.31	3.99	1.9	<0.050
Silver (Ag)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	<2.0	2.4	<2.0	2.6	2.6	<2.0	2.8	3.8	2.5	<2.0
Strontium (Sr)-Total	0.0762	0.0596	0.0209	0.047	0.0503	0.0245	0.0723	0.0725	0.0921	<0.00010
Thallium (Tl)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Titanium (Ti)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	0.00002	0.000029	<0.000010	<0.000010	<0.000010	<0.000010	0.000012	0.000016	0.000021	<0.000010
Vanadium (V)-Total	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total	<0.0010	<0.0030	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0030	<0.0010
Dissolved Metals										
Aluminum (Al)-Dissolved	0.0123	0.008	0.0187	0.0693	0.0533	0.14	0.0097	0.0159	0.0062	-
Antimony (Sb)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Arsenic (As)-Dissolved	0.00019	0.00014	0.00013	0.00026	0.00028	0.00018	0.00067	0.00035	0.00144	-
Barium (Ba)-Dissolved	0.037	0.0459	0.00995	0.0171	0.0188	0.0159	0.0418	0.0347	0.0324	-
Beryllium (Be)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-
Bismuth (Bi)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-
Boron (B)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	0.012	<0.010	-
Cadmium (Cd)-Dissolved	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	-
Calcium (Ca)-Dissolved	28.8	34	9.27	14.1	15.3	5.72	19.7	22.4	26.9	-
Chromium (Cr)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-
Cobalt (Co)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Copper (Cu)-Dissolved	0.0019	0.00044	0.00043	0.00099	0.00117	0.00092	0.00067	0.00097	0.00582	-
Iron (Fe)-Dissolved	<0.030	<0.030	<0.030	0.067	0.06	0.076	0.062	<0.030	<0.030	-
Lead (Pb)-Dissolved	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-
Lithium (Li)-Dissolved	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-
Magnesium (Mg)-Dissolved	5.26	3.17	1.37	2.87	3.03	1.26	3.75	3.88	5.62	-
Manganese (Mn)-Dissolved	0.000403	0.000259	0.000492	0.000941	0.00064	0.00128	0.00146	0.00089	0.000358	-
Mercury (Hg)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-
Molybdenum (Mo)-Dissolved	0.000333	0.000153	0.000074	0.000057	0.000069	<0.000050	0.00012	0.00011	0.000363	-
Nickel (Ni)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00069	-
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	-
Potassium (K)-Dissolved	0.334	0.365	0.171	0.25	0.283	0.112	0.337	0.28	0.48	-
Selenium (Se)-Dissolved	0.00049	0.00032	<0.00010	0.00053	0.00043	0.00039	0.00041	0.0002	0.00033	-
Silicon (Si)-Dissolved	3.9	3.37	1.87	2.47	2.62	4.01	2.25	3.93	1.84	-
Silver (Ag)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-
Sodium (Na)-Dissolved	<2.0	2.3	<2.0	2.6	2.7	<2.0	2.7	3.8	2.5	-
Strontium (Sr)-Dissolved	0.0791	0.0544	0.021	0.0477	0.0505	0.0247	0.0695	0.0732	0.0867	-
Thallium (Tl)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Tin (Sn)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Titanium (Ti)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-
Uranium (U)-Dissolved	0.000022	0.000027	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.00001	0.000014	0.00002
Vanadium (V)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Zinc (Zn)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Organic Parameters										
Total Organic Carbon	6.44	4.18	5.29	12.8	12.6	8.71	9.39	9.93	12	<0.50

(continued)

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Travel Blank	Morrison Creek - REP	Strm11.9	Strm10	Lower7	Strm8	Strm9	Morrison Creek	Strm1	Wetland
Date Sampled	12-Jun-08	12-Jun-08	24-Jul-08	25-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L642675-13	L642675-14	L661556-4	L661556-5	L661556-7	L661556-10	L661556-13	L661556-16	L661556-17	L661556-18
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests										
Hardness (as CaCO ₃)	<0.50	29.1	50.7	93.1	73.1	96.6	80.7	30.8	40	51.7
Colour, True (CU)	<5.0	45	26.4	11.5	21.9	18.1	20.7	38.7	13.3	50.3
Conductivity (µS/cm)	<2.0	62.9	107	182	158	201	149	60.7	80.7	103
pH	5.72	7.76	7.94	7.81	7.92	7.93	7.95	7.6	7.71	7.25
Total Dissolved Solids	<10	54	79	116	103	131	104	53	51	73
Total Suspended Solids	<3.0	<3.0	<3.0	3.7	<3.0	8.2	<3.0	<3.0	<3.0	<3.0
Turbidity (NTU)	<0.10	1.28	1.07	0.87	0.4	2.13	0.71	0.61	0.29	1.71
Anions and Nutrients										
Ammonia as N	<0.0050	0.0151	<0.020	0.0076	<0.0050	<0.0050	<0.0050	0.0064	<0.0050	0.0214
Acidity (as CaCO ₃)	1.3	1.1	1.8	2.9	1.9	2.3	1.8	2.4	2.2	6.3
Alkalinity, Bicarbonate (as CaCO ₃)	<2.0	28	54.7	90.9	75.2	99	80.3	27.7	40.4	61.1
Alkalinity, Carbonate (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO ₃)	<2.0	28	54.7	90.9	75.2	99	80.3	27.7	40.4	61.1
Bromide (Br)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.25
Chloride (Cl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	<0.020	0.028	0.047	0.042	0.059	0.083	0.09	0.039	0.032	<0.10
Sulfate (SO ₄)	<0.50	2.16	1.11	5.99	5.56	7.81	3.96	2.42	1.43	<2.5
Nitrate (as N)	<0.0050	0.0103	0.0394	0.0416	0.19	0.269	0.062	0.0116	0.0809	<0.025
Nitrite (as N)	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	0.0067
Total Kjeldahl Nitrogen	<0.050	0.26	0.11	0.088	0.13	0.192	0.157	0.158	<0.050	0.213
Total Nitrogen	<0.05	0.27	0.15	0.13	0.32	0.46	0.22	0.17	0.13	0.22
Total Phosphate as P	<0.0020	0.0088	0.008	0.0083	0.0038	0.0097	0.0105	0.007	0.0032	0.0196
Cyanides										
Cyanide, Total	<0.0010	0.0072	0.0066	0.0051	0.0076	0.0065	0.0056	0.0092	0.0044	0.0106
Total Metals										
Aluminum (Al)-Total	<0.0010	0.076	0.0169	0.0364	0.0418	0.116	0.0034	0.0431	0.0233	0.0087
Antimony (Sb)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	<0.00010	0.00031	0.00033	0.00015	0.00027	0.00063	0.00065	0.00033	0.00014	0.00063
Barium (Ba)-Total	<0.000050	0.0179	0.0359	0.0346	0.0282	0.0576	0.0522	0.0175	0.0182	0.0655
Beryllium (Be)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total	<0.010	<0.010	<0.010	<0.010	0.011	0.015	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total	<0.000017	<0.000017	<0.000017	0.000023	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Total	<0.020	8.72	16.4	25.8	22.9	32.1	23.2	8.74	11.7	16.2
Chromium (Cr)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total	<0.00010	0.00132	0.0007	0.001	0.00118	0.00142	0.00048	0.00107	0.00088	0.00038
Iron (Fe)-Total	<0.030	0.218	0.306	0.042	0.059	0.219	0.098	0.162	<0.030	1.3
Lead (Pb)-Total	<0.000050	<0.000050	<0.000050	0.000058	<0.000050	0.000077	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Total	<0.0050	2	2.68	5.71	4.74	5.86	4.55	2.09	2.59	2.94
Manganese (Mn)-Total	<0.000050	0.00725	0.0174	0.00908	0.004	0.0312	0.00117	0.00922	0.00195	0.243
Mercury (Hg)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000018	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	<0.000050	0.000142	0.00008	<0.000050	0.000063	0.000148	0.000113	0.000138	<0.000050	0.000059
Nickel (Ni)-Total	<0.00050	0.00068	0.00058	0.00605	0.00089	0.00142	0.00099	0.00083	0.00051	0.00078
Phosphorus (P)-Total	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30

(continued)

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Travel Blank	Morrison Creek - REP	Strm11.9	Strm10	Lower7	Strm8	Strm9	Morrison Creek	Strm1	Wetland
Date Sampled	12-Jun-08	12-Jun-08	24-Jul-08	25-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L642675-13	L642675-14	L661556-4	L661556-5	L661556-7	L661556-10	L661556-13	L661556-16	L661556-17	L661556-18
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Potassium (K)-Total	<0.050	0.354	0.152	0.211	0.347	0.447	0.357	0.345	0.237	0.129
Selenium (Se)-Total	<0.00010	0.0003	0.00021	0.00016	0.00021	0.00038	0.00021	0.00039	0.00047	0.00033
Silicon (Si)-Total	<0.050	2.58	4.16	4.09	2.88	4.42	1.74	2.35	3.1	3.17
Silver (Ag)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	<2.0	<2.0	2.1	3	4	4.9	2.8	<2.0	<2.0	2.1
Strontium (Sr)-Total	<0.00010	0.0453	0.0435	0.0848	0.0784	0.114	0.0855	0.0489	0.0304	0.0551
Thallium (Tl)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	<0.000010	<0.000010	<0.000010	0.00001	0.000017	0.000024	0.000014	<0.000010	<0.000010	<0.000010
Vanadium (V)-Total	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total	<0.0010	<0.0020	<0.0010	<0.0030	<0.0020	<0.0040	<0.0010	<0.0020	<0.0010	<0.0030
Dissolved Metals										
Aluminum (Al)-Dissolved	-	0.0488	0.008	0.0136	0.0184	0.0082	0.0034	0.0317	0.0156	0.005
Antimony (Sb)-Dissolved	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved	-	0.0003	0.00029	0.00014	0.00024	0.00044	0.00076	0.00034	0.00013	0.00051
Barium (Ba)-Dissolved	-	0.0168	0.0342	0.0355	0.0269	0.0523	0.0504	0.0173	0.0179	0.0621
Beryllium (Be)-Dissolved	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Dissolved	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved	-	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved	-	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Dissolved	-	8.52	16	27.3	21.8	29.8	24.5	8.9	11.7	15.9
Chromium (Cr)-Dissolved	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved	-	0.00091	0.00079	0.00059	0.00102	0.00092	0.00057	0.00096	0.0008	0.00031
Iron (Fe)-Dissolved	-	0.177	0.202	<0.030	<0.030	0.051	0.036	0.123	<0.030	0.64
Lead (Pb)-Dissolved	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved	-	1.91	2.6	6.05	4.55	5.4	4.71	2.09	2.59	2.93
Manganese (Mn)-Dissolved	-	0.00258	0.0064	0.000401	0.000483	0.0127	0.00115	0.00442	0.00102	0.0194
Mercury (Hg)-Dissolved	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved	-	0.000122	0.000072	<0.000050	0.000054	0.000145	0.000105	0.000117	<0.000050	<0.000050
Nickel (Ni)-Dissolved	-	<0.00050	0.00071	0.00082	0.00078	0.0011	0.00116	0.00079	0.00058	0.00073
Phosphorus (P)-Dissolved	-	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	-	0.34	0.154	0.211	0.34	0.391	0.375	0.355	0.242	0.125
Selenium (Se)-Dissolved	-	0.00038	0.00012	0.00027	0.00011	0.00028	0.00023	0.00056	0.00037	0.00031
Silicon (Si)-Dissolved	-	2.56	4.06	4.23	2.88	4.26	1.75	2.37	3.02	3.22
Silver (Ag)-Dissolved	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000014	<0.000010
Sodium (Na)-Dissolved	-	2	2	3	4	4.8	2.8	<2.0	<2.0	2.1
Strontium (Sr)-Dissolved	-	0.0437	0.0427	0.089	0.0739	0.106	0.0901	0.0509	0.0301	0.054
Thallium (Tl)-Dissolved	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved	-	<0.000010	<0.000010	<0.000010	0.000016	0.00002	0.000015	<0.000010	<0.000010	<0.000010
Vanadium (V)-Dissolved	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Dissolved	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0017	<0.0010	<0.0010	0.0015
Organic Parameters										
Total Organic Carbon	<0.50	11.2	7.77	5.69	8.69	8.87	7.92	9.88	5.1	11.8

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Strm17.1	Strm5	Strm26	Strm6	Strm4	Field Blank	Travel Blank	Power Station	Upper7	Strm9	Strm8
Date Sampled	24-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08	02-Jul-08	02-Jul-08	28-Jul-08	30-Jul-08	16-Aug-08	16-Aug-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L661556-19	L661556-21	L661556-22	L661556-23	L661556-24	L661556-25	L661556-26	L664184-1	L664184-2	L672327-1	L672327-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests											
Hardness (as CaCO ₃)	37.6	104	43.5	53.9	119	<0.50	<0.50	108	58.3	76.3	105
Colour, True (CU)	13.6	22.8	11.7	11.2	6.4	<5.0	<5.0	25.6	28.1	20.9	17.5
Conductivity (µS/cm)	80.7	218	80.9	101	227	<2.0	<2.0	208	126	149	224
pH	7.7	8.08	7.8	7.92	7.71	5.86	5.58	7.71	8.03	7.96	7.95
Total Dissolved Solids	51	138	57	66	142	<10	<10	136	87	98	144
Total Suspended Solids	<3.0	3.7	<3.0	<3.0	6.7	<3.0	<3.0	5.3	<3.0	3.1	<3.0
Turbidity (NTU)	0.3	1.71	0.59	0.28	0.59	<0.10	<0.10	3.34	0.86	1.48	0.27
Anions and Nutrients											
Ammonia as N	<0.0050	0.0079	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0472	0.011	<0.0050	0.0073
Acidity (as CaCO ₃)	2.1	1.9	1.9	1.5	4.8	1.6	1.3	2.8	1.2	1.8	2.5
Alkalinity, Bicarbonate (as CaCO ₃)	40.1	99.3	38.6	47.3	101	<2.0	<2.0	114	58.5	77.6	107
Alkalinity, Carbonate (as CaCO ₃)	<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 ₃)	<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 ₃)	40.1	99.3	38.6	47.3	101	<2.0	<2.0	114	58.5	77.6	107
Bromide (Br)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	0.032	0.079	0.028	0.034	0.052	<0.020	<0.020	0.069	0.065	0.089	0.082
Sulfate (SO ₄)	1.41	17.7	3.06	3.47	13.9	<0.50	<0.50	<0.50	2.21	3.51	8.94
Nitrate (as N)	0.0874	0.0431	0.02	0.0463	0.0592	<0.0050	<0.0050	0.0221	0.0298	0.0697	0.287
Nitrite (as N)	<0.0010	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	0.073	0.216	<0.050	<0.050	<0.050	<0.050	<0.050	0.578	0.29	0.46	0.503
Total Nitrogen	0.16	0.26	0.06	0.08	0.1	<0.05	<0.05	0.6	0.32	0.53	0.79
Total Phosphate as P	0.0031	0.0172	0.0036	0.0024	0.0063	<0.0020	<0.0020	0.0268	0.0052	0.0095	0.0045
Cyanides											
Cyanide, Total	0.0042	0.0077	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0122	0.0088	0.0021	0.0046
Total Metals											
Aluminum (Al)-Total	0.0199	0.0704	0.0235	0.0182	0.0159	<0.0010	<0.0010	0.0162	0.0456	0.0261	0.0227
Antimony (Sb)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	0.00013	0.00285	0.00019	0.00019	0.00028	<0.00010	<0.00010	0.00059	0.00031	0.00089	0.00054
Barium (Ba)-Total	0.0187	0.0396	0.013	0.0186	0.0553	<0.000050	<0.000050	0.0576	0.0211	0.0551	0.0565
Beryllium (Be)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.016
Cadmium (Cd)-Total	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	0.000018	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Total	10.9	29.8	14.6	17.9	38.8	<0.020	<0.020	35.5	19.7	24.3	34.6
Chromium (Cr)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total	<0.00010	0.00016	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total	0.00079	0.0126	0.00029	0.00034	0.00129	<0.00010	<0.00010	<0.00060	0.00049	0.00071	0.00116
Iron (Fe)-Total	<0.030	0.17	<0.030	<0.030	<0.030	<0.030	<0.030	0.265	0.099	0.123	0.084
Lead (Pb)-Total	<0.000050	0.000056	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000053	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Total	2.53	8.16	1.87	2.25	6.58	<0.0050	<0.0050	6.57	3.77	4.43	5.9
Manganese (Mn)-Total	0.00101	0.0452	0.00206	0.000886	0.0168	<0.000050	<0.000050	0.591	0.00649	0.0315	0.0494
Mercury (Hg)-Total	<0.000010	<0.000010	0.000016	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	<0.000050	0.000579	0.000067	0.000075	0.000246	<0.000050	<0.000050	0.000101	0.000053	0.00014	0.000184
Nickel (Ni)-Total	<0.00050	0.00188	<0.00050	<0.00050	0.00098	<0.00050	<0.00050	0.00082	<0.00050	0.00082	<0.00050
Phosphorus (P)-Total	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30

(continued)

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Strm17.1	Strm5	Strm26	Strm6	Strm4	Field Blank	Travel Blank	Power Station	Upper7	Strm9	Strm8
Date Sampled	24-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08	02-Jul-08	02-Jul-08	28-Jul-08	30-Jul-08	16-Aug-08	16-Aug-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L661556-19	L661556-21	L661556-22	L661556-23	L661556-24	L661556-25	L661556-26	L664184-1	L664184-2	L672327-1	L672327-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Potassium (K)-Total	0.23	0.545	0.202	0.255	0.384	<0.050	<0.050	0.622	0.199	0.392	0.457
Selenium (Se)-Total	0.00025	0.00025	0.00025	0.0001	0.00026	<0.00010	0.00013	<0.00010	<0.00010	0.00016	0.00017
Silicon (Si)-Total	3.1	1.77	1.85	2.17	4.65	<0.050	<0.050	4.25	2.43	1.63	4.31
Silver (Ag)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	<2.0	2.9	<2.0	<2.0	2.3	<2.0	<2.0	2.1	3.9	2.9	5.5
Strontium (Sr)-Total	0.0285	0.137	0.0305	0.0363	0.117	<0.00010	<0.00010	0.135	0.0667	0.0856	0.115
Thallium (Tl)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	<0.000010	0.00003	<0.000010	<0.000010	0.000034	<0.000010	<0.000010	<0.000010	<0.000010	0.000015	0.000028
Vanadium (V)-Total	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total	<0.0010	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0057	0.0016	0.0016	0.0011
Dissolved Metals											
Aluminum (Al)-Dissolved	0.0135	0.0029	0.0095	0.0096	0.0052	-	-	0.0033	0.0202	0.0028	0.0079
Antimony (Sb)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved	0.00012	0.00217	0.00016	0.00017	0.00023	-	-	0.00047	0.00028	0.00077	0.00051
Barium (Ba)-Dissolved	0.0184	0.0364	0.0127	0.0186	0.0536	-	-	0.0495	0.0195	0.0524	0.0544
Beryllium (Be)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	<0.010	<0.010	<0.010	0.017
Cadmium (Cd)-Dissolved	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	-	-	<0.000017	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Dissolved	10.9	28.8	14.4	17.9	37.1	-	-	33.1	17.7	23.6	32.9
Chromium (Cr)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved	0.00073	0.00727	0.00033	0.0004	0.00115	-	-	0.00042	0.00064	0.00047	0.00087
Iron (Fe)-Dissolved	<0.030	<0.030	<0.030	<0.030	<0.030	-	-	0.066	0.051	0.037	0.046
Lead (Pb)-Dissolved	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	-	0.000102	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved	2.54	7.83	1.84	2.24	6.36	-	-	6.12	3.44	4.24	5.57
Manganese (Mn)-Dissolved	0.000379	0.000703	0.000335	0.000249	0.013	-	-	0.218	0.00105	0.00131	0.0196
Mercury (Hg)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved	<0.000050	0.00063	0.000056	0.000059	0.000225	-	-	0.00009	<0.000050	0.000112	0.000153
Nickel (Ni)-Dissolved	<0.00050	0.00135	<0.00050	<0.00050	0.00089	-	-	<0.00050	<0.00050	0.00052	<0.00050
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.30	<0.30	-	-	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	0.221	0.507	0.19	0.265	0.391	-	-	0.576	0.178	0.375	0.445
Selenium (Se)-Dissolved	0.00021	0.00028	0.00029	0.00021	0.00011	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Dissolved	3.07	1.68	1.84	2.09	4.52	-	-	4.32	2.43	1.63	4.39
Silver (Ag)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	<0.000050	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	<2.0	3	<2.0	<2.0	2.3	-	-	2.2	3.7	3	5.6
Strontium (Sr)-Dissolved	0.0288	0.131	0.0299	0.0368	0.111	-	-	0.128	0.0611	0.0827	0.11
Thallium (Tl)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	0.00018	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved	<0.000010	0.000029	<0.000010	<0.000010	0.00003	-	-	<0.000010	<0.000010	0.000012	0.000024
Vanadium (V)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.0011	<0.0010	<0.0010	<0.0010
Organic Parameters											
Total Organic Carbon	5.11	10.2	4.19	4.05	3.76	<0.50	<0.50	14.9	10.8	8.22	7.2

(continued)

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (continued)

Sample ID	Lower7 16-Aug-08	Strm5 17-Aug-08	Upper7 17-Aug-08	Strm26 17-Aug-08	Strm6 17-Aug-08	Strm4 17-Aug-08	Morrison Creek 17-Aug-08	Strm1 17-Aug-08	Strm1 - REP 17-Aug-08	Field Blank 17-Aug-08	Travel Blank 17-Aug-08
Date Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
Time Sampled											
ALS Sample ID	L672327-3 Water	L672327-4 Water	L672327-5 Water	L672327-6 Water	L672327-7 Water	L672327-8 Water	L672327-9 Water	L672327-10 Water	L672327-11 Water	L672327-12 Water	L672327-13 Water
Physical Tests											
Hardness (as CaCO ₃)	84.1	114	87.8	47.4	73.1	117	29.9	46.7	46.2	<0.50	<0.50
Colour, True (CU)	22.2	21.1	24.8	10.9	10.3	5.7	37.5	13	13.4	<5.0	<5.0
Conductivity (µS/cm)	179	229	189	99	155	239	61.5	93.5	94.3	<2.0	<2.0
pH	7.96	8.05	8.03	7.92	8	7.78	7.76	7.81	7.8	5.55	5.52
Total Dissolved Solids	114	148	122	61	95	137	50	56	59	<10	<10
Total Suspended Solids	<3.0	4.1	<3.0	<3.0	3.1	3.1	<3.0	<3.0	10.6	<3.0	<3.0
Turbidity (NTU)	0.2	2.52	0.27	0.48	0.9	1.38	0.74	0.34	4.83	<0.10	<0.10
Anions and Nutrients											
Ammonia as N	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0061	<0.0050	<0.0050	0.0056	<0.0050
Acidity (as CaCO ₃)	1.9	1.8	1.6	1.4	1.6	3.7	1.4	1.7	1.7	1.2	1.3
Alkalinity, Bicarbonate (as CaCO ₃)	87.2	98.6	96.5	47.3	81.2	115	28	46.3	46.3	<2.0	<2.0
Alkalinity, Carbonate (as CaCO ₃)	<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 ₃)	<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 ₃)	87.2	98.6	96.5	47.3	81.2	115	28	46.3	46.3	<2.0	<2.0
Bromide (Br)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	0.058	0.079	0.066	0.031	0.039	0.048	0.031	0.032	0.032	<0.020	<0.020
Sulfate (SO ₄)	6.91	19.6	7.69	3.22	4.11	13.1	2.23	1.42	1.42	<0.50	<0.50
Nitrate (as N)	0.257	0.11	0.208	0.0622	0.149	0.0816	0.0068	0.151	0.156	<0.0050	<0.0050
Nitrite (as N)	<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	0.493	0.53	0.502	0.198	0.271	0.168	0.353	0.3	0.434	<0.050	<0.050
Total Nitrogen	0.75	0.64	0.71	0.26	0.42	0.25	0.36	0.45	0.59	<0.05	<0.05
Total Phosphate as P	0.0032	0.0163	0.005	0.0049	0.0046	0.0043	0.0067	0.0035	0.0134	<0.0020	<0.0020
Cyanides											
Cyanide, Total	0.0048	0.0049	0.0055	0.0036	0.0032	0.0047	0.0063	0.0021	0.0037	<0.0010	<0.0010
Total Metals											
Aluminum (Al)-Total	0.0277	0.048	0.023	0.0101	0.0137	0.0213	0.0362	0.0185	0.0799	<0.0010	<0.0010
Antimony (Sb)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	0.00029	0.00345	0.00047	0.00018	0.00018	0.00026	0.00039	0.00014	0.00018	<0.00010	<0.00010
Barium (Ba)-Total	0.0319	0.0419	0.0342	0.016	0.0235	0.0513	0.0167	0.0214	0.0235	<0.000050	<0.000050
Beryllium (Be)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total	0.012	<0.010	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total	<0.000017	0.000031	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Total	24.9	34.8	26.8	15.9	19.6	35.4	8.44	13.5	14.9	<0.20	<0.20
Chromium (Cr)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total	0.001	0.0138	0.00091	0.00028	0.00047	0.00107	0.00085	0.00084	0.00116	<0.00010	<0.00010
Iron (Fe)-Total	<0.030	0.127	<0.030	<0.030	<0.030	0.063	0.15	<0.030	0.12	<0.030	<0.030
Lead (Pb)-Total	<0.000050	0.000073	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Total	4.81	8.25	5.38	2.04	2.48	5.98	1.84	2.72	2.94	<0.0050	<0.0050
Manganese (Mn)-Total	0.000664	0.0494	0.000191	0.00032	0.000758	0.0172	0.00909	0.000605	0.00777	<0.000050	<0.000050
Mercury (Hg)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	<0.000050	0.000841	<0.000050	<0.000050	0.000055	0.000185	0.000089	<0.000050	0.000057	<0.000050	<0.000050
Nickel (Ni)-Total	<0.00050	0.00114	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Total	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30

(continued)

Appendix 3.1-1

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Water Quality Data, 2008 (completed)

Sample ID	Lower7 Water	Strm5 Water	Upper7 Water	Strm26 Water	Strm6 Water	Strm4 Water	Morrison Creek Water	Strm1 Water	Strm1 - REP Water	Field Blank Water	Travel Blank Water
Date Sampled	16-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L672327-3	L672327-4	L672327-5	L672327-6	L672327-7	L672327-8	L672327-9	L672327-10	L672327-11	L672327-12	L672327-13
Nature											
Potassium (K)-Total	0.384	0.652	0.398	0.201	0.268	0.336	0.332	0.271	0.311	<0.050	<0.050
Selenium (Se)-Total	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Total	3.07	2.22	3.06	1.99	2.34	4.46	2.31	3.32	3.21	<0.050	<0.050
Silver (Ag)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	5.2	2.9	6.2	<2.0	<2.0	2.3	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)-Total	0.0791	0.15	0.0899	0.0345	0.0406	0.0914	0.044	0.0352	0.0381	<0.00010	<0.00010
Thallium (Tl)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	0.00002	0.000036	0.000019	<0.000010	<0.000010	0.000035	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Vanadium (V)-Total	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total	<0.0010	0.0026	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0018	<0.0010	<0.0010
Dissolved Metals											
Aluminum (Al)-Dissolved	0.0185	0.0057	0.0222	0.0077	0.0063	0.004	0.0323	0.0139	0.014	-	-
Antimony (Sb)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-
Arsenic (As)-Dissolved	0.00026	0.00289	0.0004	0.00016	0.00017	0.0002	0.00036	0.00013	0.00013	-	-
Barium (Ba)-Dissolved	0.0331	0.0386	0.0332	0.0155	0.0311	0.0513	0.0169	0.0218	0.0217	-	-
Beryllium (Be)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-
Bismuth (Bi)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-
Boron (B)-Dissolved	0.013	<0.010	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-
Cadmium (Cd)-Dissolved	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	-
Calcium (Ca)-Dissolved	25.6	32.6	26.4	15.7	24.7	36.9	8.82	14.1	13.9	-	-
Chromium (Cr)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-
Cobalt (Co)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-
Copper (Cu)-Dissolved	0.00098	0.00853	0.00118	0.00037	0.00044	0.001	0.00089	0.0008	0.00122	-	-
Iron (Fe)-Dissolved	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.124	<0.030	<0.030	-	-
Lead (Pb)-Dissolved	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	-
Lithium (Li)-Dissolved	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-
Magnesium (Mg)-Dissolved	4.91	7.83	5.28	2.01	2.76	6.03	1.92	2.81	2.77	-	-
Manganese (Mn)-Dissolved	0.000149	0.00496	0.00028	0.00034	0.00017	0.0133	0.00502	0.000185	0.000334	-	-
Mercury (Hg)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-
Molybdenum (Mo)-Dissolved	0.000064	0.000786	0.000081	0.000075	0.000088	0.000255	0.000128	<0.000050	0.000088	-	-
Nickel (Ni)-Dissolved	<0.00050	0.00072	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	-	-
Potassium (K)-Dissolved	0.404	0.607	0.4	0.205	0.318	0.357	0.353	0.291	0.283	-	-
Selenium (Se)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-
Silicon (Si)-Dissolved	3.03	2.18	2.92	1.94	2.67	4.34	2.22	3.24	3.26	-	-
Silver (Ag)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-
Sodium (Na)-Dissolved	5.1	3	6	<2.0	2.1	2.3	<2.0	<2.0	<2.0	-	-
Strontium (Sr)-Dissolved	0.0831	0.143	0.0879	0.0338	0.0456	0.0922	0.045	0.0363	0.0361	-	-
Thallium (Tl)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-
Tin (Sn)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-
Titanium (Ti)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-
Uranium (U)-Dissolved	0.000022	0.000035	0.000026	<0.000010	0.000015	0.000036	<0.000010	<0.000010	<0.000010	-	-
Vanadium (V)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-
Zinc (Zn)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0040	-	-
Organic Parameters											
Total Organic Carbon	8.64	9.85	8.97	4.16	4	3.45	9.56	5	5.11	<0.50	<0.50

Results are expressed as milligrams per litre except where noted

APPENDIX 3.1-2
MORRISON COPPER/GOLD PROJECT
RECEIVING ENVIRONMENT STREAMS AND
TRANSMISSION LINE SITE DETECTION LIMITS, 2008



Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008

Sample ID	Strm1	Lower7	Strm5	Strm4	Strm6	Morrison Creek	Strm1	Strm4	Strm5	Strm6
Date Sampled	25-Jan-08	26-Jan-08	26-Jan-08	27-Jan-08	27-Jan-08	19-Mar-08	18-Mar-08	19-Mar-08	18-Mar-08	18-Mar-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L597874-1	L597874-2	L597874-3	L597874-5	L597874-6	L613077-1	L613077-2	L613077-3	L613077-4	L613077-5
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests										
Hardness (as CaCO ₃)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Colour, True (CU)	5	5	5	5	5	5	5	5	5	5
Conductivity (μS/cm)	2	2	2	2	2	2	2	2	2	2
pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Dissolved Solids	10	10	10	10	10	10	10	10	10	10
Total Suspended Solids	3	3	3	3	3	3	3	3	3	3
Turbidity (NTU)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients										
Ammonia as N	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Acidity (as CaCO ₃)	1	1	1	1	1	1	1	1	1	1
Alkalinity, Bicarbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Carbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Total (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Bromide (Br)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fluoride (F)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Sulfate (SO ₄)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nitrate (as N)	0.005	0.05	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Phosphate as P	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Cyanides										
Cyanide, Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Metals										
Aluminum (Al)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Total	0.00002	0.00002	0.00002	0.00002	0.00002	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	0.0001	0.0015	0.0001	0.0001	0.0015	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Total	0.0005	0.0005	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Strm1	Lower7	Strm5	Strm4	Strm6	Morrison Creek	Strm1	Strm4	Strm5	Strm6
Date Sampled	25-Jan-08	26-Jan-08	26-Jan-08	27-Jan-08	27-Jan-08	19-Mar-08	18-Mar-08	19-Mar-08	18-Mar-08	18-Mar-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L597874-1	L597874-2	L597874-3	L597874-5	L597874-6	L613077-1	L613077-2	L613077-3	L613077-4	L613077-5
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Total	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Total	0.007	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.004	0.001
Dissolved Metals										
Aluminum (Al)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Dissolved	0.00002	0.00002	0.00002	0.00002	0.00002	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Dissolved	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Dissolved	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Dissolved	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Organic Parameters										
Total Organic Carbon	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Results are expressed as milligrams per litre except where noted

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Strm7	Strm8	Strm4	Strm6	Strm5	Morrison Creek	Strm1	Strm7	Strm1	Strm5
Date Sampled	18-Mar-08	18-Mar-08	11-Apr-08	8-Apr-08	11-Apr-08	8-Apr-08	8-Apr-08	8-Apr-08	30-May-08	30-May-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	16:00	14:30
ALS Sample ID	L613077-6	L613077-7	L619038-1	L619038-2	L619038-3	L619039-1	L619039-2	L619039-3	L636783-1	L636783-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests										
Hardness (as CaCO ₃)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Colour, True (CU)	5	5	5	5	5	5	5	5	5	5
Conductivity (μS/cm)	2	2	2	2	2	2	2	2	2	2
pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Dissolved Solids	10	10	10	10	10	10	10	10	10	10
Total Suspended Solids	3	3	3	3	3	3	3	3	3	3
Turbidity (NTU)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients										
Ammonia as N	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Acidity (as CaCO ₃)	1	1	1	1	1	1	1	1	1	1
Alkalinity, Bicarbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Carbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Total (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Bromide (Br)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fluoride (F)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Sulfate (SO ₄)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nitrate (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Phosphate as P	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Cyanides										
Cyanide, Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Metals										
Aluminum (Al)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Total	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	0.0009	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Strm7	Strm8	Strm4	Strm6	Strm5	Morrison Creek	Strm1	Strm7	Strm1	Strm5
Date Sampled	18-Mar-08	18-Mar-08	11-Apr-08	8-Apr-08	11-Apr-08	8-Apr-08	8-Apr-08	8-Apr-08	30-May-08	30-May-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	16:00	14:30
ALS Sample ID	L613077-6	L613077-7	L619038-1	L619038-2	L619038-3	L619039-1	L619039-2	L619039-3	L636783-1	L636783-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Total	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Total	0.003	0.001	0.003	0.003	0.004	0.001	0.001	0.001	0.001	0.003
Dissolved Metals										
Aluminum (Al)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Dissolved	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Dissolved	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Dissolved	0.0005	0.0005	0.0007	0.0005	0.0007	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Dissolved	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Dissolved	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Organic Parameters										
Total Organic Carbon	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Results are expressed as milligrams per litre except where noted

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Morrison Creek	Morrison Creek - REP	Strm7	Strm8	Strm9	Field Blank	Travel Blank	Strm26	Strm1	Strm1 - REP
Date Sampled	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	03-Jun-08	03-Jun-08
Time Sampled	15:30	15:30	13:30	12:40	12:00	16:00	16:00	00:00	00:00	00:00
ALS Sample ID	L636783-3	L636783-4	L636783-5	L636783-6	L636783-7	L636783-8	L636783-9	L636783-10	L639717-1	L639717-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests										
Hardness (as CaCO ₃)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Colour, True (CU)	5	5	5	5	5	5	5	5	5	5
Conductivity (µS/cm)	2	2	2	2	2	2	2	2	2	2
pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Dissolved Solids	10	10	10	10	10	10	10	10	10	10
Total Suspended Solids	3	3	3	3	3	3	3	3	3	3
Turbidity (NTU)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients										
Ammonia as N	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Acidity (as CaCO ₃)	1	1	1	1	1	1	1	1	1	1
Alkalinity, Bicarbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Carbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Total (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Bromide (Br)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fluoride (F)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Sulfate (SO ₄)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nitrate (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06
Total Phosphate as P	0.002	0.002	0.02	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Cyanides										
Cyanide, Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Metals										
Aluminum (Al)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Total	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0008	0.0001	0.0001
Iron (Fe)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Morrison Creek	Morrison Creek - REP	Strm7	Strm8	Strm9	Field Blank	Travel Blank	Strm26	Strm1	Strm1 - REP
Date Sampled	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	30-May-08	03-Jun-08	03-Jun-08
Time Sampled	15:30	15:30	13:30	12:40	12:00	16:00	16:00	00:00	00:00	00:00
ALS Sample ID	L636783-3	L636783-4	L636783-5	L636783-6	L636783-7	L636783-8	L636783-9	L636783-10	L639717-1	L639717-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Total	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Total	0.003	0.003	0.001	0.001	0.001	0.001	0.001	0.003	0.003	0.004
Dissolved Metals										
Aluminum (Al)-Dissolved	0.001	0.001	0.001	0.001	0.001	-	-	0.001	0.001	0.001
Antimony (Sb)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Arsenic (As)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Barium (Ba)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005
Beryllium (Be)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005
Bismuth (Bi)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005
Boron (B)-Dissolved	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01
Cadmium (Cd)-Dissolved	0.000017	0.000017	0.000017	0.000017	0.000017	-	-	0.000017	0.000017	0.000017
Calcium (Ca)-Dissolved	0.02	0.02	0.02	0.02	0.02	-	-	0.02	0.02	0.02
Chromium (Cr)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005
Cobalt (Co)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Copper (Cu)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Iron (Fe)-Dissolved	0.03	0.03	0.03	0.03	0.03	-	-	0.03	0.03	0.03
Lead (Pb)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005
Lithium (Li)-Dissolved	0.005	0.005	0.005	0.005	0.005	-	-	0.005	0.005	0.005
Magnesium (Mg)-Dissolved	0.005	0.005	0.005	0.005	0.005	-	-	0.005	0.005	0.005
Manganese (Mn)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005
Mercury (Hg)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001
Molybdenum (Mo)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005
Nickel (Ni)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.3	0.3	-	-	0.3	0.3	0.3
Potassium (K)-Dissolved	0.05	0.05	0.05	0.05	0.05	-	-	0.05	0.05	0.05
Selenium (Se)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Silicon (Si)-Dissolved	0.05	0.05	0.05	0.05	0.05	-	-	0.05	0.05	0.05
Silver (Ag)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001
Sodium (Na)-Dissolved	2	2	2	2	2	-	-	2	2	2
Strontium (Sr)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Thallium (Tl)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Tin (Sn)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01
Uranium (U)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001
Vanadium (V)-Dissolved	0.001	0.001	0.001	0.001	0.001	-	-	0.001	0.001	0.001
Zinc (Zn)-Dissolved	0.001	0.001	0.001	0.001	0.001	-	-	0.001	0.001	0.001
Organic Parameters										
Total Organic Carbon	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Results are expressed as milligrams per litre except where noted

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Strm5	Strm6	Lower7	Strm9	Strm26	Morrison Creek	Travel Blank	Field Blank	Morrison Creek	Strm1
Date Sampled	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	12-Jun-08	12-Jun-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L639717-3	L639717-4	L639717-5	L639717-6	L639717-7	L639717-8	L639717-9	L639717-10	L642675-1	L642675-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests										
Hardness (as CaCO ₃)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-	0.5	0.5
Colour, True (CU)	5	5	5	5	5	5	5	5	5	5
Conductivity (µS/cm)	2	2	2	2	2	2	2	2	2	2
pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Dissolved Solids	10	10	10	10	10	10	10	10	10	10
Total Suspended Solids	3	3	3	3	3	3	3	3	3	3
Turbidity (NTU)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients										
Ammonia as N	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Acidity (as CaCO ₃)	1	1	1	1	1	1	1	1	1	1
Alkalinity, Bicarbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Carbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Total (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Bromide (Br)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fluoride (F)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Sulfate (SO ₄)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nitrate (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Nitrogen	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Total Phosphate as P	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Cyanides										
Cyanide, Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Metals										
Aluminum (Al)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	0.001	0.001
Antimony (Sb)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001
Arsenic (As)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001
Barium (Ba)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005
Beryllium (Be)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005
Boron (B)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	0.01
Cadmium (Cd)-Total	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	-	0.000017	0.000017
Calcium (Ca)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	0.02	0.02
Chromium (Cr)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001
Copper (Cu)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001
Iron (Fe)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	0.03
Lead (Pb)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	-	0.005	0.005
Magnesium (Mg)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	-	0.005	0.005
Manganese (Mn)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.00001
Molybdenum (Mo)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005
Nickel (Ni)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Strm5	Strm6	Lower7	Strm9	Strm26	Morrison Creek	Travel Blank	Field Blank	Morrison Creek	Strm1
Date Sampled	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	03-Jun-08	12-Jun-08	12-Jun-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L639717-3	L639717-4	L639717-5	L639717-6	L639717-7	L639717-8	L639717-9	L639717-10	L642675-1	L642675-2
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	-	-	0.3	0.3
Potassium (K)-Total	0.05	0.05	0.05	0.05	0.05	0.05	-	-	0.05	0.05
Selenium (Se)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001
Silicon (Si)-Total	0.05	0.05	0.05	0.05	0.05	0.05	-	-	0.05	0.05
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.00001
Sodium (Na)-Total	2	2	2	2	2	2	-	-	2	2
Strontrium (Sr)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001
Thallium (Tl)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001
Tin (Sn)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001
Titanium (Ti)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.00001
Vanadium (V)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	0.001	0.001
Zinc (Zn)-Total	0.003	0.003	0.004	0.003	0.003	0.003	0.001	-	0.002	0.001
Dissolved Metals										
Aluminum (Al)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	-	-	0.001	0.001
Antimony (Sb)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001
Arsenic (As)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001
Barium (Ba)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005
Beryllium (Be)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005
Bismuth (Bi)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005
Boron (B)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01
Cadmium (Cd)-Dissolved	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	-	-	0.000017	0.000017
Calcium (Ca)-Dissolved	0.02	0.02	0.02	0.02	0.02	0.02	-	-	0.02	0.02
Chromium (Cr)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005
Cobalt (Co)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001
Copper (Cu)-Dissolved	0.0001	0.0006	0.0001	0.0008	0.0006	0.0001	-	-	0.0001	0.0001
Iron (Fe)-Dissolved	0.03	0.03	0.03	0.03	0.03	0.03	-	-	0.03	0.03
Lead (Pb)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005
Lithium (Li)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	-	-	0.005	0.005
Magnesium (Mg)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	-	-	0.005	0.005
Manganese (Mn)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005
Mercury (Hg)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001
Molybdenum (Mo)-Dissolved	0.00005	0.00005	0.00005	0.00002	0.00005	0.0002	-	-	0.00005	0.00005
Nickel (Ni)-Dissolved	0.0005	0.0005	0.0006	0.0005	0.0005	0.0005	-	-	0.0005	0.0005
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.3	0.3	0.3	-	-	0.3	0.3
Potassium (K)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	-	-	0.05	0.05
Selenium (Se)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001
Silicon (Si)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	-	-	0.05	0.05
Silver (Ag)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001
Sodium (Na)-Dissolved	2	2	2	2	2	2	-	-	2	2
Strontium (Sr)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001
Thallium (Tl)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001
Tin (Sn)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01
Uranium (U)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001
Vanadium (V)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	-	-	0.001	0.001
Zinc (Zn)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	-	-	0.001	0.001
Organic Parameters										
Total Organic Carbon	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Results are expressed as milligrams per litre except where noted

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Strm4	Strm6	Strm26	Upper7	Lower7	Strm10	Strm9	Strm8	Strm5	Field Blank
Date Sampled	12-Jun-08	12-Jun-08	12-Jun-08							
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L642675-3	L642675-4	L642675-5	L642675-6	L642675-7	L642675-8	L642675-9	L642675-10	L642675-11	L642675-12
Nature	Water	Water	Water							
Physical Tests										
Hardness (as CaCO ₃)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Colour, True (CU)	5	5	5	5	5	5	5	5	5	5
Conductivity (µS/cm)	2	2	2	2	2	2	2	2	2	2
pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Dissolved Solids	10	10	10	10	10	10	10	10	10	10
Total Suspended Solids	3	3	3	3	3	3	3	3	3	3
Turbidity (NTU)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients										
Ammonia as N	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Acidity (as CaCO ₃)	1	1	1	1	1	1	1	1	1	1
Alkalinity, Bicarbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Carbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Total (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Bromide (Br)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fluoride (F)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Sulfate (SO ₄)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nitrate (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Phosphate as P	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Cyanides										
Cyanide, Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Metals										
Aluminum (Al)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Total	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Strm4	Strm6	Strm26	Upper7	Lower7	Strm10	Strm9	Strm8	Strm5	Field Blank
Date Sampled	12-Jun-08	12-Jun-08	12-Jun-08							
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L642675-3	L642675-4	L642675-5	L642675-6	L642675-7	L642675-8	L642675-9	L642675-10	L642675-11	L642675-12
Nature	Water	Water	Water							
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Total	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Total	0.001	0.003	0.001	0.001	0.001	0.001	0.002	0.001	0.003	0.001
Dissolved Metals										
Aluminum (Al)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-
Antimony (Sb)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-
Arsenic (As)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-
Barium (Ba)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-
Beryllium (Be)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-
Bismuth (Bi)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-
Boron (B)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-
Cadmium (Cd)-Dissolved	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	-
Calcium (Ca)-Dissolved	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-
Chromium (Cr)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-
Cobalt (Co)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-
Copper (Cu)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-
Iron (Fe)-Dissolved	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-
Lead (Pb)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-
Lithium (Li)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	-
Magnesium (Mg)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	-
Manganese (Mn)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-
Mercury (Hg)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-
Molybdenum (Mo)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-
Nickel (Ni)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	-
Potassium (K)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-
Selenium (Se)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-
Silicon (Si)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-
Silver (Ag)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-
Sodium (Na)-Dissolved	2	2	2	2	2	2	2	2	2	-
Strontium (Sr)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-
Thallium (Tl)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-
Tin (Sn)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-
Uranium (U)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-
Vanadium (V)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-
Zinc (Zn)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-
Organic Parameters										
Total Organic Carbon	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Results are expressed as milligrams per litre except where noted

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Travel Blank	Morrison Creek - REP	Strm11.9	Strm10	Lower7	Strm8	Strm9	Morrison Creek	Strm1	Wetland	Strm17.1
Date Sampled	12-Jun-08	12-Jun-08	24-Jul-08	25-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08
Time Sampled	00:00		00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L642675-13	L642675-14	L661556-4	L661556-5	L661556-7	L661556-10	L661556-13	L661556-16	L661556-17	L661556-18	L661556-19
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests											
Hardness (as CaCO ₃)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Colour, True (CU)	5	5	5	5	5	5	5	5	5	5	5
Conductivity (µS/cm)	2	2	2	2	2	2	2	2	2	2	2
pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Dissolved Solids	10	10	10	10	10	10	10	10	10	10	10
Total Suspended Solids	3	3	3	3	3	3	3	3	3	3	3
Turbidity (NTU)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients											
Ammonia as N	0.005	0.005	0.02	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Acidity (as CaCO ₃)	1	1	1	1	1	1	1	1	1	1	1
Alkalinity, Bicarbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2
Alkalinity, Carbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2
Alkalinity, Total (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2
Bromide (Br)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.25	0.05
Chloride (Cl)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.5	0.5
Fluoride (F)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.1	0.02
Sulfate (SO ₄)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.5	0.5
Nitrate (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.025	0.005
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001
Total Kjeldahl Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Phosphate as P	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Cyanides											
Cyanide, Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Metals											
Aluminum (Al)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Total	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Travel Blank	Morrison Creek - REP	Strm11.9	Strm10	Lower7	Strm8	Strm9	Morrison Creek	Strm1	Wetland	Strm17.1
Date Sampled	12-Jun-08	12-Jun-08	24-Jul-08	25-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L642675-13	L642675-14	L661556-4	L661556-5	L661556-7	L661556-10	L661556-13	L661556-16	L661556-17	L661556-18	L661556-19
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Total	2	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Total	0.001	0.002	0.001	0.003	0.002	0.004	0.001	0.002	0.001	0.003	0.001
Dissolved Metals											
Aluminum (Al)-Dissolved	-	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Dissolved	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Dissolved	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Dissolved	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Dissolved	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Dissolved	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Dissolved	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Dissolved	-	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Dissolved	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Dissolved	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Dissolved	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Dissolved	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Dissolved	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Dissolved	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Dissolved	-	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Dissolved	-	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Dissolved	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Dissolved	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Dissolved	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Dissolved	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Phosphorus (P)-Dissolved	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Dissolved	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Dissolved	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Dissolved	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Dissolved	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Dissolved	-	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Dissolved	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Dissolved	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Dissolved	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Dissolved	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Dissolved	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Dissolved	-	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Dissolved	-	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Organic Parameters											
Total Organic Carbon	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Results are expressed as milligrams per litre except where noted

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Equipment Blank (Go Flow)	Strm5	Strm26	Strm6	Strm4	Field Blank	Travel Blank	Power Station	Upper7	Strm9
Date Sampled	24-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08	02-Jul-08	02-Jul-08	28-Jul-08	30-Jul-08	16-Aug-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L661556-20	L661556-21	L661556-22	L661556-23	L661556-24	L661556-25	L661556-26	L664184-1	L664184-2	L672327-1
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests										
Hardness (as CaCO ₃)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Colour, True (CU)	5	5	5	5	5	5	5	5	5	5
Conductivity (μS/cm)	2	2	2	2	2	2	2	2	2	2
pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Dissolved Solids	10	10	10	10	10	10	10	10	10	10
Total Suspended Solids	3	3	3	3	3	3	3	3	3	3
Turbidity (NTU)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients										
Ammonia as N	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Acidity (as CaCO ₃)	1	1	1	1	1	1	1	1	1	1
Alkalinity, Bicarbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Carbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Alkalinity, Total (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2
Bromide (Br)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fluoride (F)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Sulfate (SO ₄)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nitrate (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Phosphate as P	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Cyanides										
Cyanide, Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Metals										
Aluminum (Al)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Total	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Equipment Blank (Go Flow)	Strm5	Strm26	Strm6	Strm4	Field Blank	Travel Blank	Power Station	Upper7	Strm9
Date Sampled	24-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08	24-Jul-08	02-Jul-08	02-Jul-08	28-Jul-08	30-Jul-08	16-Aug-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L661556-20	L661556-21	L661556-22	L661556-23	L661556-24	L661556-25	L661556-26	L664184-1	L664184-2	L672327-1
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Total	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Total	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Dissolved Metals										
Aluminum (Al)-Dissolved	0.001	0.001	0.001	0.001	0.001	-	-	0.001	0.001	0.001
Antimony (Sb)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Arsenic (As)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Barium (Ba)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005
Beryllium (Be)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005
Bismuth (Bi)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005
Boron (B)-Dissolved	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01
Cadmium (Cd)-Dissolved	0.000017	0.000017	0.000017	0.000017	0.000017	-	-	0.000017	0.000017	0.000017
Calcium (Ca)-Dissolved	0.02	0.02	0.02	0.02	0.02	-	-	0.02	0.02	0.02
Chromium (Cr)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005
Cobalt (Co)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Copper (Cu)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Iron (Fe)-Dissolved	0.03	0.03	0.03	0.03	0.03	-	-	0.03	0.03	0.03
Lead (Pb)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005
Lithium (Li)-Dissolved	0.005	0.005	0.005	0.005	0.005	-	-	0.005	0.005	0.005
Magnesium (Mg)-Dissolved	0.005	0.005	0.005	0.005	0.005	-	-	0.005	0.005	0.005
Manganese (Mn)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005
Mercury (Hg)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001
Molybdenum (Mo)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005
Nickel (Ni)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.3	0.3	-	-	0.3	0.3	0.3
Potassium (K)-Dissolved	0.05	0.05	0.05	0.05	0.05	-	-	0.05	0.05	0.05
Selenium (Se)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Silicon (Si)-Dissolved	0.05	0.05	0.05	0.05	0.05	-	-	0.05	0.05	0.05
Silver (Ag)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00005	0.00001	0.00001
Sodium (Na)-Dissolved	2	2	2	2	2	-	-	2	2	2
Strontium (Sr)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Thallium (Tl)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Tin (Sn)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01
Uranium (U)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001
Vanadium (V)-Dissolved	0.001	0.001	0.001	0.001	0.001	-	-	0.001	0.001	0.001
Zinc (Zn)-Dissolved	0.001	0.001	0.001	0.001	0.001	-	-	0.001	0.001	0.001
Organic Parameters										
Total Organic Carbon	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Results are expressed as milligrams per litre except where noted

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (continued)

Sample ID	Strm8	Lower7	Strm5	Upper7	Strm26	Strm6	Strm4	Morrison Creek	Strm1	Strm1 - REP	Field Blank	Travel Blank
Date Sampled	16-Aug-08	16-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L672327-2	L672327-3	L672327-4	L672327-5	L672327-6	L672327-7	L672327-8	L672327-9	L672327-10	L672327-11	L672327-12	L672327-13
Nature	Water	Water	Water	Water	Water							
Physical Tests												
Hardness (as CaCO ₃)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Colour, True (CU)	5	5	5	5	5	5	5	5	5	5	5	5
Conductivity (µS/cm)	2	2	2	2	2	2	2	2	2	2	2	2
pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Dissolved Solids	10	10	10	10	10	10	10	10	10	10	10	10
Total Suspended Solids	3	3	3	3	3	3	3	3	3	3	3	3
Turbidity (NTU)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients												
Ammonia as N	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Acidity (as CaCO ₃)	1	1	1	1	1	1	1	1	1	1	1	1
Alkalinity, Bicarbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2	2
Alkalinity, Carbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2	2
Alkalinity, Total (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2	2
Bromide (Br)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fluoride (F)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Sulfate (SO ₄)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nitrate (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Phosphate as P	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Cyanides												
Cyanide, Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Metals												
Aluminum (Al)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Total	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

(continued)

Appendix 3.1-2

Morrison Copper/Gold Project Receiving Environment Streams and Transmission Line Site Detection Limits, 2008 (completed)

Sample ID	Strm8	Lower7	Strm5	Upper7	Strm26	Strm6	Strm4	Morrison Creek	Strm1	Strm1 - REP	Field Blank	Travel Blank
Date Sampled	16-Aug-08	16-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08	17-Aug-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L672327-2	L672327-3	L672327-4	L672327-5	L672327-6	L672327-7	L672327-8	L672327-9	L672327-10	L672327-11	L672327-12	L672327-13
Nature	Water	Water	Water	Water	Water							
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Total	2	2	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Dissolved Metals												
Aluminum (Al)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-
Antimony (Sb)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Arsenic (As)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Barium (Ba)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Beryllium (Be)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Bismuth (Bi)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Boron (B)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-
Cadmium (Cd)-Dissolved	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	-	-
Calcium (Ca)-Dissolved	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-
Chromium (Cr)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Cobalt (Co)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Copper (Cu)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Iron (Fe)-Dissolved	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-
Lead (Pb)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Lithium (Li)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	-	-
Magnesium (Mg)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	-	-
Manganese (Mn)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Mercury (Hg)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Molybdenum (Mo)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Nickel (Ni)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	-	-
Potassium (K)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	-
Selenium (Se)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Silicon (Si)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	-
Silver (Ag)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Sodium (Na)-Dissolved	2	2	2	2	2	2	2	2	2	2	-	-
Strontium (Sr)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Thallium (Tl)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Tin (Sn)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-
Uranium (U)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Vanadium (V)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-
Zinc (Zn)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.004	-	-
Organic Parameters												
Total Organic Carbon	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Results are expressed as milligrams per litre except where noted

APPENDIX 3.1-3

MORRISON COPPER/GOLD PROJECT

GUIDELINE EXCEEDANCE (%) SUMMARY FOR WATER

QUALITY OF THE RECEIVING ENVIRONMENT STREAMS

AND THE TRANSMISSION LINE SITES, 2008



Appendix 3.1-3
Morrison Copper/Gold Project Guideline Exceedance (%) Summary for
Water Quality of the Receiving Environment Streams and the Transmission Line Sites, 2008

		BC Max														
n		Strm1 8	Morrison Creek 7	Strm4 6	Strm5 8	Strm6 7	Strm26 5	Lower7 8	Upper7 3	Strm8 5	Strm9 5	Strm10 2	Strm11.9 1	Strm17.1 1	Power Station 1	Wetland 1
pH																
Chloride	Cl	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Fluoride	F	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Sulphate	SO ₄	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Ammonia Nitrogen	N	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Nitrate Nitrogen	N	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Nitrite Nitrogen	N	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Total Cyanide	CN	0%	0%	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	100%	
Aluminum	T-Al															
Antimony	T-Sb	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Arsenic	T-As	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Barium	T-Ba	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Beryllium	T-Be	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Boron	T-B	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cadmium	T-Cd	13%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Chromium	T-Cr	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cobalt	T-Co	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Copper	T-Cu	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Iron	T-Fe	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	
Lead	T-Pb	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Lithium	T-Li	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Manganese	T-Mn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Mercury	T-Hg	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Molybdenum	T-Mo	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Nickel	T-Ni	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Selenium	T-Se															
Silver	T-Ag	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Thallium	T-Tl	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Titanium	T-Ti	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Uranium	T-U	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Zinc	T-Zn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Aluminum	D-Al	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	50%	0%	0%	0%	
Antimony	D-Sb	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Arsenic	D-As	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Barium	D-Ba	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Beryllium	D-Be	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Boron	D-B	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cadmium	D-Cd	13%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	
Chromium	D-Cr	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Cobalt	D-Co	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Copper	D-Cu	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Iron	D-Fe	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	
Lead	D-Pb	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Lithium	D-Li	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Manganese	D-Mn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Mercury	D-Hg	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Molybdenum	D-Mo	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Nickel	D-Ni	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Selenium	D-Se															
Silver	D-Ag	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Thallium	D-Tl	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Titanium	D-Ti	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Uranium	D-U	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Zinc	D-Zn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	

(continued)

Appendix 3.1-3
Morrison Copper/Gold Project Guideline Exceedance (%) Summary for
Water Quality of the Receiving Environment Streams and the Transmission Line Sites, 2008 (continued)

		BC 30 day Mean														
n		Strm1 8	Morrison Creek 7	Strm4 6	Strm5 8	Strm6 7	Strm26 5	Lower7 8	Upper7 3	Strm8 5	Strm9 5	Strm10 2	Strm11.9 1	Strm17.1 1	Power Station 1	Wetland 1
pH																
Chloride	Cl	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Fluoride	F															
Sulphate	SO ₄															
Ammonia Nitrogen	N	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Nitrate Nitrogen	N	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Nitrite Nitrogen	N	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Total Cyanide	CN	38%	100%	17%	75%	14%	40%	38%	100%	60%	80%	100%	100%	0%	100%	
Aluminum	T-Al															
Antimony	T-Sb															
Arsenic	T-As															
Barium	T-Ba	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Beryllium	T-Be															
Boron	T-B															
Cadmium	T-Cd															
Chromium	T-Cr															
Cobalt	T-Co	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Copper	T-Cu	13%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Iron	T-Fe															
Lead	T-Pb	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Lithium	T-Li															
Manganese	T-Mn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Mercury	T-Hg	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Molybdenum	T-Mo	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Nickel	T-Ni															
Selenium	T-Se	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Silver	T-Ag	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Thallium	T-Tl															
Titanium	T-Ti															
Uranium	T-U															
Zinc	T-Zn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Aluminum	D-Al	25%	0%	0%	0%	0%	0%	43%	33%	0%	0%	50%	0%	0%	0%	
Antimony	D-Sb															
Arsenic	D-As															
Barium	D-Ba	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Beryllium	D-Be															
Boron	D-B															
Cadmium	D-Cd															
Chromium	D-Cr															
Cobalt	D-Co	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Copper	D-Cu	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Iron	D-Fe															
Lead	D-Pb	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Lithium	D-Li															
Manganese	D-Mn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Mercury	D-Hg	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Molybdenum	D-Mo	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Nickel	D-Ni															
Selenium	D-Se	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Silver	D-Ag	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Thallium	D-Tl															
Titanium	D-Ti															
Uranium	D-U															
Zinc	D-Zn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	

(continued)

Appendix 3.1-3
Morrison Copper/Gold Project Guideline Exceedance (%) Summary for
Water Quality of the Receiving Environment Streams and the Transmission Line Sites, 2008 (completed)

APPENDIX 3.1-4
MORRISON COPPER/GOLD PROJECT
RELATIVE PERCENT DIFFERENCE (RPD) RESULTS FOR
RECEIVING ENVIRONMENT STREAM WATER QUALITY, 2008



Appendix 3.1-4

Morrison Copper/Gold Project Relative Percent Difference (RPD) Results for Receiving Environment Stream Water Quality, 2008

Sample ID	Morrison Creek		Morrison Creek - REP		Morrison Creek		Morrison Creek - REP		Strm1	Strm1 - REP	Strm1	Strm1 - REP
Date Sampled	30-May-08	15:30	L636783-3	30-May-08	15:30	00:00	12-Jun-08	00:00	03-Jun-08	00:00	17-Aug-08	00:00
Time Sampled			Water		Water	RPD %		Water		Water		Water
ALS Sample ID			L636783-3		L636783-4		L642675-1		L639717-1		L672327-10	
Nature	5 x DL		Water		Water		Water		Water		Water	
Physical Tests												
Hardness (as CaCO ₃)	2.50	30.8	30.2	2	27.5	29.1	6	25.8	25.8	0	46.7	46.2
Colour, True (CU)	25	42	41.1	2	44.9	45	0	39.8	42.9	7	13	13.4
Conductivity (µS/cm)	10	64.9	65.2	0	62.5	62.9	1	51.9	51.7	0	93.5	94.3
pH	0.05	6.86	7.81	13	7.79	7.76	0	7.88	7.84	1	7.81	7.8
Total Dissolved Solids	50	53	55	4	72	54	29	46	45	*	56	59
Total Suspended Solids	15	1.5	1.5	*	1.5	1.5	*	4.3	1.5	*	1.5	10.6
Turbidity (NTU)	0.5	1.28	1.15	11	1.23	1.28	4	1.7	1.3	27	0.34	4.83
Anions and Nutrients												
Ammonia as N	0.025	0.0128	0.0084	*	0.0149	0.0151	*	0.0025	0.0133	*	0.0025	0.0025
Acidity (as CaCO ₃)	5	5.6	4.8	*	1.1	1.1	*	1.6	1.7	*	1.7	1.7
Alkalinity, Bicarbonate (as CaCO ₃)	10	31.8	29.6	7	28.1	28	0	20.9	21.3	2	46.3	46.3
Alkalinity, Carbonate (as CaCO ₃)	10	1	1	*	1	1	*	1	1	*	1	1
Alkalinity, Hydroxide (as CaCO ₃)	10	1	1	*	1	1	*	1	1	*	1	*
Alkalinity, Total (as CaCO ₃)	10	31.8	29.6	7	28.1	28	0	20.9	21.3	2	46.3	46.3
Bromide (Br)	0.25	0.025	0.025	*	0.025	0.025	*	0.025	0.025	*	0.025	0.025
Chloride (Cl)	2.5	0.25	0.25	*	0.25	0.25	*	0.25	0.25	*	0.25	0.25
Fluoride (F)	0.10	0.034	0.034	*	0.028	0.028	*	0.025	0.024	*	0.032	0.032
Sulfate (SO ₄)	2.5	2.59	2.59	0	2.17	2.16	*	1.59	1.59	*	1.42	1.42
Nitrate (as N)	0.025	0.0413	0.0353	16	0.0096	0.0103	*	0.0025	0.0025	*	0.151	0.156
Nitrite (as N)	0.005	0.0005	0.0005	*	0.0005	0.0005	*	0.0005	0.0005	*	0.0005	0.0005
Total Kjeldahl Nitrogen	0.25	0.169	0.125	*	0.25	0.26	*	0.224	0.408	*	0.3	0.434
Total Nitrogen	0.25 - 0.30	0.21	0.16	*	0.26	0.27	4	0.224	0.408	*	0.45	0.59
Total Phosphate as P	0.010	0.0103	0.0133	25	0.0099	0.0088	*	0.0075	0.0069	*	0.0035	0.0134
Cyanides												
Cyanide, Total	0.005	0.0073	0.0074	1	0.008	0.0072	11	0.0076	0.0083	9	0.0021	0.0037
Total Metals												
Aluminum (Al)-Total	0.005	0.0755	0.0638	17	0.0713	0.076	6	0.153	0.152	1	0.0185	0.0799
Antimony (Sb)-Total	0.0005	0.00005	0.00005	*	0.00005	0.00005	*	0.00005	0.00005	*	0.00005	0.00005
Arsenic (As)-Total	0.0005	0.00031	0.00031	*	0.0003	0.00031	*	0.0002	0.0002	*	0.00014	0.00018
Barium (Ba)-Total	0.00025	0.0188	0.0184	2	0.0174	0.0179	3	0.0139	0.0133	4	0.0214	0.0235
Beryllium (Be)-Total	0.0025	0.00025	0.00025	*	0.00025	0.00025	*	0.00025	0.00025	*	0.00025	0.00025
Bismuth (Bi)-Total	0.0025	0.00025	0.00025	*	0.00025	0.00025	*	0.00025	0.00025	*	0.00025	0.00025
Boron (B)-Total	0.05	0.005	0.005	*	0.005	0.005	*	0.005	0.005	*	0.005	0.005
Cadmium (Cd)-Total	0.000085	0.0000085	0.0000085	*	0.0000085	0.0000085	*	0.0000085	0.0000085	*	0.0000085	0.0000085
Calcium (Ca)-Total	0.10	9.31	9.23	1	8.56	8.72	2	8.13	7.83	4	13.5	14.9
Chromium (Cr)-Total	0.0025	0.00025	0.00025	*	0.00025	0.00025	*	0.00025	0.00025	*	0.00025	0.00025
Cobalt (Co)-Total	0.0005	0.00005	0.00005	*	0.00005	0.00005	*	0.00005	0.00005	*	0.00005	0.00005
Copper (Cu)-Total	0.0005	0.00111	0.00118	6	0.00132	0.00132	0	0.00166	0.00177	6	0.00084	0.00116
Iron (Fe)-Total	0.15	0.207	0.186	11	0.213	0.218	2	0.147	0.151	*	0.015	0.12
Lead (Pb)-Total	0.00025	0.000051	0.000132	*	0.000061	0.000025	*	0.000025	0.000025	*	0.000025	0.000025
Lithium (Li)-Total	0.025	0.0025	0.0025	*	0.0025	0.0025	*	0.0025	0.0025	*	0.0025	0.0025
Magnesium (Mg)-Total	0.025	1.94	1.89	3	1.92	2	4	1.56	1.51	3	2.72	2.94
Manganese (Mn)-Total	0.00025	0.00719	0.00674	6	0.00727	0.00725	0	0.0112	0.0104	7	0.000605	0.00777
Mercury (Hg)-Total	0.00005	0.000005	0.000005	*	0.000005	0.000005	*	0.000011	0.00001	*	0.000005	0.000005
Molybdenum (Mo)-Total	0.00025	0.000154	0.000117	*	0.000219	0.000142	*	0.000073	0.000025	*	0.000025	0.000057
Nickel (Ni)-Total	0.0025	0.00054	0.00025	*	0.00066	0.00068	*	0.00025	0.00025	*	0.00025	0.00025
Phosphorus (P)-Total	1.5	0.15	0.15	*	0.15	0.15	*	0.15	0.15	*	0.15	0.15
Potassium (K)-Total	0.25	0.345	0.343	1	0.347	0.354	2	0.192	0.184	*	0.271	0.311

Results are expressed as milligrams per litre except where noted.

Values in bold are half the detection limit.

RPD = Relative Percent Difference relative to mean (in %).

DL = Analytical Detection Limit.

* Denotes that RPD was not calculated due to one or more values <5 times the detection limit.

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

(continued)

Appendix 3.1-4

Morrison Copper/Gold Project Relative Percent Difference (RPD) Results for Receiving Environment Stream Water Quality, 2008 (completed)

Sample ID	Morrison Creek	Morrison Creek - REP	Morrison Creek	Morrison Creek - REP	Strm1	Strm1 - REP	Strm1	Strm1 - REP
Date Sampled	30-May-08	30-May-08	12-Jun-08	12-Jun-08	03-Jun-08	03-Jun-08	17-Aug-08	17-Aug-08
Time Sampled	15:30	15:30	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L636783-3	L636783-4	L642675-1	L642675-14	L639717-1	L639717-2	L672327-10	L672327-11
Nature	5 x DL	Water	RPD %	Water	RPD %	Water	RPD %	Water
Selenium (Se)-Total	0.0005	0.00005	0.00005	*	0.00011	0.0003	*	0.00034
Silicon (Si)-Total	0.25	2.63	2.57	2	2.51	2.58	3	2.93
Silver (Ag)-Total	0.00005	0.00005	0.00005	*	0.00005	0.00005	*	0.00005
Sodium (Na)-Total	10	1	1	*	1	1	*	1
Strontrium (Sr)-Total	0.0005	0.0471	0.0458	3	0.0475	0.0453	5	0.0217
Thallium (Tl)-Total	0.0005	0.00005	0.00005	*	0.00005	0.00005	*	0.00005
Tin (Sn)-Total	0.0005	0.00005	0.00005	*	0.00005	0.00005	*	0.00005
Titanium (Ti)-Total	0.05	0.005	0.005	*	0.005	0.005	*	0.005
Uranium (U)-Total	0.00005	0.000005	0.000005	*	0.00001	0.00005	*	0.000005
Vanadium (V)-Total	0.005	0.0005	0.0005	*	0.0005	0.0005	*	0.0005
Zinc (Zn)-Total	0.005 - 0.020	0.0015	0.0015	*	0.001	0.001	*	0.0015
Dissolved Metals								
Aluminum (Al)-Dissolved	0.005	0.0365	0.037	1	0.0406	0.0488	18	0.0847
Antimony (Sb)-Dissolved	0.0005	0.00005	0.00005	*	0.00005	0.00005	*	0.00005
Arsenic (As)-Dissolved	0.0005	0.00028	0.00027	*	0.00029	0.0003	*	0.00016
Barium (Ba)-Dissolved	0.00025	0.0175	0.0174	1	0.0165	0.0168	2	0.0125
Beryllium (Be)-Dissolved	0.0025	0.00025	0.00025	*	0.00025	0.00025	*	0.00025
Bismuth (Bi)-Dissolved	0.0025	0.00025	0.00025	*	0.00025	0.00025	*	0.00025
Boron (B)-Dissolved	0.05	0.005	0.005	*	0.005	0.005	*	0.005
Cadmium (Cd)-Dissolved	0.000085	0.000085	0.000085	*	0.000085	0.000085	*	0.000085
Calcium (Ca)-Dissolved	0.1000	9.19	9.01	2	7.99	8.52	6	7.85
Chromium (Cr)-Dissolved	0.0025	0.00025	0.00025	*	0.00025	0.00025	*	0.00025
Cobalt (Co)-Dissolved	0.0005	0.00005	0.00005	*	0.00005	0.00005	*	0.00005
Copper (Cu)-Dissolved	0.0005	0.00092	0.00094	2	0.0008	0.00091	13	0.0015
Iron (Fe)-Dissolved	0.15	0.122	0.119	*	0.155	0.177	13	0.063
Lead (Pb)-Dissolved	0.00025	0.000025	0.000025	*	0.000025	0.000025	*	0.000025
Lithium (Li)-Dissolved	0.025	0.0025	0.0025	*	0.0025	0.0025	*	0.0025
Magnesium (Mg)-Dissolved	0.025	1.91	1.88	2	1.84	1.91	4	1.49
Manganese (Mn)-Dissolved	0.00025	0.00145	0.0013	11	0.00271	0.00258	5	0.00109
Mercury (Hg)-Dissolved	0.00005	0.000012	0.000011	*	0.000005	0.000005	*	0.000013
Molybdenum (Mo)-Dissolved	0.00025	0.000221	0.000108	*	0.000199	0.000122	*	0.000025
Nickel (Ni)-Dissolved	0.0025	0.00025	0.00025	*	0.00025	0.00025	*	0.00025
Phosphorus (P)-Dissolved	1.5	0.15	0.15	*	0.15	0.15	*	0.15
Potassium (K)-Dissolved	0.25	0.338	0.342	1	0.327	0.34	4	0.183
Selenium (Se)-Dissolved	0.0005	0.00005	0.00005	*	0.00005	0.00038	*	0.00023
Silicon (Si)-Dissolved	0.25	2.68	2.64	2	2.57	2.56	0	2.91
Silver (Ag)-Dissolved	0.00005	0.00005	0.00005	*	0.00005	0.00005	*	0.00005
Sodium (Na)-Dissolved	10	1	1	*	1	2	*	1
Strontium (Sr)-Dissolved	0.0005	0.0465	0.0464	0	0.0457	0.0437	4	0.021
Thallium (Tl)-Dissolved	0.0005	0.00005	0.00005	*	0.00005	0.00005	*	0.00005
Tin (Sn)-Dissolved	0.0005	0.00005	0.00005	*	0.00005	0.00005	*	0.00005
Titanium (Ti)-Dissolved	0.05	0.005	0.005	*	0.005	0.005	*	0.005
Uranium (U)-Dissolved	0.00005	0.000005	0.000005	*	0.000005	0.000005	*	0.000005
Vanadium (V)-Dissolved	0.005	0.0005	0.0005	*	0.0005	0.0005	*	0.0005
Zinc (Zn)-Dissolved	0.005 - 0.020	0.0005	0.0005	*	0.0005	0.0005	*	0.0013
Organic Parameters								
Total Organic Carbon	2.5	11.5	11.3	2	11.3	11.2	1	10.8
							11	2
							5	5.11
								2

Results are expressed as milligrams per litre except where noted.

Values in bold are half the detection limit.

RPD = Relative Percent Difference relative to mean (in %).

DL = Analytical Detection Limit.

* Denotes that RPD was not calculated due to one or more values <5 times the detection limit.

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

APPENDIX 3.2-1
MORRISON COPPER/GOLD PROJECT
STREAM AND LAKE SEDIMENT DATA, 2008



Appendix 3.2-1
Morrison Copper/Gold Project Stream and Lake Sediment Data, 2008

Sample ID	Receiving Environment Streams														
	Morrison Creek -1				Morrison Creek - 2				Morrison Creek - 3						
Date Sampled	STRM 1 - 1	STRM 1 - 2	STRM 1 - 3	Morrison Creek -1	DUP	Morrison Creek - 2	DUP	Morrison Creek - 3	DUP	STRM 4 - 1	STRM 4 - 2	STRM 4 - 3	STRM 5 - 1		
Time Sampled	29-Jul-08	29-Jul-08	29-Jul-08	29-Jul-08	29-Jul-08	29-Jul-08	29-Jul-08	29-Jul-08	28-Jul-08	28-Jul-08	28-Jul-08	28-Jul-08	28-Jul-08		
ALS Sample ID	L664173-1	L664173-2	L664173-3	L664760-22	L664760-9	L664760-23	L664760-10	L664760-24	L664760-21	L664173-10	L664173-11	L664173-12	L664173-25		
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Physical Tests															
% Moisture	34.4	60.3	53.8	24.7	24.1	26.6	24.2	27.7	36.5	37.4	48.4	37.4	84.7		
pH	6.8	6.71	6.66	6.65	6.55	6.65	6.55	6.61	6.59	7.19	7	7.02	7.2		
Particle Size															
% Gravel (>2mm)	9	12	8	4	4	1	1	2	3	3	3	10	<1		
% Sand (2.0mm - 0.063mm)	64	40	46	81	83	88	86	67	66	73	74	68	7		
% Silt (0.063mm - 4um)	19	35	32	11	10	9	10	23	22	18	18	16	60		
% Clay (<4um)	8	13	14	4	3	2	3	8	8	6	6	7	34		
Cyanides															
Cyanide, Total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	4.4	<3.0	5.1		
Organic / Inorganic Carbon															
Total Organic Carbon	1.5	7.6	4.9	0.7	0.5	0.6	0.8	1.6	1.5	1.2	1.7	2.4	18.4		
Plant Available Nutrients															
Available Ammonium-N	3.8	17.2	10.4	2	2	3	3	1	1	3.4	4	4.7	38.6		
Nitrate+Nitrite-N	<0.4	0.9	<0.4	-	-	-	-	-	<0.4	<0.4	<0.4	<0.4	6.1		
Nitrate-N	<0.4	0.7	<0.4	-	-	-	-	-	<0.4	<0.4	<0.4	<0.4	4.9		
Nitrite-N	<0.4	<0.4	<0.4	-	-	-	-	-	<0.4	<0.4	<0.4	<0.4	1.2		
Available Phosphate-P	2	6	3	-	-	-	-	-	-	3	3	4	5		
Metals															
Aluminum (Al)	17900	19100	20800	10200	10200	10100	10700	12200	12700	16500	16300	15500	12500		
Antimony (Sb)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
Arsenic (As)	16	19.7	19.3	8.41	9.28	10.3	9	10.6	9.27	22.3	19.8	21.3	133		
Barium (Ba)	196	250	282	88.6	82.4	91.2	102	129	134	197	176	173	456		
Beryllium (Be)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50		
Bismuth (Bi)	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20		
Cadmium (Cd)	<0.50	0.53	<0.50	<0.10	<0.10	<0.10	<0.10	0.1	0.11	<0.50	<0.50	<0.50	<0.50	1.5	
Calcium (Ca)	6010	9160	8140	2700	3250	2770	2860	3550	3410	6210	5820	5770	11700		
Chromium (Cr)	26.1	26.6	29.9	15.2	13.9	14.4	15	19	18.5	24.8	23.5	21.9	25.2		
Cobalt (Co)	14.5	14.3	15.3	7.5	7.6	7.4	8	8.8	9.1	13.7	13	12.5	19.7		
Copper (Cu)	28	40.1	43.3	10	10.1	11.9	12.5	15.6	16	46.5	49.2	48.9	1110		
Iron (Fe)	42900	40600	42700	22500	23600	23700	24700	25200	26000	37500	35800	33600	44500		
Lead (Pb)	<30	<30	<30	3.8	3.7	4	4.3	5	5.2	<30	<30	<30	<30		
Lithium (Li)	14.1	14	15.8	9.3	9.2	9.1	9.8	10.5	11.3	14.2	14	13.8	11.4		
Magnesium (Mg)	8760	7950	8190	3920	4140	3940	4130	4080	4250	7790	7140	7020	4300		
Manganese (Mn)	1900	2040	2220	399	416	357	404	429	434	1490	1040	977	7090		
Mercury (Hg)	0.088	0.105	0.0995	0.0683	0.069	0.0644	0.0975	0.0834	0.0868	0.0751	0.0713	0.0713	0.09	0.364	
Molybdenum (Mo)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.5	
Nickel (Ni)	20.2	21.2	22.8	16.1	15.7	15.8	17.3	19.4	20.3	23.1	21.7	20.5	68.8		
Phosphorus (P)	518	966	676	597	884	653	606	566	588	642	626	588	1380		
Potassium (K)	800	730	900	590	480	580	550	680	690	1040	1070	930	1060		
Selenium (Se)	<2.0	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0		
Silver (Ag)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0		
Sodium (Na)	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200		
Strontium (Sr)	22.3	33.8	32.7	24	21.8	22.7	25.2	29.9	30.5	31.4	30	27.1	61.8		
Thallium (Tl)	<1.0	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<1.0	<1.0	<1.0		
Tin (Sn)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0		
Titanium (Ti)	483	236	245	241	162	203	174	166	177	463	446	399	60.6		
Vanadium (V)	80.2	71.4	76.1	35.7	35.5	35.4	36.6	40.3	41.7	64.3	63.6	59.3	46.6		
Zinc (Zn)	89.6	97.4	98.9	50	50.9	50.2	52.1	55.6	56.7	103	101	100	225		
XNo class															
Total Available Nitrogen	3.8	17.9	10.4	-	-	-	-	-	-	3.4	4	4.7	44.7		
Leachable Anions & Nutrients															
Total Nitrogen by LECO	0.1	0.51	0.3	0.11	0.08	0.1	0.11	0.13	0.15	0.11	0.14	0.18	1.18		

(continued)

< = Less than the detection limit indicated.

Results are expressed as milligrams per dry kilogram except where noted.

Total Organic Carbon and Total Nitrogen (by LECO) are expressed as percent, dry weight basis.

Appendix 3.2-1
Morrison Copper/Gold Project Stream and Lake Sediment Data, 2008 (continued)

Receiving Environment Streams															
Sample ID	STRM 5 - 2	STRM 5 - 3	STRM 6 - 1	STRM 6 - 2	STRM 6 - 3	STRM 26 - 1	STRM 26 - 2	STRM 26 - 3	LOWER 7 - 1	LOWER 7 - 2	LOWER 7 - 3	UPPER 7 - 1	UPPER 7 - 2	UPPER 7 - 3	STRM 8 - 1
Date Sampled	28-Jul-08	28-Jul-08	25-Jul-08	25-Jul-08	25-Jul-08	25-Jul-08	25-Jul-08	25-Jul-08	27-Jul-08	27-Jul-08	27-Jul-08	30-Jul-08	30-Jul-08	30-Jul-08	28-Jul-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L664173-26	L664173-27	L664173-28	L664173-29	L664173-30	L664173-4	L664173-5	L664173-6	L664173-7	L664173-8	L664173-9	L664173-16	L664173-17	L664173-18	L664173-22
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Physical Tests															
% Moisture	78.4	64.5	17.1	27.6	19.7	22.3	32.8	27.6	29.4	33.5	22.6	23.5	25.8	20.1	37.4
pH	7.37	7.36	7.47	7.26	6.69	7.23	7.12	7.23	7.23	7.18	7.14	7.25	7.41	7.49	7.12
Particle Size															
% Gravel (>2mm)	10	28	13	3	12	20	6	2	19	14	5	32	35	34	8
% Sand (2.0mm - 0.063mm)	24	33	75	72	68	58	75	74	72	79	60	47	48	69	
% Silt (0.063mm - 4um)	49	28	8	17	9	9	25	16	6	10	12	5	13	15	16
% Clay (<4um)	16	12	3	8	3	3	11	7	1	4	5	2	4	4	7
Cyanides															
Cyanide, Total	4.7	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Organic / Inorganic Carbon															
Total Organic Carbon	14.2	5.9	0.4	1.3	0.5	0.3	2.6	1	0.2	1	0.8	0.2	0.5	0.5	1.2
Plant Available Nutrients															
Available Ammonium-N	24.3	11.5	1.3	2.3	1.5	3.1	5.6	2.3	2.2	3.5	4.5	1.8	4.3	2.8	2.3
Nitrate+Nitrite-N	4.3	3.9	0.8	<0.4	0.9	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Nitrate-N	4	3.5	0.7	<0.4	0.9	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Nitrite-N	<0.4	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Available Phosphate-P	5	4	2	2	1	1	1	1	2	3	2	<1	1	<1	1
Metals															
Aluminum (Al)	14600	11500	15900	16700	16700	20700	22200	20500	17500	18200	17100	19300	21700	20100	15200
Antimony (Sb)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Arsenic (As)	96.9	138	17.7	15.7	16.4	20	22.2	23.1	14.4	18.8	15.3	29.2	26.5	27.7	28.6
Barium (Ba)	337	241	133	131	132	136	181	143	145	155	136	155	168	155	244
Beryllium (Be)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bismuth (Bi)	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Cadmium (Cd)	0.97	1.07	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.58
Calcium (Ca)	11600	5840	4910	5960	5430	6950	8240	7100	5760	6270	5670	9550	16100	9970	5990
Chromium (Cr)	25.1	23.5	19.2	22	20.1	44.3	44.1	43.7	17.7	18.7	18.5	44.6	76.5	47.2	22
Cobalt (Co)	14.5	18.6	11.1	11.5	12.4	20.2	19.1	20.5	11.9	13.4	11.5	21.5	23.7	20.2	13.2
Copper (Cu)	1270	590	18.1	18.7	17.5	28.6	45.6	32	17.1	22.4	16.9	51.6	37.4	40.4	20.7
Iron (Fe)	35600	47400	35900	34700	36500	45200	44100	45600	36500	35600	33000	49000	49900	48600	33700
Lead (Pb)	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
Lithium (Li)	13.5	11	15	15.4	15.5	18.5	20.4	19.6	15.3	15.8	15.1	17.9	19.7	18.9	15.4
Magnesium (Mg)	4800	4310	7950	7750	8420	13600	12200	13400	7940	7510	7100	15500	17700	15000	5980
Manganese (Mn)	3250	2400	993	999	1120	1490	1590	1400	1260	1520	1210	1890	2200	1730	1530
Mercury (Hg)	0.265	0.155	0.108	0.0504	0.0569	0.12	0.131	0.161	0.0303	0.0411	0.0339	0.709	0.447	0.77	0.0664
Molybdenum (Mo)	4.2	4.7	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Nickel (Ni)	56.4	55.4	17.6	18.5	18.9	31.8	30.6	31.9	17.5	19.3	16.4	29.8	58.7	36.6	24.4
Phosphorus (P)	1050	1020	563	669	635	583	559	532	564	579	599	630	861	739	614
Potassium (K)	1240	1040	870	950	930	1050	1240	920	900	1040	1110	1110	2120	1350	750
Selenium (Se)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Silver (Ag)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Sodium (Na)	<200	<200	220	340	260	290	300	280	380	510	360	300	270	280	<200
Strontium (Sr)	61.4	34.7	27.5	27.6	25.6	24.4	35	29.3	34.1	28.9	25.2	35.7	36.8	37.2	35.1
Thallium (Tl)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tin (Sn)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Titanium (Ti)	158	58.6	452	443	481	338	257	283	522	530	500	200	207	261	210
Vanadium (V)	48.2	51.8	58.6	60.2	59.8	88.9	81.8	85.1	57.6	55.3	54	94.2	95.5	98.4	56.6
Zinc (Zn)	210	185	88.7	87.3	91.8	85.3	96.3	87.2	94	97.7	90.4	90	78.9	86.7	83.6
XNo class															
Total Available Nitrogen	28.3	15.4	2	2.3	2.4	3.1	5.6	2.3	2.2	3.5	4.5	1.8	4.3	2.8	2.3
Leachable Anions & Nutrients															
Total Nitrogen by LECO	1.02	0.47	0.07	0.12	0.09	0.04	0.15	0.09	0.05	0.11	0.1	0.06	0.06	0.08	0.13

(continued)

< = Less than the detection limit indicated.
 Results are expressed as milligrams per dry kilogram except where noted.
 Total Organic Carbon and Total Nitrogen (by LECO) are expressed as percent, dry weight basis.

Appendix 3.2-1
Morrison Copper/Gold Project Stream and Lake Sediment Data, 2008 (continued)

Sample ID	Receiving Environment Streams									Transmission Line Sites					
	STRM 8 - 2	STRM 8 - 3	STRM 9 - 1	STRM 9 - 2	STRM 9 - 3	STRM 10 - 1	STRM 10 - 2	STRM 10 - 3	STRM 11.9 - 1	STRM 11.9 - 2	STRM 11.9 - 3	STRM 17.1 - 1	STRM 17.1 - 2	STRM 17.1 - 3	
Date Sampled	28-Jul-08	28-Jul-08	28-Jul-08	28-Jul-08	28-Jul-08	25-Jul-08	25-Jul-08	25-Jul-08	30-Jul-08	30-Jul-08	30-Jul-08	29-Jul-08	29-Jul-08	29-Jul-08	
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	
ALS Sample ID Matrix	L664173-23	L664173-24	L664173-13	L664173-14	L664173-15	L664173-31	L664173-32	L664173-33	L664173-19	L664173-20	L664173-21	L664173-34	L664173-35	L664173-36	
Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Physical Tests															
% Moisture	27.3	26.1	85.8	47.3	72.3	20.1	57	29.9	25.6	29.6	35.4	43.4	43.2	61.3	
pH	7.17	7.33	7.26	7.26	7.14	6.99	6.99	7.02	7.18	7.17	7	6.92	6.91	6.78	
Particle Size															
% Gravel (>2mm)	3	3	5	5	1	36	41	37	8	13	5	17	9	9	
% Sand (2.0mm - 0.063mm)	72	78	10	64	30	48	36	44	82	75	76	57	67	48	
% Silt (0.063mm - 4um)	17	13	59	24	54	12	16	13	7	9	14	18	17	28	
% Clay (<4um)	7	6	26	8	14	5	7	6	3	3	5	8	7	14	
Cyanides															
Cyanide, Total	<3.0	<3.0	3.5	3.6	13	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	
Organic / Inorganic Carbon															
Total Organic Carbon	1.9	1.1	18.6	2.8	8.2	1.3	4.2	2.8	0.8	1	2.1	3.5	2.3	6.9	
Plant Available Nutrients															
Available Ammonium-N	3.1	2.8	31.5	6	19.8	3.6	7.5	8.1	1.6	3.3	4.5	6.1	3.8	7.9	
Nitrate+Nitrite-N	<0.4	<0.4	9.4	4.4	7.1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
Nitrate-N	<0.4	<0.4	8.8	4.2	6.8	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
Nitrite-N	<0.4	<0.4	0.6	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
Available Phosphate-P	2	1	1	3	4	1	1	1	2	3	3	1	1	1	
Metals															
Aluminum (Al)	16100	15800	13900	7730	13600	17900	19900	19200	14900	13900	14600	17200	18000	20900	
Antimony (Sb)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
Arsenic (As)	33.2	30.4	71	44.3	43.8	28.5	24	32.1	12.6	11.9	12.8	17	18.1	17.4	
Barium (Ba)	279	234	1010	362	625	331	299	277	172	148	162	208	222	270	
Beryllium (Be)	<0.50	<0.50	0.55	<0.50	0.55	<0.50	0.52	0.51	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Bismuth (Bi)	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Cadmium (Cd)	0.58	<0.50	1	0.62	0.63	1.02	0.63	0.66	<0.50	<0.50	<0.50	<0.50	0.57	<0.50	
Calcium (Ca)	6740	5690	18900	4950	12000	5500	8130	6020	4380	4570	5340	6160	6360	8830	
Chromium (Cr)	24.4	24.6	18.6	22.1	24	21.2	23.8	22.1	26.5	21.1	21.8	24	24.6	26.2	
Cobalt (Co)	15.1	14.2	15.6	12.7	13	17.2	13	14.3	14.8	12.9	14.4	14.1	15.3	14.7	
Copper (Cu)	20.8	18.4	32.6	19.8	26.5	21.3	23.8	22.5	39.1	29.3	30.4	29.5	31.9	41.8	
Iron (Fe)	37000	36100	46200	32700	34700	43700	41400	40000	37600	36400	35300	41100	45300	40400	
Lead (Pb)	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	
Lithium (Li)	16.4	16	11.2	6.5	11.7	21.5	24.8	25.5	12.7	11.8	12.9	14	14.5	15.9	
Magnesium (Mg)	6930	6810	3440	2760	3410	6370	6270	6170	7420	7130	7130	8110	7920	7980	
Manganese (Mn)	1990	1480	15900	3770	5820	3930	2920	2850	1290	1110	1360	1740	2140	2100	
Mercury (Hg)	0.0931	0.0823	0.182	0.0926	0.138	0.0479	0.103	0.0774	0.0545	0.0504	0.0454	0.0653	0.0694	0.0779	
Molybdenum (Mo)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	
Nickel (Ni)	26.5	26.6	42.3	37.3	37.1	27.5	24.1	23	21.8	17.9	20.4	18.4	18.6	22.1	
Phosphorus (P)	820	576	1440	718	1080	581	668	580	565	516	635	568	522	673	
Potassium (K)	860	860	1140	820	1230	750	810	870	620	580	650	760	820	1000	
Selenium (Se)	<2.0	<2.0	<8.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<4.0	
Silver (Ag)	<2.0	<2.0	2.1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	
Sodium (Na)	200	210	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	
Strontium (Sr)	39.4	36.1	95.2	39.6	65.5	34.8	37.1	33.2	23.3	21.4	20.3	25.1	25.2	32.6	
Thallium (Tl)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Tin (Sn)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	
Titanium (Ti)	271	281	35.9	39.3	44.4	386	226	291	534	524	476	398	402	287	
Vanadium (V)	61.2	61.5	43.1	42.1	45.1	67.5	61.2	65	69.1	73.3	68	72.7	78.5	71.4	
Zinc (Zn)	87.1	85.5	93.1	75.7	93.9	111	103	104	92.3	86.9	84.7	83.4	90.9	91.8	
XNo class															
Total Available Nitrogen	3.1	2.8	40.9	10.2	26.6	3.6	7.5	8.1	1.6	3.3	4.5	6.1	3.8	7.9	
Leachable Anions & Nutrients															
Total Nitrogen by LECO	0.15	0.12	1.15	0.22	0.64	0.12	0.3	0.17	0.08	0.07	0.14	0.21	0.17	0.47	

(continued)

Appendix 3.2-1
Morrison Copper/Gold Project Stream and Lake Sediment Data, 2008 (continued)

Sample ID	Morrison Lake Stations											
	1 Soil	2 Soil	3 Soil	1 Soil	2 Soil	3 Soil	1 Soil	2 Soil	3 Soil	1 Soil	1 DUP Soil	2 Soil
Date Sampled	21-Jul-08	21-Jul-08	21-Jul-08	22-Jul-08	22-Jul-08	22-Jul-08	27-Jul-08	27-Jul-08	27-Jul-08	27-Jul-08	27-Jul-08	26-Jul-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L664760-3	L664760-4	L664760-5	L664760-6	L664760-7	L664760-8	L664760-17	L664760-18	L664760-19	L664760-11	L664760-16	L664760-12
Physical Tests												
% Moisture	81.1	81.4	75.1	70.8	74	36	70.9	66.9	64.7	77.3	77.7	71.2
pH	6.05	5.69	5.89	5.7	5.65	6.24	6.32	5.79	5.83	5.97	6.02	5.68
Particle Size												
% Gravel (>2mm)	<1	<1	<1	<1	<1	4	<1	<1	2	<1	<1	<1
% Sand (2.0mm - 0.063mm)	1	1	7	3	17	63	7	17	41	4	1	11
% Silt (0.063mm - 4um)	60	66	67	70	56	27	66	54	43	63	64	68
% Clay (<4um)	39	33	26	28	26	6	27	28	15	33	35	20
Cyanides												
Cyanide, Total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	5
Organic / Inorganic Carbon												
Total Organic Carbon	8	10.7	12	5.5	10.2	2.5	6	5.3	15.3	6.4	6.6	6.6
Plant Available Nutrients												
Available Ammonium-N	4	8	3	3	3	5	4	2	2	5	6	3
Nitrate+Nitrite-N	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate-N	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite-N	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	-	-	-	-	-	-	-	-	-	-	-	-
Metals												
Aluminum (Al)	26700	22400	14200	23800	14900	13400	26100	24900	17400	29800	24200	21900
Antimony (Sb)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Arsenic (As)	192	89.3	6.67	85.4	18.7	5.13	158	32.2	7.54	140	139	79.6
Barium (Ba)	506	398	203	339	220	99.8	734	304	139	792	681	438
Beryllium (Be)	0.84	0.64	<0.50	0.59	<0.50	<0.50	0.6	0.62	<0.50	0.81	0.71	0.62
Bismuth (Bi)	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Cadmium (Cd)	1	0.98	0.67	0.59	0.52	0.19	0.63	0.68	0.3	0.9	1.01	0.66
Calcium (Ca)	7760	6970	7960	6460	7580	4870	6530	6240	9240	6570	6030	6370
Chromium (Cr)	30.4	27.5	21.2	27.7	23.2	13.9	39.2	36	34.8	34.4	28.9	29.8
Cobalt (Co)	13.4	10.9	7.3	12.7	8.8	6.6	17.6	15.8	10.5	16.6	18.9	13.4
Copper (Cu)	147	85.5	90.4	39.7	40.4	13.7	54.5	45	29.3	59.1	50.6	42.7
Iron (Fe)	97000	72700	22000	63200	34900	23300	85500	55500	33700	100000	86200	62900
Lead (Pb)	12.3	12	8.8	10.8	7.1	3.9	9.5	8.4	4.3	11.4	10.8	9.4
Lithium (Li)	16.3	14.1	9.9	18	10.7	11.2	19.8	19.5	14.5	19.2	15.3	17.6
Magnesium (Mg)	5050	4620	3760	6050	4120	5250	7310	7360	9310	5360	4510	5050
Manganese (Mn)	4910	2340	422	1470	684	332	9050	1200	304	7060	6340	2310
Mercury (Hg)	0.325	0.292	0.238	0.231	0.315	0.163	0.39	0.249	0.375	0.35	0.36	0.246
Molybdenum (Mo)	5.1	<4.0	<4.0	<4.0	<4.0	<4.0	6.4	<4.0	<4.0	5.9	5.6	<4.0
Nickel (Ni)	40.4	33.8	24.3	27.2	21.8	13.3	35.7	36.5	22.8	41.6	37.6	31.8
Phosphorus (P)	3500	2830	845	2070	1540	598	2610	1420	671	3440	2940	2140
Potassium (K)	1870	1500	940	1700	1060	850	1680	1630	1090	1840	1490	1300
Selenium (Se)	1.35	1.51	0.82	0.66	0.92	<0.50	0.71	0.75	<0.50	1.23	1.19	0.74
Silver (Ag)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Sodium (Na)	200	<200	<200	260	<200	200	240	220	260	210	<200	<200
Strontium (Sr)	68.5	57	52	56.4	49.2	27	58.9	52	40.6	66.5	60.4	62.2
Thallium (Tl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tin (Sn)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Titanium (Ti)	74.4	70.2	47.4	161	139	403	72.9	110	309	57	51.2	67.2
Vanadium (V)	63.5	51.3	34.9	64	44.2	44.1	78.3	75.1	64.5	79.9	71	61.3
Zinc (Zn)	152	131	92.7	115	86.9	69.7	118	128	76.7	148	128	117
XNo class												
Total Available Nitrogen	-	-	-	-	-	-	-	-	-	-	-	-
Leachable Anions & Nutrients												
Total Nitrogen by LECO	0.67	0.84	0.97	0.45	0.69	0.2	0.46	0.41	0.83	0.55	0.57	0.55

(continued)

< = Less than the detection limit indicated.

Results are expressed as milligrams per dry kilogram except where noted.

Total Organic Carbon and Total Nitrogen (by LECO) are expressed as percent, dry weight basis.

Appendix 3.2-1
Morrison Copper/Gold Project Stream and Lake Sediment Data, 2008 (continued)

Sample ID	Morrison Lake D - Morrison Lake D - Morrison Lake D			Morrison Lake E - Morrison Lake E - Morrison Lake E -		
	2 DUP	3	3 DUP	1	2	3
Date Sampled	26-Jul-08	26-Jul-08	26-Jul-08	26-Jul-08	26-Jul-08	26-Jul-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L664760-15	L664760-13	L664760-14	L664760-20	L664760-1	L664760-2
Matrix	Soil	Soil	Soil	Soil	Soil	Soil
Physical Tests						
% Moisture	68.6	58.6	60.1	61.1	50.6	61.8
pH	5.87	6.06	6.08	6.41	5.73	5.83
Particle Size						
% Gravel (>2mm)	<1	<1	<1	<1	4	16
% Sand (2.0mm - 0.063mm)	10	13	15	33	52	37
% Silt (0.063mm - 4um)	63	64	63	48	32	31
% Clay (<4um)	26	23	22	18	12	16
Cyanides						
Cyanide, Total	3	4.1	<3.0	<3.0	<3.0	<3.0
Organic / Inorganic Carbon						
Total Organic Carbon	6.4	6	5.9	3.5	4.5	9.8
Plant Available Nutrients						
Available Ammonium-N	3	2	2	1	<1	3
Nitrate+Nitrite-N	-	-	-	-	-	-
Nitrate-N	-	-	-	-	-	-
Nitrite-N	-	-	-	-	-	-
Available Phosphate-P	-	-	-	-	-	-
Metals						
Aluminum (Al)	22700	19600	19700	13600	8730	7370
Antimony (Sb)	<10	<10	<10	<10	<10	<10
Arsenic (As)	75.9	35.7	35.7	98.1	85	7.56
Barium (Ba)	444	342	339	470	257	146
Beryllium (Be)	0.64	0.55	0.55	0.61	<0.50	<0.50
Bismuth (Bi)	<20	<20	<20	<20	<20	<20
Cadmium (Cd)	0.67	0.65	0.57	0.49	0.36	0.39
Calcium (Ca)	6460	7950	7840	4030	3240	5270
Chromium (Cr)	31	28.6	28.2	26.1	20.2	13.7
Cobalt (Co)	13.6	12.3	12.3	13.9	8.8	4.6
Copper (Cu)	42.4	39.1	38.6	31.1	19.3	16.2
Iron (Fe)	63100	40000	39400	48200	43900	14900
Lead (Pb)	9.6	9.1	8.6	8.1	5.8	3.7
Lithium (Li)	17.3	18	18	10.2	7.4	5.9
Magnesium (Mg)	5140	5490	5490	3020	2240	1840
Manganese (Mn)	2310	1710	1680	4930	1220	260
Mercury (Hg)	0.215	0.167	0.154	0.185	0.113	0.171
Molybdenum (Mo)	<4.0	<4.0	<4.0	4.6	<4.0	<4.0
Nickel (Ni)	32.1	30.3	30.7	39.7	26.8	15.1
Phosphorus (P)	2160	1190	1170	1160	825	590
Potassium (K)	1410	1070	1100	1390	980	750
Selenium (Se)	0.79	0.65	0.57	0.53	<0.50	<0.50
Silver (Ag)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Sodium (Na)	<200	<200	<200	<200	<200	<200
Strontium (Sr)	65.1	61.2	60	43.8	31.7	37.2
Thallium (Tl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tin (Sn)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Titanium (Ti)	78.1	91.1	93.9	45.1	36.3	52.8
Vanadium (V)	63	59.4	59	52	36.6	23.7
Zinc (Zn)	119	107	107	88.4	65.5	47.2
XNo class						
Total Available Nitrogen	-	-	-	-	-	-
Leachable Anions & Nutrients						
Total Nitrogen by LECO	0.53	0.44	0.4	0.24	0.25	0.65

< = Less than the detection limit indicated.

Results are expressed as milligrams per dry kilogram except where noted.

Total Organic Carbon and Total Nitrogen (by LECO) are expressed as percent, dry weight basis.

APPENDIX 3.2-2
RELATIVE PERCENT DIFFERENCE (RPD) FOR
STREAM AND LAKE SEDIMENT DATA, 2008



Appendix 3.2-2
Relative Percent Difference (RPD) for Stream and Lake Sediment Data, 2008

Sample ID	Morrison Creek - 1	Morrison Creek - 1 DUP	Morrison Creek - 2	Morrison Creek - 2 DUP	Morrison Creek - 3	Morrison Creek - 3 DUP
Date Sampled	29-Jul-08	29-Jul-08	29-Jul-08	29-Jul-08	29-Jul-08	29-Jul-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L664760-22	L664760-9	L664760-23	L664760-10	L664760-24	L664760-21
Matrix	5xDL	Soil	Soil	RPD %	Soil	RPD %
Physical Tests	5xDL					
% Moisture	0.50	24.7	24.1	2	26.6	24.2
pH	0.05	6.65	6.55	2	6.65	6.55
Particle Size						
% Gravel (>2mm)	5.00	4	4	*	1	1
% Sand (2.0mm - 0.063mm)	5.00	81	83	2	88	86
% Silt (0.063mm - 4um)	5.00	11	10	10	9	10
% Clay (<4um)	5.00	4	3	*	2	3
Cyanides						
Cyanide, Total	15.00	15	15	*	15	15
Organic / Inorganic Carbon						
Total Organic Carbon (%)	0.50	0.7	0.5	*	0.6	0.8
Plant Available Nutrients						
Available Ammonium-N	5.00	2	2	*	3	3
Metals						
Aluminum (Al)	250.00	10200	10200	0	10100	10700
Antimony (Sb)	50.00	5	5	*	5	5
Arsenic (As)	2.50	8.41	9.28	10	10.3	9
Barium (Ba)	5.00	88.6	82.4	7	91.2	102
Beryllium (Be)	2.50	0.25	0.25	*	0.25	0.25
Bismuth (Bi)	100.00	10	10	*	10	10
Cadmium (Cd)	0.50	0.05	0.05	*	0.05	0.05
Calcium (Ca)	250.00	2700	3250	18	2770	2860
Chromium (Cr)	10.00	15.2	13.9	9	14.4	15
Cobalt (Co)	10.00	7.5	7.6	*	7.4	8
Copper (Cu)	5.00	10	10.1	1	11.9	12.5
Iron (Fe)	250.00	22500	23600	5	23700	24700
Lead (Pb)	10.00	3.8	3.7	*	4	4.3
Lithium (Li)	10.00	9.3	9.2	*	9.1	9.8
Magnesium (Mg)	250.00	3920	4140	5	3940	4130
Manganese (Mn)	5.00	399	416	4	357	404
Mercury (Hg)	0.03	0.0683	0.069	1	0.0644	0.0975
Molybdenum (Mo)	20.00	2	2	*	2	2
Nickel (Ni)	25.00	16.1	15.7	*	15.8	17.3
Phosphorus (P)	250.00	597	884	39	653	606
Potassium (K)	1000.00	590	480	*	580	550
Selenium (Se)	2.50	0.25	0.25	*	0.25	0.25
Silver (Ag)	10.00	1	1	*	1	1
Sodium (Na)	1000.00	100	100	*	100	100
Strontium (Sr)	2.50	24	21.8	10	22.7	25.2
Thallium (Tl)	2.50	0.25	0.25	*	0.25	0.25
Tin (Sn)	25.00	2.5	2.5	*	2.5	2.5
Titanium (Ti)	5.00	241	162	39	203	174
Vanadium (V)	10.00	35.7	35.5	1	35.4	36.6
Zinc (Zn)	5.00	50	50.9	2	50.2	52.1
Leachable Anions & Nutrients						
Total Nitrogen by LECO (%)	0.10	0.11	0.08	*	0.1	0.11
					*	0.13
					*	0.15
					*	14

Results are expressed as milligrams per litre except where noted.

Values in bold are half the detection limit.

RPD = Relative Percent Difference relative to mean (in %).

DL = Analytical Detection Limit.

* Denotes that RPD was not calculated due to one or more values <5 times the detection limit.

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

(continued)

Appendix 3.2-2
Relative Percent Difference (RPD) for Stream and Lake Sediment Data, 2008 (completed)

Sample ID	Morrison Lake D - 3	Morrison Lake D - 3 DUP	Morrison Lake D - 2	Morrison Lake D - 2 DUP	Morrison Lake D - 1	Morrison Lake D - 1 DUP
Date Sampled	26-Jul-08	26-Jul-08	26-Jul-08	26-Jul-08	27-Jul-08	27-Jul-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L664760-13	L664760-14	L664760-12	L664760-15	L664760-11	L664760-16
Matrix	5xDL	Soil	RPD %	Soil	RPD %	Soil
Physical Tests	5xDL					
% Moisture	0.50	58.6	60.1	3	71.2	68.6
pH	0.05	6.06	6.08	0	5.68	5.87
Particle Size						
% Gravel (>2mm)	5.00	0.5	0.5	*	0.5	0.5
% Sand (2.0mm - 0.063mm)	5.00	13	15	14	11	10
% Silt (0.063mm - 4um)	5.00	64	63	2	68	63
% Clay (<4um)	5.00	23	22	4	20	26
Cyanides						
Cyanide, Total	15.00	4.1	1.5	*	5	3
Organic / Inorganic Carbon						
Total Organic Carbon (%)	0.50	6	5.9	2	6.6	6.4
Plant Available Nutrients						
Available Ammonium-N	5.00	2	2	*	3	3
Metals						
Aluminum (Al)	250.00	19600	19700	1	21900	22700
Antimony (Sb)	50.00	5	5	*	5	5
Arsenic (As)	2.50	35.7	35.7	0	79.6	75.9
Barium (Ba)	5.00	342	339	1	438	444
Beryllium (Be)	2.50	0.55	0.55	*	0.62	0.64
Bismuth (Bi)	100.00	10	10	*	10	10
Cadmium (Cd)	0.50	0.65	0.57	13	0.66	0.67
Calcium (Ca)	250.00	7950	7840	1	6370	6460
Chromium (Cr)	10.00	28.6	28.2	1	29.8	31
Cobalt (Co)	10.00	12.3	12.3	0	13.4	13.6
Copper (Cu)	5.00	39.1	38.6	1	42.7	42.4
Iron (Fe)	250.00	40000	39400	2	62900	63100
Lead (Pb)	10.00	9.1	8.6	*	9.4	9.6
Lithium (Li)	10.00	18	18	0	17.6	17.3
Magnesium (Mg)	250.00	5490	5490	0	5050	5140
Manganese (Mn)	5.00	1710	1680	2	2310	2310
Mercury (Hg)	0.03	0.167	0.154	8	0.246	0.215
Molybdenum (Mo)	20.00	2	2	*	2	*
Nickel (Ni)	25.00	30.3	30.7	1	31.8	32.1
Phosphorus (P)	250.00	1190	1170	2	2140	2160
Potassium (K)	1000.00	1070	1100	3	1300	1410
Selenium (Se)	2.50	0.65	0.57	*	0.74	0.79
Silver (Ag)	10.00	1	1	*	1	1
Sodium (Na)	1000.00	100	100	*	100	*
Strontium (Sr)	2.50	61.2	60	2	62.2	65.1
Thallium (Tl)	2.50	0.25	0.25	*	0.25	0.25
Tin (Sn)	25.00	2.5	2.5	*	2.5	2.5
Titanium (Ti)	5.00	91.1	93.9	3	67.2	78.1
Vanadium (V)	10.00	59.4	59	1	61.3	63
Zinc (Zn)	5.00	107	107	0	117	119
Leachable Anions & Nutrients						
Total Nitrogen by LECO (%)	0.10	0.44	0.4	10	0.55	0.53
					4	4

Results are expressed as milligrams per litre except where noted.

Values in bold are half the detection limit.

RPD = Relative Percent Difference relative to mean (in %).

DL = Analytical Detection Limit.

* Denotes that RPD was not calculated due to one or more values <5 times the detection limit.

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

APPENDIX 3.3-1

PERIPHYTON TAXONOMIC DATA FOR STREAMS, 2008



Appendix 3.3-1

Site Sample # Date	Morrison Creek			Strm1			Strm4			Strm5			Strm6			Lower7				
	1 29-Jul-08	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 29-Jul-08	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 2 Jul-08	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 27-Jul-08	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 27-Jul-08	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 27-Jul-08	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²		
Unit	Taxa																			
CHRYSOPHYTA - DIATOMS																				
Achnanthes sp.																				
Achnanthidium minutissimum	4.77	15.19	0.06		11.98	5.76	6.90	1.38	0.19	1.62	1.81	0.60	0.03	4.93	0.43	13.42	10.38	4.30	1.92	
Asterionella formosa																				
Aulacoseira sp.	0.19																			
Aulacoseira ambigua		0.38																		
Cocconeis placentula	1.27	0.32			0.08	0.06	0.06	0.25	0.80	1.25	8.48	1.58	4.22	0.06	0.28	0.08	0.19	0.13	0.07	
Cyclotella bodanica																				
Cyclotella bodanica var. lemanica		0.02																		
Cyclotella ocellata																				
Cymbella sp.	0.13						0.32													
Cymbella affinis	0.02																			
Cymbella cistula																				
Cymbella turnida																				
Diatom mesodon																	0.43		0.22	
Diatom tenuis																				
Diatom vulgaris																	1.69	0.06		
Didymosphenia geminata	0.02					0.04											0.01			
Encyonema minutum	0.02	0.13															1.18	0.19	0.03	
Encyonema obscurum																	0.01			
Encyonema silesiacum																				
Epithemia sp.																				
Eunotia sp.																				
Fragilaria alpestris																				
Fragilaria capucina	1.01					0.08											0.44	0.19	5.53	
Fragilaria nanana	0.25																			
Frustulia sp.																				
Gomphonema sp.																				
Gomphonema acuminatum																				
Gomphonema angustum																				
Gomphonema angustatum	1.08					0.42	0.25	0.06	0.24	0.05	0.08	0.68	0.25	0.02	0.19	0.02	0.17	0.38	0.19	
Gomphonema exiguum																				
Gomphonema gracile																				
Gomphonema minutum	0.38						0.13		0.20	0.02		1.18	0.43		0.35		0.34		0.06	
Gomphonema olivaceum																				
Gomphonema parvulum																				
Gomphonema subtile																				
Gomphonema tenellum																				
Hannaea arcus						0.06											0.05	5.48	0.03	
Meridion circulare	0.19		0.13	0.25	0.13	0.05	0.02	0.14			0.05			0.02	0.04	0.34		0.06		
Navicula sp.																				
Navicula bryophila																				
Navicula cari																	0.02			
Navicula cryptocephala																				
Navicula cryptotenella																	0.01			
Navicula radiosa																	0.13	0.13		
Navicula subminuscula																	0.02	0.02	0.03	
Nitzschia sp.																	0.01			
Nitzschia dissipata																				
Nitzschia inconspicua																				
Nitzschia tubicola																				
Pinnularia sp.																	0.01			
Pinnularia obscura																				
Planothidium lanceolatum																				
Reimeria sinuata																				
Rhoicosphenia curvata																				
Staurosira construens																				
Staurosirella pinnata	0.25																			
Stephanodiscus parvus	0.06																			
Surirella sp.																	0.01			
Synedra parasitica																				
Synedra ulna	0.04	0.38	0.03														0.02	0.08	0.13	1.05
Tabellaria flocculosa																				
CHLOROPHYTA																				
Coelastrum microporum																	0.34			
Pyramimonas tetrarhynchus																	0.04	0.01		
Stigeoclonium sp.																	0.47			
Stigeoclonium tenuie																				
Scenedesmus sp.	0.04		1.08														0.84			
CRYPTOPHYTA																				
Rhodomonas sp.	0.06																			
CYANOPHYTA																				
Aphanocapsa sp.							3.29										0.01			
Aphanocapsa holsatica							0.19										0.04			
Aphanothecia clathrata							0.06										0.40			
Leptolyngbya sp.							4.43	0.84	1.27									6.37		
Merismopedia tenuis																				
Oscillatoria sp.																				
Oscillatoria tenuis																				
Total	6.58	25.19	2.44	13.02	735.27	659.84	23.76	1.60	755.86	14.29	3.82	5.30	12.30	2.50	38.31	384.37	242.67	579.78		

(continued)

Appendix 3.3-1
Periphyton Taxonomic Data for Streams, 2008 (completed)

Site Sample # Date	Upper7			Strm8			Strm9			Strm10			Strm11.9			Strm17.1			Strm26					
	30-Jul-08			28-Jul-08			28-Jul-08			25-Jul-08			30-Jul-08			29-Jul-08			25-Jul-08					
	1 cells x 10 ⁶ /m ²	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 cells x 10 ⁶ /m ²	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 cells x 10 ⁶ /m ²	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 cells x 10 ⁶ /m ²	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 cells x 10 ⁶ /m ²	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 cells x 10 ⁶ /m ²	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²	1 cells x 10 ⁶ /m ²	2 cells x 10 ⁶ /m ²	3 cells x 10 ⁶ /m ²			
Unit																								
Taxa																								
CHRYSOPHYTA - DIATOMS																								
Achnanthes sp.																								
Achnanthidium minutissimum	1.58	2.08	13.92	0.95	2.89	1.06	0.57	8.02	0.72	0.04	1.09	0.66	0.73											
Asterionella formosa																								
Aulacoseira sp.																								
Aulacoseira ambigua																								
Cocconeis placentalia	0.96	0.74	0.35	0.27	1.52	0.33	1.84	4.13	0.71	0.39	0.10	0.05	0.21											
Cyclotella bodanica																								
Cyclotella bodanica var. lemanica																								
Cyclotella ocellata																								
Cymbella sp.																								
Cymbella affinis																								
Cymbella cistula																								
Cymbella tumida																								
Diatoma mesodon																								
Diatoma tenuis																								
Diatoma vulgaris	0.04																							
Didymosphenia geminata	0.02																							
Encyonema minutum	0.03																							
Encyonema obscurum																								
Encyonema silesiacum																								
Epithemia sp.																								
Eunotia sp.																								
Fragilaria alpestris																								
Fragilaria capucina	0.05																							
Fragilaria nanana																								
Frustulia sp.																								
Gomphonema sp.																								
Gomphonema acuminatum																								
Gomphonema angustum	0.65	1.28		0.16	0.23	0.06	0.02		0.02	0.04	2.10	1.92	0.17	0.04	2.53		0.34	0.02	0.04	0.54	1.52			
Gomphonema angustum																								
Gomphonema exiguum																								
Gomphonema gracile																								
Gomphonema minutum	0.31	0.18		0.08			0.02		0.02		0.10	0.41								0.22	0.34			
Gomphonema olivaceum																								
Gomphonema parvulum																								
Gomphonema subtile																								
Gomphonema tenellum	0.06	0.20		0.04			0.02		0.02	0.20		0.20	4.35	0.34	0.51	0.01	0.04	0.10		2.12	0.68			
Hannaea arcus																								
Meridion circulare	0.20	0.02		0.06	0.23	0.05	0.05		0.18	1.11	0.18	0.01	0.20	0.25	0.23	0.11	0.08	0.04		0.13	1.18			
Navicula sp.																								
Navicula bryophila																								
Navicula cari																								
Navicula cryptocephala	0.02			0.15		0.02	0.02		0.05		0.01		0.46		0.13									
Navicula cryptotenella																								
Navicula radiosa																								
Navicula subminimcula	0.02	0.05		0.04			0.30		0.07				0.03	0.04										
Nitzschia sp.																								
Nitzschia dissipata																								
Nitzschia inconspicua																								
Nitzschia tubicola																								
Pinnularia sp.																								
Pinnularia obscura																								
Planothidium lanceolatum	0.03	0.37	1.01	0.25	0.19	0.13	0.06	0.06	0.07	0.25	1.34	0.20			0.01	0.11	0.17	0.08	0.10	0.03	0.35	0.51		
Reimeria sinuata																								
Rhoicosphenia curvata																								
Staurosira construens																								
Staurosira pinnata	0.25	0.13		0.13		0.08	0.02	0.03	0.04	0.02	0.30		0.05				0.04	0.02	0.01		0.09	0.03		
Stephanodiscus parvus																								
Surirella sp.																								
Synedra parasitica																								
Synedra ulna	0.02																							
Tabellaria flocculosa																								
CHLOROPHYTA																								
Coelastrum microporum																								
Pyramimonas tetrarhynchus																								
Stigeoclonium sp.	0.31																0.06			0.23	0.26	4.11	1.87	
Stigeoclonium tenuue																								
Scenedesmus sp.																								
CRYPTOPHYTA																								
Rhodomonas sp.																						0.17		
CYANOPHYTA																								
Aphanocapsa sp.																								
Aphanocapsa holsatica	1.90							0.35	0.97												0.90			
Aphanothecae clathrata																								
Leptolyngbya sp.	4.23							2.79					0.37											
Merismopedia tenuis																								
Oscillatoria sp.																								
Oscillatoria tenuis	1.05	10.03	7.76	15.58	5.00	7.71	2.19	3.58	13.39	4.37	3.61	12.65	8.25	46.86	3399.17</									

APPENDIX 3.3-2

PERIPHYTON AND PHYTOPLANKTON BIOMASS DATA, 2008



Appendix 3.3-2
Periphyton and Phytoplankton Biomass Data, 2008

Site	Replicate	Chl a (μg)	Area/Volume	$\mu\text{g/L}$	$\mu\text{g/cm}^2$
LakeA	1	0.359	0.25 L	1.44	-
LakeA	2	0.32	0.25 L	1.28	-
LakeA	3	0.264	0.25 L	1.06	-
LakeB	1	0.494	0.25 L	1.98	-
LakeB	2	0.534	0.25 L	2.14	-
LakeB	3	0.548	0.25 L	2.19	-
LakeC	1	0.487	0.25 L	1.95	-
LakeC	2	0.517	0.25 L	2.07	-
LakeC	3	0.527	0.25 L	2.11	-
LakeD	1	0.573	0.25 L	2.29	-
LakeD	2	0.553	0.25 L	2.21	-
LakeD	3	0.581	0.25 L	2.32	-
LakeE	1	0.634	0.25 L	2.54	-
LakeE	2	0.627	0.25 L	2.51	-
LakeE	3	0.623	0.25 L	2.49	-
Strm1	1	6.23	8.45 cm	-	0.74
Strm1	2	24.2	8.45 cm	-	2.86
Strm1	3	5.12	8.45 cm	-	0.61
Morrison Creek	1	4.25	8.45 cm	-	0.50
Morrison Creek	2	7.81	8.45 cm	-	0.92
Morrison Creek	3	4.07	8.45 cm	-	0.48
Strm4	1	4.04	8.45 cm	-	0.48
Strm4	2	22.2	8.45 cm	-	2.63
Strm4	3	4.8	8.45 cm	-	0.57
Strm5	1	10.6	8.45 cm	-	1.25
Strm5	2	7.12	8.45 cm	-	0.84
Strm5	3	8.86	8.45 cm	-	1.05
Strm6	1	0.841	8.45 cm	-	0.10
Strm6	2	2.28	8.45 cm	-	0.27
Strm6	3	17.5	8.45 cm	-	2.07
Strm26	1	79.2	8.45 cm	-	9.37
Strm26	2	124	8.45 cm	-	14.67
Strm26	3	29.2	8.45 cm	-	3.46
Lower7	1	27.7	8.45 cm	-	3.28
Lower7	2	32.3	8.45 cm	-	3.82
Lower7	3	69.9	8.45 cm	-	8.27
Upper7	1	4.66	8.45 cm	-	0.55
Upper7	2	4.58	8.45 cm	-	0.54
Upper7	3	4.52	8.45 cm	-	0.53
Strm8	1	2.78	8.45 cm	-	0.33
Strm8	2	1.6	8.45 cm	-	0.19
Strm8	3	0.82	8.45 cm	-	0.10
Strm9	1	3.5	8.45 cm	-	0.41
Strm9	2	6.25	8.45 cm	-	0.74
Strm10	1	3.85	8.45 cm	-	0.46
Strm10	2	11.6	8.45 cm	-	1.37
Strm10	3	1.51	8.45 cm	-	0.18
Strm11.9	1	5.82	8.45 cm	-	0.69
Strm11.9	2	15.2	8.45 cm	-	1.80
Strm11.9	3	8.54	8.45 cm	-	1.01
Strm17.1	1	4.59	8.45 cm	-	0.54
Strm17.1	2	5.57	8.45 cm	-	0.66
Strm17.1	3	5.84	8.45 cm	-	0.69

APPENDIX 3.3-3
MORRISON COPPER/GOLD PROJECT
STREAM BENTHOS DATA, 2008



Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008

TAXON	Stage	No. of individuals	Morrison Cr. -1	Morrison Cr. -2	Morrison Cr. -3	Morrison Cr. -4	Morrison Cr. -5	Strm 1-1	Strm 1-2	Strm 1-3	Strm 1-4	Strm 1-5	Strm 4-1	Strm 4-2	Strm 4-3	Strm 4-4	Strm 4-5
NEMATODA																	
Nematoda indet.	A	5360				48	120	16	24				96				
ANNELIDA																	
Oligochaeta																	
Enchytraeidae																	
Enchytraeidae indet.	J	5808															
Enchytraeidae indet.	A	3548		12	12	72	96	108	32	6	12	24	48	24	12	12	36
Lumbricidae																	
Lumbricidae indet.	A	62								6							
Naididae																	
<i>Chaetogaster diaphanus</i>	A	24															
<i>Chaetogaster diastrophus</i>	A	12				12											
Naididae indet. Group 2																	
<i>Pristina aequiseta</i>	A	30							12		6						
Naididae indet. Group 3																	
<i>Pristinella jenkinae</i>	J	24															
<i>Pristinella jenkinae</i>	A	4384	84				72	24									
Naididae indet. Group 5																	
<i>Nais communis</i>	J	54	6														
<i>Nais communis</i>	A	930	18														
<i>Nais variabilis</i>	A	48		12													
Tubificidae																	
Tubificidae indet. Group 2	J	48															
Tubificidae indet. Group 2	A	146															
<i>Rhyacodrilus</i> sp.	A	6															6
MOLLUSCA																	
Gastropoda																	
Gastropoda indet.	J	12	12														
Valvatidae																	
<i>Valvata</i> sp.	J	6	6														
Bivalvia																	
Sphaeriidae																	
<i>Pisidium casertanum</i>	J	48															
<i>Pisidium casertanum</i>	A	96															
<i>Pisidium</i> spp.	J	1166	36	48	672	96	24	12									
<i>Pisidium</i> spp.	A	24															
Unionidae																	
<i>Anodonta kennerlyi</i>	A	97							1								
ARTHROPODA																	
ARACHNIDA																	
Acoli																	
Acoli indet.		22970	174	180	120	144	216	48	12	60	60	288	24		12	204	84
Arrenuroidea																	
Arrenuridae																	
<i>Arrenurus</i> sp.		300							12				48				
Lebertoidea																	
Lebertiidae																	
<i>Lebertia</i> sp.		2222															
Pionidae																	
Pionidae indet.		356						12		8							12
Sperchontidae																	
Sperchontidae indet.		672															24
<i>Sperchon</i> sp.		4214	30	84	36		36						12	12			36
Torrenticolidae																	
<i>Testudacarus</i> sp.		96						12									
<i>Torrenticola</i> sp.		660	12	48										24			12
Oribatida																	
Hydrozetidae																	
<i>Hydrozetes</i> sp.		48															
Strombioidea																	
Stygothrombidae																	
Stygothrombidae indet.		288															
<i>Stygothrombium</i> sp.		1766	6	36		60	12	8				12					

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Morrison Cr. -1	Morrison Cr. -2	Morrison Cr. -3	Morrison Cr. -4	Morrison Cr. -5	Strm 1-1	Strm 1-2	Strm 1-3	Strm 1-4	Strm 1-5	Strm 4-1	Strm 4-2	Strm 4-3	Strm 4-4	Strm 4-5	
CRUSTACEA																		
Amphipoda																		
Hyalellidae																		
<i>Hyalella azteca</i>	A	60																
Cladocera																		
Daphniidae																		
<i>Daphnia</i> sp.	A	8																
Copepoda																		
Cyclopoida																		
Cyclopoida indet.	cpp	200	6		12								24				12	
Harpacticoida																		
Harpacticoida indet.	cpp	994	6							12			24	12	36	12		
Ostracoda																		
Podocopina																		
Podocopina indet.	A	59846	108	120	84	24	108		6	96	24		15048	7392	2802	4248	3840	
INSECTA																		
Collembola																		
Collembola indet.	A	12																
Poduridae																		
Poduridae indet.	A	5640				12		88	12	24			240					
Sminthuridae									8									
Sminthuridae indet.	A	8																
Ephemeroptera																		
Ephemeroptera indet.	N	24											24					
Ameletidae																		
<i>Ameletus</i> sp.	N	12242							56	78	216	168	312		30		12	
Baetidae																		
Baetidae indet.	N	10216	108	84	480	936	588	40	12	72	144							
<i>Acentrella</i> sp.	N	36			12		24											
<i>Baetis bicaudatus</i>	N	5296																
<i>Baetis tricaudatus</i>	N	3570	162	12	324	924	396											
Ephemerellidae																		
Ephemerellidae indet.	N	26882	6		12	12	12	40	84	36	60	288						
<i>Drunella doddsii</i>	N	1322						8			96							
<i>Drunella grandis</i>	N	120					36	36										
<i>Drunella flavilinea</i>	N	48																
<i>Drunella</i> sp.	N	210	42	24		24												
<i>Ecdyonurus criddlei</i>	N	156	12				12											
<i>Serratella velmae</i>	N	348				36												
Heptageniidae																		
Heptageniidae indet.	N	21350	132	60	132	264	384	32	24	96	84	48		24	12	12		
<i>Cinygmulia</i> sp.	N	6738						18						24			12	
<i>Epeorus deceptivus</i>	N	3840					24	24					60					
<i>Rhithrogena</i> sp.	N	2678						8	18				12					
Leptophyphidae																		
<i>Tricorythodes</i> sp.	N	96			96													
Leptophlebiidae																		
<i>Paraleptophlebia</i> sp.	N	14606	6	264	144	36	24	64	96	156	72	48						
Odonata																		
Gomphidae																		
<i>Ophiogomphus</i> sp.	N	2				1		1										
Plecoptera																		
Capniidae																		
Capniidae indet.	N	70328	102	24		24	24	464	444	552	1152	360	96	24	72	24		
Chloroperlidae																		
Chloroperlidae indet.	N	5576	18		24	12	48	24	24	12	12	72					24	
<i>Paraperla</i> sp.	N	978							6	12							12	
<i>Suwallia</i> sp.	N	24																
<i>Sweltsa</i> sp.	N	14872	24	24	36	72	84		30	24	12	96		72	54	36		
Leuctridae																		
Leuctridae indet.	N	9194	6					24	60	132	204	216		12	24	36		
<i>Despaxia augustus</i>	N	5860						8	42	12			6	24	48			

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Morrison Cr. -1	Morrison Cr. -2	Morrison Cr. -3	Morrison Cr. -4	Morrison Cr. -5	Strm 1-1	Strm 1-2	Strm 1-3	Strm 1-4	Strm 1-5	Strm 4-1	Strm 4-2	Strm 4-3	Strm 4-4	Strm 4-5
Nemouridae																	
Nemouridae indet.	N	35626	6		12	24		280	72	156	756	384	24		12	36	
<i>Visoka</i> sp.	N	2406			12			8	6						60		12
<i>Zapada cintipes</i>	N	492				264	36		8								
<i>Zapada columbiana</i>	N	1650			24			16	6								
<i>Zapada oregonensis</i>	N	264														12	12
Perlidae																	
Perlidae indet.	N	176															
<i>Doroneuria</i> sp.	N	150															
Perlodidae																	
Perlodidae indet.	N	888															
<i>Megarcys</i> sp.	N	24															
<i>Skwala</i> sp.	N	270	18	24	48	120	12										
Trichoptera																	
Trichoptera indet.	L	1306	42	60	12				16	6							
Trichoptera indet.	P	18							6								
Brachycentridae																	
<i>Micrasema</i> sp.	L	96															
Glossomatiidae																	
<i>Glossosoma</i> sp.	L	648		12		144	108				12						
Hydroptilidae																	
Hydroptilidae indet.	L	12		12													
Hydropsychidae																	
Hydropsychidae indet.	L	108			60	48											
<i>Hydropsyche</i> sp.	L	1558	6	24	228	564	696	40									
<i>Parapsyche elisia</i>	L	48															
Lepidostomatidae																	
<i>Lepidostoma</i> sp.	L	276				12											
Limnephilidae																	
Limnephilidae indet.	L	12														12	
Limnephilidae indet.	P	8															
<i>Eccisomyia</i> sp.	L	420															
<i>Onocosmoecus unicolor</i>	L	12													48	24	
<i>Onocosmoecus</i> sp.	L	6	6														
Rhyacophilidae																	
Rhyacophilidae indet.	P	218						72	80	66							
<i>Rhyacophila</i> sp.	L	10426	6					48		66	120	432	144			6	12
<i>Rhyacophila</i> sp.	P	106							6								
Uenoidae																	
<i>Neothremma</i> sp.	L	840															
Lepidoptera																	
Crambidae																	
Crambidae indet.	L	24															
Coleoptera																	
Elmidae																	
Elmidae indet.	L	1772	60	84	120	156	48										
<i>Heterlimnius</i> sp.	L	3338	180	108	60	324	168	8									
<i>Heterlimnius</i> sp.	A	24															
<i>Macronychus</i> sp.	A	48				24	24										
Hydrophilidae																	
Hydrophilidae indet.	L	24															
Staphylinidae																	
Staphylinidae indet.	A	24												24			
Diptera																	
Ceratopogonidae																	
<i>Probezzia</i> sp.	L	4306	6									24					
Chironomidae																	
Chironomidae indet.	L	282192	282	1416	756	312	204	352	342	1164	2364	1944		120	12	120	276
Chironomidae indet.	P	9504	6		36	84		80	66	60	72	120				12	
Chironomidae indet.	A	562								24				6			

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Morrison Cr. -1	Morrison Cr. -2	Morrison Cr. -3	Morrison Cr. -4	Morrison Cr. -5	Strm 1-1	Strm 1-2	Strm 1-3	Strm 1-4	Strm 1-5	Strm 4-1	Strm 4-2	Strm 4-3	Strm 4-4	Strm 4-5
Chironominae																	
Chironomini																	
<i>Chironomus</i> sp.	L	24														12	12
<i>Stictochironomus</i> sp.	L	588															
Tanytarsini																	
<i>Corynocera</i> sp.	L	900						36									
<i>Microspectra</i> sp.	L	3504	6					12	24						6	72	
<i>Neostempellina</i> sp.	L	66	6	36				24									
<i>Stempellina</i> sp.	L	56776	18	12													
<i>Sublettea</i> sp.	L	16594	6	108				108									
<i>Tanytarsus</i> sp.	L	14182	6	12				24	72	16	18	48	12	72	48	48	6
<i>Zavrelia</i> sp.	L	12		12													36
Orthocladiinae																	
<i>Corynoneura</i> sp.	L	18338	30	48													
<i>Eukiefferiella</i> sp.	L	17184		264				12	72	80	240	192	228	120			
<i>Krenosmittia</i> sp.	L	36							24			180	564	216			
<i>Limnophyes</i> sp.	L	2404						72	96			12					
<i>Orthocladius</i> sp.	L	12096	42	108	324	360		36	56	42	36	48	96	96	72	24	
<i>Parametriocnemus</i> sp.	L	492						24	96								
<i>Rheocriptopus</i> sp.	L	16342							64	150	228						
<i>Thienemanniella</i> sp.	L	8412	30	24	24				40	18			84				
Podominae																	
<i>Boreochilus</i> sp.	L	180											12				
Tanypodinae																	
<i>Macropelopia</i> sp.	L	192													48	24	24
<i>Pentaneura</i> sp.	L	10446	6	168	36	144		12	8						72	24	24
Culicidae													6				
<i>Culicidae</i> indet.	A	6															
Dixidae																	
<i>Dixa</i> sp.	L	144															
Empididae																	
<i>Empididae</i> indet.	A	24															
<i>Chelfera/Metachela</i> sp.	L	180											24		6	12	
<i>Clinocera</i> sp.	L	12															
<i>Oreogeton</i> sp.	L	3676											32	36	60	96	48
Psychodidae																	
<i>Pericoma/Telmatoscopus</i> sp.	L	4416															
Simuliidae																	
<i>Simuliidae</i> indet.	L	300						24									
<i>Simuliidae</i> indet.	P	204							12								
<i>Simuliidae</i> indet.	A	312															
<i>Prosimillium</i> sp.	L	300						12					24			6	
Tipulidae																	
<i>Tipulidae</i> indet.	L	8											8				
<i>Antocha monticola</i>	L	48						48									
<i>Antocha</i> sp.	L	12							12								
<i>Dicranota</i> sp.	L	4336											32	30	24	60	24
<i>Hexatoma</i> sp.	L	138	24					24								18	
Total Number of Organisms		891671	1914	3660	3973	6144	4022	2408	2520	4512	7428	6120	16320	8040	3378	5628	4884
Total Number of Taxa		5971	35	29	22	37	35	30	30	29	26	14	13	23	21	21	
MEMO																	
Diptera indet.	A	24															
Hemiptera indet.	A	120															
Hymenoptera indet.	A	96															
Invertebrate eggs		324													120		12
Lepidoptera indet.	A	6											6				
Thysanoptera indet.	L	332											6				
Thysanoptera indet.	A	260											8				

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Strm 5-1	Strm 5-2	Strm 5-3	Strm 5-4	Strm 5-5	Strm 6-1	Strm 6-2	Strm 6-3	Strm 6-4	Strm 6-5	Lower Strm 7-1	Lower Strm 7-2	Lower Strm 7-3	Lower Strm 7-4	Lower Strm 7-5
NEMATODA																	
Nematoda indet.	A	2528	5			12	168	48		3							
ANNELIDA																	
Oligochaeta																	
Enchytraeidae																	
Enchytraeidae indet.	J	2856			132		30	252	48		30			24			
Enchytraeidae indet.	A	1563		21	60		6	108			18					24	
Lumbricidae																	
Lumbricidae indet.	A	28															
Naididae																	
<i>Chaetogaster diaphanus</i>	A	12															
<i>Chaetogaster diastrophus</i>	A																
<i>Naididae</i> indet. Group 2																	
<i>Pristina aquiseta</i>	A	6															
<i>Naididae</i> indet. Group 3																	
<i>Pristinella jenkinæ</i>	J	12						12									
<i>Pristinella jenkinæ</i>	A	2102		11	168		12	612	192		51			96			
<i>Naididae</i> indet. Group 5																	
<i>Nais communis</i>	J	24															
<i>Nais communis</i>	A	456			36												
<i>Nais variabilis</i>	A	18						6	12								
Tubificidae																	
Tubificidae indet. Group 2	J	24															
Tubificidae indet. Group 2	A	73		1													
<i>Rhyacodrilus</i> sp.	A																
MOLLUSCA																	
Gastropoda																	
Gastropoda indet.	J																
Valvatidae																	
<i>Valvata</i> sp.	J																
Bivalvia																	
Sphaeriidae																	
<i>Pisidium casertanum</i>	J	24															
<i>Pisidium casertanum</i>	A	48															
<i>Pisidium</i> spp.	J	151		1	36												
<i>Pisidium</i> spp.	A																
Unionidae																	
<i>Anodonta kennerlyi</i>	A	48															
ARTHROPODA																	
ARACHNIDA																	
Acari																	
Acari indet.		10672	6	240	48	60	60		36	6	48	48	42	48	30		96
Arrenuroidea																	
Arrenuridae																	
<i>Arrenurus</i> sp.		120															
Lebertoidea																	
Lebertiidae																	
<i>Lebertia</i> sp.		1111	1	36		6	60					12					
Pionidae																	
<i>Pionidae</i> indet.		162								6		12					
Sperchontidae																	
<i>Sperchontidae</i> indet.		288		36									12		24		
<i>Sperchon</i> sp.		1984		12		12				12				18			
Torrenticolidae																	
<i>Testudacarus</i> sp.		42															
<i>Torrenticola</i> sp.		282															
Oribatida																	
Hydrozetidae																	
<i>Hydrozetes</i> sp.		24															
Strombioidea																	
Stygothrombidae																	
<i>Stygothrombidae</i> indet.		134							48	18		12					
<i>Stygothrombium</i> sp.		826		24	12								24		24		

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Strm 5-1	Strm 5-2	Strm 5-3	Strm 5-4	Strm 5-5	Strm 6-1	Strm 6-2	Strm 6-3	Strm 6-4	Strm 6-5	Lower Strm 7-1	Lower Strm 7-2	Lower Strm 7-3	Lower Strm 7-4	Lower Strm 7-5		
CRUSTACEA																			
Amphipoda																			
Hyaellidae																			
<i>Hyalella azteca</i>	A	30					6	24											
Cladocera																			
Daphniidae																			
<i>Daphnia</i> sp.	A	4	4																
Copepoda																			
Cyclopoida																			
Cyclopoida indet.	cpp	73	1														24		
Harpacticoida																			
Harpacticoida indet.	cpp	446	14	108				12											
Ostracoda																			
Podocopina																			
Podocopina indet.	A	12973	54	2064	156			816	2064	102	279	552	648	12	24	18	48	72	
INSECTA																			
Collembola																			
Collembola indet.	A	6																	
Poduridae																			
Poduridae indet.	A	2632	1	12						6	3					84	48	48	
Sminthuridae																			
Sminthuridae indet.	A																		
Ephemeroptera																			
Ephemeroptera indet.	N																		
Ameletidae																			
<i>Ameletus</i> sp.	N	5685										3	36		84	384	138	312	120
Baetidae																			
Baetidae indet.	N	3876	6	24	72	6	12		18	12	36	36	18			12			
<i>Acentrella</i> sp.	N																		
<i>Baetis bicaudatus</i>	N	2493							24	9	48	60	12	144	30	120			
<i>Baetis tricaudatus</i>	N	876	3	48		6	48												
Ephemerellidae																			
Ephemerellidae indet.	N	13166							336	12	24	216	180	210	792	354	696	408	
<i>Drunella doddsii</i>	N	609							18	9	60	12	6			30	24		
<i>Drunella grandis</i>	N	24																	
<i>Drunella flavilinea</i>	N	24																	
<i>Drunella</i> sp.	N	60																	
<i>Ecdyonurus criddlei</i>	N	60																	
<i>Serratella velmae</i>	N	156																	
Heptageniidae																			
Heptageniidae indet.	N	10023	12	96	84	54	24		144	12	9	60	36	720	696	618	24	96	
<i>Cinygmulia</i> sp.	N	3342	2	12					48	24	42	216	84	6	72		24	24	
<i>Epeorus deceptivus</i>	N	1866							18	12	60	12	90	312	48				
<i>Rhithrogena</i> sp.	N	1320								48		54	48	30		24	24		
Leptophyphidae																			
<i>Tricorythodes</i> sp.	N																		
Leptophlebiidae																			
Paraleptophlebia sp.	N	6848	2	48	12	18	48	48	24	12	120	24	48	216	42	216	48		
Odonata																			
Gomphidae																			
<i>Ophiogomphus</i> sp.	N																		
Plecoptera																			
Capniidae																			
Capniidae indet.	N	33483	9	60	12	6	108	864	150	72	876	516	96	360	210	288	648		
Chloroperlidae																			
Chloroperlidae indet.	N	2653		24	12	12	12	240	42	15	72	96	36	24	6	24	72		
<i>Paraperla</i> sp.	N	474							6	36	12								48
<i>Suwalla</i> sp.	N	12																	
<i>Sweltsa</i> sp.	N	7154	7	12	24	24				33	96	12	36	120	54	96	168		
Leuctridae																			
Leuctridae indet.	N	4240	12	48	36	30	168	48	48	12	84	36	78	48	24	72	48		
<i>Despaxia augustus</i>	N	2860	1	36		6			15		12	6	120	6	6	72	72	24	

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Strm 5-1	Strm 5-2	Strm 5-3	Strm 5-4	Strm 5-5	Strm 6-1	Strm 6-2	Strm 6-3	Strm 6-4	Strm 6-5	Lower Strm 7-1	Lower Strm 7-2	Lower Strm 7-3	Lower Strm 7-4	Lower Strm 7-5
Nemouridae																	
<i>Nemouridae</i> indet.	N	16932		4			12	48	528	222	96	552	480	36	96	54	48
<i>Visoka</i> sp.	N	1154										12			6	192	48
<i>Zapada cintipes</i>	N	92		2													
<i>Zapada columbiana</i>	N	802															
<i>Zapada oregonensis</i>	N	120														24	
Perlidae																	
<i>Perlidae</i> indet.	N	88															
<i>Doroneuria</i> sp.	N	75															
Perlodidae																	
<i>Perlodidae</i> indet.	N	426										6					
<i>Megarcys</i> sp.	N	12															
<i>Skwala</i> sp.	N	24															
Trichoptera																	
<i>Trichoptera</i> indet.	L	585		3	36	12	36					6	18	108			
<i>Trichoptera</i> indet.	P	6													6		
Brachycentridae																	
<i>Micrasema</i> sp.	L	48															
Glossomatidae																	
<i>Glossosoma</i> sp.	L	186										6	12				24
Hydroptilidae																	
<i>Hydroptilidae</i> indet.	L																
Hydropsychidae																	
<i>Hydropsychidae</i> indet.	L																
<i>Hydropsyche</i> sp.	L																
<i>Parapsyche elsis</i>	L	24															
Lepidostomatidae																	
<i>Lepidostoma</i> sp.	L	132															
Limnephiliidae																	
<i>Limnephiliidae</i> indet.	L																
<i>Limnephiliidae</i> indet.	P	4															24
<i>Ecclisomyia</i> sp.	L	168															
<i>Onocosmoecus unicolor</i>	L																
<i>Onocosmoecus</i> sp.	L																
Rhyacophilidae																	
<i>Rhyacophilidae</i> indet.	P																
<i>Rhyacophila</i> sp.	L	4796		1													
<i>Rhyacophila</i> sp.	P	50		2													
Uenoidae																	
<i>Neothremma</i> sp.	L	420															
Lepidoptera																	
Crambidae																	
<i>Crambidae</i> indet.	L	12															
Coleoptera																	
Elmidae																	
<i>Elmidae</i> indet.	L	652															
<i>Heterlimnius</i> sp.	L	1245		4	12	156	108	30	84	144	48	18	60	60	6		
<i>Heterlimnius</i> sp.	A	12						24	144		48	15	24	48		6	24
<i>Macronychus</i> sp.	A							12									
Hydrophilidae																	
<i>Hydrophilidae</i> indet.	L	12															
Staphylinidae																	
<i>Staphylinidae</i> indet.	A																
Diptera																	
Ceratopogonidae																	
<i>Probezzia</i> sp.	L	2138		2	84	12	12	204	48			18	48	12			
Chironomidae																	
<i>Chironomidae</i> indet.	L	136264		58	660	108	546	636		186	138	1140	384	138	1176	450	4296
<i>Chironomidae</i> indet.	P	4484		2	12		42	60	144	6	30	48	36	6	96	24	1944
<i>Chironomidae</i> indet.	A	266		2											24		

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Strm 5-1	Strm 5-2	Strm 5-3	Strm 5-4	Strm 5-5	Strm 6-1	Strm 6-2	Strm 6-3	Strm 6-4	Strm 6-5	Lower Strm 7-1	Lower Strm 7-2	Lower Strm 7-3	Lower Strm 7-4	Lower Strm 7-5
Chironominae																	
Chironomini																	
<i>Chironomus</i> sp.	L																
<i>Stictochironomus</i> sp.	L	294											6				
Tanytarsini																	
<i>Corynocera</i> sp.	L	432															
<i>Micropsectra</i> sp.	L	1662															
<i>Neostempellina</i> sp.	L																
<i>Stempellina</i> sp.	L	26889	16	180	48	348	228	96	42	45	456	168	54	264	90	1248	240
<i>Sublettea</i> sp.	L	8054	2			72	480	96		30			6			48	
<i>Tanytarsus</i> sp.	L	6864	14	12	72	96	96	48			120		6	96	18	408	192
<i>Zavrelia</i> sp.	L																
Orthocladiinae																	
<i>Corynoneura</i> sp.	L	8790	7	36		60	84	960	36	75	348	612	114	528	54	168	144
<i>Eukiefferiella</i> sp.	L	7664	7	12	12			192	12	21	108	192	24	24	24	72	24
<i>Krenosmittia</i> sp.	L																
<i>Limnophyes</i> sp.	L	1112	2										60	6			
<i>Orthocladius</i> sp.	L	5378	5				6	36			18	9	36	180	6		
<i>Parametriocnemus</i> sp.	L	186	6				6	24					6		6		
<i>Rheocricotopus</i> sp.	L	7854		72	24	204	312	96	12	6			24	6		30	312
<i>Thienemanniella</i> sp.	L	4084			12			192					228	12	48	60	96
Podominae																	
<i>Boreochlus</i> sp.	L	84											12				
Tanypodinae																	
<i>Macropelopia</i> sp.	L	48															
<i>Pentaneura</i> sp.	L	4964	2	12		36	24						12		18	24	18
Culicidae																	
Culicidae indet.	A																
Dixidae																	
<i>Dixa</i> sp.	L	72															
Empididae																	
Empididae indet.	A	12											12				
<i>Chelfiera/Metachela</i> sp.	L	69											9		12		
<i>Clinocera</i> sp.	L	6											6				
<i>Oreogeton</i> sp.	L	1690											42	6	48	6	
Psychodidae																	
<i>Pericoma/Telmatoscopus</i> sp.	L	2208															
Simuliidae																	
Simuliidae indet.	L	138											96	12			
Simuliidae indet.	P	96															
Simuliidae indet.	A	156											6				
<i>Prosimillium</i> sp.	L	129	9	36										42			
Tipulidae																	
Tipulidae indet.	L																
<i>Antocha monticola</i>	L																
<i>Antocha</i> sp.	L																
<i>Dicranota</i> sp.	L	2074	1										96	6	15	12	24
<i>Hexatoma</i> sp.	L	36															
Total Number of Organisms		405360	325	4704	864	1854	5136	7104	1428	1269	6060	4548	2016	6048	2742	9432	5160
Total Number of Taxa		2790	32	27	15	25	27	26	30	31	31	29	27	22	27	28	23
MEMO																	
Diptera indet.	A	12															
Hemiptera indet.	A	60														48	
Hymenoptera indet.	A	48															
Invertebrate eggs		96															
Lepidoptera indet.	A																
Thysanoptera indet.	L	166															
Thysanoptera indet.	A	126															

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Upper Strm 7-1	Upper Strm 7-2	Upper Strm 7-3	Upper Strm 7-4	Upper Strm 7-5	Strm 8-1	Strm 8-2	Strm 8-3	Strm 8-4	Strm 8-5	Strm 9-1	Strm 9-2	Strm 9-3	Strm 9-4	Strm 9-5
NEMATODA																	
Nematoda indet.	A	1146		30				276	66		48		90	120			
ANNELIDA																	
Oligochaeta																	
Enchytraeidae																	
Enchytraeidae indet.	J	1170						24		24	12		12				
Enchytraeidae indet.	A	663		6				24	12				6	108	744	15	72
Lumbricidae																	
Lumbricidae indet.	A	14									12						
Naididae																	
<i>Chaetogaster diaphanus</i>	A	6												6			
<i>Chaetogaster diastraphus</i>	A																
<i>Naididae</i> indet. Group 2																	
<i>Pristina aquiseta</i>	A	3															
<i>Naididae</i> indet. Group 3																	
<i>Pristinella jenkinæ</i>	J																
<i>Pristinella jenkinæ</i>	A	480												54	384	18	24
<i>Naididae</i> indet. Group 5																	
<i>Nais communis</i>	J	12											6	6			
<i>Nais communis</i>	A	210											6	12	168	24	
<i>Nais variabilis</i>	A																
Tubificidae																	
Tubificidae indet. Group 2	J	12						12									
Tubificidae indet. Group 2	A	36						12	12	6			6				12
<i>Rhyacodrilus</i> sp.	A																
MOLLUSCA																	
Gastropoda																	
Gastropoda indet.	J																
Valvatidae																	
<i>Valvata</i> sp.	J																
Bivalvia																	
Sphaeriidae																	
<i>Pisidium casertanum</i>	J	12															12
<i>Pisidium casertanum</i>	A	24															24
<i>Pisidium</i> spp.	J	3															3
<i>Pisidium</i> spp.	A																
Unionidae																	
<i>Anodonta kennerlyi</i>	A	24															24
ARTHROPODA																	
ARACHNIDA																	
Acoli																	
Acoli indet.		4952	3	36	8	12	120	180	12				96	12	192	342	1008
Arrenuroidea																9	984
Arrenuridae																	
<i>Arrenurus</i> sp.		60							12								24
Lebertoidea																	
Lebertiidae																	
<i>Lebertia</i> sp.		498											12	12			6
Pionidae																	
<i>Pionidae</i> indet.		72															
Sperchontidae																	
<i>Sperchontidae</i> indet.		108															
<i>Sperchon</i> sp.		965	3	12	2			72	36				192	168	96		288
Torrenticolidae																	
<i>Testudacarus</i> sp.		21	3	6									6			3	36
<i>Torrenticola</i> sp.		141															
Oribatida																	
Hydrozetidae																	
<i>Hydrozetes</i> sp.		12															
Strombioidea																	
Stygothrombidae																	
<i>Stygothrombidae</i> indet.		28						4					12				
<i>Stygothrombium</i> sp.		371			2			48	24				18	240	3		

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Upper Strm 7-1	Upper Strm 7-2	Upper Strm 7-3	Upper Strm 7-4	Upper Strm 7-5	Strm 8-1	Strm 8-2	Strm 8-3	Strm 8-4	Strm 8-5	Strm 9-1	Strm 9-2	Strm 9-3	Strm 9-4	Strm 9-5
CRUSTACEA																	
Amphipoda																	
Hyaellidae																	
<i>Hyalella azteca</i>	A																
Cladocera																	
Daphniidae																	
<i>Daphnia</i> sp.	A																
Copepoda																	
Cyclopoida																	
Cyclopoida indet.	cpp	24															
Harpacticoida																	
Harpacticoida indet.	cpp	156															
Ostracoda																	
Podocopina																	
Podocopina indet.	A	3032		12	2	12	48	864	180				48	24	18	552	6
INSECTA																	
Collembola																	
Collembola indet.	A	3															3
Poduridae																	
Poduridae indet.	A	1215	3			12		48	12	12				6			
Sminthuridae																	
Sminthuridae indet.	A																
Ephemeroptera																	
Ephemeroptera indet.	N																
Ameletidae																	
<i>Ameletus</i> sp.	N	2304	36	126	24	132	288	12	66	36	120	12					
Baetidae																	
Baetidae indet.	N	1812		12	6								258	60	192	144	24
<i>Acentrella</i> sp.	N																
<i>Baetis bicaudatus</i>	N	1023	15	12	12	6							18				
<i>Baetis tricaudatus</i>	N	384											96	102	120	42	12
Ephemerellidae																	
Ephemerellidae indet.	N	4969	87	222	76	450	168				72			6			
<i>Drunella doddsii</i>	N	225	3														
<i>Drunella grandis</i>	N	12															12
<i>Drunella flavilinea</i>	N																
<i>Drunella</i> sp.	N	18											12			6	
<i>Ecdyonurus criddlei</i>	N	30											30				
<i>Serratella velmae</i>	N	78											12	12	48	6	
Heptageniidae																	
Heptageniidae indet.	N	3741	153	120	114	426	168	60	30	24	120		78	12	24	72	60
<i>Cinygmulia</i> sp.	N	1346	3	24	8	6	24						24	9		9	12
<i>Epeorus deceptivus</i>	N	633	9														
<i>Rhithrogena</i> sp.	N	546		6	6								12				
Leptophyphidae																	
<i>Tricorythodes</i> sp.	N																
Leptophlebiidae																	
<i>Paraleptophlebia</i> sp.	N	2961	18	150	30	60	288						42	6	48	9	120
Odonata																	
Gomphidae																	
<i>Ophiogomphus</i> sp.	N																
Plecoptera																	
Capniidae																	
Capniidae indet.	N	14604	6	6	6	96	120	60	150	72	300	108	12			6	
Chloroperlidae																	
Chloroperlidae indet.	N	983	3	42	2	18	72	24		12		6	6				
<i>Paraperla</i> sp.	N	186															
<i>Suwalla</i> sp.	N	6															
<i>Sweltsa</i> sp.	N	3236	6	54	2	54	120	48	24	24	120	84	12				12
Leuctridae																	
Leuctridae indet.	N	1724	3	12	2	54	240	24	12	48	48	12		48	3	12	
<i>Despaxia augustus</i>	N	1281	3	48	36	48		42	12	36	12	12	96	6	108		

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Upper Strm 7-1	Upper Strm 7-2	Upper Strm 7-3	Upper Strm 7-4	Upper Strm 7-5	Strm 8-1	Strm 8-2	Strm 8-3	Strm 8-4	Strm 8-5	Strm 9-1	Strm 9-2	Strm 9-3	Strm 9-4	Strm 9-5
Nemouridae																	
Nemouridae indet.	N	7330	18	36	16	18	96	120	108		120	84	78	132	264	24	36
<i>Visoka</i> sp.	N	448		6	4	6	24						6		24	15	
<i>Zapada cintipes</i>	N	45															
<i>Zapada columbiana</i>	N	380	6			2											12
<i>Zapada oregonensis</i>	N	48										24					
Perlidae																	
Perlidae indet.	N	17				2											3
<i>Doroneuria</i> sp.	N	12															
Perlodidae																	
Perlodidae indet.	N	210											6	12			
<i>Megarcys</i> sp.	N																
<i>Skwala</i> sp.	N	12															12
Trichoptera																	
Trichoptera indet.	L	183								6			12		24	3	12
Trichoptera indet.	P																
Brachycentridae																	
<i>Micrasema</i> sp.	L	24												12		12	
Glossomatidae																	
<i>Glossosoma</i> sp.	L	72					24										
Hydroptilidae																	
Hydroptilidae indet.	L																
Hydropsychidae																	
Hydropsychidae indet.	L																
<i>Hydropsyche</i> sp.	L																
<i>Parapsyche elsis</i>	L	12															
Lepidostomatidae																	
<i>Lepidostoma</i> sp.	L	66					6										12
Limnephiliidae																	
Limnephiliidae indet.	L																
Limnephiliidae indet.	P	2											2				
<i>Ecclisomyia</i> sp.	L	72						24			24						
<i>Onocosmoecus unicolor</i>	L																
<i>Onocosmoecus</i> sp.	L																
Rhyacophilidae																	
Rhyacophilidae indet.	P																
<i>Rhyacophila</i> sp.	L	2051	15	36	14	18	48						12		18	12	
<i>Rhyacophila</i> sp.	P	6															
Uenoidae																	
<i>Neothremma</i> sp.	L	210	6				12										
Lepidoptera																	
Crambidae																	
Crambidae indet.	L	6			6												
Coleoptera																	
Elmidae																	
Elmidae indet.	L	95	3	12	2	18	48										
<i>Heterlimnius</i> sp.	L	322		12	4	24	48										
<i>Heterlimnius</i> sp.	A																
<i>Macronychus</i> sp.	A																
Hydrophilidae																	
Hydrophilidae indet.	L	6											6				
Staphylinidae																	
Staphylinidae indet.	A																
Diptera																	
Ceratopogonidae																	
<i>Probezzia</i> sp.	L	849		24		24	240	24	6			6	30	72	15	192	
Chironomidae																	
Chironomidae indet.	L	62202	51	348	72	1488	3696	636	498	24	504	276	174	354	2112	99	2448
Chironomidae indet.	P	1761		12		18	96	48	54			36	6	6	24	3	36
Chironomidae indet.	A	120			6		12	6					12	24			

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Upper Strm 7-1	Upper Strm 7-2	Upper Strm 7-3	Upper Strm 7-4	Upper Strm 7-5	Strm 8-1	Strm 8-2	Strm 8-3	Strm 8-4	Strm 8-5	Strm 9-1	Strm 9-2	Strm 9-3	Strm 9-4	Strm 9-5
Chironominae																	
Chironomini																	
<i>Chironomus</i> sp.	L																
<i>Stictochironomus</i> sp.	L	144															
Tanytarsini																	
<i>Corynocera</i> sp.	L	216															
<i>Micropsectra</i> sp.	L	804	3														
<i>Neostempellina</i> sp.	L																
<i>Stempellinella</i> sp.	L	11683	45	120	22	60	840	204	258	264	276	480	378	192	240	72	696
<i>Sublettea</i> sp.	L	3660	15	12		54	24	480	30	24	120	96	42		216	21	180
<i>Tanytarsus</i> sp.	L	2843	9		2		192	396	324	180	360	696			24		
<i>Zavrelia</i> sp.	L																
Orthocladiinae																	
<i>Corynoneura</i> sp.	L	2782	48	30	22	120											
<i>Eukiefferiella</i> sp.	L	3470	6	18	8	18	72	108	36	48	24	24	24		72	30	48
<i>Krenosmittia</i> sp.	L																
<i>Limnophyes</i> sp.	L	522													6		
<i>Orthocladius</i> sp.	L	2526			6	24	24										
<i>Parametriocnemus</i> sp.	L	66													6		
<i>Rheocricotopus</i> sp.	L	3318	3	24	6	18									18	18	21
<i>Thienemanniella</i> sp.	L	1718	12	6	2	18	144	36	24	48	60	84	12	42	60	48	192
Podominae																	
<i>Boreochlus</i> sp.	L	36															
Tanypodinae																	
<i>Macropelopia</i> sp.	L	24															
<i>Pentaneura</i> sp.	L	2361		60	12	12	24								150	84	456
Culicidae																	
Culicidae indet.	A																
Dixidae																	
<i>Dixa</i> sp.	L	36													12	18	6
Empididae																	
Empididae indet.	A																
<i>Chelfiera/Metachela</i> sp.	L	18													12		
<i>Clinocera</i> sp.	L																
<i>Oreogeton</i> sp.	L	764			2	18		12	6						12		
Psychodidae																	
<i>Pericoma/Telmatoscopus</i> sp.	L	1104													24	138	672
Simuliidae																	
Simuliidae indet.	L																
Simuliidae indet.	P	48															
Simuliidae indet.	A	48															
<i>Prosimullum</i> sp.	L	60													48		12
Tipulidae																	
Tipulidae indet.	L																
<i>Antocha monticola</i>	L																
<i>Antocha</i> sp.	L																
<i>Dicranota</i> sp.	L	936		6		12	24		18	12					12		
<i>Hexatoma</i> sp.	L	12															
Total Number of Organisms		173335	597	1704	504	3378	7632	3876	2066	984	2796	2148	2220	2244	8904	864	6612
Total Number of Taxa		1195	24	27	26	27	25	24	26	22	24	18	35	29	27	32	27
MEMO																	
Diptera indet.	A	6			6												
Hemiptera indet.	A	6			6												
Hymenoptera indet.	A	24															
Invertebrate eggs		48															
Lepidoptera indet.	A																
Thysanoptera indet.	L	77			2											3	
Thysanoptera indet.	A	48															

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Strm 11.9-1	Strm 11.9-2	Strm 11.9-3	Strm 11.9-4	Strm 11.9-5	Strm 17.1-1	Strm 17.1-2	Strm 17.1-3	Strm 17.1-4	Strm 17.1-5	Strm 26-1	Strm 26-2	Strm 26-3	Strm 26-4	Strm 26-5
NEMATODA																	
Nematoda indet.	A	258	72	12		12	24		24	72			24			6	12
ANNELIDA																	
Oligochaeta																	
Enchytraeidae																	
Enchytraeidae indet.	J	87				3					48						
Enchytraeidae indet.	A	174									144		12	12	24		6
Lumbricidae																	
Lumbricidae indet.	A	1										1					
Naididae																	
<i>Chaetogaster diaphanus</i>	A																
<i>Chaetogaster diastrophus</i>	A																
<i>Naididae</i> indet. Group 2																	
<i>Pristina aequiseta</i>	A																
<i>Naididae</i> indet. Group 3																	
<i>Pristinella jenkiniae</i>	J																
<i>Pristinella jenkiniae</i>	A																
<i>Naididae</i> indet. Group 5																	
<i>Nais communis</i>	J																
<i>Nais communis</i>	A																
<i>Nais variabilis</i>	A																
Tubificidae																	
Tubificidae indet. Group 2	J																
Tubificidae indet. Group 2	A																
<i>Rhyacodrilus</i> sp.	A																
MOLLUSCA																	
Gastropoda																	
Gastropoda indet.	J																
Valvatidae																	
<i>Valvata</i> sp.	J																
Bivalvia																	
Sphaeriidae																	
<i>Pisidium casertanum</i>	J																
<i>Pisidium casertanum</i>	A																
<i>Pisidium</i> spp.	J																
<i>Pisidium</i> spp.	A																
Unionidae																	
<i>Anodonta kennerlyi</i>	A																
ARTHROPODA																	
ARACHNIDA																	
Acoli																	
Acoli indet.		969	24		9	36	72	120	60	240	24	156	120	12	24	36	36
Arrenuroidea																	
Arrenuridae																	
<i>Arrenurus</i> sp.		12														6	6
Lebertoidea																	
Lebertidae																	
<i>Lebertia</i> sp.		234	48					30	84			24	48				
Pionidae																	
<i>Pionidae</i> indet.		6														6	
Sperchontidae																	
Sperchontidae indet.																	
<i>Sperchon</i> sp.		102			6				72								24
Torrenticolidae																	
<i>Testudacarus</i> sp.		6													6		
<i>Torrenticola</i> sp.		48											24				24
Oribatida																	
Hydrozetidae																	
<i>Hydrozetes</i> sp.		6														6	
Strombioidea																	
Stygothrombidae																	
<i>Stygothrombidae</i> indet.		12													12		
<i>Stygothrombium</i> sp.		12													12		

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Strm 11.9-1	Strm 11.9-2	Strm 11.9-3	Strm 11.9-4	Strm 11.9-5	Strm 17.1-1	Strm 17.1-2	Strm 17.1-3	Strm 17.1-4	Strm 17.1-5	Strm 26-1	Strm 26-2	Strm 26-3	Strm 26-4	Strm 26-5	
CRUSTACEA																		
Amphipoda																		
Hyalellidae																		
<i>Hyalella azteca</i>	A																	
Cladocera																		
Daphniidae																		
<i>Daphnia</i> sp.	A																	
Copepoda																		
Cyclopoida																		
Cyclopoida indet.	cpp																	
Harpacticoida																		
Harpacticoida indet.	cpp	42			6							6		24			6	
Ostracoda																		
Podocopina																		
Podocopina indet.	A	573	24	6	3	12	24	36	84			36	18	192	12	6	36	84
INSECTA																		
Collembola																		
Collembola indet.	A																	
Poduridae																		
Poduridae indet.	A	561	48		3		24	18				6	240		60	6	156	
Sminthuridae																		
Sminthuridae indet.	A																	
Ephemeroptera																		
Ephemeroptera indet.	N																	
Ameletidae																		
<i>Ameletus</i> sp.	N	726	48	36	30	24	72	84	48	120	132	60			12	36	24	
Baetidae																		
Baetidae indet.	N	558			12			54	36	144	6	54	48	60	84	36	24	
<i>Acentrella</i> sp.	N																	
<i>Baetis bicaudatus</i>	N	444		6		12			12	24	30	24	120		66	78	72	
<i>Baetis tricaudatus</i>	N	6													6			
Ephemerellidae																		
Ephemerellidae indet.	N	1944	72	60	66	24	144	264	132	336	312	120	144	12	12	6	240	
<i>Drunella doddsii</i>	N	108							24		12			24	12	12	36	
<i>Drunella grandis</i>	N																	
<i>Drunella flavilinea</i>	N																	
<i>Drunella</i> sp.	N																	
<i>Ecdyonurus criddlei</i>	N																	
<i>Serratella velmae</i>	N																	
Heptageniidae																		
Heptageniidae indet.	N	1140		78	60	48		156	60	240	162	114	24	24	30	120		
<i>Cinygmulia</i> sp.	N	618		12								6	144	42	102	108	204	
<i>Epeorus deceptivus</i>	N	306		30	12	36			12	72		24	48	42	18	12		
<i>Rhithrogena</i> sp.	N	267		6	3	12			48		12		24	36	30	96		
Leptophyidae																		
<i>Tricorythodes</i> sp.	N																	
Leptophlebiidae																		
<i>Paraleptophlebia</i> sp.	N	1095	24	36	15	12	48	66	24	192	138	120	168	18	42	84	108	
Odonata																		
Gomphidae																		
<i>Ophiogomphus</i> sp.	N																	
Plecoptera																		
Capniidae																		
Capniidae indet.	N	6831	192	288	213	72	504	600	420	1152	1002	540	336	78	66	288	1080	
Chloroperlidae																		
Chloroperlidae indet.	N	393		24	15	12	96	12	12	24	30	42			18	6	18	84
<i>Paraperla</i> sp.	N	87		12	9			6			18	6	24				12	
<i>Suwalla</i> sp.	N																	
<i>Sweltsa</i> sp.	N	1338	288	294	42	120	216	6	12		54	24	120	12	18	36	96	
Leuctridae																		
Leuctridae indet.	N	603	48	30	15	12	48	54	60	114	72	24	24	12	6	84		
<i>Despaxia augustus</i>	N	411	96	60	3	36	48	12	12	24	18	36	24	12	6	12	12	

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (continued)

TAXON	Stage	No. of individuals	Strm 11.9-1	Strm 11.9-2	Strm 11.9-3	Strm 11.9-4	Strm 11.9-5	Strm 17.1-1	Strm 17.1-2	Strm 17.1-3	Strm 17.1-4	Strm 17.1-5	Strm 26-1	Strm 26-2	Strm 26-3	Strm 26-4	Strm 26-5	
Nemouridae																		
<i>Nemouridae</i> indet.	N	3090			6	12	72	24	234	156	744	120	180	456	48	42	180	816
<i>Visoka</i> sp.	N	204		24								6	120	120	6	6	48	
<i>Zapada cintipes</i>	N																	
<i>Zapada columbiana</i>	N	180					12			18								
<i>Zapada oregonensis</i>	N	12									24			24	12	60	6	24
Perlidae																		
<i>Perlidae</i> indet.	N	6																6
<i>Doroneuria</i> sp.	N	6															6	
Perlodidae																		
<i>Perlodidae</i> indet.	N	96										24	6			12	6	48
<i>Megarcys</i> sp.	N																	
<i>Skwala</i> sp.	N																	
Trichoptera																		
<i>Trichoptera</i> indet.	L	63		24	6	3	12			12					6			
<i>Trichoptera</i> indet.	P																	
Brachycentridae																		
<i>Micrasema</i> sp.	L																	
Glossomatidae																		
<i>Glossosoma</i> sp.	L	24																24
Hydroptilidae																		
<i>Hydroptilidae</i> indet.	L																	
Hydropsychidae																		
<i>Hydropsychidae</i> indet.	L																	
<i>Hydropsyche</i> sp.	L																	
<i>Parapsyche elsis</i>	L	6															6	
Lepidostomatidae																		
<i>Lepidostoma</i> sp.	L	24		24														
Limnephiliidae																		
<i>Limnephilidae</i> indet.	L																	
<i>Limnephilidae</i> indet.	P																	
<i>Ecclisomyia</i> sp.	L	12			12													
<i>Onocosmoecus unicolor</i>	L																	
<i>Onocosmoecus</i> sp.	L																	
Rhyacophilidae																		
<i>Rhyacophilidae</i> indet.	P																	
<i>Rhyacophila</i> sp.	L	939				3	12	24	78	60	144	54	138	72	24	78	60	192
<i>Rhyacophila</i> sp.	P																	
Uenoidae																		
<i>Neothremma</i> sp.	L	96																
Lepidoptera																		
Crambidae																		
<i>Crambidae</i> indet.	L																	
Coleoptera																		
Elmidae																		
<i>Elmidae</i> indet.	L	6															6	
<i>Heterlimnius</i> sp.	L	72		24													6	36
<i>Heterlimnius</i> sp.	A																	
<i>Macronychus</i> sp.	A																	
Hydrophilidae																		
<i>Hydrophilidae</i> indet.	L																	
Staphylinidae																		
<i>Staphylinidae</i> indet.	A																	
Diptera																		
Ceratopogonidae																		
<i>Probezzia</i> sp.	L	108		24			12								48	12	12	
Chironomidae																		
<i>Chironomidae</i> indet.	L	24711	6240	966	603	816	3384	666	744	2016	282	336	3000	216	822	1488	3132	
<i>Chironomidae</i> indet.	P	711	24	36	3		120	24	12	96	120	30	96	30	6	84	36	
<i>Chironomidae</i> indet.	A	30									12		6	6	6	6	6	

(continued)

Appendix 3.3-3
Morrison Copper/Gold Project Stream Benthos Data, 2008 (completed)

TAXON	Stage	No. of individuals	Strm 11.9-1	Strm 11.9-2	Strm 11.9-3	Strm 11.9-4	Strm 11.9-5	Strm 17.1-1	Strm 17.1-2	Strm 17.1-3	Strm 17.1-4	Strm 17.1-5	Strm 26-1	Strm 26-2	Strm 26-3	Strm 26-4	Strm 26-5
Chironominae																	
Chironomini																	
<i>Chironomus</i> sp.	L																
<i>Stictochironomus</i> sp.	L	72	24	30									6	12			
Tanytarsini																	
<i>Corynocera</i> sp.	L	72	72														
<i>Micropsectra</i> sp.	L	204	48	96		24				12				18			6
<i>Neostempellina</i> sp.	L																
<i>Stempellinella</i> sp.	L	3768	504	276	120	408	192	120	240	240	180	240	504	42	90	120	492
<i>Sublettea</i> sp.	L	1173	168	36	27		600	6	24	96	6	54	6	18	24	24	108
<i>Tanytarsus</i> sp.	L	330	312	6		12											
<i>Zavrelia</i> sp.	L																
Orthocladiinae																	
<i>Corynoneura</i> sp.	L	1194		72	48	144	24	60	96	264	174	60	24	24	42	42	120
<i>Eukiefferiella</i> sp.	L	1467	72	102	21	60	48	78	108	240	258	120	96	54	48	18	144
<i>Krenosmittia</i> sp.	L																
<i>Limnophyes</i> sp.	L	258													132	126	
<i>Orthocladius</i> sp.	L	1209		6	21	48	24	6		72	6	12	600	54	108	168	84
<i>Parametriocnemus</i> sp.	L	18											6			12	
<i>Rheocrictopus</i> sp.	L	1239	120	150	21		120	42	60	96	84	24	312	24		114	72
<i>Thienemanniella</i> sp.	L	654		48	30		192	18	24		96	42	144	18	12	6	24
Podoninae																	
<i>Boreochlus</i> sp.	L	6						6									
Tanypodinae																	
<i>Macropelopia</i> sp.	L																
<i>Pentaneura</i> sp.	L	507	216	102	3	48	24			24	12	6	48			24	
Culicidae																	
Culicidae indet.	A																
Dixidae																	
<i>Dixa</i> sp.	L																
Empididae																	
Empididae indet.	A																
<i>Chelifera/Metachela</i> sp.	L	3			3												
<i>Clinocera</i> sp.	L																
<i>Oreogeton</i> sp.	L	357		24	3			36	120	96	24	42					12
Psychodidae																	
<i>Pericoma/Telmatoscopus</i> sp.	L	24	24														
Simuliidae																	
Simuliidae indet.	L																
Simuliidae indet.	P	24															
Simuliidae indet.	A	24															24
<i>Prosimillium</i> sp.	L																
Tipulidae																	
Tipulidae indet.	L																
<i>Antocha monticola</i>	L																
<i>Antocha</i> sp.	L																
<i>Dicranota</i> sp.	L	426		36	18		120	36	36	48	96						36
<i>Hexatoma</i> sp.	L																
Total Number of Organisms		63403	8928	3000	1464	2160	6216	2952	2880	7249	3636	2862	7392	1002	2160	3378	8124
Total Number of Taxa		401	24	28	28	22	21	25	24	27	28	32	25	25	29	30	33
MEMO																	
Diptera indet.	A																
Hemiptera indet.	A																
Hymenoptera indet.	A	12															12
Invertebrate eggs		24					24										
Lepidoptera indet.	A																
Thysanoptera indet.	L	30															
Thysanoptera indet.	A	24					24								24	6	

APPENDIX 3.3-4
MORRISON COPPER/GOLD PROJECT
BRAY CURTIS PERCENT SIMILARITY VALUES
FOR STREAM BENTHOS, 2008



Appendix 3.3-4

Morrison Copper/Gold Project Bray Curtis Percent Similarity Values for Stream Benthos, 2008

Morrison Creek	Morrison Creek	Morrison Creek	Morrison Creek	Morrison Creek	Strm1	Strm1	Strm1	Strm1	Strm1med	Strm4	Strm4	Strm4	Strm4	Strm5	Strm5	Strm5	Strm5	
Morrison Creek																		
Morrison Creek	64.14																	
Morrison Creek	32.73	37.57																
Morrison Creek	26.32	28.37	72.27															
Morrison Creek	31.09	35.29	63.12	71.60														
Strm1	27.74	28.30	58.77	64.29	71.70													
Strm1	24.24	28.36	60.73	65.72	70.65	68.46												
Strm1	27.81	28.96	75.40	82.52	84.40	77.97	79.16											
Strm1	15.36	18.77	22.20	22.08	24.18	19.71	20.28	22.71										
Strm1	19.70	25.83	26.24	28.80	30.06	23.57	25.25	28.43	64.04									
Strm1med	16.40	23.68	34.63	40.29	40.45	31.23	32.10	38.72	46.89	62.11								
Strm4	23.52	30.82	32.52	36.53	44.33	31.53	34.44	37.11	51.28	62.74	63.49							
Strm4	23.02	23.89	36.73	36.97	38.29	27.21	25.80	33.58	48.77	57.58	56.36	69.35						
Strm4	22.68	28.44	34.67	32.75	31.94	25.94	21.96	31.00	21.54	32.26	42.56	34.76	31.85					
Strm4	36.63	40.11	45.47	43.40	47.03	40.92	40.52	47.27	32.31	42.50	44.75	52.98	50.87	36.10				
Strm4	29.16	38.66	39.09	35.93	39.82	33.69	29.78	38.46	20.35	39.07	35.60	37.18	36.08	47.31	52.20			
Strm5	33.98	34.46	51.56	49.50	53.85	41.47	44.00	53.87	25.36	27.52	28.05	41.43	39.20	44.45	55.86	52.46		
Strm5	40.52	38.42	45.50	45.65	53.13	41.53	41.86	49.25	35.38	33.55	36.08	42.16	43.18	35.58	65.84	42.25	63.00	
Strm5	21.09	21.18	44.91	48.45	46.73	52.15	45.88	49.21	30.44	27.67	35.69	36.17	37.22	19.67	39.18	23.81	32.30	41.70
Strm5	25.08	30.69	54.05	56.13	54.57	47.03	47.30	55.35	19.28	25.04	34.09	32.03	33.54	32.33	37.51	41.66	38.80	35.55
Strm5	27.53	30.97	50.15	56.79	53.43	45.07	41.13	53.42	24.24	32.36	48.56	43.57	41.09	45.37	42.59	44.70	49.24	45.34
Strm6	26.65	30.43	54.66	61.10	64.54	67.82	60.91	65.25	26.07	30.68	35.38	36.22	36.23	23.48	40.85	33.20	42.52	44.99
Strm6	28.82	27.38	55.28	60.30	58.02	59.95	55.10	61.84	24.43	30.26	40.39	38.00	36.50	25.10	43.94	34.20	38.82	43.18
Strm6	25.27	27.42	54.40	60.21	49.50	51.72	48.48	58.06	19.69	29.24	36.77	34.58	36.40	39.63	39.29	42.95	46.25	40.00
Strm6	24.18	24.06	51.95	61.59	61.93	63.44	60.81	66.36	21.27	26.11	31.46	33.50	34.83	24.85	40.46	31.29	42.81	39.88
Strm6	26.68	27.90	63.47	67.88	61.31	58.09	60.01	66.30	19.40	29.28	40.51	37.83	32.77	34.28	44.27	38.20	47.11	40.95
Lower7	25.41	23.58	54.03	62.10	67.58	62.50	69.14	68.03	22.46	24.66	30.16	33.98	32.40	22.68	38.93	26.11	43.51	42.48
Lower7	25.72	27.49	57.20	62.38	63.75	57.75	67.15	66.68	25.62	27.72	29.47	34.90	41.76	26.91	44.73	37.44	49.30	46.07
Lower7	19.38	23.08	42.43	46.10	40.43	35.50	36.18	44.85	11.62	25.82	35.53	29.71	22.75	40.32	31.56	41.01	41.21	25.97
Lower7	30.73	34.49	54.46	64.61	54.51	50.65	48.22	57.84	19.71	28.86	36.24	37.27	39.10	37.06	47.17	44.09	56.82	41.38
Lower7	21.15	27.00	45.55	46.41	37.50	35.72	33.80	43.32	14.04	28.98	33.21	28.52	23.81	43.55	32.36	44.83	41.05	26.72
Upper7	31.25	30.86	54.14	61.17	60.86	56.48	59.40	65.64	16.27	27.71	36.82	33.12	33.68	31.84	45.56	37.81	50.12	42.37
Upper7	33.95	35.52	46.41	51.80	63.06	62.27	64.79	61.26	24.59	26.10	33.69	41.64	32.95	25.36	44.58	33.93	44.22	45.40
Upper7	29.73	33.35	45.60	45.51	50.05	42.83	47.88	48.75	36.40	41.16	45.33	54.86	54.30	34.32	55.74	42.21	46.92	57.96
Upper7	28.16	31.10	59.18	61.21	59.13	47.28	48.68	59.70	35.53	39.33	51.09	48.10	46.58	47.31	49.11	46.03	57.51	53.47
Upper7	17.03	20.30	43.88	50.66	45.94	33.38	39.58	46.87	23.82	35.59	46.62	39.29	39.42	36.68	38.12	41.72	48.99	35.88
Strm8	31.66	31.22	52.87	58.20	60.72	47.65	53.39	59.21	25.65	35.44	41.64	49.26	39.69	29.97	40.62	37.26	52.81	47.80
Strm8	24.94	24.52	47.87	53.41	52.19	42.11	45.90	53.26	28.75	33.31	42.87	41.87	41.68	36.19	40.59	42.88	53.76	44.00
Strm8	38.30	39.40	40.21	40.63	49.07	41.22	38.41	44.57	21.48	22.66	28.25	44.55	31.20	38.79	49.27	41.85	53.43	44.68
Strm8	35.85	36.47	42.61	38.16	40.66	39.05	34.13	40.47	22.29	19.18	24.16	33.47	27.03	31.47	48.81	35.68	48.09	48.33
Strm8	35.54	34.71	41.99	37.82	46.55	44.31	42.38	44.74	23.49	21.57	24.64	37.83	37.00	24.52	55.10	33.73	47.97	57.82
Strm9	28.50	28.42	37.11	34.71	35.23	31.29	23.54	35.32	18.45	23.96	26.36	32.17	27.84	44.64	43.27	46.01	50.17	41.82
Strm9	33.24	33.79	34.59	35.89	49.54	41.14	41.20	43.24	22.70	20.70	25.46	41.07	37.05	27.62	48.26	31.88	48.35	49.44
Strm9	37.54	37.11	44.40	38.86	44.35	41.37	34.09	43.15	20.52	21.01	24.94	41.24	35.50	36.46	54.80	42.87	56.93	50.01
Strm9	30.94	27.19	41.44	45.66	50.21	42.33	48.54	48.82	24.31	23.22	27.25	35.04	34.27	24.48	40.23	33.22	48.28	46.61
Strm9	27.80	27.73	59.40	68.32	63.61	54.60	57.16	66.56	21.93	31.00	35.96	38.76	40.06	29.30	43.23	33.56	54.46	44.91
Strm9med	26.14	28.37	60.18	64.92	58.94	52.29	51.73	63.92	18.89	32.40	45.99	38.03	37.45	42.57	47.19	43.94	55.40	43.54
Strm11.9	28.33	33.54	54.51	60.59	59.35	56.59	54.17	63.53	30.03	38.16	46.28	44.39	35.98	37.33	43.97	42.29	56.13	46.34
Strm11.9	28.03	25.76	57.39	63.50	59.95	58.41	62.68	66.23	20.64	23.70	33.45	34.28	37.19	26.31	41.99	29.80	47.74	48.72
Strm11.9	27.54	29.33	69.36	71.77	71.03	66.18	65.11	77.80	16.78	23.79	35.22	35.44	35.85	32.69	50.51	42.29	47.96	44.98
Strm11.9	25.63	31.51	65.80	70.69	72.67	65.17	61.92	75.95	20.64	25.74	38.95	42.70	35.91	32.15	50.14	42.43	52.58	50.54
Strm11.9	32.39	31.68	58.62	62.38	67.62	75.05	66.52	69.70	21.63	20.11	25.77	31.20	30.20	20.20	39.74	24.47	42.31	44.25
Strm17.1	26.11	28.21	64.71	73.84	73.35	68.36	65.20	75.14	18.95	28.59	40.59	36.92	36.01	32.53	43.32	35.34	45.26	43.09
Strm17.1	29.91	33.24	66.68	74.23	69.60	65.01	60.90	73.49	20.13	23.08	35.61	42.32	40.65	30.81	47.51	37.53	48.30	45.77
Strm17.1	28.97	26.84	56.33	59.51	61.83	59.58	63.03	63.96	27.14	28.61	31.90	38.56	33.02	26.84	45.58	29.74	43.60	47.59
Strm17.1	26.22	28.76	51.22	58.77	49.26	46.81	40.88	53.48	19.31	25.68	37.10	33.07	33.96	42.64	39.94	46.66	48.13	39.87
Strm17.1	27.88	24.73	52.66	58.36	53.36	52.33	48.07	57.33	17.70	26.84	35.00	31.13	32.79	30.53	37.15	34.52	38.99	35.16
Strm26	34.28	27.76	59.71	65.07	65.27	58.09	56.84	68.02	22.10	30.32	36.98	32.85	33.89	34.49	44.15	34.83	49.19	47.75
Strm26	26.58	26.87	57.62	64.07	67.27	68.96	67.97	67.52	21.40	22.00	29.11	33.64	32.55	22.92	39.06	28.10	41.55	41.44
Strm26	0.47	0.62	0.79	0.78	0.60	0.54	0.56	0.72	0.84	1.14	1.25 </							

Appendix 3.3-4
Morrison Copper/Gold Project Bray Curtis Percent Similarity Values for Stream Benthos, 2008 (continued)

	Strm6	Strm6	Strm6	Strm6	Strm6	Lower7	Lower7	Lower7	Lower7	Upper7	Upper7	Upper7	Upper7	Strm8	Strm8	Strm8	Strm8	Strm9	Strm9
Morrison Creek																			
Morrison Creek																			
Morrison Creek																			
Morrison Creek																			
Morrison Creek																			
Strm1																			
Strm1																			
Strm1																			
Strm1																			
Strm1med																			
Strm4																			
Strm4																			
Strm4																			
Strm4																			
Strm5																			
Strm5																			
Strm5																			
Strm6																			
Strm6	68.72																		
Strm6	54.15	50.97																	
Strm6	65.40	56.32	60.60																
Strm6	56.64	56.59	70.62	64.72															
Lower7	59.67	49.97	49.30	73.28	60.59														
Lower7	63.12	51.41	57.52	68.82	63.29	70.70													
Lower7	28.85	33.01	54.44	35.92	49.03	32.08	33.59												
Lower7	49.58	50.51	66.21	58.06	65.32	52.13	54.65	58.85											
Lower7	34.03	32.94	55.51	34.11	47.98	29.71	32.48	73.95	57.60										
Upper7	53.74	49.91	63.46	59.24	67.41	60.29	61.77	54.95	69.28	50.86									
Upper7	55.58	49.06	44.06	61.18	50.82	72.64	57.37	35.65	54.43	32.09	59.96								
Upper7	44.30	41.49	36.71	43.65	44.83	47.39	50.75	29.73	43.11	26.31	45.22	51.71							
Upper7	47.29	45.00	48.66	51.14	56.67	54.54	54.96	39.53	54.98	37.20	58.02	54.09	67.51						
Upper7	34.85	33.56	43.65	37.96	42.51	41.06	45.59	44.61	43.17	37.11	43.30	36.76	42.59	57.78					
Strm8	46.76	44.69	48.77	53.47	55.90	53.93	57.74	44.11	55.62	42.05	55.98	55.57	54.33	66.48	54.56				
Strm8	43.06	41.93	50.62	50.91	52.84	54.12	51.57	40.04	49.65	35.18	47.75	49.48	56.46	68.32	58.69	58.03			
Strm8	32.17	38.42	41.36	36.57	45.36	35.27	37.63	39.25	51.51	36.90	41.73	41.08	40.10	45.43	33.47	42.89	41.52		
Strm8	31.18	36.83	35.19	36.44	44.52	31.72	33.87	31.24	48.83	34.04	35.15	35.16	41.08	42.06	24.44	37.62	37.66	66.10	
Strm8	39.51	38.36	29.25	38.43	35.39	44.23	43.10	21.60	38.22	21.14	38.31	42.76	48.90	43.84	25.12	35.49	34.79	49.81	
Strm9	24.32	31.62	41.89	27.53	36.38	26.25	27.94	45.43	49.78	46.69	39.26	28.94	30.35	40.41	35.43	34.85	38.17	61.98	
Strm9	34.93	32.65	28.77	36.75	33.53	44.31	42.20	23.47	43.74	23.70	41.42	51.84	41.13	42.48	26.69	40.13	38.40	54.48	
Strm9	30.84	36.87	40.02	36.96	44.04	33.85	38.44	36.12	53.02	36.44	41.58	40.12	41.38	46.93	31.60	40.64	42.78	79.00	
Strm9	42.14	35.47	37.97	47.11	46.45	60.70	59.92	27.84	43.96	25.11	50.22	57.07	47.15	53.24	41.91	61.63	49.96	38.91	
Strm9	52.71	50.91	57.33	59.12	62.01	60.59	64.32	44.76	59.63	42.25	62.76	54.27	47.21	57.61	51.95	62.30	54.25	44.13	
Strm9med	46.66	51.01	62.95	51.23	68.38	49.06	52.24	59.17	65.10	57.39	66.56	47.60	47.10	63.69	53.31	57.61	56.11	47.03	39.32
																		32.77	
																		46.33	
																		36.06	
Strm11.9	55.57	50.45	61.08	61.19	62.06	52.51	57.49	50.21	63.39	49.41	61.72	54.28	47.76	59.61	47.14	63.11	56.39	47.36	
Strm11.9	51.13	53.32	52.28	59.43	59.68	67.37	69.27	37.50	56.97	35.67	64.44	64.69	49.50	55.98	40.38	57.38	50.35	39.63	
Strm11.9	59.49	61.68	60.39	57.72	68.13	57.74	65.04	51.58	63.11	47.06	69.24	56.22	48.22	57.04	46.23	59.84	48.60	48.07	
Strm11.9	56.81	61.78	57.70	57.34	65.24	55.98	60.16	51.81	62.97	45.66	63.83	54.38	50.54	59.54	46.99	62.61	53.39	51.39	
Strm11.9	61.27	52.84	48.22	59.99	53.62	60.09	60.01	34.30	52.83	33.25	58.83	53.59	39.80	46.42	32.74	52.04	40.66	40.20	
Strm17.1	59.94	60.96	60.45	63.54	67.81	63.42	64.68	46.79	65.07	45.24	67.01	58.07	45.94	56.62	45.55	57.09	51.81	45.23	
Strm17.1	62.26	63.30	64.31	64.48	67.86	60.81	62.43	44.04	62.74	42.38	58.53	55.30	48.66	55.49	46.03	58.71	53.99	50.63	
Strm17.1	61.99	60.95	41.06	58.63	51.48	66.82	60.27	27.21	50.21	30.15	48.94	58.49	44.34	49.64	32.40	49.05	42.37	40.86	
Strm17.1	46.50	54.01	66.81	48.86	59.88	42.36	43.99	45.85	59.47	46.07	54.81	41.02	39.93	52.24	38.44	39.64	53.19	47.87	
Strm17.1	52.81	55.17	58.91	53.70	61.56	46.51	46.10	44.56	54.06	43.39	54.55	41.21	40.94	45.90	34.81	42.25	42.44	41.66	
Strm26	58.82	61.87	58.93	63.96	65.31	60.56	63.17	41.00	59.04	40.12	60.13	49.66	42.55	55.37	38.45	54.01	51.96	46.91	
Strm26	71.98	61.93	51.16	58.43	58.47	67.40	64.52	30.92	49.89	30.34	54.56	56.26	41.05	45.32	33.41	46.80	46.56	39.70	
Strm26	0.51	0.61	1.14	0.64	0.87	0.50	0.67	1.91	0.98	1.96	0.83	0.54	0.74	1.00	1.45	0.84	1.17	0.81	
Strm26	0.51	0.61	1.14	0.64	0.87	0.50	0.67	1.91	0.98	1.96	0.83	0.54	0.74	1.00	1.45	0.84	1.17	0.81	
Strm26	0.51	0.61	1.14	0.64	0.87	0.50	0.67	1.91	0.98	1.96	0.83	0.54	0.74	1.00	1.45	0.84	1.17	0.81	

Note: Shaded/bolded values show similarity of site to either reference site Strm1 or Strm9.

(continued)

Appendix 3.3-4
Morrison Copper/Gold Project Bray Curtis Percent Similarity Values for Stream Benthos, 2008 (completed)

Strm9	Strm9	Strm9	Strm9med	Strm11.9	Strm11.9	Strm11.9	Strm11.9	Strm17.1	Strm17.1	Strm17.1	Strm17.1	Strm26	Strm26	Strm26	Strm26	
Morrison Creek																
Morrison Creek																
Morrison Creek																
Morrison Creek																
Morrison Creek																
Morrison Creek																
Strm1																
Strm1																
Strm1																
Strm1																
Strm1			Strm1med													
Strm4																
Strm4																
Strm4																
Strm4																
Strm5																
Strm5																
Strm5																
Strm5																
Strm6																
Strm6																
Strm6																
Lower7																
Lower7																
Lower7																
Lower7																
Upper7																
Upper7																
Upper7																
Upper7																
Strm8																
Strm8																
Strm8																
Strm8																
Strm9																
Strm9																
Strm9	38.98															
Strm9	44.06	60.96														
Strm9med	47.08	43.47	68.75													
Strm11.9	46.16	51.93	68.69	64.56												
Strm11.9	38.91	65.21	66.27	59.20		56.20										
Strm11.9	46.65	45.69	62.59	68.57		56.44	64.37									
Strm11.9	51.55	50.24	67.47	67.05		63.07	63.20	82.00								
Strm11.9	42.04	43.12	55.57	49.19		52.00	59.27	65.26	63.12							
Strm17.1	41.97	41.63	64.28	62.53		55.04	64.58	76.43	70.77	68.77						
Strm17.1	51.10	48.34	65.39	62.87		58.97	61.95	75.80	73.11	63.67	71.46					
Strm17.1	40.09	55.17	53.19	46.28		51.73	64.64	57.98	57.48	57.22	56.26	59.74				
Strm17.1	45.94	34.25	50.59	61.79		59.97	47.51	56.05	52.73	44.12	52.59	59.73	46.28			
Strm17.1	38.05	38.18	50.48	59.01		61.93	48.67	55.72	53.71	47.43	47.90	57.64	54.38	66.60		
Strm26	43.65	49.16	61.71	62.76		62.41	63.29	62.77	63.09	59.66	60.13	66.49	65.46	61.65	71.75	
Strm26	35.95	51.97	56.56	51.52		51.55	65.18	62.23	62.62	69.52	63.10	63.97	71.50	48.05	56.87	64.80
Strm26	0.93	0.63	0.80	1.20		1.06	0.69	0.83	0.80	0.51	0.70	0.73	0.53	1.27	0.89	0.77
Strm26	0.93	0.63	0.80	1.20		1.06	0.69	0.83	0.80	0.51	0.70	0.73	0.53	1.27	0.89	0.77
Strm26	0.93	0.63	0.80	1.20		1.06	0.69	0.83	0.80	0.51	0.70	0.73	0.53	1.27	0.89	0.77
Strm26	0.93	0.63	0.80	1.20		1.06	0.69	0.83	0.80	0.51	0.70	0.73	0.53	1.27	0.89	0.77

Note: Shaded/bolded values show similarity of site to either reference site Strm1 or Strm9.

APPENDIX 3.4-1
MORRISON COPPER/GOLD PROJECT
LAKE WATER QUALITY DATA, 2008



Appendix 3.4-1
Morrison Copper/Gold Project Lake Water Quality Data, 2008

Sample ID	LakeB Deep	LakeA Shallow	LakeA Shallow	LakeB Shallow	LakeC Deep	LakeC Shallow	LakeE Deep	LakeE Shallow	LakeD Deep	LakeD Shallow	Wetland	Equipment Blank (GO FLOW)	Field Blank	Travel Blank
Date Sampled	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	24-Jul-08	24-Jul-08	02-Jul-08	02-Jul-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L661556-1	L661556-2	L661556-3	L661556-6	L661556-8	L661556-9	L661556-11	L661556-12	L661556-14	L661556-15	L661556-18	L661556-20	L661556-25	L661556-26
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests														
Hardness (as CaCO ₃)	30.9	30.1	29.7	28.5	29.9	28.5	28.2	28.3	29.4	28.8	0.5	0.61	<0.50	<0.50
Colour, True	36.6	38.3	38.6	38.8	36.5	38.8	38	38.7	36.5	38.8	5	<5.0	<5.0	<5.0
Conductivity	65	58.4	59.4	58.6	62	57.5	60.8	58.4	61.1	57.9	2	5.8	<2.0	<2.0
pH	7.23	7.63	7.65	7.62	7.42	7.54	7.42	7.58	7.47	7.53	0.01	5.25	5.86	5.58
Total Dissolved Solids	57	59	57	54	57	58	58	54	54	55	10	<10	<10	<10
Total Suspended Solids	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	3	<3.0	<3.0	<3.0
Turbidity	0.51	0.43	0.45	0.55	0.45	0.52	0.54	0.85	0.55	0.56	0.1	<0.10	<0.10	<0.10
Anions and Nutrients														
Ammonia as N	0.113	<0.020	<0.020	0.0121	<0.0050	0.0182	0.0074	0.0135	<0.0050	0.021	0.005	0.0104	<0.0050	<0.0050
Acidity (as CaCO ₃)	3.4	2.1	2.1	1.7	2.5	2	2.4	1.8	2.3	2.5	1	2.2	1.6	1.3
Alkalinity, Bicarbonate (as CaCO ₃)	27.7	26.5	26.3	25.8	27.5	26.1	26.8	26.3	28	26.1	2	<2.0	<2.0	<2.0
Alkalinity, Carbonate (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO ₃)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO ₃)	27.7	26.5	26.3	25.8	27.5	26.1	26.8	26.3	28	26.1	2	<2.0	<2.0	<2.0
Bromide (Br)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.25	<0.050	<0.050	<0.050
Chloride (Cl)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.5	1.23	<0.50	<0.50
Fluoride (F)	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.036	0.022	0.036	0.1	<0.020	<0.020	<0.020
Sulfate (SO ₄)	2.54	2.4	2.4	2.39	2.46	2.34	2.42	2.56	2.61	2.43	2.5	<0.50	<0.50	<0.50
Nitrate (as N)	0.0635	0.005	0.0099	0.0053	0.0644	<0.0050	0.0475	0.008	0.0589	0.0066	0.025	<0.0050	<0.0050	<0.0050
Nitrite (as N)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.005	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	0.117	0.085	0.13	0.135	0.136	0.14	0.123	0.112	0.161	0.153	0.05	<0.050	<0.050	<0.050
Total Nitrogen	0.18	0.09	0.14	0.14	0.2	0.14	0.17	0.12	0.22	0.16	0.05	<0.05	<0.05	<0.05
Total Phosphate as P	0.0058	0.0061	0.0068	0.0116	0.0063	0.0076	0.007	0.0124	0.0066	0.0083	0.002	<0.0020	<0.0020	<0.0020
Cyanides														
Cyanide, Total	0.0063	0.0081	0.0071	0.0077	0.007	0.008	0.0078	0.0076	0.0076	0.0086	0.001	0.0022	<0.0010	<0.0010
Total Metals														
Aluminum (Al)-Total	0.0436	0.0412	0.0412	0.0401	0.0427	0.0388	0.0483	0.0409	0.0428	0.0427	0.001	0.295	<0.0010	<0.0010
Antimony (Sb)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	0.00029	0.00027	0.00029	0.00028	0.00026	0.00028	0.00027	0.00028	0.00029	0.00027	0.0001	<0.00010	<0.00010	<0.00010
Barium (Ba)-Total	0.0168	0.015	0.0165	0.0158	0.0162	0.0155	0.0254	0.0157	0.0163	0.0161	0.00005	0.11	<0.000050	<0.000050
Beryllium (Be)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	<0.00050	<0.00050
Boron (B)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	<0.010	<0.010	<0.010
Cadmium (Cd)-Total	<0.000017	0.000031	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	0.000017	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Total	9.1	7.82	8.36	8.31	8.22	7.81	8.34	8.16	8.73	8.5	0.02	0.184	<0.020	<0.020
Chromium (Cr)-Total	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00254	<0.00050	<0.00050	<0.00050	0.0005	0.00942	<0.00050	<0.00050
Cobalt (Co)-Total	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	0.0001	0.00017	<0.00010	<0.00010
Copper (Cu)-Total	0.00106	0.00149	0.00101	0.00093	0.0009	0.00083	0.00181	0.00089	0.00091	0.00099	0.0001	0.00255	<0.00010	<0.00010
Iron (Fe)-Total	0.138	0.111	0.12	0.125	0.142	0.126	0.153	0.122	0.132	0.124	0.03	0.044	<0.030	<0.030
Lead (Pb)-Total	0.000059	0.000084	0.00015	<0.000050	0.000054	<0.000050	0.000145	<0.000050	<0.000050	<0.000050	0.00005	0.000312	<0.000050	<0.000050
Lithium (Li)-Total	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Total	2.14	1.85	1.99	1.94	2	1.88	1.93	1.83	1.99	2.04	0.005	0.0309	<0.0050	<0.0050
Manganese (Mn)-Total	0.00351	0.00257	0.00266	0.00263	0.00315	0.00248	0.00493	0.00277	0.00341	0.003	0.00005	0.00371	<0.000050	<0.000050
Mercury (Hg)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000013	0.00001	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	0.000114	0.000124	0.000121	0.00012	0.000111	0.000111	0.000119	0.000114	0.000094	0.000126	0.00005	<0.000050	<0.000050	<0.000050
Nickel (Ni)-Total	0.00085	0.00076	0.002	0.00068	0.00094	0.00062	0.0551	0.00074	0.00086	0.00077	0.0005	0.14	<0.0050	<0.0050
Phosphorus (P)-Total	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.3	<0.30	<0.30	<0.30
Potassium (K)-Total	0.358	0.338	0.332	0.337	0.332	0.325	0.343	0.326	0.354	0.355	0.05	<0.050	<0.050	<0.050
Selenium (Se)-Total	0.00036	0.00034	0.00036	0.00028	0.00019	0.00011	0.00019	0.00032	0.00022	0.00045	0.0001	0.00039	<0.00010	0.00013

Results are expressed as milligrams per litre except where noted

(continued)

Appendix 3.4-1
Morrison Copper/Gold Project Lake Water Quality Data, 2008 (completed)

Sample ID	LakeB Deep	LakeA Shallow	LakeA Shallow	LakeB Shallow	LakeC Deep	LakeC Shallow	LakeE Deep	LakeE Shallow	LakeD Deep	LakeD Shallow	Wetland	Equipment Blank (GO FLOW)	Field Blank	Travel Blank
Date Sampled	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	23-Jul-08	24-JUL-08	24-Jul-08	02-Jul-08	02-Jul-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L661556-1	L661556-2	L661556-3	L661556-6	L661556-8	L661556-9	L661556-11	L661556-12	L661556-14	L661556-15	L661556-18	L661556-20	L661556-25	L661556-26
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Silicon (Si)-Total	2.83	2.44	2.54	2.57	2.8	2.56	2.74	2.54	2.76	2.44	0.05	0.052	<0.050	<0.050
Silver (Ag)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2	<2.0	<2.0	<2.0
Strontium (Sr)-Total	0.0467	0.0396	0.0415	0.0413	0.0421	0.0395	0.0415	0.0408	0.0419	0.0444	0.0001	0.00104	<0.00010	<0.00010
Thallium (Tl)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0001	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000011	<0.000010	<0.000010	<0.000010	0.0001	0.00279	<0.000010	<0.000010
Titanium (Ti)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	<0.010	<0.010	<0.010
Uranium (U)-Total	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010
Vanadium (V)-Total	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total	<0.0010	0.0042	<0.0010	<0.0010	0.0011	<0.0010	0.0015	<0.0010	<0.0010	<0.0020	0.003	0.0277	<0.0010	<0.0010
Dissolved Metals														
Aluminum (Al)-Dissolved	0.0343	0.0357	0.0341	0.0352	0.035	0.0347	0.0372	0.0349	0.0336	0.0354	0.001	0.304	-	-
Antimony (Sb)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	-	-
Arsenic (As)-Dissolved	0.00026	0.00027	0.00027	0.00026	0.00034	0.00027	0.00024	0.00028	0.00026	0.00027	0.0001	<0.00010	-	-
Barium (Ba)-Dissolved	0.0164	0.0159	0.0164	0.0157	0.0165	0.0158	0.025	0.0155	0.016	0.016	0.00005	0.113	-	-
Beryllium (Be)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	-	-
Bismuth (Bi)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	-	-
Boron (B)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	<0.010	-	-
Cadmium (Cd)-Dissolved	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	0.000017	<0.000017	-	-
Calcium (Ca)-Dissolved	8.91	8.67	8.58	8.19	8.59	8.23	8.17	8.28	8.6	8.3	0.02	0.192	-	-
Chromium (Cr)-Dissolved	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00165	<0.00050	<0.00050	<0.00050	0.0005	0.00857	-	-
Cobalt (Co)-Dissolved	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	0.00018	-	-
Copper (Cu)-Dissolved	0.00105	0.00103	0.00104	0.00097	0.00095	0.00099	0.00147	0.00087	0.00097	0.00091	0.0001	0.00221	-	-
Iron (Fe)-Dissolved	0.106	0.102	0.102	0.101	0.107	0.104	0.115	0.104	0.111	0.108	0.03	0.043	-	-
Lead (Pb)-Dissolved	<0.000050	<0.000050	0.00007	<0.000050	<0.000050	<0.000050	0.00007	<0.000050	<0.000050	<0.000050	0.00005	0.000321	-	-
Lithium (Li)-Dissolved	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.005	<0.0050	-	-
Magnesium (Mg)-Dissolved	2.1	2.05	2.02	1.95	2.06	1.93	1.9	1.86	1.92	1.96	0.005	0.0324	-	-
Manganese (Mn)-Dissolved	0.000808	0.00062	0.000612	0.000511	0.000725	0.00059	0.00147	0.000586	0.000673	0.000696	0.00005	0.00367	-	-
Mercury (Hg)-Dissolved	<0.000010	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000011	0.00001	<0.000010	-	-	-
Molybdenum (Mo)-Dissolved	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00005	<0.000050	-	-
Nickel (Ni)-Dissolved	0.00113	0.00075	0.00125	0.0008	0.00103	0.00066	0.0534	0.00067	0.00086	0.00078	0.0005	0.131	-	-
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.3	<0.30	-	-
Potassium (K)-Dissolved	0.372	0.361	0.343	0.337	0.348	0.338	0.334	0.337	0.336	0.346	0.05	<0.050	-	-
Selenium (Se)-Dissolved	0.00047	0.00038	0.00044	0.00028	0.00026	0.00014	0.00012	0.00022	0.00019	0.00038	0.0001	0.00036	-	-
Silicon (Si)-Dissolved	2.77	2.47	2.5	2.51	2.75	2.48	2.69	2.49	2.69	2.48	0.05	0.053	-	-
Silver (Ag)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	-	-
Sodium (Na)-Dissolved	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2	<2.0	-	-
Strontium (Sr)-Dissolved	0.0441	0.0432	0.0427	0.0412	0.0445	0.042	0.0413	0.041	0.0418	0.0439	0.0001	0.00108	-	-
Thallium (Tl)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0001	<0.000010	-	-
Tin (Sn)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.00012	<0.000010	<0.000010	<0.000010	0.0001	0.00274	-	-
Titanium (Ti)-Dissolved	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	<0.010	-	-
Uranium (U)-Dissolved	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	-	-
Vanadium (V)-Dissolved	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001	<0.0010	-	-
Zinc (Zn)-Dissolved	0.0014	<0.0010	<0.0010	<0.0010	0.0014	<0.0010	0.0019	<0.0010	0.0015	0.0013	0.001	0.0272	-	-
Organic Parameters														
Total Organic Carbon	9.58	5.61	10.1	9.83	10.2	9.76	10.3	9.96	9.99	10	0.5	<0.50	<0.50	<0.50

Results are expressed as milligrams per litre except where noted

APPENDIX 3.4-2
MORRISON COPPER/GOLD PROJECT
LAKE WATER QUALITY DETECTION LIMITS, 2008



Appendix 3.4-2
Morrison Copper/Gold Project Lake Water Quality Detection Limits, 2008

Sample ID	LakeB Deep	LakeA Shallow	LakeA Shallow	LakeB Shallow	LakeC Deep	LakeC Shallow	LakeE Deep	LakeE Shallow	LakeD Deep	LakeD Shallow	Equipment Blank (GO FLOW)	Field Blank 02-JUL-08 00:00	Travel Blank 02-JUL-08 00:00
Date Sampled	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	24-JUL-08 00:00	24-JUL-08 00:00	
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00			
ALS Sample ID	L661556-1	L661556-2	L661556-3	L661556-6	L661556-8	L661556-9	L661556-11	L661556-12	L661556-14	L661556-15	L661556-20	L661556-25	L661556-26
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests													
Hardness (as CaCO ₃)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Colour, True (CU)	5	5	5	5	5	5	5	5	5	5	5	5	5
Conductivity (µS/cm)	2	2	2	2	2	2	2	2	2	2	2	2	2
pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Dissolved Solids	10	10	10	10	10	10	10	10	10	10	10	10	10
Total Suspended Solids	3	3	3	3	3	3	3	3	3	3	3	3	3
Turbidity (NTU)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients													
Ammonia as N	0.05	0.02	0.02	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Acidity (as CaCO ₃)	1	1	1	1	1	1	1	1	1	1	1	1	1
Alkalinity, Bicarbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2	2	2
Alkalinity, Carbonate (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2	2	2
Alkalinity, Total (as CaCO ₃)	2	2	2	2	2	2	2	2	2	2	2	2	2
Bromide (Br)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fluoride (F)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Sulfate (SO ₄)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nitrate (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Nitrogen	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Phosphate as P	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Cyanides													
Cyanide, Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Metals													
Aluminum (Al)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Total	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017
Calcium (Ca)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001

Results are expressed as milligrams per litre except where noted

(continued)

Appendix 3.4-2
Morrison Copper/Gold Project Lake Water Quality Detection Limits, 2008 (completed)

Sample ID	LakeB Deep	LakeA Shallow	LakeA Shallow	LakeB Shallow	LakeC Deep	LakeC Shallow	LakeE Deep	LakeE Shallow	LakeD Deep	LakeD Shallow	Equipment Blank (GO FLOW)	Field Blank	Travel Blank
Date Sampled	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	23-JUL-08	24-JUL-08	02-JUL-08	02-JUL-08
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L661556-1	L661556-2	L661556-3	L661556-6	L661556-8	L661556-9	L661556-11	L661556-12	L661556-14	L661556-15	L661556-20	L661556-25	L661556-26
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Sodium (Na)-Total	2	2	2	2	2	2	2	2	2	2	2	2	2
Strontium (Sr)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001
Dissolved Metals													
Aluminum (Al)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-
Antimony (Sb)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Arsenic (As)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Barium (Ba)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Beryllium (Be)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Bismuth (Bi)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Boron (B)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-
Cadmium (Cd)-Dissolved	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	0.000017	-	-
Calcium (Ca)-Dissolved	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-
Chromium (Cr)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Cobalt (Co)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Copper (Cu)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Iron (Fe)-Dissolved	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-
Lead (Pb)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Lithium (Li)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	-	-
Magnesium (Mg)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	-	-
Manganese (Mn)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Mercury (Hg)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Molybdenum (Mo)-Dissolved	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	-	-
Nickel (Ni)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	-	-
Potassium (K)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	-
Selenium (Se)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Silicon (Si)-Dissolved	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	-
Silver (Ag)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Sodium (Na)-Dissolved	2	2	2	2	2	2	2	2	2	2	2	-	-
Strontium (Sr)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Thallium (Tl)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Tin (Sn)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-
Uranium (U)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Vanadium (V)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-
Zinc (Zn)-Dissolved	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-
Organic / Inorganic Carbon													
Total Organic Carbon	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Results are expressed as milligrams per litre except where noted

APPENDIX 3.4-3
MORRISON COPPER/GOLD PROJECT
GUIDELINE EXCEEDANCE (%) SUMMARY FOR
LAKE WATER QUALITY, 2008



Appendix 3.4-3
Morrison Copper/Gold Project Guideline Exceedance (%) Summary for Lake Water Quality, 2008

n		BC Max									
		LakeA - Shallow	LakeA - Deep	LakeB - Shallow	LakeB - Deep	LakeC - Shallow	LakeC - Deep	LakeD - Shallow	LakeD - Deep	LakeE - Shallow	LakeE - Deep
1	1	1	1	1	1	1	1	1	1	1	1
pH											
Chloride Cl		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fluoride F		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sulphate SO ₄		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ammonia Nitrogen N		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nitrate Nitrogen N		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nitrite Nitrogen N		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total Cyanide CN		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aluminum T-Al											
Antimony T-Sb		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Arsenic T-As		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Barium T-Ba		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Beryllium T-Be		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Boron T-B		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cadmium T-Cd		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Chromium T-Cr		0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Cobalt T-Co		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Copper T-Cu		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Iron T-Fe		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lead T-Pb		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lithium T-Li		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Manganese T-Mn		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mercury T-Hg		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Molybdenum T-Mo		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nickel T-Ni		0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Selenium T-Se											
Silver T-Ag		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Thallium T-Tl		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Titanium T-Ti		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Uranium T-U		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Zinc T-Zn		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aluminum D-Al		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Antimony D-Sb		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Arsenic D-As		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Barium D-Ba		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Beryllium D-Be		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Boron D-B		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cadmium D-Cd		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Chromium D-Cr		0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Cobalt D-Co		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Copper D-Cu		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Iron D-Fe		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lead D-Pb		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lithium D-Li		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Manganese D-Mn		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mercury D-Hg		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Molybdenum D-Mo		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nickel D-Ni		0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Selenium D-Se											
Silver D-Ag		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Thallium D-Tl		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Titanium D-Ti		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Uranium D-U		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Zinc D-Zn		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

(continued)

Appendix 3.4-3
Morrison Copper/Gold Project Guideline Exceedance (%) Summary for Lake Water Quality, 2008 (continued)

		BC 30 day Mean									
n		LakeA - Shallow	LakeA - Deep	LakeB - Shallow	LakeB - Deep	LakeC - Shallow	LakeC - Deep	LakeD - Shallow	LakeD - Deep	LakeE - Shallow	LakeE - Deep
pH											
Chloride	Cl	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fluoride	F										
Sulphate	SO ₄										
Ammonia Nitrogen	N	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nitrate Nitrogen	N	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nitrite Nitrogen	N	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total Cyanide	CN	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Aluminum	T-Al										
Antimony	T-Sb										
Arsenic	T-As										
Barium	T-Ba	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Beryllium	T-Be										
Boron	T-B										
Cadmium	T-Cd										
Chromium	T-Cr										
Cobalt	T-Co	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Copper	T-Cu	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Iron	T-Fe										
Lead	T-Pb	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lithium	T-Li										
Manganese	T-Mn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mercury	T-Hg	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Molybdenum	T-Mo	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nickel	T-Ni										
Selenium	T-Se	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Silver	T-Ag	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Thallium	T-Tl										
Titanium	T-Ti										
Uranium	T-U										
Zinc	T-Zn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aluminum	D-Al	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Antimony	D-Sb										
Arsenic	D-As										
Barium	D-Ba	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Beryllium	D-Be										
Boron	D-B										
Cadmium	D-Cd										
Chromium	D-Cr										
Cobalt	D-Co	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Copper	D-Cu	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Iron	D-Fe										
Lead	D-Pb	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lithium	D-Li										
Manganese	D-Mn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mercury	D-Hg	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Molybdenum	D-Mo	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nickel	D-Ni										
Selenium	D-Se	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Silver	D-Ag	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Thallium	D-Tl										
Titanium	D-Ti										
Uranium	D-U										
Zinc	D-Zn	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

(continued)

Appendix 3.4-3

APPENDIX 3.5-1
LIMNOLOGY DEPTH PROFILE DATA FROM
MORRISON LAKE STATIONS, 2008



Appendix 3.5-1
Limnology Depth Profile Data
from Morrison Lake Stations, 2008

Lake Station	Sample Date	Depth	Temp. (°C)	DO (mg/L)
LakeA	21-Jul-08	0	14.8	9.25
		1	14.4	9.19
		2	13.5	9.05
		3	11.4	8.9
		4	10.7	8.85
		5	10.1	8.78
		6	9.9	8.75
		7	8.8	8.28
		8	7.8	7.96
LakeB	22-Jul-08	0	14.50	9.37
		1	14.40	9.34
		2	14.40	9.34
		3	14.30	9.30
		4	14.20	9.24
		5	12.80	9.03
		6	10.40	8.93
		7	9.00	8.65
		8	7.90	8.60
		9	7.70	8.89
		10	7.40	8.79
		11	7.10	8.88
		12	6.80	8.87
		13	6.70	8.86
		14	6.60	8.80
		15	6.50	8.80
		16	6.20	8.74
		17	5.80	8.60
		18	5.80	8.54
LakeC	27-Jul-08	0	16.6	9.66
		1	14.7	9.65
		2	14.6	9.68
		3	14.6	9.54
		4	14.5	9.5
		5	14.4	9.5
		6	14.4	9.48
		7	13.7	9.39
		8	12.8	9.34
		9	8.7	9.15
		10	8	9.13
		11	7.3	9.15
		12	7.2	9.1
		13	6.5	9.18
		14	6.2	9.2
		15	6.1	9.22
		16	5.2	9.41
		17	4.9	9.45
		18	4.8	9.4
		19	4.8	9.36
		20	4.7	9.34
		21	4.7	9.33
		22	4.6	9.26
		23	4.6	9.24
		24	4.6	9.19

(continued)

Appendix 3.5-1
Limnology Depth Profile Data
from Morrison Lake Stations, 2008 (completed)

Lake Station	Sample Date	Depth	Temp. (°C)	DO (mg/L)
LakeD	26-Jul-08	0	16.70	9.76
		1	15.40	9.81
		2	15.30	9.77
		3	15.00	9.68
		4	14.80	9.67
		5	14.60	9.57
		6	14.40	9.50
		7	11.70	9.10
		8	9.30	9.06
		9	7.60	9.23
		10	7.20	9.17
		11	7.10	9.20
		12	7.10	9.14
		13	7.00	9.15
		14	6.70	9.18
		15	6.30	9.22
		16	6.20	9.25
		17	6.10	9.26
		18	5.70	9.36
		19	5.20	9.43
		20	5.00	9.41
		21	5.00	9.48
		22	4.90	9.47
		23	4.90	9.47
		24	4.80	9.44
		25	4.70	9.35
		26	4.70	9.33
LakeE	26-Jul-08	0	15.3	9.42
		1	14.7	9.45
		2	14.7	9.46
		3	14.6	9.46
		4	14.6	9.4
		5	14.4	9.33
		6	12.9	9.15
		7	10.8	9.01
		8	9.5	9
		9	8.7	9
		10	7.9	9.1
		11	7.1	9.16
		12	6.9	9.2
		13	6.5	9.21
		14	6.2	9.24
		15	5.9	9.22
		16	5.7	9.23
		17	5.5	9.34
		18	5.3	9.35
		19	5.2	9.38
		20	5	9.36
		21	4.9	9.37
		22	4.9	9.35
		23	4.8	9.31
		24	4.8	9.29
		25	4.7	9.29
		26	4.6	9.2
		27	4.6	9.17
		28	4.5	9.14
		29	4.5	6.9

APPENDIX 3.7-1
PHYTOPLANKTON TAXONOMIC DATA FOR
MORRISON LAKE, 2008



Appendix 3.7-1
Phytoplankton Taxonomic Data for Morrison Lake, 2008

Site Sample# Units Taxon	LakeE			LakeD			LakeC			LakeB			LakeA		
	1 cells/mL	2 cells/mL	3 cells/mL												
BACILLARIOPHYCEAE (Diatoms)															
Centrales															
<i>Coscinodiscus</i> sp.		<5.6			<3.4	<3.8	<3.4	<3.4	<3.4	<6.2	<3.4	<2.3	<3.4	<2.4	<2.4
<i>Cyclotella</i> sp.	<2.8	<5.6	<3.4	<3.4	<3.8	3.4	6.8	3.4	3.4	<6.2	<3.4	<2.3	<6.8	6.8	<2.4
<i>Melosira italica</i>	36.4	16.8	112.2	44.2	60.8	295.8	51.0	71.4	156.4	334.8	217.6	156.4	238.0	122.4	228.0
<i>Rhizosolenia</i> sp.		5.6	<3.4	<3.4	3.8	<3.4	<3.4	<3.4	<3.4	<6.2	<3.4	2.3	<3.4	2.4	
<i>Stephanodiscus</i> sp.	11.2	<5.6	10.2	6.8	7.6	30.6	3.4	10.2	<3.4	6.2	13.6	2.3	13.6	6.8	12.0
<i>Thalassiosira</i> sp. (?)		<5.6	<3.4	<3.4	26.6	6.8	<3.4	<3.4	13.6	12.4	20.4				4.8
Pennales															
<i>Achnanthes minutissima</i>	<2.8		<3.4	<3.4	3.8	<3.4		3.4	3.4	<6.2	<3.4	<2.3	<6.8	2.4	
<i>Achnanthes</i> sp.		<5.6	6.8		<3.8	<3.4		<3.4	<3.4		3.4	4.6	<6.8	3.4	2.4
<i>Amphiprora</i> (= <i>Enotmoneis</i>) sp.				<3.8									<6.8		<2.4
<i>Amphipleura</i> sp.		<5.6		<3.4		<3.4		<3.4			<3.4	<2.3	<6.8	<3.4	<2.4
<i>Amphora ovalis</i>															<2.4
<i>Amphora</i> sp.		<5.6	<3.4	3.4	<3.8	<3.4	<3.4	<3.4	<3.4	<6.2	<3.4	<2.3	6.8	<3.4	<2.4
<i>Asterionella formosa</i>	5.6	11.2	23.8	27.2	41.8	81.6	27.2	10.2	44.2	62.0	13.6	9.2	<6.8	88.4	28.8
<i>Caloneis</i> sp.															<2.4
<i>Cocconeis placenta</i>		<5.6				<3.4			<3.4						
<i>Cocconeis</i> spp.	<2.8	<5.6	<3.4		7.6		<3.4				6.2	<3.4		6.8	<2.4
<i>Cymbella affinis</i>		<3.4		<3.8		<3.4									<2.4
<i>Cymbella cistula</i>		<3.4										<2.3			
<i>Cymbella turgida</i>		<5.6		<3.4	<3.8	<3.8			<3.4	<3.4	<3.4		<6.8	<3.4	
<i>Cymbella ventricosa</i>		<5.6	<3.4	<3.4		<3.4			<3.4	<3.4	<3.4		2.3	6.8	
<i>Cymbella</i> spp.		5.6	<3.4			<3.8		<3.4						10.2	2.4
<i>Denticula</i> sp.														<3.4	
<i>Diatoma</i> sp.			<3.4									<3.4	<2.3	<3.4	<2.4
<i>Diploneis</i> sp.	<2.8		<3.4		<3.8	<3.4		<3.4	3.4				<6.8	<3.4	2.4
<i>Epithemia zebra</i>															<2.4
<i>Epithemia</i> sp.								<3.4						<6.8	
<i>Eunotia pectinalis</i>															<2.4
<i>Eunotia</i> sp.			6.8	<3.4	<3.8	<3.4			<3.4	3.4			2.3	<6.8	2.4
<i>Fragilaria capucina</i>												6.2			<2.4
<i>Fragilaria construens v. construens</i>					<3.4		<3.4								<2.4
<i>Fragilaria crotonensis</i>	<2.8	<5.6	<3.4	<3.4	<3.8	<3.4	<3.4								<2.4
<i>Fragilaria pinnata</i>															<2.4
<i>Fragilaria</i> sp.	<2.8	<5.6	<3.4		<3.8	<3.8			<3.4						<2.4
<i>Frustulia</i> sp.		<5.6		<3.4		<3.8		3.4							<2.4
<i>Gomphonema acuminatum</i>			<3.4			<3.8									<2.4
<i>Gomphonema constrictum</i>		<5.6													<2.4
<i>Gomphonema olivaceum</i>			3.4	<3.4	<3.8										<2.4
<i>Gomphonema truncatum</i>			<3.4	<3.4											<2.4
<i>Gomphonema</i> sp.	<2.8	<5.6	<3.4	13.6											2.4
<i>Meridion</i> sp.															<2.4
<i>Navicula pupula</i>															
<i>Navicula radiosa</i>		<5.6	<3.4	<3.4	<3.8										<2.4
<i>Navicula viridula</i>															
<i>Navicula</i> spp.	2.8	<5.6	<3.4	6.8	7.6	3.4	<3.4	<3.4	<3.4	6.2	6.8	6.9	<6.8	17.0	9.6
<i>Nitzschia acicularis</i>					<3.4										

Note: < indicates taxon identified during initial screening of samples, but not observed in subsamples

(continued)

Appendix 3.7-1
Phytoplankton Taxonomic Data for Morrison Lake, 2008 (continued)

Site Sample# Units Taxon	LakeE			LakeD			LakeC			LakeB			LakeA		
	1 cells/mL	2 cells/mL	3 cells/mL												
BACILLARIOPHYCEAE (Diatoms)															
<i>Nitzschia dissipata</i>				<3.4									<2.3	13.6	<2.4
<i>Nitzschia filiformis</i>			<3.4												
<i>Nitzschia heufalaria</i>				3.4		<3.4									
<i>Nitzschia linearis</i>							<3.4								
<i>Nitzschia palea</i>	<5.6	<3.4			<3.8	<3.4		<3.4					<6.8	<3.4	
<i>Nitzschia sigma</i>			<3.4		<3.8	<3.4		<3.4						<3.4	<2.4
<i>Nitzschia spp.</i>	16.8	3.4		3.4	<3.8	6.8	3.4	3.4	6.8	2.3	<6.8	10.2	16.8		
<i>Pinnularia spp.</i>	<5.6			<3.4	<3.8	<3.4	<3.4	<3.4	<3.4	<2.3	<6.8	<3.4	<2.4		
<i>Pleurosigma / Gyrosigma sp.</i>				<3.4	<3.8								<6.8	<3.4	<2.4
<i>Stauroneis sp.</i>							<3.4						<2.3	<6.8	<2.4
<i>Surirella sp.</i>			<3.4			<3.8		<3.4					<2.3	<3.4	<2.4
<i>Synedra acus</i>			6.8		<3.4		<3.4								
<i>Synedra tabulata</i>				<3.4			<3.4								
<i>Synedra ulna</i>	5.6	<3.4		<3.4	<3.8	<3.4		<3.4						<3.4	<2.4
<i>Synedra sp.</i>	<2.8	<5.6		<3.4	<3.8	<3.4		<3.4						<3.4	<2.4
<i>Tabellaria fenestrata</i>	2.8	5.6	3.4	<3.4	3.8	3.4	<3.4	<3.4	<3.4	31.0	<3.4	23.0	<6.8	<3.4	2.4
<i>Tabellaria flocculosa</i>	2.8	5.6	<3.4	<3.4	<3.8	<3.4	<3.4	<3.4	<3.4	<6.2	<3.4	<2.3	<6.8	3.4	
CYANOPHYTA															
Chroococcales															
<i>Anabaena sp.</i>	<2.8	33.6	17.0	30.6	<3.8	47.6	102.0	81.6	<3.4	347.2	10.2	62.1	142.8	<3.4	2.4
<i>Aphanocapsa elachista</i>	168.0		<3.4	<3.4	<3.8	<3.4				<6.2		9.2			
<i>Aphanocapsa sp.</i>	<2.8	<5.6	<3.4	<3.4	<3.8	<3.4		<3.4	<3.4				<2.3	<3.4	<2.4
<i>Chroococcus turgidus</i>			<3.4	<3.4	<3.8	<3.4		27.2	3.4	<3.4			<3.4	29.9	<6.8
<i>Chroococcus sp.</i>	44.8	34.0	40.8	64.6	68.0	3.5	20.4	95.2		155.0	27.2	13.8		6.8	38.4
<i>Coelosphaerium naegelianum</i>	<5.6	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<6.2	193.8	<2.3			<2.4
<i>Coelosphaerium sp.</i>	<5.6	<3.4	<3.4	<3.8	<3.4	<3.4	<3.4	<3.4	<3.4	<6.2	<3.4	<2.3			<3.4
<i>Gloeocapsa sp.</i>	16.8	13.6	74.8	30.4	34.0	61.2	13.6	13.6		68.2	6.8	23.0	20.4	34.0	45.6
<i>Gomphosphaeria sp.</i>	<2.8	<5.6	<3.4	<3.4	<3.8		<3.4						<2.3	10.2	36.0
<i>Merismopedia elegans</i>			54.4	27.2	<3.8	<3.4	<3.4	<3.4	<3.4	<6.2	<3.4	<2.3		<3.4	<2.4
<i>Merismopedia glauca</i>			<3.4												<3.4
<i>Merismopedia sp.</i>	<5.6														
<i>Microcystis sp. (?)</i>			<3.4												
Nostocales															
<i>Aphanizomenon flos-aquae</i>	<5.6	23.8		<3.4			30.6	<3.4	13.6		<6.2	<3.4	<2.3	<6.8	27.2
<i>Arthrosira sp.</i>			<3.4					<3.4	<3.4			<3.4	<2.3		
<i>Nostoc sp.</i>															
RHODOPHYTA															
<i>Asterocystis sp.</i>															
<i>Batrachospermum sp.</i>							<3.8							176.8	
<i>Chlamydomyx sp.</i>															<2.4
<i>Gloeotrichia sp.</i>															
Oscillatoriaceae															
<i>Lingbya limnetica</i>															<3.4
<i>Lingbya sp.</i>	<2.8	<5.6	<3.4			<3.8									<2.4
<i>Oscillatoria sp.</i>			<3.4												<2.4
<i>Spirogyra sp.</i>	<5.6	3.4	<3.4			<3.4									<6.8
<i>Romeria sp. (?) (Ulothrix sp. 1)</i>	<2.8	<5.6	6.8	<3.4	<3.8	<3.4	<3.4	<3.4	<3.4	<6.2	<3.4	18.4	20.4	<3.4	<2.4
<i>Ulothrix sp. 2</i>															<6.8

Note: < indicates taxon identified during initial screening of samples, but not observed in subsamples

(continued)

Appendix 3.7-1
Phytoplankton Taxonomic Data for Morrison Lake, 2008 (continued)

Site Sample# Units Taxon	LakeE			LakeD			LakeC			LakeB			LakeA		
	1 cells/mL	2 cells/mL	3 cells/mL												
CHLOROPHYTA															
Chlorococcales															
<i>Ankistrodesmus falcatus</i>	11.2	95.2	10.2	10.2	<3.8	3.4	<3.4	<3.4	6.8	<6.2	<3.4	2.3	6.8	<3.4	<2.4
<i>Botryococcus braunii</i>	<2.8	<5.6	<3.4	<3.4	<3.8	<3.4	<3.4	<3.4	<3.4	<6.2	<3.4	<2.3	<6.8	<3.4	7.2
<i>Closteriopsis sp.</i>															
<i>Coelastrum sp.</i>					<3.8										
<i>Cosmarium sp.</i>			<3.4												<2.4
<i>Crucigenia quadrata</i>	22.4	89.6	68.0	68.0	15.2	13.6	40.8	27.2	<3.4	24.8	54.4	18.4	<3.4	9.6	
<i>Elakatothrix gelatinosa</i>	14.0	50.4	13.6	13.6	11.4	34.0	20.4	3.4	10.2	6.2	23.8	9.2	<6.8	20.4	12.0
<i>Eusastrum sp.</i>					<3.8					<6.2				<3.4	
<i>Kirchneriella sp.</i>		22.4	<3.4	27.2	<3.8	<3.4		<3.4	<3.4		3.4				<2.4
<i>Nephrocytium sp.</i>	<2.8	<5.6													
<i>Oocystis spp.</i>	5.6	44.8	23.8	3.4	<3.8	27.2	40.8	10.2	81.6	43.4	30.6	25.3	54.4	27.2	36.0
<i>Pediastrum cf. boryanum</i>										<6.2					
<i>Pediastrum sp.</i>															
<i>Quadrigula closterioides</i>	<2.8	<5.6	<3.4		<3.8	<3.4		<3.4							
<i>Quadrigula lacustris</i>	<2.8		<3.4												19.2
<i>Quadrigula sp.</i>					<3.4				<3.4						
<i>Scenedesmus arcuatus</i>															<2.4
<i>Scenedesmus cf. denticulatus</i>															
<i>Scenedesmus quadricauda</i>										<6.2					
<i>Scenedesmus sp.</i>	<2.8	<5.6	<3.4	<3.4	<3.8	<3.4	<3.4	<3.4	<3.4	<6.2	<3.4	<2.3	13.6	<3.4	<2.4
<i>Selenastrum minutum</i>	103.6	644.0	486.2		402.8	567.8	425.0	227.8	353.6		333.2	211.6	95.2	221.0	237.6
<i>Sphaerocystis schroeteri</i>	22.4	<5.6	102.0	<3.4	<3.8	<3.4	<3.4	<3.4	<3.4	<6.2	<3.4	92.0	<6.8	34.0	<2.4
<i>Tetraedron minimum</i>					418.2										
<i>Tetraedron regulare</i>															<2.4
<i>Tetraedron sp.</i>		<5.6				<3.4									<2.4
Oedogoniales															
<i>Characium sp.</i>						<3.8									
<i>Golenkinia sp.</i>		<5.6			<3.4	<3.8	<3.4	<3.4	<3.4						
Tetrasporales															
<i>Gloeocystis sp.</i>	<2.8	<5.6	23.8	13.6	<3.8	34.0	20.4	3.4	34.0	<6.2	<3.4	16.1	<6.8	30.6	4.8
Volvocales															
<i>Eudorina elegans</i>															
Zygnematales															
<i>Arthrodesmus sp.</i>	<2.8														
<i>Cosmarium sp.</i>															
<i>Genicularia elegans</i>		<5.6													
<i>Gonatozygon sp.</i>	<2.8														
<i>Staurastrum sp.</i>		<5.6	<3.4												
CHRYSPHYTA															
<i>Dinobryon cf. bavaricum</i>	<2.8	56.0	3.4	10.2	3.8	3.4	3.4	13.6	68.0	<6.2	13.6	18.4	34.0	40.8	52.8
<i>Dinobryon divergens</i>	2.8	<5.6	6.8	13.6	15.2	23.8	<3.4	17.0	44.2	31.0	6.8	2.3	13.6	17.0	38.4
<i>Dinobryon sp.</i>	2.8														<2.4
<i>Mallomonas akrokomos</i>	<2.8	11.2	13.6	<3.4	3.8	6.8	13.6	<3.4	<3.4	6.2	<3.4	27.6	<6.8	3.4	2.4
<i>Mallomonas sp.</i>	<2.8	<5.6	3.4	3.4	3.8	<3.4	<3.4	<3.4	3.4	<6.2	6.8	2.3		6.8	<2.4
<i>Rhizochrysis limnetica</i>		<5.6	<3.4	<3.4											

Note: < indicates taxon identified during initial screening of samples, but not observed in subsamples

(continued)

Appendix 3.7-1
Phytoplankton Taxonomic Data for Morrison Lake, 2008 (completed)

Site Sample# Units Taxon	LakeE			LakeD			LakeC			LakeB			LakeA		
	1 cells/mL	2 cells/mL	3 cells/mL												
CRYPTOPHYTA															
<i>Chroomonas acuta</i>	179.2	492.8	584.8	224.4	209.0	238.0	391.0	340.0	370.6	638.6	221.0	241.5	27.2	204.0	237.6
<i>Cryptomonas ovata/erosa</i>	2.8	61.6	30.6	20.4	22.8	37.4	37.4	54.4	51.0	86.8	102.0	29.9	27.2	44.2	33.6
PYRRHOPHYTA															
<i>Centritractus sp.</i>													<6.2		
<i>Chlamydomonas sp.</i>	<2.8							<3.4						<6.8	3.4
<i>Rhodomonas sp.</i>	<2.8	11.2	3.4	10.2		20.4	13.6	6.8	6.8	31.0	3.4	16.1		44.2	26.4
<i>Gymnodinium sp.</i>	<2.8	<5.6	17.0	<3.4	<3.8	3.4	3.4	<3.4	<3.4	18.6	10.2	<2.3	<6.8	3.4	2.4
<i>Peridinium sp.</i>							<3.4								
<i>Ceratium hirundinella</i>	<2.8	<5.6	<3.4			<3.4	<3.4						<3.4	<2.3	<2.4
<i>Cystodinium cornifex</i>		<5.6	<3.4			<3.4							3.4	<2.3	<2.4
EUGLENOPHYTA															
<i>Carteria sp.</i>		<5.6			<3.8										
<i>Euglena sp.</i>															<2.4
<i>Phacus sp.</i>	<2.8	11.2	10.2	<3.4	<3.8	10.2	3.4	3.4	<3.4	12.4	<3.4	2.3	6.8	6.8	<2.4
<i>Pyramimonas sp.</i>	<2.8	<5.6	<3.4	<3.4	3.8	<3.4	<3.4	3.4	<3.4	<6.2		<2.3		<3.4	<2.4
<i>Trachelomonas sp.</i>		<5.6	<3.4	<3.4	<3.8			6.8		<6.2	<3.4		6.8		
<i>Tetraselmis sp.</i>				<3.4		<3.4		<3.4		<3.4			2.3		<3.4
UID ovoid green algae ~2-3um									12614.0				78200.0		
UID ovoid brown algae ~6um-35-40um with sheath													107168.0		
													3624.4		

Note: < indicates taxon identified during initial screening of samples, but not observed in subsamples

APPENDIX 3.7-2
MORRISON LAKE BENTHOS DATA, 2008



Appendix 3.7-2
Morrison Lake Bentho Data, 2008

TAXON	Stage	No. of Individuals	LakeE-1 MLE-1	LakeE-2 MLE-2	LakeE-3 MLE-3	LakeD-1 ML01-1	LakeD-2 ML01-2	LakeD-3 ML01-3	LakeC-1 ML02-1	LakeC-2 ML02-2	LakeC-3 ML02-3	LakeB-1 ML03-1	LakeB-2 ML03-2	LakeB-3 ML03-3	LakeA-1 ML04-1	LakeA-2 ML04-2	LakeA-3 ML04-3
NEMATODA																	
Nematoda indet.	A	8		4		1			3								
ANNELIDA																	
Oligochaeta																	
Enchytraeidae																	
Enchytraeidae indet.	J	8		8													
Enchytraeidae indet.	A	34		8												24	2
Tubificidae																	
Tubificidae indet. Group 2	A	17	2			1							1	12		1	2
<i>Rhyacodrilus coccineus</i>	A	8							6								
Tubificidae indet. Group 5	J	12										1		12			
<i>Limnodrilus hoffmeisteri</i>	A	1															
<i>Limnodrilus</i> sp.	A	5		4		1											
MOLLUSCA																	
Bivalvia																	
Bivalvia indet.	J	16		4										12			
Sphaeriidae																	
Sphaeriidae indet	J	16															16
<i>Pisidium casertanum</i>	J	2				2											
<i>Pisidium casertanum</i>	A	8				3	1									2	2
<i>Pisidium</i> spp.	J	34							6	1			2	18		7	
Yunionidae																	
<i>Anodonta kennerlyi</i>	J	12													12		
<i>Anodonta kennerlyi</i>	A	12															
ARTHROPODA																	
ARACHNIDA																	
Acari																	
Arrenuroidea																	
Mideopsidae																	
<i>Mideopsis</i> sp.	A	1															
CRUSTACEA																	
Cladocera																	
Daphniidae																	
<i>Daphnia</i> sp.	A	38	2		6				18					12			
Copepoda																	
Calanoida																	
Calanoida indet.	cpp	437	17	220	6		4	156						18	12		4
Cyclopoida									1					12			
Cyclopoida indet.	cpp	15	2														
Ostracoda																	
Podocopina																	
Podocopina indet.	A	53	5				10	6	7	8			5	12			
INSECTA																	
Megaloptera																	
Sialidae																	
<i>Sialis</i> sp.	L	8			6												2
Diptera																	
Chironomidae																	
Chironomidae indet.	L	45	2		12	2	2						24	1			2
Chironomidae indet.	P	16			1								12	3			
Chironominae																	
Chironomini																	
<i>Chironomus</i> sp.	L	20			1												2
<i>Polyphemus</i> sp.	L	14		8													
<i>Stictochironomus</i> sp.	L	104	2	12			6	2	16	24	10	18		14			
Tanytarsini																	
<i>Micropsectra</i> sp.	L	72		20	6	6	24		8		2			12			
<i>Tanytarsus</i> sp.	L	30			6						24						
Diamesinae																	
<i>Protanytus</i> sp.	L	15		4			1	6									4
Orthocladiinae																	
<i>Eukiefferiella</i> sp.	L	8	2		6												
<i>Heterotrissocladius</i> sp.	L	84	19		11	9	6	4	8	12	13						2
Prodiamesinae																	
<i>Monodamesa</i> sp.	L	1				1											
Tanypodinae																	
<i>Ablabesmyia</i> sp.	L	12												12			
<i>Procladius</i> sp.	L	22											2		12	2	6
<i>Tanypus</i> sp.	L	8															8
Simuliidae																	
Simuliidae indet.	A	1															
Total Number of Organisms		1199	55	292	36	36	59	204	30	40	144	39	78	108	27	3	48
Total Number of Taxa		100	8	9	4	9	9	7	9	4	7	7	5	7	4	2	9
MEMO																	
Psocoptera indet. (booklice/barklice)	A	1												1			
Thysanoptera indet.	A	2															2

Numbers represent the numbers of individuals collected per sample

APPENDIX 3.7-3
MORRISON LAKE ZOOPLANKTON DATA, 2008



Appendix 3.7-3 Morrison Lake Zooplankton Data, 2008

TAXON	STAGE	No. of Individuals	LakeA	LakeA	LakeA	LakeB	LakeB	LakeB	LakeC	LakeC	LakeC	LakeD	LakeD	LakeD	LakeE	LakeE	LakeE
ROTIFERA																	
<i>Conochilus</i> sp.	colony	22	9	60	11	12	60	6	120	7	13	7	12	10	9	8	5
<i>Kellicottia longispina</i>		53000	12400	12600	3600	11000	13000	8000	8800	10700	5600	23000	30000	9900	19000	24000	10000
<i>Keratella cochlearis</i>		100	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0
Unidentified Rotifera #1			40	50	0	10	20	0	0	0	0	0	0	0	0	0	0
Unidentified Rotifera #2			0	3200	1600	0	0	0	0	0	0	0	0	0	0	0	0
CLADOCERA																	
Bosminidae																	
<i>Bosmina longirostris</i>		3718	320	790	570	360	820	570	2400	1300	380	1100	310	700	3300	410	8
*Chydoridae																	
<i>Chydorus sphaericus</i>			0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
<i>Daphnidae</i>	juvenile	292	690	950	250	420	420	920	270	130	90	80	50	260	100	2	190
<i>Ceriodaphnia</i> sp.			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Daphnia ambigua</i>	M	5	2	0	0	0	0	10	0	0	5	0	0	6	0	0	5
<i>Daphnia ambigua</i>	F	125	230	300	21	76	350	310	90	47	11	200	87	41	90	10	25
Holopediidae																	
<i>Holopedium gibberum</i>			0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Leptodoridae																	
<i>Leptodora kindtii</i>		2	4	0	0	1	0	1	0	0	0	1	0	0	2	0	0
Polyphemidae																	
<i>Polyphemus pediculus</i>			2	0	1	0	0	0	10	2	1	1	0	0	0	0	0
Sididae																	
<i>Diaphanosoma birgei</i>		1	70	170	3	150	160	300	60	80	4	30	6	14	0	1	0
<i>Sida crystallina</i>			0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
COPEPODA																	
Calanoida																	
Diaptomidae																	
<i>Leptodiaptomus ashlandi</i>	M	200	0	30	10	0	0	10	0	0	10	0	0	0	0	0	200
<i>Leptodiaptomus ashlandi</i>	F		10	40	20	20	20		10	10	40	100	20	0	0	0	0
<i>Leptodiaptomus pribilofensis</i>	M	2250	70	110	100	260	250	230	900	550	160	900	350	200	1400	580	270
<i>Leptodiaptomus pribilofensis</i>	F	1990	80	90	12	410	240	410	1200	330	80	1200	330	90	1000	670	320
<i>Diaptomidae</i>	CV	53000	2000	1500	300	6000	7000	2900	6600	5800	1700	14000	15000	3000	15000	11000	27000
<i>Diaptomidae</i>	CIV	67000	3100	3700	400	14000	15000	14600	17900	8100	3300	22000	15000	5400	21000	20000	26000
<i>Diaptomidae</i>	CIII	920	70	120	20	400	340	400	100	90	50	0	40	0	700	20	200
<i>Diaptomidae</i>	CII	100	40	20	30	200	180	60	300	20	60	0	10	10	100	0	0
<i>Diaptomidae</i>	CI	100	20	20	50	20	70	0	0	10	20	0	40	100	100	0	0
Temoridae																	
<i>Epischura nevadensis</i>	M	81	2	24	12	25	21	43	36	25	34	31	19	30	28	42	11
<i>Epischura nevadensis</i>	F	56	3	30	21	22	27	65	38	31	28	48	23	20	20	16	20
<i>Epischura nevadensis</i>	CV	13	20	4	6	2	3	11	8	11	8	7	5	18	0	11	2
<i>Epischura nevadensis</i>	CIV	10	10	10	4	20	10	10	40	40	20	20	20	50	0	0	10
<i>Epischura nevadensis</i>	CIII		10	20	50	20	50	30	20	10	10	0	30	60	0	0	0
<i>Epischura nevadensis</i>	CII		20	40	20	30	30	30	10	20	0	10	0	0	0	0	0
<i>Epischura nevadensis</i>	CI		40	50	80	20	20	0	30	60	0	10	20	0	0	0	0
<i>Heterocope septentrionalis</i>	M	84	1	0	0	16	0	0	56	2	0	110	1	0	76	8	0
<i>Heterocope septentrionalis</i>	F	95	0	0	0	13	1	0	67	4	0	150	0	0	93	2	0
Unidentified Calanoida	nauplius	3000	600	600	110	900	1300	1400	800	1500	1500	1300	1900	1400	700	1600	700
Cyclopoida																	
<i>Cyclops bicusp. thomasi</i>	M	960	430	220	3	250	400	800	600	230	110	900	440	330	500	270	190
<i>Cyclops bicusp. thomasi</i>	F	2080	450	490	4	800	710	1000	1000	410	170	1400	750	700	1200	570	310
Unidentified Cyclopoida	copepodite	52000	5900	2500	410	9000	12000	9800	13400	11800	4900	15000	9000	8000	24000	15000	13000
Unidentified Cyclopoida	nauplius	500	1200	20	0	2900	1500	100	1900	800	100	1200	500	20	400	100	0
TOTALS		752850	27843	27770	7722	47357	54002	42037	56735	42089	18464	82785	73963	30379	88918	74320	78466

APPENDIX 3.7-4
DETAILED ZOOPLANKTON SAMPLING HAUL DATA, 2008



Appendix 3.7-4
Detailed Zooplankton Sampling Haul Data, 2008

Site	Replicate	Radius ² (m)	Height(m)	Volume(m ³)	Total Volume (3 hauls)
LakeA	1	0.0225	7.0	0.495	1.484
LakeA	2	0.0225	5.0	0.353	1.060
LakeA	3	0.0225	2.7	0.191	0.573
LakeB	1	0.0225	16.5	1.166	3.499
LakeB	2	0.0225	10.0	0.707	2.121
LakeB	3	0.0225	4.0	0.283	0.848
LakeC	1	0.0225	30.0	2.121	6.362
LakeC	2	0.0225	13.0	0.919	2.757
LakeC	3	0.0225	4.0	0.283	0.848
LakeD	1	0.0225	26.0	1.838	5.513
LakeD	2	0.0225	11.0	0.778	2.333
LakeD	3	0.0225	4.0	0.283	0.848
LakeE	1	0.0225	28.0	1.979	5.938
LakeE	2	0.0225	11.0	0.778	2.333
LakeE	3	0.0225	4.0	0.283	0.848